BALD EAGLE CONCENTRATIONS IN GLACIER NATIONAL PARK

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Bald Eagles *(Haliaeetus leucocephalus)* congregate in Glacier National Park, Montana, each autumn to feed upon spawning Kokanee Salmon *(Oncorbynchus nerka)*. Systematic observations and censuses of these eagle concentrations were initiated in 1965. McClelland (Condor 75:121-123, 1973) reported the results of the censuses for 1965-1966 and 1968-1970. From September to early December during 1971 and 1972 I conducted a study of the eagles in the same area, with special emphasis on recommendations for management. The purpose of this note is to present findings supplemental to McClelland's, including the results of my censuses during 1971 and 1972, and censuses conducted during 1973 through 1977 by Park personnel.

The study area and the history of the salmon runs and eagle concentrations have been described in detail by McClelland (op. cit.) and Shea (MS thesis, Univ. of Montana, Missoula, 1973). The area includes the foot of Lake McDonald and the entire 3.9 km of lower McDonald Creek in Glacier National Park, and 7.1 km of the Middle Fork of the Flathead River (Figure 1). My study efforts were concentrated in McDonald Creek's big bend area, which is ideally suited for observation because of good spawning conditions for the salmon, an abundance of perching and feeding sites for the eagles and good visibility for the observer.

Kokanee Salmon were first introduced into the Flathead River drainage around 1916, and into Lake McDonald in 1922 and 1923 (Glacier National Park files). The first indication of large numbers of eagles gathering to feed on the salmon was noted in 1939, when Park Rangers counted 37 eagles along McDonald Creek. Numbers gradually increased annually, and from 1965 through 1970, the average maximum count was 249 eagles.

I made 12 censuses by canoe along the 11 km water route during each of the two autumns, using the method described by McClelland (op. cit.). Eagles were counted and classified as matures or immatures. They were considered immature unless the heads and tails appeared completely white (Southern, Jack-Pine Warbler 45:70-80, 1967). The 1973 through 1976 counts by Park personnel differed in that fewer counts were made each season, and in that the Flathead River portion of the count was discontinued during several of these years. The maximum counts for these years are comparable to those made previously, as most birds are present along McDonald Creek. During 1977, more personnel were involved, enabling more complete coverage of the entire Lake McDonald area to the inlet. This additional coverage added 41 birds to the 1977 maximum count.

In addition to censuses, I made observations of feeding behavior and daily activity patterns from three blinds erected along McDonald Creek.

Systematic censuses provide a general basis for future comparisons of total eagle numbers and percentages of immature birds. Dates of maximum counts are variable, apparently influenced by fluctuations in the salmon runs, and to a lesser extent, by the weather.

Immature Bald Eagles tend to move south earlier in the fall than do the adults (Sprunt and Ligas, Proc. 62nd Ann. Conv., Natl. Audubon Soc., 1966), and this trend was evident in four of the seven years (Glacier National Park files). Because of this there is apt to be a higher percentage of immatures during years when maximum counts occurred earlier. The 1977 maximum count was the highest ever recorded in Glacier.

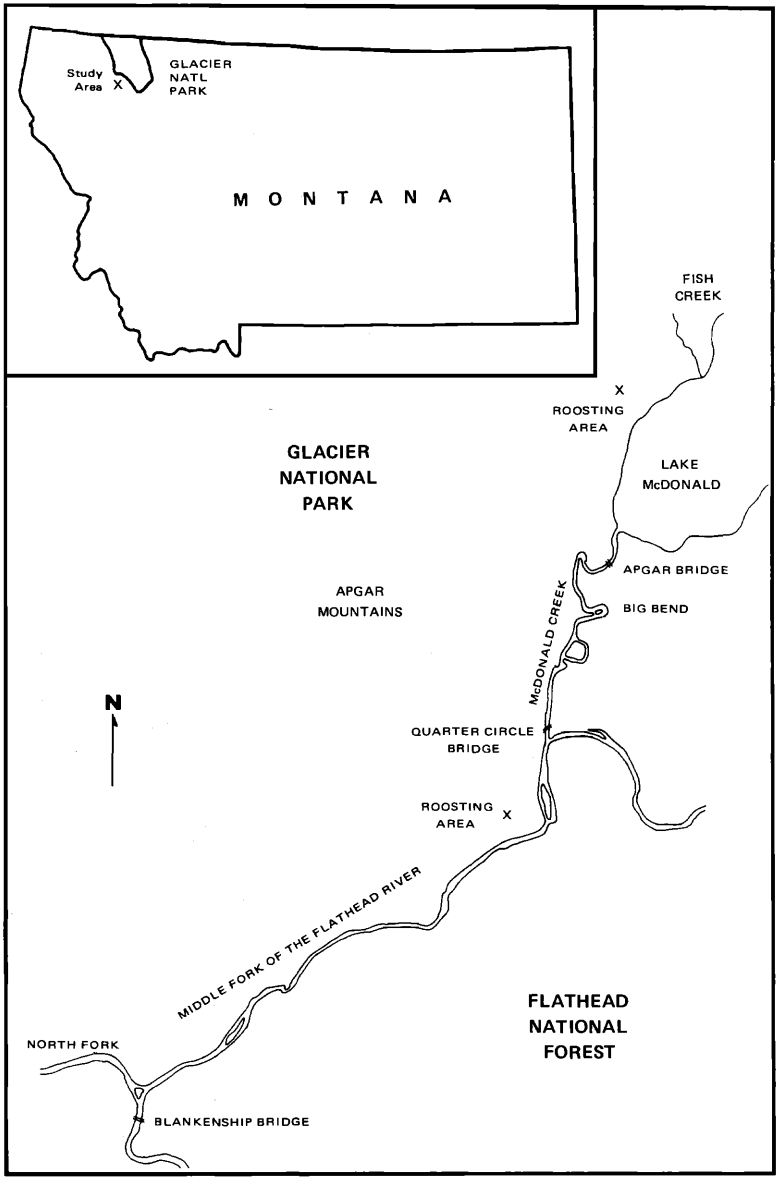

Figure 1. Location of Glacier National Park and of the study area.

Table 1. Maximum Bald Eagle numbers and percentages of immatures in the maximum counts for the period 1971 through 1977.

Year	Date	Total	% Immature
1971	10 November	267	54
1972	9 November	261	33
1973	21 November	357	34
1974	15 November	359	30
1975	25 November	377	25
1976	16 November	361	26
1977	30 November	444	30

Adult Bald Eagles were found to be very adept at capturing salmon. Most often eagles dived from a high perch and stooped upon weakly swimming, spawned-out fish. I observed 312 of these dives and found that mature birds successfully captured salmon on 84% of their attempts. If undisturbed, an adult eagle usually consumed a fish (about 32 cm average total length), often leaving the head, in 3 to 6 minutes. One adult captured and ate three entire salmon in 45 minutes. In contrast, subadult eagles did not attempt to capture salmon by diving as often as did adults, and when they did so, they were less successful. Of 99 observed attempts, 64% were successful. Young birds more often secured their food by picking up salmon along the shore, wading after salmon in shallow water, or by stealing from other eagles. They also took longer to consume their catch; one immature took 19 minutes to eat a single salmon. Hunting and feeding skills apparently develop during the long subadult period.

Daily activities and movements of eagles on McDonald Creek followed a definite pattern. Virtually no birds were present along the Creek at night, but they began arriving from their roosts at an average of 30 minutes (range of 24 to 39 minutes) before actual sunrise. This was followed by a 2 to 3 hour period of intensive feeding. Activities during the rest of the day included long periods of perching, interspersed with feeding, occasional short flights along the Creek, and bathing and preening. Departure from the feeding areas to the roosts in the evening began about 30 minutes before actual sunset. Two principal roosts were located, one on the west bank of the Middle Fork about 1.1 km south of the confluence with McDonald Creek, and the other adjacent to the southwest shore of Lake McDonald, about 3.2 km north of the feeding areas (Figure 1). Favored roost trees were large Black Cottonwoods *(Populus trichocarpa)* and Western Larch *(Larix occidentalis)*. On the evening of 2 November 1972, I counted 76 eagles flying north to the Lake McDonald roost from the north end of McDonald Creek, or 37% of the total number counted earlier the same day during a census by canoe. The latest observed flight of an eagle to the roost was 15 minutes after actual sunset.

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