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THE BALD EAGLE AND THE OSPREY IN THE MARITIME PROVINCES

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THE BALD EAGLE AND THE OSPREY IN THE MARITIME PROVINCES

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ABSTRACT

The spatial and seasonal distribution, abundance and productivity of the Bald Eagle (*Haliaeetus leucocephalus alascanus* and *H.l. leucocephalus*) and the Osprey (*Pandion haliaetus*) in the Maritime Provinces are reviewed in the light of the historical record of occurrence and aerial surveys conducted in 1974 and 1975. It is estimated that about 15 pairs of eagles nest in New Brunswick. Summer populations are swelled by the presence of immature birds of the southern race which has recently undergone a notable decrease in the estuary of the Saint John River. About 65 pairs of eagles at present nest in Nova Scotia, one third of them on Cape Breton Island. Nesting is rare in Prince Edward Island. Over one-half of the breeding pairs produced young in 1974-1975. Between 0.7 and 0.8 young per occupied nest and 1.3 to 1.5 young per successful nest were raised. Regional populations appear to be reproductively stable.

The Osprey nests mainly along the coasts of the region. Important nesting concentrations are identified. One hundred and nineteen occupied nests were located in New Brunswick in 1974 and 106 were found in Nova Scotia during 1975. An average of 10 occupied nests per year were seen in Prince Edward Island. Regional production of the Osprey in 1974-1975 was 1.44 young per occupied nest and 1.85 young per successful nesting. This compares well with the more productive populations in eastern North America.

RESUME

Nous passons en revue les données portant sur la répartition spatiale et saisonnière, l'abondance et la productivité de l'Aigle à tête blanche (Haliaetus leucocephalus alascanus et H.l. leucocephalus) et l'Aigle pêcheur (Pandion haliaetus) dans les Maritimes, à la lumière des données antérieures et d'inventaires aériens effectués en 1974 et 1975. On évalue à 15 environ, le nombre de couples d'Aigles à tête blanche qui nichent au Nouveau-Brunswick. Les populations estivales sont grossies par la présence d'oiseaux immatures de la race méridionale, qui a récemment subi une baisse notable dans l'estuaire de la rivière Saint-Jean. Environ 65 couples nichent en Nouvelle-Ecosse dont le tiers dan l'Ile du Cap-Breton. Les nids sont rares dans l'Ile-du-Prince-Edouard. Plus de la moitié des couples ont donné des petits en 1974-1975. Le nombre de jeunes par nid occupé variait de 0,7 à 0,8 et on comptait de 1,3 à 1,5 petit par couvée réussie. Du point de vue reproduction, la population de la région semble stable.

L'Aigle pêcheur niche principalement le long des côtes. Nous avons déterminé les concentrations importantes de nids. On a dénombré 119 nids occupés au Nouveau-Brunswick, en 1974, et 106, en Nouvelle-Ecosse, en 1975. Dans l'Ile-du-Prince-Edouard, on en a dénombré en moyenne 10 par année. En 1974-1975, le nombre de petits était de 1,44 par nid occupé, et de 1,85 par couvée réussie. Ces résultats se comparent à ceux des populations les plus productives de l'est de l'Amérique du Nord.

INTRODUCTION

The Bald Eagle (*Haliaeetus leucocephalus*) and the Osprey (*Pandion haliaetus*) are integral parts of the avian fauna of the Maritime Provinces, occurring as both resident and transient birds. Declining populations of both species in various parts of North America have been demonstrated in the last two decades.

Since the 1960s the southern Bald Eagle (*H.l. leucocephalus*) has been listed as an endangered bird in the United States, while the northern race (*H.l. alascanus*) is not considered either rare or endangered (Snow 1973). The Osprey, despite local reproductive declines, is not regarded as endangered in the United States. In Canada, Bald Eagles and Ospreys have received considerable attention more recently but more information is needed before the status of each species can be properly assessed. While there is no national endangered species list as such, one authority (Godfrey 1970) has considered both species endangered.

The primary agents involved in lowered Bald Eagle productivity have been identified as the persistent chlorinated hydrocarbon pesticides, particularly DDE (Hickey 1969, Snow 1973). Similar environmental pollutants also have influenced the reproductive success of the Osprey (Wiemeyer et al. 1975). There is evidence that high values of DDE and PCB have occurred the eggs of both species in Canada (Gilbertson and Reynolds 1974).

Only recently has concern been expressed for the Bald Eagle and the Osprey in the Maritime Provinces and few studies have been conducted to assess their status in the region. The present investigation was undertaken in 1974 in response to that concern and because of the paucity of

well-documented information. The intention was (1) to review past and present records of occurrence and distribution of those species in the three provinces of New Brunswick, Nova Scotia and Prince Edward Island, (2) to locate active nest sites through aerial and surface surveys of selected coastal and inland regions and (3) to obtain information on past and present reproductive performance.

METHODS

The methods used in this study can be divided into two phases, one concerned with the gathering and interpreting of past records and the other with field surveys undertaken in 1974 and 1975.

1. Literature Review

A search of published and unpublished literature on the occurrence, abundance and productivity of the Bald Eagle and the Osprey in the region was conducted. Unpublished sources included records on file at The New Brunswick Museum, The Nova Scotia Museum, government wildlife agencies in the three provinces, and the Canadian Wildlife Service. Bird records from the national parks in the region (Kouchibouguac, Fundy, Kejimkujik, Cape Breton Highlands, and Prince Edward Island) were reviewed. Information was also provided by various other provincial and federal natural resource agencies, including the New Brunswick Forest Service, the Nova Scotia Forestry Division, the Canadian Fisheries and Marine Service, and the Canadian Forestry Service.

Records of observations of Bald Eagles and Ospreys were taken from reports of the various naturalists' clubs in New Brunswick and of the

Nova Scotia Bird Society. Bird records of the Canadian Audubon Society, now incorporated in the Canadian Nature Federation, were also searched. Correspondence and discussion with those engaged in raptor research in the Maritime Provinces, with technicians, biologists, enforcement agents, guides and outfitters, rangers, military personnel and naturalists added greatly to the data bank. The Northeastern Wildlife Station, University of New Brunswick, provided much information on Bald Eagles in the Portobello Creek-French Lake district of Sunbury and Queens County, New Brunswick.

Records of Christmas Bird Censuses (Counts) were also used. While that information inherently has high variability, general trends may be shown (Stewart 1954). Only censuses made during the last decase were used since they were more standardized than earlier censuses.

The files of the Maritimes Nest Records Scheme provided some data on past productivity. The scheme was established to assemble data on the nesting of birds in the Maritime Provinces and to make it available to students of avian breeding biology. Several biases prejudice that kind of information, but it is possible to use it to monitor the status of a bird species. Its greatest value is the added breadth and statistical strength of the information collected (Peakall 1970).

Records of the Cooperative Breeding Bird Survey, conducted to obtain indices of abundance of breeding birds (chiefly songbirds), were consulted but found to be of limited use.

Some of the ensuing discussion is based on analysis of the sight records. Certain biases are usually associated with that type of data

and the way it is reported or gathered, not the least of which is the randomness of the sightings and the competence of the observers. For example, the adult Bald Eagle, because of its white head and tail, is easier to identify than the darker immature bird. Observations were culled when there was some doubt as to their reliability, and when duplicate sightings were found.

2. Field Surveys

The field work was done during the period May to August in 1974 and 1975, and consisted of surface and aerial surveys for the purpose of identifying important nesting areas, assessing production, and determining relative population size.

Ground checks of breeding territories were done, in part, by field personnel of various federal and provincial agencies. The greatest emphasis, however, was placed on the more productive aerial search.

The aerial survey was confined to New Brunswick and Prince Edward Island in 1974 and primarily to Nova Scotia in 1975. Most of the flying was done using a Cessna 180 Skywagon and a Cessna 336 Skywagon. A pilot-observer and one other observer constituted the crew. As nests and birds were located they were plotted on appropriate maps. Other details, such as nest contents, were recorded on tape.

Both coastal and inland flying were undertaken. The coastal survey was systematic in that a transect approximately 0.4 km wide was flown (0.2 km on each side of the aircraft) along the shoreline. At times that was necessarily reduced because of landform characteristics and in some areas

the transect was located inland so as to follow the forest edge. The flying was done at an altitude varying between 45 m and 60 m at air speeds of 140 to 160 km/h. The inland flying (except for Bras d'Or Lake on Cape Breton Island) consisted of checking lakes and river systems where there were known or suspected territories. During both years helicopters were used for short periods to investigate Bald Eagle and Osprey territories in New Brunswick and Nova Scotia.

(a) New Brunswick

The entire coastline of the province was surveyed in 1974, extending from Matapedia in Restigouche County, east of Miscou Island, south along the east coast, across the Chignecto Isthmus, along the Bay of Fundy coast to St. Stephen and all the inshore islands and the Grand Manan archipelago. In addition, the larger river systems were followed up varying distances from the coast. In total, 1620 km were flown, occupying a flying time of 20.6 hours. Weather conditions in 1974 were such that very few flights had to be cancelled or terminated enroute.

Inland flying accumulated 12.9 hours and covered the larger river systems and lakes. In addition, a helicopter search of the Portobello Creek-French Lake-Grand Lake district took 2.3 hours, and covered 300 km of forest, swamp and lake shoreline. Flying speed was about 100 km/h, at an altitude of 40-45 m. During 1975, known and suspected nests were checked from the air to obtain productivity data. Both fixed-wing aircraft and helicopter were used, and flying time occupied 8.5 hours.

(b) Nova Scotia

Both coastal and inland aerial surveys were made in Nova Scotia in 1975. A total of 1820 km was flown along the coasts from Chedabucto Bay to Yarmouth on the Atlantic shore, from George Bay to Baie Verte along Northumberland Strait, and along Cobequid Bay (at the head of the Bay of Fundy), for a flight time of 14.8 hours. Adverse weather along the coastal areas greatly influenced the amount of flying done. Rain and fog posed continual problems, and coastal flying was less than planned. Wind was a particularly important factor responsible for reduced flying time in Cape Breton Island. About 8.9 hours were devoted to inland flying. The north shore of Bras d'Or Lake (Cape Breton Island), totalling 270 km, was investigated. All islands in the lake were checked for nests. A number of the larger lakes and rivers in mainland Nova Scotia also were flown. In addition a large part of inland Antigonish County and some of Guysborough County were searched by personnel of the Department of Lands and Forests using both fixed-wing aircraft and helicopter.

(c) Prince Edward Island

Field investigation was conducted by the provincial Fish and Wildlife Division in fixed-wing aircraft in both 1974 and 1975. Six hours of flying were devoted to surveys of about 980 km of coastline and major rivers in 1974. Three hours of flying were done in 1975 to check on known nests.

RESULTS AND DISCUSSION

THE BALD EAGLE

1. Historical Perspective

(a) New Brunswick

The earliest mention of the Bald Eagle in New Brunswick was by Denys (1672) who referred to it as the largest bird of Acadia (the coastal area of New Brunswick, Nova Scotia, and Prince Edward Island). It was much later, however, that further documentation of the bird in the province was made (Table 1), suggesting a wide distribution. Moore (1928) listed the eagle as a resident bird that was never numerous in the province. Two distinct populations occur, the northern subspecies, seen throughout the year as an uncommon resident (and breeding bird), and the southern form, considered an uncommon summer resident and transient (Squires 1952, 1976). Wright (1953) thought that the estuary of the St. John River was probably one of the most important summer habitats of the southern form in the north-east coastal region of the continent. It was not uncommon to see 20 to 30 eagles there in a day (Squires 1952, 1976).

(b) Nova Scotia

Bald Eagles occur in Nova Scotia as both resident and transients. Shell heaps, dating to 1300, at St. Margarets Bay in Halifax County contained eagle remains (Erskine 1966). Cabot's notes of his landing in June 1497 in Victoria County, Cape Breton Island, provide what is probably the earliest recorded sightings (of "dark eagles") in the province. During the later 1850s, Gilpin (1881) thought that eagles were abundant and that

they remained all year, especially along the shore of the Bay of Fundy. Much later accounts suggested that the eagle was rare in Nova Scotia, except on Cape Breton Island, where it was uncommon (Tufts 1956). Tufts (1962, 1973) stated that the eagle was uncommon throughout at all seasons except locally and periodically. Local and regional observations reported in the literature are cited in Table2. As in New Brunswick, two different populations of eagles frequent the province. Tufts (1956) considered the southern bird rare and of irregular occurrence, juvenile birds only having been identified. Godfrey (1958) thought that that subspecies was a summer visitor to Cape Breton Island. Broley (1947) reported the recovery in Nova Scotia of four eagles, all less than one year old, which were banded in Florida.

(c) Prince Edward Island

The Bald Eagle is essentially a transient in Prince Edward Island. Early naturalists made mention of it as only a very rare or occasional visitor to the province (Bain 1891, MacSwain 1907 and Hurst 1947). Godfrey (1954) listed the northern Bald Eagle as a rare summer resident and the southern race as a non-breeding summer visitor. More recently the eagle was thought to be rare in all seasons, an observer expecting to see one to five birds in a season (Anonymous 1974).

2. General Distribution

Bald Eagles are distributed generally throughout the Maritime Provinces. Due to seasonal movements, however, their occurrence varies widely within the region.

The distribution of eagle sightings in New Brunswick in 1974-1975 and in 1959-1973 is shown in Figure 1. The greatest number are usually seen along the coast of the lower Bay of Fundy but a considerable number are also seen in central New Brunswick. A similar proportion of total observations was noted for most counties in each period. Differences noted for Victoria and Northumberland County may be due to the unusually mild fall and early winter weather in both 1974 and 1975 which left the rivers open for a longer period than usual. The St. John River estuary counties from Sunbury to Saint John almost certainly reflect the real change in eagle abundance between 1959-1973 and 1974-1975: a decline in eagle observations is readily apparent when comparing spring and summer sightings in that region in 1974-1975 (21% of the total) and in 1959-1973 (71% of the total). That decline may reflect the generally deteriorating breeding success of Bald Eagles reported south of the Maritime Provinces since the 1950s.

The spatial distribution of eagle observations in Nova Scotia in 1974-1975 is shown in Figure 1. Over half of the sightings were made on Cape Breton Island where the Bras d'Or Lake region provides particularly favourable nesting and feeding habitat. The eastern mainland counties indicate a greater abundance of birds there than farther to the southwest. The relatively high porportion of observations in Kings County is due largely to an influx of wintering birds which are attracted to certain areas where offal is available.

During the period 1963-1969 (excluding 1965), of 1141 observations of Bald Eagles reported by field staff of the Department of Lands and Forests, 16% were for the western region, 21% for the eastern, and 63% for Cape Breton

Island. The western region comprises the seven counties west-southwest of Hants and Halifax Counties. The 1974-1975 values of 14%, 34% and 52%, respectively reflect a similar pattern of distribution.

Only 14 reports of eagles were tallied in Prince Edward Island in 1974-1975. Over 75% of those were from Kings County.

In the Maritime Provinces, of 870 reports of Bald Eagles in 1974-1975 over 70% were in Nova Scotia and less than 2% in Prince Edward Island. Thirty-seven percent of all observations were on Cape Breton Island.

3. Seasonal Distribution and Abundance

Bald Eagle abundance varies markedly with the seasons. From a low in the fall, abundance increases to a maximum during spring and summer, as shown by the numbers of observations in New Brunswick and Nova Scotia (Table 3). Distribution by region and season is shown in Table 4. The overall importance of Cape Breton Island is once again apparent.

(a) Winter (December, January, February)

Most eagles wintering in New Brunswick concentrate along the coastline of Charlotte County and in the lower valley of the St. John River. Few are seen in the eastern counties or north of latitude 47°N. Particularly mild weather in the fall keeps the rivers ice-free into December, which encourages eagles to remain longer in more northern areas. During 1974-1975 birds were seen in eight of the 15 counties.

In Nova Scotia, eagles winter along the coast and larger river systems where there is open water. Favoured wintering areas appear to be along

coastal Queens and Yarmouth Counties where up to 12 birds have been seen regularly at various locales. Scattered birds may be found all along the Atlantic coast of Nova Scotia. Other locations often attract eagles because of the availability of offal. They include sites in Kings, Hants and Lunenburg Counties, where 12 to 20 birds may be seen. Fish-processing plants in southern Cape Breton Island attract a few eagles. Southern Richmond County accounted for most of the winter sightings in Cape Breton Island in 1974-1975. Winter observations of eagles occured in 15 of the 18 counties.

The few eagles that are seen in Prince Edward Island during the winter are in southern coastal areas of Queens and Kings Counties.

Information generated by Christmas Bird Counts provides a useful measure of relative bird abundance in late December and early January. In 1973 and 1974, the total number of Bald Eagles noted in New Brunswick and Nova Scotia was 60 and 38, respectively. That may represent a minimum estimate of early winter abundance in those provinces. Figure 2 shows the abundance of eagles in 33 selected count areas in the Maritime Provinces. The counts selected were restricted to those that were made in over one-half of the years between 1963 and 1976, many throughout the entire period. The mean number of birds per count was used since the eagle, being so conspicuous, is a bird whose apparent abundance is not directly proportional to the number of party-hours (Robbins 1960). The three-year running average illustrates a progressive increase in numbers of eagles seen.

Winter observations shown in Table 4 suggest that a greater percentage of birds are seen in western Nova Scotia than on Cape Breton Island. The

increase in sightings from fall to winter in the western mainland along with the decrease on Cape Breton Island suggests a southward movement. The weather and availability of food however could delay such movements. Gittens (1968) noted a distinct drop in the eagle population in the Bras d'Or Lake area of Cape Breton Island after the end of December and thought that between mid-December and mid-March a large portion of the native birds migrated out of the province. Total Bald Eagle sightings in New Brunswick decreased in a similar manner from December to February.

(b) Spring (March, April, May)

Bald Eagles generally start moving northward in or through the Maritime Provinces in March, or possibly February if weather and water conditions allow. There is an increase in sightings in both northern and central New Brunswick and on Cape Breton Island (Table 5) and a concurrent decrease in southern New Brunswick and western mainland Nova Scotia, suggesting a northward dispersal. The peak of migration occurs in April for the summering population in the estuary of the St. John River. It is at that later time that representatives of the southern subspecies apparently move into the region. The proportion of the migrating birds that is represented by the southern form is unknown but it was thought to be substantial at favoured summering areas in the past, at least in New Brunswick (Wright 1953). Broley (1947) reported that the regular movement of those birds northward from Florida begins in April. All recoveries of banded southern Bald Eagles in the Maritime Provinces have been immature or juvenile birds.

Spring concentrations of eagles fishing alewives and other anadromous fish are occasionally seen in New Brunswick and Nova Scotia, particularly

in Antigonish County and Cape Breton Island, but appear to be much less common in New Brunswick. Smaller numbers are seen scattered along the river valleys and coasts in those provinces. A Canadian Wildlife Service aerial survey in mid-April 1973 showed 27 eagles in the western part of Bras d'Or Lake. On an aerial survey of the same area in early April 1968, Gittens (1968) tallied 32 birds, and 29 in early May.

Few Bald Eagles have been sighted during spring in Prince Edward Island (Table 5).

(c) Summer (June, July, August)

The greatest concentration of summering Bald Eagles is on Cape Breton Island (Table 4), particularly in the Bras d'Or Lake area where large numbers (50 to 75 birds) have been encountered (Gittens 1968), and along the coastal and lowland river valleys, occurring in 19 of 22 study areas (Erskine 1971). The Baddeck River delta, River Denys basin and Southwest Margaree River are particularly favoured areas.

A substantial summering population, reportedly in excess of one bird per square mile (2.59 km^2) and amount to at least 100 individuals, had existed in the past on the lower St. John River (Wright 1953). That population has declined appreciably. On August 1, 1974 the shorelines of the lakes and streams and the meadow-forest interface in the Portobello Creek-French Lake district were surveyed by helicopter. The total distance flown included 125 km in the district and the remainder around adjacent Grand Lake and the Jemseg River drainage. No eagles were seen in an area where 54 birds were seen in 1949 and 45 in 1950. Earlier in 1974 there had

been one breeding pair of eagles in the area which eventually deserted their nest. On a 190 km canoe trip in mid-July through that district and nearby Oromocto River, only one eagle was seen.

Inland populations frequent the larger lakes and rivers. Coastal birds are found mainly along the northern and southeastern shores of mainland Nova Scotia and to a somewhat lesser extent the eastern and western coasts of Cape Breton Island, and the Charlotte county coastline including the Grand Manan archipelago in New Brunswick. On the coast, eagles are often associated with harbours or river mouths where food is more readily available. Elsewhere, only a few summering eagles are found.

Summering Bald Eagles start moving southward in August. A decline in observations in central New Brunswick at that time and a subsequent increase in the southern counties suggests a movement towards the coast. Wright (1953) reported that the peak number on the St. John River was reached by August 1, a decline taking place thereafter until only a few were left in mid-September. Gittens (1968) also noted a decline in numbers beginning in August on Bras d'Or Lake. Congregations such as 11 immatures flushed in a bog by Erskine (1955) in mid-August 1953 on St. Paul Island, north of Cape Breton Island, may have been been birds moving southward from Newfoundland. However, the summer population of eagles on St. Paul Island was thought to be high at that time. Few eagles are seen in the southeastern counties of New Brunswick during the summer yet each August small concentrations appear for a short time and move through.

(d) Fall (September, October, November)

A reduction in Bald Eagle sightings in New Brunswick and Nova Scotia in the fall (Table 5) suggests a shifting within or movement out of the Maritime Provinces at that time. That is the season when the fewest birds are seen, except in Prince Edward Island, where fall reports predominate. The high relative abundance in that province at that time probably signifies movement by eagles from the north, usually in early October.

Those birds moving south in early fall are probably individuals of the southern subspecies since the northern eagles do not migrate as early as September (Broley 1947), particularly if the weather is mild and open water and food are available. The decreases in northern and central New Brunswick and matching increases in southern regions of the province (Table 6) probably indicate southward movement. The high proportion of eagles seen in eastern mainland Nova Scotia may represent a shift from Cape Breton Island where a corresponding decrease is noted. By late September many of the birds are gone from Bras d'Or Lake. An aerial survey in 1967 showed only 14 eagles in late September on the western side of Bras d'Or Lake (Gittens 1968), while on a similar survey by the Canadian Wildlife Service in 1973, 13 were counted. Farther north along the west coast of Cape Breton Island, 38 Bald Eagles counted in late September 1972, in a distance of 5 km, probably constituted a migrating contingent. There may be considerable numbers of birds on Cape Breton Island that do not leave until much later in the fall or winter. Gittens (1968) reported over 100 eagles arriving at Bras d'Or Lake in November that may have been immigrants from the north or local birds. Many had left by early

December. Fall concentrations of 30-40 eagles also have been known to occur in some areas of Guysborough County, usually from mid-October to mid-November.

4. Age Distribution

The proportion of immatures among Bald Eagles in the Maritime Provinces varies with the season and the location. A progressive decline in younger birds over a period of years may indicate reduced productivity. Population decreases in certain parts of North America were thought to have resulted in a decline in immature birds (Sprunt 1969).

The proportion of immatures may be seasonally influenced by:

(1) birds of the northern subspecies that move inland from coastal areas in early spring or move farther north within or out of the region;

(2) birds of the southern subspecies that move into or through the region in April-May;

(3) birds of both subspecies that wander about while summering in the region;

(4) northern young of the year, on the wing in August, that move south in the region or out of it in late fall;

(5) southern birds that move south and out of the region in the late summer and early fall as well as those that pass through from more northern regions of Canada; and

(6) northern birds that move southward within the region in early winter or move out entirely, as well as those that pass through from more northerly latitudes.

The statistics presented here were acquired by tabulating random observations only in cases in which the age (adult or immature) of the birds was given.

The proportion of immatures reported from 1960 to 1975 is shown in Table 7. Generally, this proportion appears to increase during the summer months. The more recent decrease in summer in Nova Scotia and in spring and summer in New Brunswick may signify that fewer young birds were summering in the region than before.

Fall ratios in New Brunswick and Nova Scotia are comparable. In Prince Edward Island there is a much higher proportion of young birds, probably due to the influx of northern migrants.

Differences in the proportion of young birds in winter are apparent when comparing New Brunswick and Nova Scotia. The difference within Nova Scotia with regard to wintering birds is shown below (% immatures for each season with sample sizes in parentheses):

	Winter	Spring	Summer	Fall
Cape Breton Island	10 (105)	31 (184)	20 (338)	22 (205)
Mainland	43 (196)	37 (172)	18 (119)	19 (52)

Gittens (1968), in his aerial survey of Bras d'Or Lake in 1967-1968, also showed a very similar seasonal variation. The younger birds apparently move farther south in the province than the adults. One reason for that may be that when food is scarce in late winter adults may supplant the subadults (immatures), as suggested by Erskine (1968). The majority of

winter birds seen in southwestern Nova Scotia were reported by Gittens (1968) to be immatures. Eagles attracted to offal in Kings County have also been predominantly immatures.

Additional data collected from October 1974 to March 1975 show that 34% of 52 eagles reported were immatures (Nova Scotia Bird Society 1975). Of 220 eagles tallied in the present study during the same period, 33% were found to be young birds. Gilpin (1881) commented that "adults are few in comparison with the young", without any reference to season. Even in very general terms, that could not be said of the present day eagle numbers in that province.

Earlier work in central New Brunswick (B.S. Wright, unpublished MS) gives some indication of the proportion of immatures in the summering population. On a 104 km^2 study area the adult to immature ratio was 1:4. Northeastern Wildlife Station records from 1953 to 1962 showed the following proportions of immatures seen in the same area: May - 44% (41), June - 23% (73), July - 21% (70), and August - 10% (19). The influx of young birds in the spring is apparent and also the decline in August due to the exodus of birds from the area. Summer records show that for 1955 - 1957 and 1959, immatures comprised 27% of the eagle population there. The same proportion was calculated using an independent source, the field notes of a waterfowl biologist working in that area during those years.

5. Breeding Occurrence

(a) New Brunswick

The distribution of occupied Bald Eagle territories is shown in Figure 3.

Nesting occurred predominantly in the southwestern part of the province. Eight territories were found in 1974, and nine in 1975. Since 1950, eagles appear to have nested in all counties except Albert, Westmorland, Kent and Saint John.

Early references to breeding indicate that eagles regularly nested on Grand Manan (Herrick 1873, Pearsall 1879, Boardman 1903, Pettingill 1939). The Grand Manan archipelago continues to provide nesting habitat for one or two pairs each year. Nesting also occurred on the mainland coast of Charlotte County (Chamberlain 1882), as well as in the St. Croix River valley (Boardman 1903). The St. Croix River watershed still attracts nesting eagles, territories having been occupied for over 25 years. Today one or two pairs also nest on coastal lakes of Charlotte County, that is within eight kilometres of the coast. No past or present breeding activity has been reported along the coast of the Bay of Fundy east of Red Head, Saint John County. The only early mention of eagles nesting in the more northern counties refers to Northumberland (Philipp and Bowdish 1917). Since then very few breeding pairs have been seen in Madawaska, Restigouche, Victoria and Gloucester County. The only occupied territory found in the northern counties in 1974 and 1975 was on the Tabusintac River, Northumberland County, where eagles were reported to have nested for 20 years. The large Miramichi drainages in that county supported only a few nesting pairs, which were last reported in the 1950s.

The estuary of the St. John River undoubtedly contains preferred nesting habitat for Bald Eagles, which are known to have nested there since at least 1900. A cliff nest was reported at Upper Greenwich, Kings

County in 1911 (Townsend 1912) and a nest at the mouth of Noonan Stream, Sunbury County, about 1920 was said to have been occupied for many years. During 1974 and 1975, three occupied territories were located in the estuary. Between 1950 and 1975 only 26 occupied eagle nests have been recorded for that part of the river, even though large numbers of birds summered in the region. An average of 1.0 nest per year was noted there in the 1950s, 1.7 in the 1960s, and 1.5 in the 1970s. There are very few records of eagle nests in the river valley above the estuary.

The Bald Eagle was never a common breeding bird in New Brunswick. Thirty nests were recorded in the period 1900 to 1950, and 13 before then. Seventy-five occupied nests were counted between 1950 and 1973 with no more than five per year seen. Squires (1952) also commented on the scarcity of breeding reports in New Brunswick. If the scale of abundance for breeding birds proposed by Arbib (1957) is applied, the provincial breeding status of the Bald Eagle should be considered very rare, i.e. one pair for 326 km^2 or more, and it seems likely that that has not changed appreciably from the past.

We estimate that there are at present about 15 breeding pairs in the province.

(b) Nova Scotia

Of the occupied nests recorded in 1974-1975 in the Maritime Provinces, 65% were found in Nova Scotia, and 33% in New Brunswick. The distribution of 126 occupied nests reported from 1960 to 1974 shows a very similar breakdown - 61% in Nova Scotia and 37% in New Brunswick. One-third of the nests

in the region and over one-half of the Nova Scotia nests were located on Cape Breton Island. Gittens (1968) presented a list of known and suspected territories in the Bras d'Or Lake region in 1967 and 1968, with considerable detail on each nest. Because of time constraints much of our aerial survey in 1975 was concentrated on the Bald Eagles nesting in the River Denys basin. That area of about 135 km^2 (part of Bras d'Or Lake) appears to have the greatest concentration of breeding eagles in the Maritime Provinces and, in addition, there is comparative breeding information available from earlier years.

The breeding abundance of Bald Eagles increases from a low in western Nova Scotia to a maximum on Cape Breton Island (Figure 3). Seventy-seven occupied nests were reported between 1960 and 1973, representing an average of 5.5 each year. In addition, 15 occupied nests were found on aerial surveys in 1967 and 25 in 1968 (Gittens 1968). Fourteen occupied nests were reported in 1974, and we found 22 in 1975.

A number of breeding eagles are present in the north coast counties (Cumberland, Colchester, Pictou and Antigonish), at least one pair being found at each large harbour. There are also a few inland nesters. Breeding activity in at least one of the counties, Pictou, extends back to the 1950s (Holdway 1967).

Dows (1865) noted eagles nesting in the pines of Tangier, Halifax County. While breeding occurred there as late as 1967, no more recent nests were located. It seems likely that the number of nests reported in 1974-1975 were underestimated in such counties as Halifax, Guysborough,

Cape Breton and some of the north coast counties. On the mainland, the aerial survey was mostly confined to coastal areas. However, there were Bald Eagles nesting in smaller numbers on some of the inland lakes in eastern Nova Scotia, probably more than were accounted for in those two years. A number of nests have been reported there over the years, but most have been unoccupied.

Bald Eagles have nested in Kings County in the past (Tufts 1917) but it seems now that only a pair has been rather regular in producing young since the 1920s. Downs (1865) reported eagles nesting on ledges in Shubenacadie; there are a few recent breeding records for that area. Gilpin (1881) found eagles nesting in trees or on the ground on the shores of the Bay of Fundy. Now, however, breeding birds are very scarce along that coast. Only one territory, in Digby County, occupied for about the past 15 years, is located in that region.

Gittens (1968) listed 36 nests in 1967-1968 on Cape Breton Island, 26 of which were on Bras d'Or Lake. Twelve of those, of which nine were occupied, were in the basin of the River Denys. In 1975, an aerial search of that watershed revealed almost the same number of nests, many in the same locations. Other areas of central Cape Breton Island, where numbers of breeding eagles were reported in 1968, were not flown in 1975, but recent reports of suspected nest sites there suggest a rather similar frequency and distribution.

Extensive flying in 1967 suggested that 29-35 nesting pairs were active then on Cape Breton Island (E. Gittens, unpublished MS), while in

1968 the estimate for the entire province was 79 known (but not necessarily occupied) and suspected territories (Gittens 1968). A similar type of estimate would suggest 70 pairs in Nova Scotia in 1975. However, considering only occupied territories and active suspected sites (based on pairs of eagles repeatedly seen locally), we estimate that there are 63 breeding pairs in the province, 41 on Cape Breton Island and 22 on the mainland. As a breeding bird, in the province as a whole, the Bald Eagle can be considered very rare, i.e. one pair for 326 km^2 or more. However, the greater numbers occupying Cape Breton Island make "rare" a more appropriate term, i.e. one pair per 67-326 km^2, although it is locally more abundant. For example, in the basis of the River Denys it may be considered fairly common as a nesting bird.

(c) Prince Edward Island

Very few Bald Eagles have been reported nesting in Prince Edward Island (Figure 3). The only recent record is of a territory occupied in Kings County in 1967 and 1968. No birds apparently nested again until 1975 when the same nest was occupied. A much earlier nest found in the Souris district of Kings County was destroyed (Godfrey 1954).

6. Productivity

Nests were checked from the air at least twice during the breeding season in 1974 and 1975, usually during incubation and again when fledglings were present. Ground checks during those years and in years past often consisted of only one visit to the nest site, and consequently the calculated success ratio and number of young per breeding pair could be inflated.

A territory or breeding area was considered occupied if an adult bird was seen sitting in the nest, presumed to be incubating, at least once during the early part of the breeding season. A successful nest was one that produced at least one eaglet to an advanced stage of development.

Parameters of reproductive success are shown in Table 8. A little over one-half of the breeding pairs noted on aerial surveys produced young (57.1% in 1974, 55.6% in 1975). Between 0.7 and 0.8 young were produced per occupied nest with known outcome and 1.3 to 1.5 young per successful (productive) nest in 1974-1975. Ground reports showed, aside from the expected higher success ratio, a comparable production of young. Sprunt et al. (1973) suggested that at least 50% of the breeding pairs must be productive each year, each producing 0.5 to 0.7 young to maintain a stable population. That level of productivity was attained in the Maritime Provinces.

A comparison of eagle production between provinces is difficult to make since varying quantities of both aerial and ground information were combined in different years. No aerial survey was done in Nova Scotia in 1974; pre-1974 records were all ground based records. However, in 1975 almost all nests with known outcome in New Brunswick and Nova Scotia were seen from the air, suggesting that Nova Scotia eagles were more successful. Overall success in the Maritime Provinces in 1975 was 54%, with 0.8 young per occupied nest and 1.5 young per successful nest. That compares favourably with other northern eagle populations nesting in Alaska (Hensel and Troyer 1964), northwestern Ontario (Grier 1974), central Saskatchewan and Manitoba (Whitfield et al 1974) and Labrador and northeastern Quebec (Wetmore and Gillespie 1976).

Eagle productivity in the River Denys basin in 1968 (Gittens 1968) and in 1975 is compared below:

	1968	1975
Known nests	12	13
Occupied nests	9	7
Outcome known	9	6
Percent successful	89	50
Young per occupied nest	1.33	0.83
Young per successful nest	1.50	1.67

Fewer birds were raised in 1975. The success ratio for 1968 was particularly high. However, the data represent only two years and normal yearly variation could account for the differences: obviously a longer series is needed.

Changes in eagle productivity are indicated in Table 8 in which information from all sources is combined. Some indicators of reproductive success are possibly exaggerated and of unequal variability. Trends in production are thus difficult to assess although it seems that mean brood sizes are considerably larger in the 1970s.

A healthy population of Bald Eagles should produce larger broods. Sprunt et al. (1973) pointed out that Alaskan birds produce two young 35% of the time, while a declining population such as found around the Great Lakes brings off broods of two young in only 3% of the attempts. In our study, 50% of successful nests had two young, increasing from only 13% in

the 1960s (Table 8). For an eagle population considered stable in central Saskatchewan and Manitoba from 1967 to 1969, 50 to 55% of the nests produced broods of two young (Whitfield et al. (1974)).

We found the average clutch size of the Bald Eagle to be 2.15, based on 13 full clutches. The bulk of the nests (69%) had two-egg clutches, while three eggs were seen in 23% of the nests.

THE OSPREY

1. Historical Perspective

The Osprey, or fish hawk, was first reported in the region by Denys (1672) who, in his travels along the coast of Acadia, made reference to a "hawk that captures only fish". It was thought to be numerous in the early 1900s (Taverner 1919) and still "holding its own" in later years (Taverner 1934).

The bird was described as both a transient and summer resident distributed throughout New Brunswick and was considered tolerably common (Chamberlain 1882, Moore 1928). More recently it was considered not uncommon (Squires 1952) and then uncommon (Squires 1976) in that province. An indication of the reported status of the Osprey in various parts of New Brunswick is shown in Table 9.

Ospreys were apparently part of the avian fauna in Nova Scotia long before the white man set foot in the region. Shell heaps dug up at Bear River contained Osprey remains which were dated between 500 B.C. and 300 A.D. (Erskine 1966). Champlain mentions fish hawks seen in 1604 in what

is now Yarmouth County (in Tufts 1973). Their earlier presence on the Atlantic coast of the province, where they were considered very common, as well as some distance inland, was noted by Downs (1865) and Gilpin (1881). More recently the Osprey was listed in Nova Scotia as fairly common in suitable locations (Tufts 1956, 1962). Later it was thought to have declined in numbers, resulting in it being considered uncommon throughout much of its former range (Tufts 1973). Indications of more local status and occurrence in Nova Scotia are shown in Table 10.

One of the earliest references to Ospreys in Prince Edward Island was that of Bain (1891), who noted its presence along the coast in summer. It was considered not uncommon (MacSwain 1908) and, as of 1916, more or less common (Hurst 1947). Godfrey (1954) and Anonymous (1974) thought it an uncommon summer resident. In 1968 Osprey numbers were thought to be normal to decreasing (Adolphson and Jonkel 1969). The only reference to a specific locality is to Wood Island where it was an uncommon summer resident in the period 1956 to 1963 (Holdway 1964).

2. General Distribution

(a) New Brunswick

Ospreys are widely distributed throughout New Brunswick and are seen in all counties, being found in varying numbers both inland and along the coast. Most of the Ospreys, however, frequent river mouths and harbours, particularly along the north coast, the east coast between the Tabusintac River and Kouchibouguac National Park, and the Charlotte County coastline including the Grand Manan archipelago. The virtual absence of Ospreys along the Bay of Fundy east of Saint John is noteworthy. That may be due

to the steep topography, deep water, dearth of harbours and, at the head of the bay, periodic turbidity of the water.

Ospreys are found inland often on the larger lakes and rivers but are also attracted to smaller waters supporting a spawning run of fish. However, the largest lake in the province, Grand Lake (Queens County), has few Ospreys during the summer.

Most birds are seen in the southwestern part of the province, probably because of the abundance of inland lakes and coastal harbours and the presence of the St. John River. That river drainage, particularly, supported much of the inland population in the past. Aerial surveillance during 1974 and 1975 along the estuary of the St. John River suggests that the Osprey may not be as abundant as formerly. Using the standards of abundance of Arbib (1957), it should be considered uncommon there (one to five seen in a single day, no more than 25 in a season). H. Peters (unpublished MS) regarded the Osprey in that region in the early 1940s as common and "often seen". They were infrequent visitors to Gilbert Island in the upper estuary in 1972 and 1973 (Barkhouse 1975).

Provincially the Osprey should be considered uncommon although fairly common (six to 25 seen in a single day) in some coastal areas.

(b) Nova Scotia

The Osprey is widely distributed in Nova Scotia, the majority of sightings being made in the eastern and parts of the northern coasts of the mainland. The paucity of Osprey numbers along the coast of the Bay of Fundy is not unlike that shown opposite on the shores of New Brunswick.

Farther east few are seen in the Minas Basin, and Cobequid Bay area, yet inland from that region, they often occur on the Shubenacadie drainage. Ospreys are occasionally encountered along some of the larger river systems and lakes, in some places more abundantly (such as in inland Antigonish County) than in others (such as on Lake Rossignol, the largest in mainland Nova Scotia). Larger numbers are frequently seen in Mahone Bay, St. Margarets Bay, Musquodoboit Harbour, Petpeswick Harbour, and Antigonish Harbour.

Ospreys are considerably less abundant on Cape Breton Island than on the mainland. Relatively few birds are seen on the extensive Bras d'Or Lake during the summer. Neither H. Peters (unpublished MS) in 1942 nor A.W. Cameron (unpublished MS) mentioned Ospreys in their reports of birds in Cape Breton Highlands National Park. Coastal areas support small numbers, usually at harbours and river mouths. Inland sightings are scattered mainly in the southern half of the island, particularly around Bras d'Or Lake.

On a provincial scale the Osprey should be considered uncommon, but locally fairly common in some coastal areas.

(c) Prince Edward Island

Ospreys are generally found throughout the island, usually along the rivers and parts of the coast. They appear to be more frequent along the north coast than the south. The non-breeding abundance of this bird is probably uncommon.

3. Migration

(a) Spring

Ospreys arrive in the Maritime Provinces in April or, infrequently, in March (Table 11). They are often seen on inland waters before the ice goes out. Arrival dates suggest that the birds are first seen in southwestern Nova Scotia or sometimes farther east in Halifax County, usually during the first two weeks of April. In southwestern New Brunswick, first arrivals are typically in mid-April, while it is not until late April that the Osprey reaches Prince Edward Island.

Ospreys may move half way up the Nova Scotia mainland before they appear in New Brunswick, usually a one or two week difference but as little as one or two days. The general movement in Nova Scotia appears to be northeasterly towards the north coast and Cape Breton Island and takes about 10 to 12 days to span the province.

In New Brunswick the birds seem to move east along the Bay of Fundy coastline and north up the St. John River valley, and reach Northumberland Strait in late April, about 10 days, and mid-province in five to seven days. They appear to arrive somewhat earlier in the northern part of the province (Restigouche and Gloucester Counties) than in more central and western parts. If they migrate on a broad front as suggested by Henny and Van Velzen (1972), that may account for those earlier arrivals. Farther north, Ospreys first appear in east-central Labrador in early May (S.P. Wetmore and D.I. Gillespie, unpublished MS).

(b) Fall

Ospreys are frequently seen throughout the Maritime Provinces into September. In New Brunswick they start moving south then, while in both Nova Scotia and Prince Edward Island late August seems to be the time. By the middle of October most of the birds have left the three provinces. Only an average of 15% of the Osprey sightings occurred after 15 October in New Brunswick and Nova Scotia. November and December sightings are infrequent and represent late stragglers. Weather and the availability of open water are probably factors in the birds lingering until then. The rare winter observation has also been reported in both New Brunswick and Nova Scotia.

4. Breeding Occurrence

(a) New Brunswick

Ospreys breed throughout most of the province at both inland and coastal sites. An indication of coastal breeding abundance is given in Figure 1. Table 12 shows the proportion of nests found, by county, in 1974. In 1974 and 1975, 199 occupied nests were found, representing only 61% of the total nests located. Most of the unoccupied nests were new. Coastal concentrations occurred in both Charlotte and Northumberland Counties. There were no breeding records for Madawaska and Albert Counties. The occupied inland nests amounted to 14% of the total and were usually found in the larger river valleys and on some of the larger lakes (Oromocto, Miramichi and others). Ospreys are known to nest on electric power lines, particularly in Charlotte County. Only a few birds nest in the St. John River valley above the estuary. Although sparsely scattered, nests were more numerous in the estuary.

Coastal breeding areas, where concentrations of nesting birds are found are as follows:

North Coast: Heron Island (active since 1920s)
Peters River
Bass River (active at least since 1940s)

East Coast: Tabusintac Lagoon
Neguac Lagoon
Miramichi Bay Islands
Kouchibouguac National Park and vicinity

Bay of Fundy: Grand Manan archipelago
Charlotte County coast west of Blacks Harbour

Those areas are shown in Figure 1. In addition there are scattered nests along the east coast of the province, and the south coast west of Saint John.

The New Brunswick coastline was flown in 1974, and 103 breeding pairs of Ospreys were counted in about 660 km^2. That suggested that along the coast, where the great majority nest, the birds are fairly common breeders (one pair per 2.59 to 12.95 km^2) but locally common (one pair per 50.99 ha to 2.59 km^2) to very common (one pair per 0.40 to 10.12 ha). The various coastal components of that are seen in Figure 1.

(b) Nova Scotia

Table 12 shows the distribution of occupied nests found in the province in 1975. Of the 189 nests recorded in 1974 and 1975, 72% were occupied. The greatest amount of nesting activity was noted in counties bordering the Atlantic Ocean, particularly Halifax, Lunenburg and Shelburne and in Antigonish County to the north. Little breeding activity was noted in counties bordering the Bay of Fundy though a limited amount apparently takes place in Annapolis and Digby Counties.

The bulk of Osprey nesting takes place along the coast of the mainland. The aerial search for nests indicated that there was little coastal activity east of Liscomb Island on Guysborough County. However, nests were scattered all along the eastern coast, particularly on the inshore islands. Concentrations in Musquodoboit Harbour, on McNab Island in Halifax Harbour, in Mahone Bay and at Port Latour are significant (Figure 1). Indications are that nesting is minimal along coastal Yarmouth, Digby, Annapolis and Kings Counties. There was no evidence of nesting in coastal Hants, Colchester and Cumberland Counties. Along the north coast, only a few nests were reported.

At most of the more inland lakes (including Lake Rossignol) and rivers flown in 1975 there was no Osprey activity. There was activity at Grafton Lake, in Kejimikijik National Park. Reliable reports received in 1974 and 1975, however, indicated that there was scattered nesting on some inland and coastal lakes as well as on a few electric power lines on the mainland. There are doubtless other inland locations that should be searched for occupied nests, but with the myriad of lakes in the province, that would be a formidable task. One area where a considerable number of inland nests were encountered was in Antigonish County. Nineteen nests were located there, some of which were on electric power lines. In 1975, 17% of the occupied nests recorded in Nova Scotia were inland, that is at least eight kilometres from the coast.

Seventy-three breeding pairs of Ospreys were counted during 1975 and the 740 km^2 of coastal transect that were flown. On the basis of those observations, the Osprey can be considered to be a fairly common breeder (one pair

per 15.54 to 64.75 km^2) along coastal mainland Nova Scotia (Figure 1).

Ospreys are rare (one pair per 67.34 to 323.75 km^2) to very rare (one pair per 326.34 km^2 or more) as breeding birds on Cape Breton Island. There were very few reports of nesting birds and those were for inland locations only, mostly recent and for all four counties. Despite a considerable amount of flying, no occupied Osprey nests were found in the Bras d'Or Lake region. Other pilots and observers confirmed our observation on the scarcity of breeding birds.

(c) Prince Edward Island

Ten occupied Osprey nests, representing 95% of those found, were located each year during 1974 (Table 12) and 1975. Most of those were in coastal Prince County, particularly between Cascumpec Bay and Malpeque Bay. All nests were within 13 km of the coast, only two were on Northumberland Strait, and three were on rivers (Bell, Boughton and Winter).

Ospreys in Prince Edward Island are rare breeders (one pair per 67.34 to 323.75 km^2 and locally uncommon (one pair per 15.54 to 64.75 km^2).

5. Productivity

(a) Breeding Biology

A generalized scheme of events associated with the Osprey breeding cycle in the Maritime Provinces is shown below using pre-1974 information:

Mid-April	- nest building and repair
24 April to 27 June	- viable eggs in nest
2 June to 22 August	- young in nest
Early August to 19 August	- young fledge

Additional data for 1974 and 1975 would slightly modify that scheme. The first eggs noted in 1975 were on May 2 (a clutch of three in Prince Edward Island). In New Brunswick, viable eggs were found as late as July 4 in 1974. There is some indication that eggs hatch at least one week earlier in Nova Scotia than in New Brunswick. Of 14 nests checked by air in 1975 in Antigonish and Guysborough County, Nova Scotia, 57% contained young on June 12. The first hatch there was on June 11. The first eggs elsewhere in Nova Scotia, however, had hatched by June 3. Young were first recorded in 1975 in New Brunswick on June 20 and on June 15 young were being banded in Prince Edward Island. In 1974, the first young seen in New Brunswick was on June 24.

The young remain in the nest in Nova Scotia until the first weeks of August. However, on August 15, along the east coast, young that could fly were found perched on the nest as were those that were not yet aloft, but exercising their wings. In addition there were those that were still crouched in the nest, not yet fully grown. In Lunenburg and Shelburne Counties, 20 nests that were active earlier in the season were all empty on August 15, suggesting that the young had fledged. As early as August 6 in New Brunswick, young Ospreys were standing in the nests exercising their wings. In Prince Edward Island, Ospreys were seen to leave the nest for the first time on August 16. That was from a man-made structure erected to provide for two young birds that had fallen with their nest during a storm.

It is not unusual for the young to return to the nest after their first attempt at flying. We noted that in Prince Edward Island, Ospreys returned

to the nest for about 10 days usually until the end of August. However, two young were still in the nest on September 25. In Nova Scotia, a young bird was still on the nest on September 6, but most of the nests were empty by the end of August. In northern New Brunswick parents and young of two families were seen at the nests as late as August 28 and September 1.

Ospreys were infrequently seen nesting within or in very close proximity to coastal colonies of Great Blue Herons (*Ardea herodias*) and Double-crested Cormorants (*Phalacrocorax auritus*).

(b) Reproductive Success

In assessing Osprey productivity, a nest was considered occupied if an adult was seen incubating and nesting was deemed successful if at least one young was raised to an advanced stage. Most of the productivity data gathered in 1974 and 1975 were gained from the aerial surveys. Nearly all pre-1974 data represent ground reports.

During 1974 and 1975, 536 Osprey nests were found in the region, 66% of which were occupied. Indications of reproductive success are summarized in Table 13. The provincial averages suggest a general similarity throughout the region even though yearly differences, of unknown significance, do occur. Success varied from 40% to 75% in 1974 and from 75% to 88% in 1975. The number of young per nesting attempt ranged from 0.80 to 1.32 and from 1.46 to 1.63 respectively. The aerial surveys indicate a high overall success rate of 78% and a reproductive rate that is on a par with the most

productive populations in North America (Table 14). The total figures for 1974-1975 are very similar to those of the pre-1974 era. Henny and Wight (1969) estimated that 0.95 to 1.30 young must be fledged per nesting pair to maintain a stable population. That success was attained in all three provinces.

To assess the extent of overestimating success using the 1974-1975 data, comparisons were made between two subsamples of nests. Data from 108 nests checked at least twice, early and late in the season, are compared below with data from other nests.

	Occupied Nests	Percent Success	Young Per Occupied Nest	Young Per Successful Nest
Checked at least twice	108	75.0	1.41	1.89
Other	126	82.5	1.56	1.89

The reproductive success is somewhat inflated for the nests with fewer visits ("other") but the differences are not appreciable.

Based on 58 nests the average clutch size of the Osprey in 1974-1975 was 2.31, ranging from one to four eggs, and 2.45 before 1974 (Table 15). Average brood sizes were 1.87 in 1974-1975 and 1.93 before then, and varied from one to three young.

Peterson (1969) felt that the decline of Ospreys in the northeastern United States was a result of low hatching success. Data from the Maritime Provinces for 1974 and 1975 show that an average of 52% of the eggs hatched

(50.0 in 1974, 53.4 in 1975), based on 36 complete clutches. Twenty-eight percent of the clutches completely hatched (28.6 in 1974, 27.3 in 1975).

During both 1974 and 1975, a number of Ospreys were noted at or near empty nests during the summer, nests that had been considered occupied earlier in the season. Henny and Van Velzen (1972) pointed out that approximately five to ten percent of the pairs on nesting areas could be non-breeders. Our aerial survey indicated that an average of 12.0% of the birds thought to be breeding were, in fact, non-breeders.

SUMMARY

An investigation into the past and present occurrence, abundance and productivity of the Osprey and Bald Eagle in the Maritime Provinces was undertaken in 1974 and 1975. Extensive aerial surveys in New Brunswick, Nova Scotia and Prince Edward Island identified important nesting areas and provided information on reproductive success. Ground surveys, other aerial reconnaissance and field observations contributed by many individuals and agencies substantially added to the data bank.

Bald Eagles are seen throughout the Maritime Provinces, their distribution and abundance varying markedly with the season. The greatest numbers are seen in Nova Scotia. Over one-third of total regional observations in 1974-1975 were on Cape Breton Island. Both the northern and southern subspecies frequent the Maritime Provinces as resident or transient birds.

Spring migration or movement usually starts in March with a peak in April. Summering birds include both the southern eagle and northern resident. The largest number of eagles is seen during the spring and summer. The greatest concentration of summering birds is on Cape Breton Island, particularly Bras d'Or Lake. An appreciable decline of summering eagles in the lower St. John River in New Brunswick is apparent. Of the southern subspecies only immatures are thought to summer in the region. The birds start moving southward in August, though most of the passage is later in the fall. Wintering eagles, of the northern subspecies, move towards the more southern coastal zone. Evidence indicates a recent increase in the numbers of overwintering eagles.

The ratio of immature to mature Bald Eagles varies with the month, season, locale and province. Generally the proportion of immatures appears to be higher during the summer months.

Nine occupied eagle territories were found in New Brunswick in 1975, predominantly in the southwestern part of the province. The breeding status of the bird is very rare, and it seems likely that that has not changed appreciably from the past. The present number of breeding pairs in the province is estimated to be approximately 15. Sixty-five percent of all occupied nests found in 1974-1975 were in Nova Scotia, one-third being in Cape Breton Island. Twenty-two occupied nests were identified in Nova Scotia in 1975. As a breeding bird, the Bald Eagle is considered to be very rare, although on Cape Breton Island it is a rare breeder and fairly common locally. We estimate the number of breeding pairs in the province to be about 65, 40 being on Cape Breton Island. Only one pair nested in Prince Edward Island in 1975.

Aerial surveys indicated that over one-half of the breeding pairs produced young in 1974-1975. Between 0.7 and 0.8 young per pair were recorded and 1.3 to 1.5 young per successful nest. That level of productivity compares favourably with other northern Bald Eagle populations in Canada and in Alaska. The average clutch size for all years was 2.15. The Bald Eagle is maintaining a reproductively stable population in the Maritime Provinces.

Ospreys are widely distributed in all three provinces, particularly in coastal areas where they are frequently seen near harbours, river estuaries and inshore islands. The birds are considered to be uncommon throughout the region though fairly common in some local coastal areas. Spring arrival usually occurs during the first two weeks of April in southwestern Nova Scotia, and mid-April in southwestern New Brunswick. By late April, Ospreys have reached Prince Edward Island. Movement south starts in late August throughout the region and by the middle of October most birds have left.

The great majority of the birds nest along the coast. One hundred and nineteen occupied nests were located in 1974 in New Brunswick, 14% of them inland. Important breeding areas were identified along the north coast, the east coast and in and around the Bay of Fundy. During 1975, 106 occupied nests were found in Nova Scotia, of which 17% were inland. The greatest nesting activity in the province was noted in the counties bordering the Atlantic Ocean. There were few reports of Ospreys nesting on Cape Breton Island. Twenty occupied nests were found in Prince Edward Island in 1974-1975, most of those in coastal Prince County.

Egg laying starts in late April, the first young hatching in early June. The birds are flying by mid-August. The average clutch size in 1974-1975 was 2.31 and the brood size was 1.87. An average of 52% of the eggs hatched. Before 1974 the clutches averaged 2.45, the broods 1.93. The 1974-1975 aerial surveys indicated that about 12% of the birds thought to be nesting were, in fact, non-breeders.

The overall productivity of the Osprey in the Maritime Provinces as shown by the aerial surveys during 1974-1975 was 1.44 young per occupied nest and 1.85 young per successful nesting. Seventy-eight percent of the nests were successful. Reproductive success in the three provinces was generally similar. Ospreys in this region appear to be maintaining a stable population comparable with the best in eastern North America.

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TABLE 1. General distribution and abundance of the Bald Eagle in New Brunswick, as reported in the literature.

Location	Time Period	Status	Source
Grand Manan	Latter part of the 19th century	Very common resident	Herrick (1873)
Saint John & Kings County	Latter part of the 19th century	Abundant, resident all year	Chamberlain (1882)
St. Croix River	1853-1900	Common	Boardman (1903)
Northumberland County	1915 & 1916 (June)	Common	Philipp and Bowdish (1917)
Grand Manan	-	Resident and transient	Pettingill (1939) G. Boyer, unpublished MS.
South-central N.B.	1937 - 1944	Resident and migrant "recorded often"*	H. Peters, unpublished MS.
N.B. - N.S. border area	1947 - 1964	Occasional visitant (only 1 record)	Boyer (1966)
Green River-Upper	1948 - 1965	About 1 eagle seen annually in the 1950s only	Bennett et al. (1966)
Portobello Creek - French Lake area	1949 - 1950	About 50 eagles on the 40 square mile area each summer	Wright (1953)
Dungarvon & N.W. Miramichi Rivers	Summers 1953, 1954	Seen on several occasions	C. Watts, unpublished MS. J.K. Lowther, unpublished MS.
St. John River	July 1971	6 eagles seen on about 250 miles of river	P.A. Pearce, unpublished MS.
Kouchibouguac National Park	1972 - 1973	Resident or irregular visitant (only 1 record), endnagered	E. Tull, unpublished MS.
Fundy National Park	-	Resident or irregular visitant	K.H. Deichmann, unpublished MS.

* 10-14 eagles observed almost every day in the vicinity of Portobello Creek in May and June.

TABLE 2. General distribution and abundance of the Bald Eagle in Nova Scotia, as reported in the literature.

Eastern shore	Mid-1800s	Pretty common	Downs (1865)
Grand Pre area of Kings County	1895 to 1915	Exceedingly rare	Tufts (1917)
Southwestern counties	1898 to 1915	Only 1 recorded	Allen (1916)
Cape Breton Highlands	-	Not uncommon, especially along the east coast	A.W. Cameron, unpublished MS.
Cape Breton Island	Up to 1955	Still a common sight in most parts of the Island	Godfrey (1958)
Cole Harbour-Chezzetcook	Mid-1950s	Not plentiful, seen on a few occasions	Macpherson and Allen (1957)
Pictou area	1957 to 1966	Permanent resident	Holdway (1967)
Western Cape Breton Island (wetlands)	1960 to 1968 (late spring & summer)	Uncommon	Erskine (1971)
Shelburne County	1961 to 1971 (summer)	None seen	Gallagher and Gallagher (1971)
Cape Breton Island and part of coastal mainland	1967 to 1968	Low to high numbers varying regionally and seasonally	Gittens (1968)
Kejimkujik National Park	Early 1970s	Very rare spring transient and summer resident, not seen in fall or winter	S. Lunn, unpublished MS.

TABLE 3. Seasonal occurrence of Bald Eagles in the Maritime Provinces.

Province	Total Sightings	Winter	Spring	Summer	Fall
New Brunswick			Percent of Total		
1974-1975	237	21	30	34	14
1959-1973	613	31	27	30	12
Nova Scotia					
1974-1975	604	22	30	35	14
1960-1973	757	21	33	32	14
Prince Edward Island					
1974-1975	14	7	21	36	36
Pre -1974	70	10	7	14	69
Maritime Provinces					
1974-1975	855	21	30	35	14
Pre -1974	1440	25	29	30	16

TABLE 4. Distribution of Bald Eagles in the Maritime Provinces in 1974-1975, expressed as a percent of the observations in each season.

Province	Winter	Spring	Summer	Fall
New Brunswick				
Northern	1	6	5	4
Central	12	9	13	13
Southern	14	13	10	11
Nova Scotia				
Western	32	3	6	1
Eastern	26	24	19	28
Cape Breton Island	14	44	45	39
Prince Edward Island				
Entire Province	1	1	2	4

TABLE 5. Seasonal occurrence of Bald Eagles in the Maritime Provinces by region, expressed as a percent of regional totals.

New Brunswick 1959-1975	Northern	Central	Southern
Winter	6	22	43
Spring	25	30	25
Summer	62	38	16
Fall	7	10	16
Total Sightings	89	422	339

Nova Scotia 1974-1975	Western	Eastern	Cape Breton Island
Winter	69	24	8
Spring	10	31	35
Summer	20	29	43
Fall	1	16	14
Total Sightings	84	199	321

Prince Edward Island	Entire Province
Winter	9
Spring	10
Summer	18
Fall	63
Total Sightings	84

TABLE 6. Seasonal distribution of Bald Eagles in New Brunswick and Nova Scotia, expressed as a percent of each season total.

Province	Winter	Spring	Summer	Fall
New Brunswick 1959-1975				
Northern	3	9	21	6
Central	37	55	60	42
Southern	60	36	19	52
Total Sightings	244	235	268	103
Nova Scotia 1974-1975				
Western	44	4	8	1
Eastern	36	34	27	41
Cape Breton Island	20	62	65	58
Total Sightings	131	183	212	78

TABLE 7. The proportion of immatures among Bald Eagles seen in the Maritime Provinces.

	1960-1973		1974-1975	
	% Immature	Birds Observed	% Immature	Birds Observed
New Brunswick				
Winter	18	73	20	35
Spring	24	102	14	50
Summer	36	123	27	93
Fall	26	58	20	25
Nova Scotia				
Winter	35	109	38	159
Spring	27	144	32	192
Summer	32	186	13	186
Fall	23	43	20	61
Prince Edward Island				
Winter	18	11	0	2
Spring	33	3	25	4
Summer	-	-	33	3
Fall	93	41	60	5

TABLE 8. Reproductive success of the Bald Eagle in the Maritime Provinces. The figures in parentheses indicate the number of broods used in calculating the percent of broods with two young.

	1974-1975	1970-1973	1960-1969	Before 1960
Occupied Nests	54	27	60	44
Outcome Known	42	18	39	18
Percent Successful	61.9	72.2	92.3	77.8
Young Per Occupied Nest	0.88	1.06	1.03	0.83
Young Per Successful Nest	1.42	1.46	1.11	1.07
Percent of Broods with Two Young	50.0(22)	46.2(13)	12.5(32)	-

TABLE 9. General distribution and abundance of the Osprey in New Brunswick, as reported in the literature.

Location	Time Period	Status	Source
Lower St. John River	-	Frequent arrival before ice was out	Chamberlain (1882)
Lower St. John River	1911	No mention in annotated bird list	Townsend (1912)
Northumberland County	June 1915 & 1916	Few seen	Philipp and Bowdish (1917)
South-central region	1937 - 1944	Common migrant and summer resident	H. Peters, unpublished MS.
Fredericton	-	Often seen	Squires (1944)
Border region with Nova Scotia	1947 - 1956	Rare but regular summer resident	Boyer (1966)
Green & Upper Kedgwick Rivers	1950 - 1960	Uncommon to fairly common*	Bennett et al. (1966)
Dungarvon & Northwest Miramichi	Summer 1953	Few seen	C. Watts, unpublished MS.
Dungarvon & Renous Rivers	1954	Abundant	J.K. Lowther, unpublished MS.
St. John River (Clair to Oak Point)	1971	22 seen on 402 km canoe trip	P.A. Pearce, unpublished MS.
Kouchibouguac National Park	June 1971	1-4 seen almost daily	P.A. Pearce, unpublished MS.
Kouchibouguac National Park	-	Common spring & fall migrant & summer resident	E. Tull, unpublished MS
Fundy National Park	-	Rare migrant and summer visitor	K.H. Deichmann, unpublished MS.

* Using Arbib (1957) standard of abundance.

TABLE 10. General distribution and abundance of the Osprey in Nova Scotia, as reported in the literature.

Location	Time Period	Status	Source
Grand Pré area of Kings County	1895 - 1915	Rare, formerly not uncommon	Tufts (1917)
Yarmouth County	Early 1900s	Few seen	Allen (1916)
Antigonish County	1914	Uncommon spring migrant	Lewis (1920)
Coastal Queens County	-	Occurrence documented	Lewis (1956)
Pictou area of Pictou County	1957 - 1966	Summer resident	Holdway (1967)
Cape Breton Island	-	Rather common resident	Godfrey (1958)
Western Cape Breton Island (wetlands)	1960 - 1968	Uncommon	Erskine (1971)
Shelburne County	1961 - 1971	Seen regularly	Gallagher and Gallagher (1971)
Lunenburg County (offshore islands)	-	Occurrence documented	A.R. Lock, unpublished MS.
Kejimkujik National Park	1972 - 1973	Rare spring, summer and fall resident	S. Lunn, unpublished MS.
Cape Breton Highlands	1970s	Generally rare	Park Naturalist Staff (pers. comm.)
Coastal Halifax County	-	Occurrence well documented	A.R. Lock, unpublished MS., Macpherson and Allen 1957, McAloney and Sabean 1972, Ross 1971, Welsh 1969

TABLE 11. Median arrival dates of the Osprey in New Brunswick and Nova Scotia

NEW BRUNSWICK			NOVA SCOTIA		
County	Median Arrival Date	No.of Years	County	Median Arrival Date	No.of Years
Charlotte	15-16 April	12	Yarmouth	10 April	3
St. John	17-18 April	8	Shelburne	13 April	3
Kings	17-18 April	12	Queens	25 March	1
Albert	19 April	7	Lunenburg	16 April	1
York	21 April	27	Halifax	14 April	11
Sunbury	21-22 April	16	Kings	20 April	1
Queens	23-24 April	14	Cumberland	18 April	1
Westmorland	26-27 April	8	Pictou	22 April	3
Kent	26 April	3	Antigonish	23 April	1
Carleton	25 April	3	Guysborough	25 April	1
Northumberland	23-24 April	12	Cape Breton Island (Bras d'Or Lake)	21 April	4
Restigouche	19-21 April	8	Sable Island	31 May	6
Gloucester	17 April	5			

TABLE 12. The distribution of occupied nests of the Osprey in the Maritime Provinces presented as a percent of the provincial total during the years of most extensive survey. (An asterisk indicates evidence of limited nesting in other years.)

NEW BRUNSWICK (1974)		NOVA SCOTIA (1975)		PRINCE EDWARD ISLAND (1974)	
County	Percent	County	Percent	County	Percent
Restigouche	5.9	Cumberland	1.9	Prince	80.0
Gloucester	10.8	Colchester	0.0	Queens	10.0
Madawaska	0.0	Pictou	1.9	Kings	10.0
Victoria	*0.0	Antigonish	16.0		
Northumberland	26.9	Guysborough	6.6		
Kent	10.8	Hants	0.0		
Carleton	1.7	Halifax	32.1		
York	4.2	Kings	0.0		
Sunbury	1.7	Lunenburg	18.9		
Queens	1.9	Annapolis	*0.0		
Kings	4.2	Queens	3.8		
Westmorland	2.5	Digby	*0.0		
Albert	0.0	Yarmouth	2.8		
Charlotte	28.6	Shelburne	15.1		
Saint John	0.8	Inverness	*0.0		
		Victoria	0.9		
		Richmond	*0.0		
		Cape Breton	*0.0		
TOTAL NESTS =	119	TOTAL NESTS =	106	TOTAL NESTS =	10

TABLE 13. Osprey reproductive success in the Maritime Provinces, using both aerial survey and ground report data.

Survey	Occupied Nests	Outcome Known	Percent Successful	Young Per Occupied Nest	Young Per Successful Nest
New Brunswick					
1975 Aerial Sruvey	66	65	88	1.63	1.86
Total Reports	70	67	88	1.64	1.86
1974 Aerial Survey	107	87	75	1.32	1.77
Total Reports	121	90	76	1.33	1.77
Pre-1974 Reports	173	37	70	1.41	2.00
TOTAL FOR 1974-1975	191	157	81	1.47	1.81
Nova Scotia					
1975 Aerial Survey	94	55	75	1.46	1.96
Total Reports	105	59	76	1.48	1.93
1974 Aerial Survey	-	-	-	-	-
Total Reports	30	6	100	1.83	1.83
Pre-1974 Reports	100	33	79	1.39	1.77
TOTAL FOR 1974-1975	135	65	79	1.51	1.92
Prince Edward Island					
1975 Aerial Survey	-	-	-	-	-
Total Reports	10	10	80	1.80	2.25
1974 Aerial Survey	6	5	40	0.80	2.00
Total Reports	10	8	63	1.38	2.20
Pre-1974 Reports	8	5	80	1.60	2.00
TOTAL FOR 1974-1975	20	18	72	1.61	2.23
Maritime Provinces					
1975 (total)	185	136	82	1.58	1.92
1974 (total	161	104	76	1.37	1.80
Pre-1974 (total)	281	75	75	1.41	1.89
Aerial Survey (1974-1975)	273	212	78	1.44	1.85
Other Reports (1974-1975)	73	28	93	1.86	2.00
TOTAL FOR 1974-1975	346	240	80	1.49	1.87

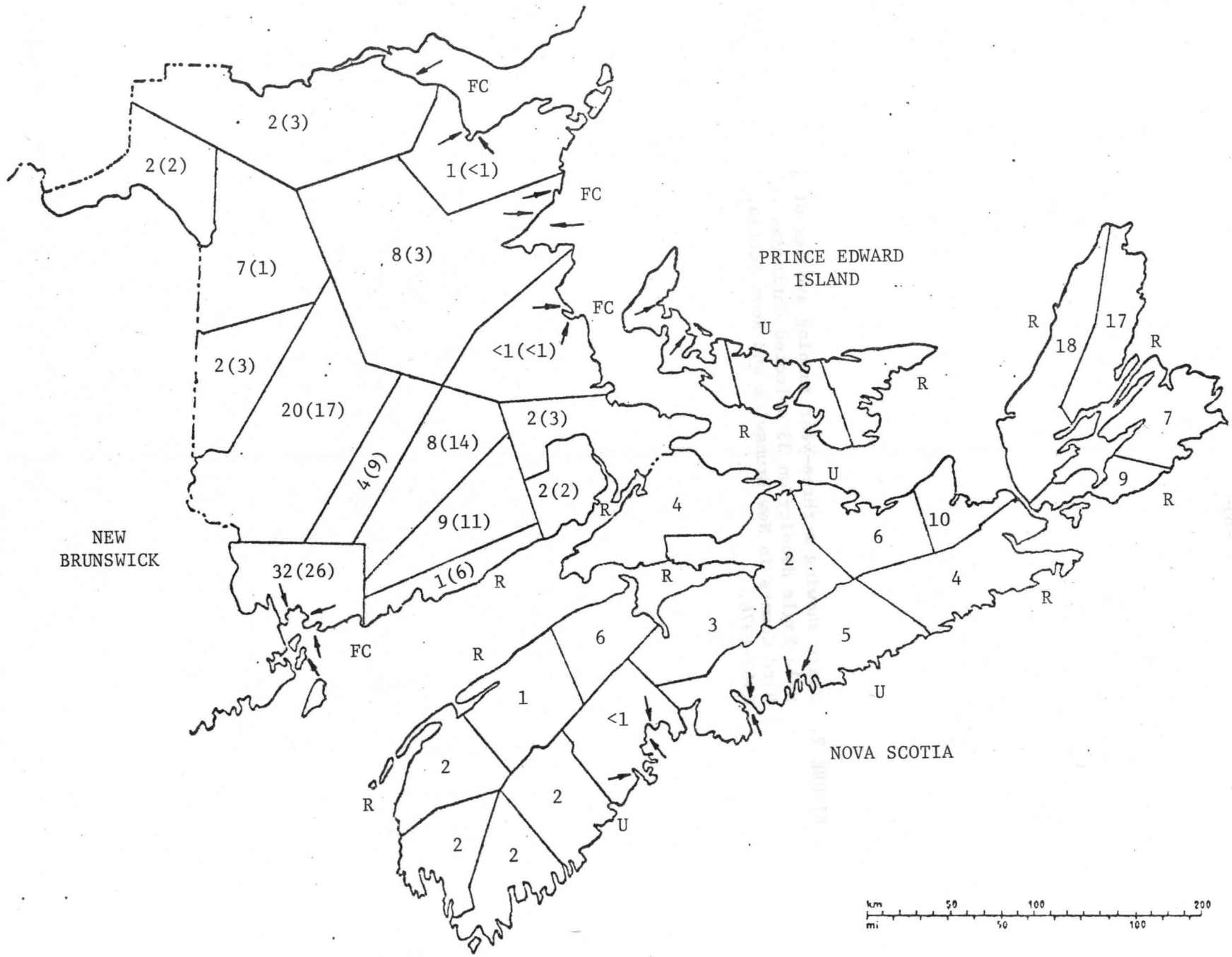
TABLE 14. Reproductive success of some Osprey populations in eastern North America.

Location	Years	Percent Nest Success	Young Per Occupied Nest	Young Per Successful Nest	Source
Labrador (west central	1970-1973	44	0.60	1.4	Wetmore and Gillespie (1976)
Labrador (east central)	1969-1973	57	1.00	1.7	Wetmore and Gillespie (1976)
New Brunswick	1974-1975	78	1.41	1.8	This study
Nova Scotia	1975	72	1.35	1.9	This study
Prince Edward Island	1974-1975	64	1.55	2.4	This study
Maine	1971-1974	48-62	0.95-1.20	1.8-2.0	J.A.M. Johnston, unpublished MS.
New York (Adirondacks)	1970-1972	16-38	0.34	1.3	Singer (1974)
Maryland (Choptank River)	1968-1971	45-69	0.93	1.8	Reese (1972)
Maryland (Chesapeake Bay)	1963-1969	32-58	0.64-1.16	1.7-2.0	Reese (1970)

TABLE 15. Frequency distribution (in percent) of clutch and brood sizes of Ospreys in the Maritime Provinces, based on 58 and 180 nests, respectively, in 1974-1975 and 79 and 224 nests, respectively, for all years.

	CLUTCH SIZE				BROOD SIZE			
	1	2	3	4	1	2	3	4
1974-1975	15.5	39.7	43.1	1.7	30.5	51.7	17.8	0
All Years	12.8	42.3	42.3	2.6	29.5	52.7	17.8	0
Mean for All Years		2.35				1.88		

FIGURE 1. Map of the Maritime Provinces showing
(a) significant coastal breeding areas of the Osprey (indicated by arrows),
(b) coastal breeding abundance of the Osprey (FC=fairly common, U=uncommon, R=rare) and
(c) distribution of Bald Eagle observations in New Brunswick and Nova Scotia.
New Brunswick values are the percentages by county of 238 observations in 1974-1975, those in parentheses being the percentages by county of 605 observations in 1959-1973. Nova Scotia values are the percentages by county of 618 observations in 1974-1975.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PRINCE EDWARD
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BRUNSWICK
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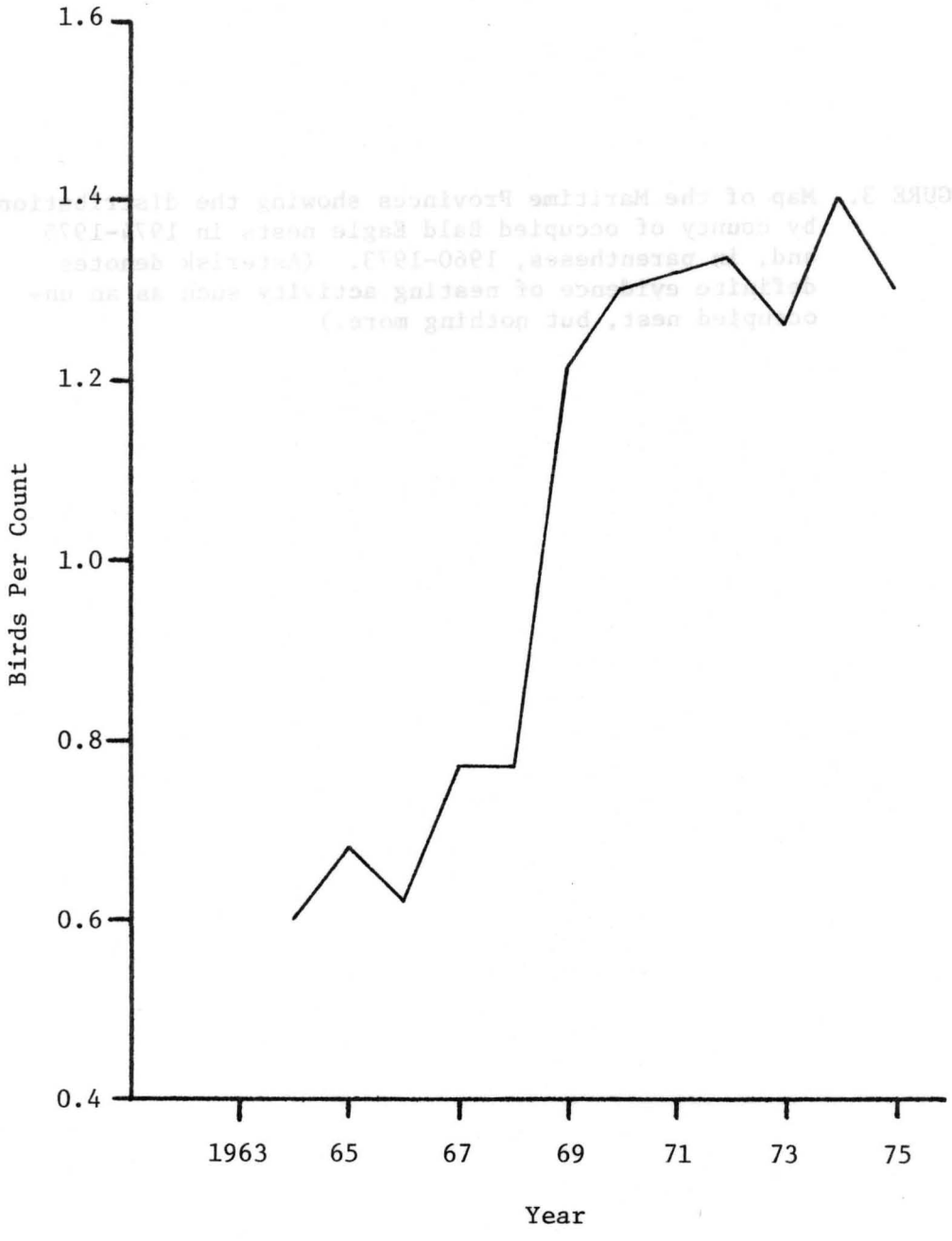
FIGURE 2. Chart showing a three-year running average of Bald Eagle density on 33 selected Christmas Bird Counts in New Brunswick and Nova Scotia, 1963-1976.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Birds Per Count
1963
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Year

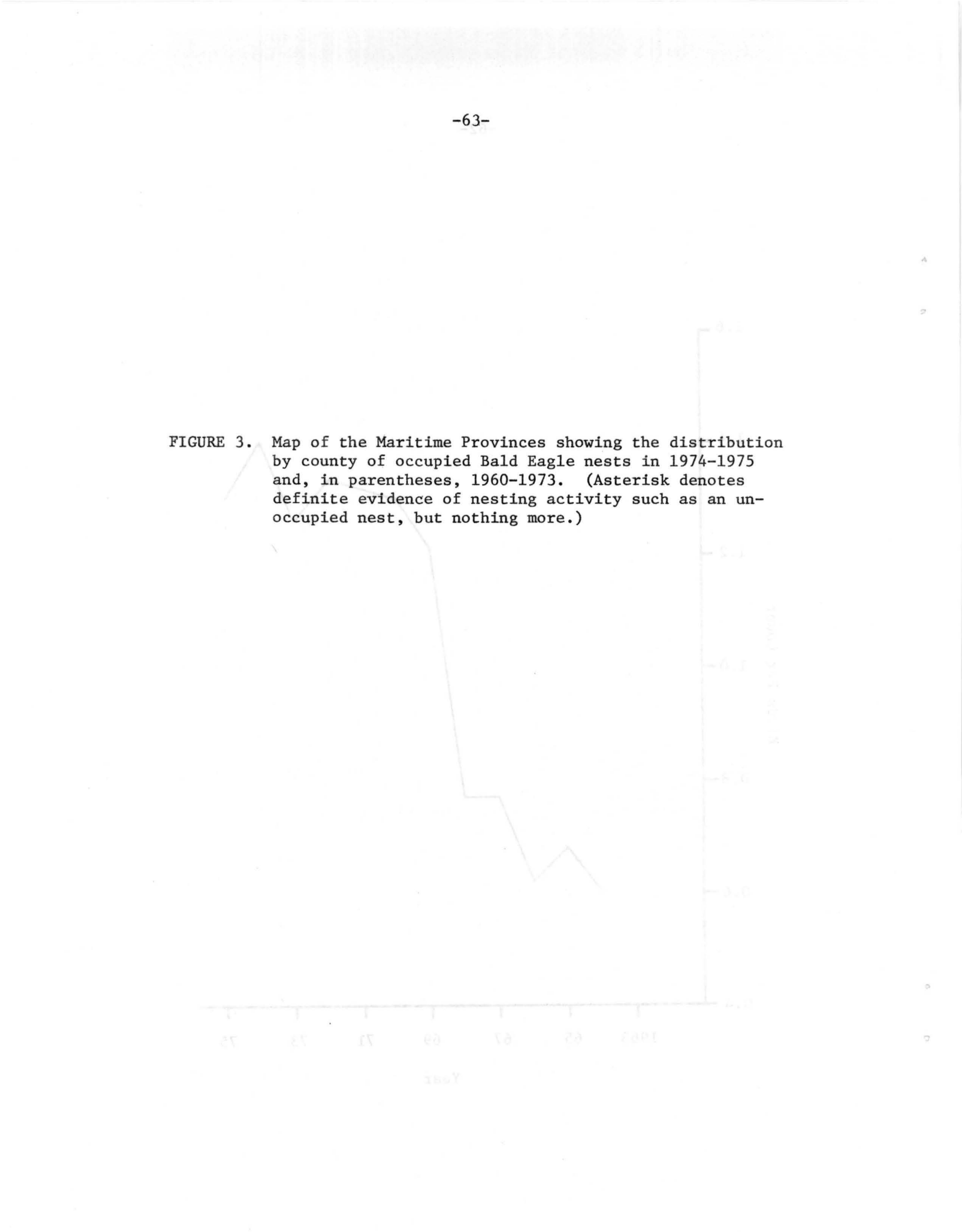
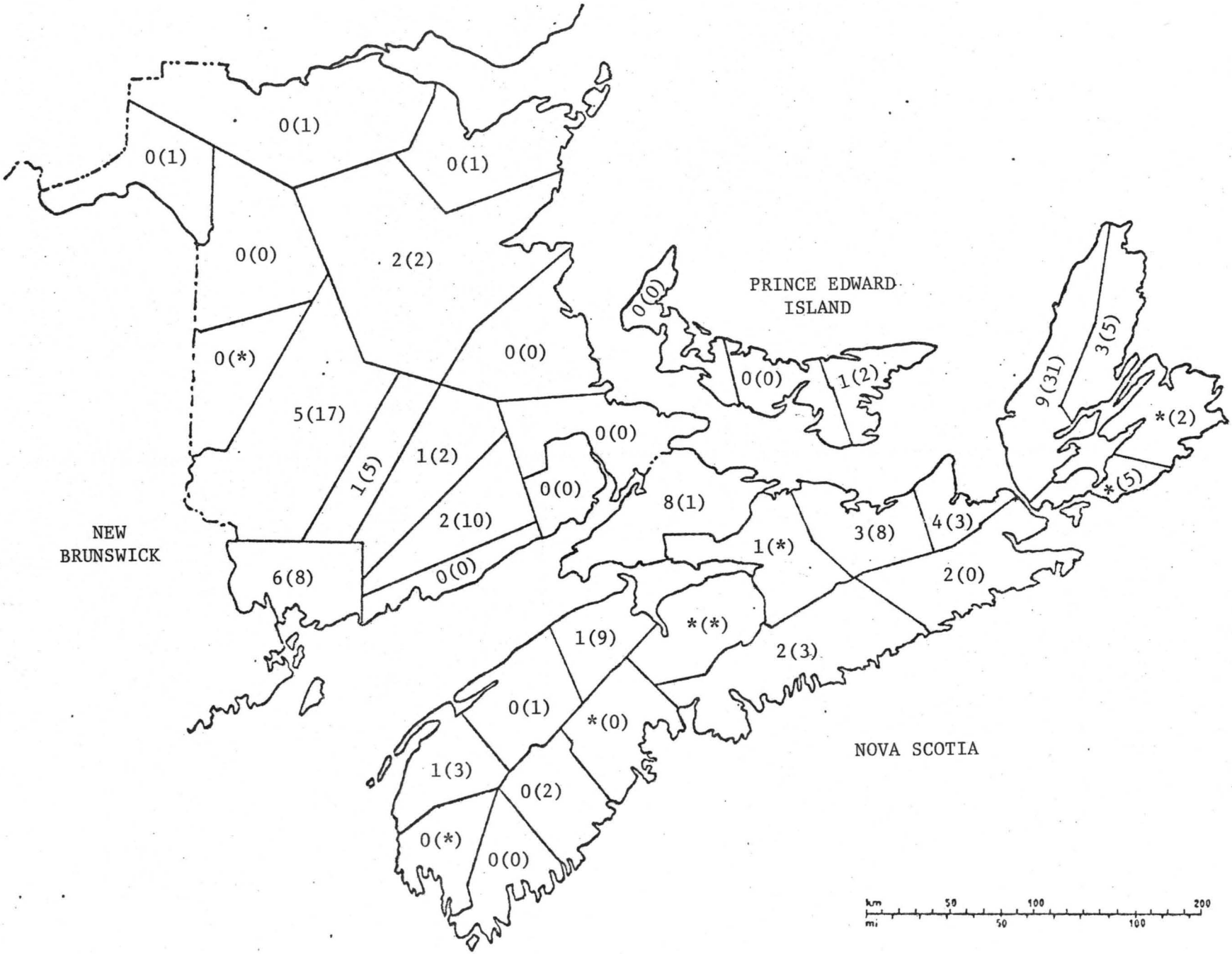


FIGURE 3. Map of the Maritime Provinces showing the distribution by county of occupied Bald Eagle nests in 1974-1975 and, in parentheses, 1960-1973. (Asterisk denotes definite evidence of nesting activity such as an unoccupied nest, but nothing more.)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NEW BRUNSWICK
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