

The Status of Bald Eagles in the Yukon Territory, Canada

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The Yukon initiated an inventory of its breeding birds of prey in the early 1970's. This work has focused on large falcons and other raptors primarily where input was needed for making land use decisions. The information from these surveys has been entered into a dataset on the Yukon Government IBM mainframe for analysis as required. Over the years, a systematic survey has been conducted as funding has become available. The strategy was to design a standard survey and data format so the overall data base can expand in a meaningful way (Hayes and Kale 1979).

The Bald Eagle has been recorded during these surveys as one of the target species. Priority, however, has focused on other raptors when habitats have been selected for field work; the coverage for breeding Bald Eagles has rarely been as complete. However, the highly visible nature of the species enhances its coverage through incidental sightings. Coverage accuracy in the case of the higher priority large falcons has been estimated at an average 80% in the habitat actually surveyed (Mossop 1988). For Bald Eagles, accuracy is likely about 75%, similar to that suggested for other study areas (Grier et al. 1981).

Methods

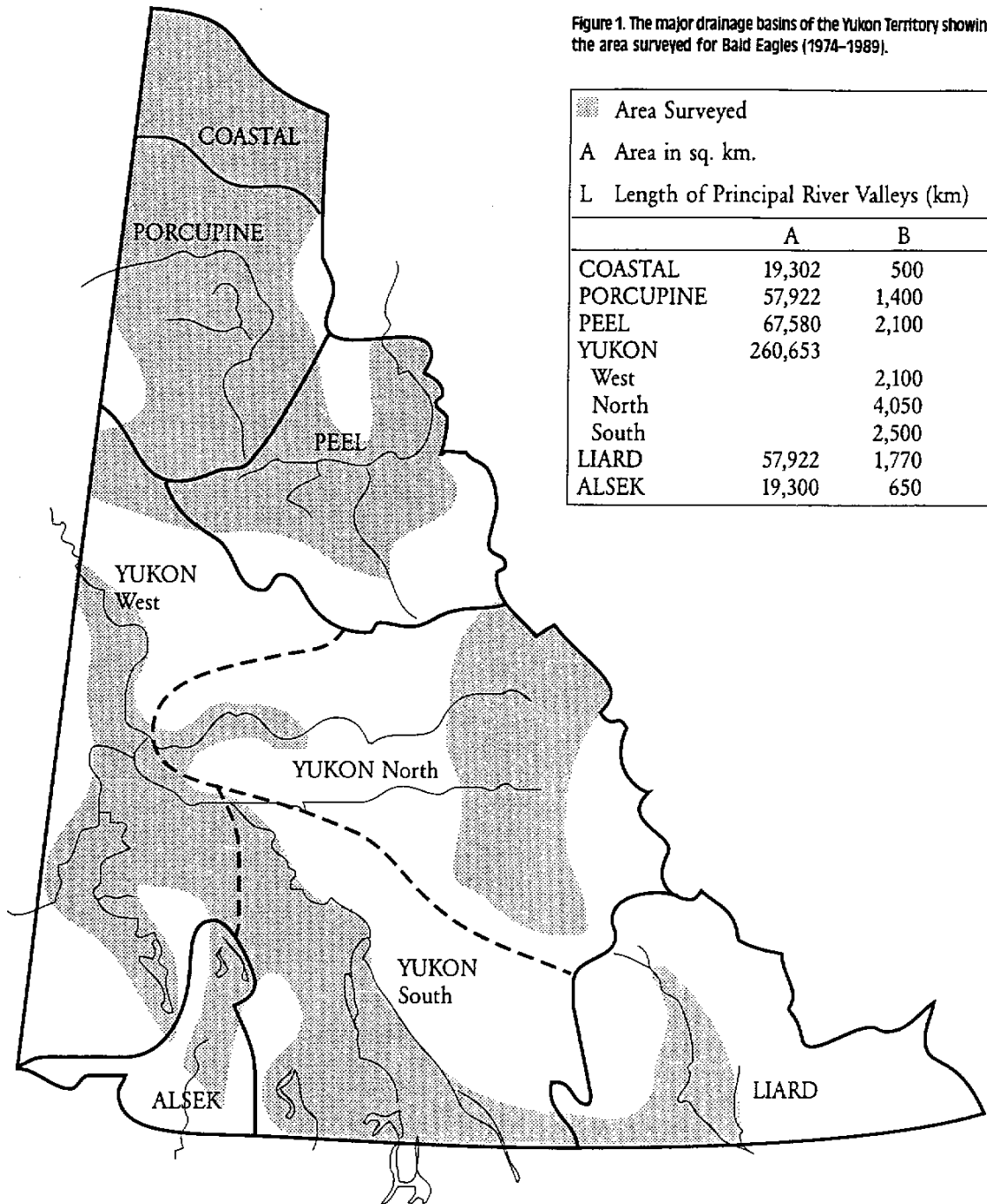
Breeding population

Most raptor inventory surveys in the Yukon have been conducted by aircraft, usually by helicopter. Some initial surveys were conducted by boat, but effectiveness of this survey method for identifying breeding Bald Eagles in the large flood plains of many Yukon rivers has not been considered foolproof. Air surveys have been timed to correspond with late incubation or early brood rearing. Perched or incubating adults have been found to be highly visible. Virtually all waterways surveyed by boat have been resurveyed by air over the years.

The term "nest site" has taken the meaning of an area around an occupied nest which is reasonably assumed to be defended. Stick nests within 2 km of attending adults have been assumed to be the same "site".

At each nest site, its accurate location has been mapped at 1:250,000 and assigned its UTM coordinates which act as a permanent identifier. The species, condition and height of the nest tree have been recorded along with the distance from water. The presence of

alternate nests in the area has been recorded. The presence of adult(s) and the productivity parameters at the nest have been noted including the estimated age of young. For management purposes, analyses of breeding populations of riparian nesting species like Bald Eagles and Peregrine Falcons have been by major drainage basin. The Yukon inventory has divided the territory into seven basins; various ones have received differing levels of attention (Figure 1).



The task of extrapolating Bald Eagle population parameters to these entire drainages varies greatly and simply cannot be done with precise confidence in most cases. Nevertheless, an initial look at the known breeding numbers gives a relatively good generalized impression of the status of the Bald Eagle and points out where future work should be prioritized.

All data were coded and stored as a SAS (Statistical Analysis System) data set. Analysis has been by standard SAS procedures allowing the lumping and comparing of parameters in a variety of ways. Where statistical significance is indicated, tests are by Chi squared at the 90% confidence level. The process of judging coverage was approached in two ways: by the linear distance of water courses surveyed and by the area surveyed within each drainage. In the first case, the average linear shoreline distance between nest sites was calculated and numbers were simply then expanded to extrapolate breeding numbers to the whole drainage. Only river valleys, which were considered large enough to be suitable eagle nesting habitat, were measured in each drainage. As a standard, only those rivers recognized in surveys of Canada's hydrometric network were measured. The entire shorelines of large lakes were included. Concurrently, the measured area of coverage for birds of prey in general within the drainage was used as a percent to extrapolate potential breeding numbers. This value is calculated as a matter of course in the reporting of population analysis of raptors throughout the territory.

Quantifying productivity at the known nest sites is difficult because site visits were not regular or necessarily of the same sample. The best indication from the Yukon drainages is a lumped sample of visits over the years of survey. No repeat visits of the same nest within one year were included. This, although giving no measure of changes in productivity over the years, suggests a relative measure of productivity between areas and allows comparison with eagle populations elsewhere. The attendance of adults at nest sites tends to be the weakest statistic in our single visit survey simply because birds not productive in that year may not be in the immediate area when the survey was conducted. The proportion of sites producing young and the average number of young per nest site over the years are probably more useful indicators.

The Bald Eagle is the one raptor in the northwest which lends itself to identification of critical feeding and concentration areas due to its traditional use of salmon spawning streams and sometimes waterfowl staging areas in late summer. These sites become known mostly through fisheries research and incidental observations made by trappers and others on the land. The importance of these staging and feeding sites to the local eagle populations is undoubtedly enormous and a cataloguing of their locations and the numbers of eagles in attendance has accumulated over the years.

Results and Current Status

Breeding Bald Eagles have been recorded in all drainage basins of the Yukon. The species is considered a common breeder throughout the territory. Across the territory nest sites were virtually always located in trees (one rock site out of 162); large spruce trees in riparian sites dominated (58%) while the rest were in deciduous trees (42%). Differences did occur in the density of breeders between drainage basins, however and productivity

differences also seem apparent from some parts of the territory.

1) North Slope (Coastal)

Only two breeding pairs have been identified in the drainages flowing into the Beaufort Sea. Coverage has been about 90% of both the major drainages and of the area. Clearly these habitats are well north of the Arctic Circle with few nesting trees and a very short open water season are marginal breeding habitat for Bald Eagles. Golden Eagles, meanwhile, are by far the most common breeding raptor in the region suggesting the differing strategies of the two eagle species create differing opportunity at high latitude.

Productivity of Bald Eagles in North Slope drainages is hard to assess, but indications are of a relatively low breeding effort. Of the two nest sites, only one is known to have produced young in the last 5 years.

2) Porcupine River

This drainage straddles the Arctic Circle, but contains some rich wildlife features including the wetlands of Old Crow Flats and the large salmon runs of the Porcupine River. The Bald Eagle is a fairly common breeder throughout.

Twenty-four different nesting sites are in the data file for the Porcupine drainage. Coverage by area in the drainage has been estimated at 80% and 70% by watercourse. This suggests a breeding population of between 37 and 43 pairs. An average linear watercourse distance between nests averaged 32 km. Productivity at these nest sites was assessed from 36 annual visits to different nests. The visits span the period from 1977 to 1984. Occupancy by adults averaged 53% and 42% produced young. The production averaged two young per successful nest.

A concentration of eagles is associated with spawning salmon in the upper Porcupine drainage, including the Fishing Branch River. It is possible that most of the eagles breeding in the Porcupine Basin may concentrate in that area in late summer.

3) Peel River

This large drainage in the north eastern portion of the territory lies mostly south of the Arctic Circle and contains relatively productive wetlands. It harbors no Pacific salmon runs, but is used extensively by the very productive Mackenzie River delta fish populations.

Twenty-six different Bald Eagle nest sites are known from the basin. Coverage was estimated at 60% by area and 50% by watercourse distance. A breeding population of between 54 and 123 pairs is suggested. Inter-nest distance along waterways averaged 17 km. Productivity measurement is from a sample of 52 annual visits over the period from 1978-1982. In that period, 69% of nest sites were found attended by adults and 50% of nests produced young. An average of 1.5 (\pm 0.2) young were being raised at successful nests. No eagle concentrations are known to occur in this area.

4) Yukon North

This section of the large Yukon River basin includes the mainstream of the Yukon River and its two largest tributaries, the Stewart and the Pelly rivers. Several salmon runs are included and the valleys of the large rivers have relatively productive wetland habitats. Twenty-three Bald Eagle nest sites are known from the region. Coverage by area was 40% and 30% of the linear waterway distance was surveyed. A breeding population of between 72 and 96 pairs is suggested. Linear distance between pairs averaged 42 km. There were 27 visits over the period from 1978-1982. An average of 81% of the sites were attended by adults and overall 63% produced young. An average of 1.4 young (± 0.4) were produced per successful nest.

No staging or concentration sites are known for the drainage although coverage in this mostly remote drainage during late summer has been negligible.

5) Yukon West

This area includes the large tributaries of the Yukon which drain the northern flanks of the St. Elias Mountains. Several salmon runs occur in these drainages and extensive wetlands used by a variety of waterfowl species are in the hinterlands.

Twenty-one nesting sites are known from the area. Coverage was 60% by area, 60% by waterway, translating into a potential population of about 41 pairs. Linear distance between pairs averaged 51 km. At these sites, 25 visits were made over the years 1978-1988. Sixty-eight percent of nest sites were found attended by adults and 44% produced young. The average number of young per successful nest was 1.3 (± 0.2).

Two concentrations of eagles are known in the region. One concentration of up to 100 eagles occurs on the Kluane River north of Kluane Lake in association with a salmon spawning area. The other, about 25 birds similarly associated with salmon, occurs on the upper White River near the mouth of the Koidern River.

6) Yukon South

This includes an area dominated by the large headwater lakes of the Yukon River. Several salmon runs occur and the lake systems are relatively productive. The Yukon tends to be dominated by the mountains of the coast ranges limiting Bald Eagle habitat to the valley bottoms.

Fifty-two different nest sites are known from this area. Coverage was 54% by area and 44% by watercourse, suggesting a population between 138 and 158 nest sites. Average linear watercourse distance between sites was 16 km. Visits to individual nest sites over the period 1977-1988 totaled 59. On these visits, 62% of sites were found attended by adults and 44% produced young. On average, successful pairs were raising 1.7 (± 0.2) young.

Four small fall concentrations of eagles occur. One concentration of up to 50 eagles is on the Teslin River in association with a chinook salmon spawning area. Another (up to 30 eagles) on the Nisutlin River is associated with staging waterfowl and a chinook salmon

run. Small concentrations of eagles (estimated at 20 and 50) are also known from the Big and Little Salmon rivers in association with spawning chinook salmon.

7) Alsek River

This area includes a diverse region of some large lakes and rivers harboring salmon in the southern territory, but also includes a large area of high mountains and glaciers. The eagle habitat is closely linked with the Yukon south segment and perhaps should be considered part of that area.

Nine Bald Eagle nests are known from the area. With an estimated 50% of the area covered and 75% watercourse coverage, the population may be between 15 and 22 pairs. Distance between sites was about 25 km. Productivity from 13 annual visits over the period 1978-1989 showed 69% of sites occupied and 39% producing young. On average, successful pairs were producing 1.6 (\pm 0.4) young.

A small concentration (averaging 5-15 birds) occurs annually in association with salmon runs to the upper Tatshenshini River near the village of Klukshu about 30 km west of Haines Junction on the southern border of Kluane National Park.

Table 1. Estimated number of Bald Eagle nest sites in the Yukon Territory by drainage basin.

Drainage	Known nest sites	Yukon Totals	
		Extrapolated by area	Extrapolated by inter-nest distance
North Slope	2	3	3-4
Porcupine	24	37	42
Peel	26	54	123
Yukon River (north)	23	72	96
(west)	21	41	41
(south)	52	138	158
Alsek	9	22	15
Liard	5	31	63
Total	162	398	552

8) Liard River

This is a relatively large drainage in the south eastern portion of the territory which drains eastward into the Mackenzie system. It has been poorly surveyed and the known Bald Eagle population is not thought to be indicative of total numbers.

Five nest sites are known. With coverage less than 20% by area and 10% by waterway, a population of between 31 and 63 pairs is suggested. Seven visits show an average occupancy of 57% and an average of 39% of nests producing young. No eagle concentration areas are known for the region.

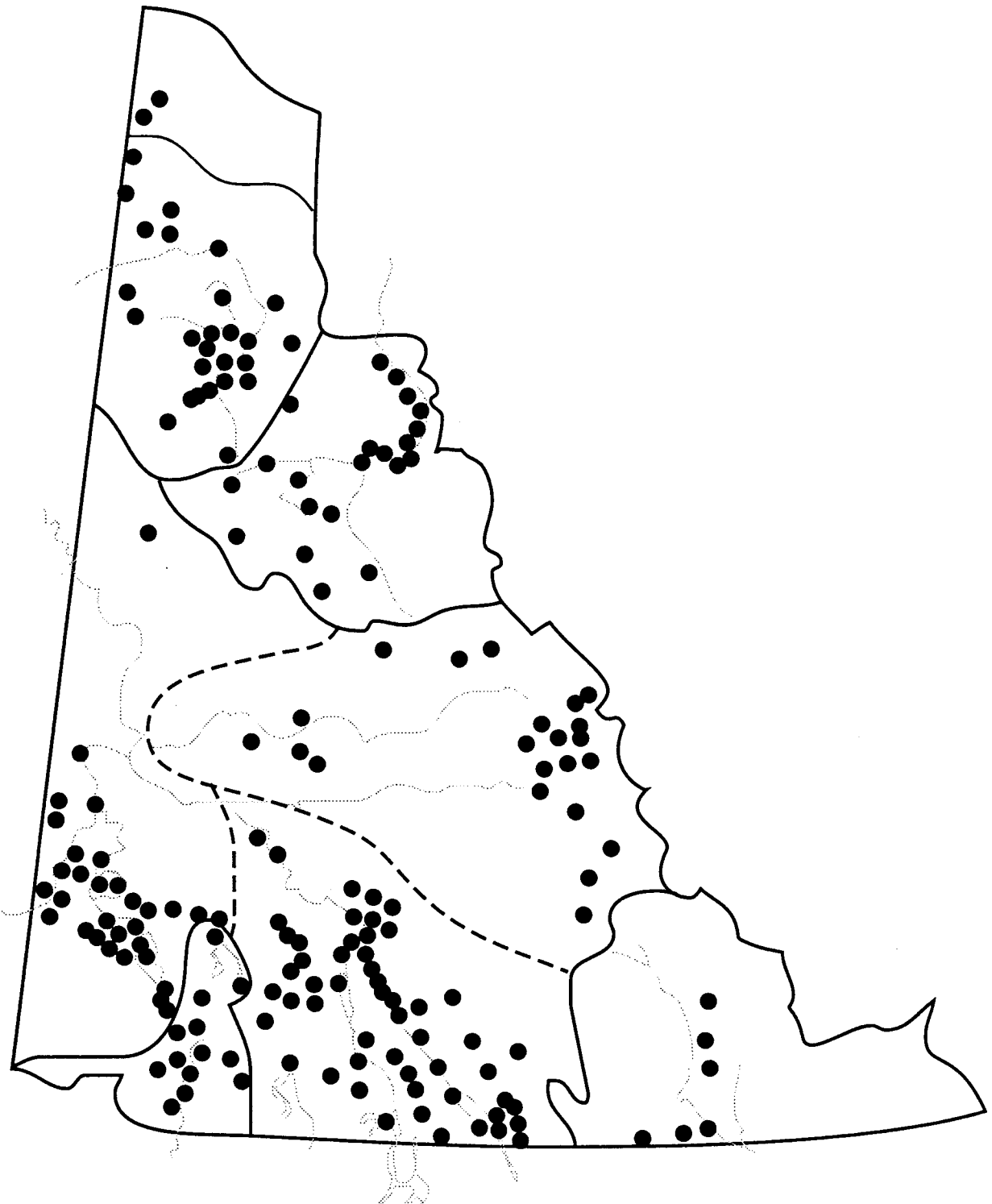


Figure 2. Locations of known nest sites of Bald Eagle from survey 1974-1989.

Discussions and Conclusions

With the possible exception of the North Slope, breeding pairs of Bald Eagles are found throughout Yukon. No evidence exists to suggest any trend in their numbers. Ignoring the

possible differences in density between drainages, it is clear that the breeding range of the species must be considered to include the whole territory (Figure 2).

Location of known nest sites

In total, 163 Bald Eagle nest sites are known throughout the Yukon. Depending on the reliability of methods of extrapolation this could translate to a total population of somewhere between 400 and 550 breeding sites (Table 1). Clearly these numbers depend substantially on the estimates of coverage and the overall estimate of accuracy. Because there is no area where Bald Eagle surveys have been a priority, there is no way to check these estimates. They are based on assumed visibility and coverage relative to the other birds of prey being surveyed more completely in the same area. A refinement of these extrapolations will await a specific survey of Bald Eagles in some significant area of the territory.

The breeding densities suggested are low when compared with prime eagle nesting habitat in Saskatchewan and Manitoba (Leighton et al. 1979, Koonz 1983). The Yukon's 482,000 km² may support 500 breeding pairs or one nest site per 960 km². However, it is questionable whether the Yukon with its mountain-valley habitats can be compared to the more homogeneous habitats in Saskatchewan and Manitoba. The linear measure of shoreline has more promise for extrapolating and comparing Yukon's eagle densities and perhaps Bald Eagle populations in general (Whitfield et al. 1974). The Yukon's 16,520 km of principal waterways average one nest site per 30-40 km. This compares to 17-19 km per nest site from the areas mentioned above, suggesting Yukon populations in the medium to low range by comparison.

The differences between Yukon drainage areas are significant in some cases. The North Slope with its 175 km average distance between nest sites is probably best viewed as non-eagle habitat. While the Peel and Yukon south drainages (17 km and 15 km between sites) compare closely with southern eagle populations. The rest of the Yukon averages 39 km between sites. Productivity parameters from the various drainages show no significant differences. On average, 39%-63% of nest sites were producing young annually. No significant difference could be detected in the production of young from the successful nests in the various drainages. Using the lumped sample of all nests visited in all years, productivity averaged 1.6 ± 0.19 (s.d.) young per successful nest site. These values are well within the ranges for reproductive statistics of Bald Eagles throughout North America (Stalmaster 1987).

The total population of Bald Eagles migrating annually out of the Yukon, based on the survey data and all the assumptions noted, is at best a relatively shaky estimate. Nevertheless, it appears that between 800-1,100 adults, approximately 300-480 young of the year and an unknown number of subadults (perhaps 150-250) are in the 1,250-1,900 "fall flight" population. The best overall impression is of a stable, normally productive population at medium to low density, occupying suitable habitat throughout the riparian systems of the territory.

A total population of 315 eagles is estimated at the eight known staging sites. Clearly, not

all eagles in the Yukon fall population are accounted for. These high latitude, interior eagles are critically dependant on late summer salmon runs. It is hoped a more complete inventory of these important staging habitats will accumulate over time and a further understanding of eagle migration strategy, particularly in the far north, will emerge.

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