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FOOD HABITS OF THE NORTHERN BALD EAGLE IN THE ALEUTIAN ISLANDS, ALASKA

By OLAUS J. MURIE

Two Biological Survey expeditions to the Aleutian Islands in 1936 and 1937, offered excellent opportunities for observations on the Northern Bald Eagle, *Haliaeetus leucocephalus alascanus*, which is common throughout that chain of islands. In view of the interest in the status of the Bald Eagle in Alaska, it seems appropriate to record our findings.

An extensive faunal survey of the Aleutians was made to form the basis of management plans for the Aleutian Islands Wildlife Refuge, administered by the Biological Survey. A good seaworthy ship, the *U.S.M.S. Brown Bear*, was placed at our disposal, and this made possible a thorough exploration of those interesting islands. In 1936, Cecil Williams and I made up the scientific party, and we were assisted by Douglas Gray and Homer Jewell of the Alaska Game Commission. In 1937, I was accompanied by Dr. Victor B. Scheffer, John H. Steenis, and Douglas Gray, who again represented the Alaska Game Commission.

Since our program was rather comprehensive, we could not devote the time we should have liked to the Bald Eagle, but enough data were obtained on its food habits during the nesting season to be significant. When a nest was visited, all food debris was collected. In 1936, ten nests or nesting sites were inspected and food materials listed. Some of these were on Amak Island, just north of the western tip of the Alaska Peninsula, and on Sankin Island, near False Pass; others were to the west. These nests were well distributed throughout the chain of islands. In 1937, eighteen nests were studied. Thus in the two years, 28 nests of the Northern Bald Eagle were examined and a total of 399 food items listed. Many other nests were seen, but there was not sufficient time to examine them.

Easily identified food items were simply listed on the spot. The remainder were taken to the ship, where further identifications could be made by comparison with specimens collected in the course of the trip. The material most difficult to determine was saved for study in the laboratory. Items of this kind from the first expedition were examined in Washington, D.C., by Cecil Williams, and those from the 1937 expedition were examined at my field headquarters at Jackson, Wyoming.

In the two following tables are listed the food remains and pellets found in Bald Eagle nests in 1936 and 1937, respectively. Percentages are based on numbers of individuals rather than volume, as the latter method is not applicable to this kind of material. (The first table includes material from two localities where we did not have time to locate the nests themselves, but substantial collections of pellets and food remains warrant their being listed as nests.)

FOOD ITEMS IN BALD EAGLE NESTS, 1936

Item	Total number of individuals	Per- centage	Number of nests in which found	Greatest number in one nest
Birds				
Shearwater, <i>Puffinus</i>	6	8.1	4	2
Fulmar, <i>Fulmarus glacialis</i>	5	6.7	3	3
Forked-tailed Petrel, <i>Oceanodroma furcata</i>	1	1.3	1	1
Cormorant, <i>Phalacrocorax</i>	2	2.7	2	1
Duck	1	1.3	1	1
Harlequin Duck, <i>Histrionicus histrionicus</i>	2	2.7	2	1
Pacific Eider, <i>Somateria v-nigra</i> (female)	1	1.3	1	1
Glaucous-winged Gull, <i>Larus glaucescens</i>	2	2.7	1	2
Kittiwake, <i>Rissa tridactyla</i>	1	1.3	1	1
Murres, <i>Uria aalge</i> , <i>U. lomvia</i>	12	16.2	1	12

Item	Total number of individuals	Per- centage	Number of nests in which found	Greatest number in one nest
Birds				
Pigeon Guillemot, <i>Cephus columba</i>	2	2.7	2	1
Ancient Murrelet, <i>Synthliboramphus antiquus</i>	1	1.3	1	1
Paroquet Auklet, <i>Cyclorhynchus psittacula</i>	2	2.7	1	2
Crested Auklet, <i>Aethia cristatella</i>	3	4.0	2	2
Tufted Puffin, <i>Lunda cirrhata</i>	1	1.3	1	1
Undetermined alcid	1	1.3	1	1
Undetermined bird	1	1.3	1	1
	44	58.9		
Mammals				
Domestic Sheep	1	1.3	1	1
Field Mouse, <i>Microtus amakensis</i>	3	4.0	1	3
	4	5.3		
Fishes				
Atka Mackerel, <i>Pleurogrammus monopterygius</i>	5	6.7	1	5
Cottids	6	8.1	2	4
Undetermined fish	3	4.0	3	1
	14	18.8		
Invertebrates				
Squid	1	1.3	1	1
Snails	6	8.1	4	3
Crab	4	5.4	2	3
Nereid (mandibles)	1	1.3	1	1
	12	16.1		
	74			

FOOD ITEMS IN BALD EAGLE NESTS, 1937

Birds				
Shearwater, <i>Puffinus (tenuirostris?)</i>	13	3.9	9	3
Fulmar, <i>Fulmarus glacialis</i>	74	22.6	15	20
Cormorant (probably <i>Phalacrocorax pelagicus</i>)	20	6.1	10	6
Emperor Goose, <i>Phalacte canagica</i>	2	.6	2	1
Duck	1	.3	1	1
Pintail, <i>Dafila acuta</i>	1	.3	1	1
Teal (probably <i>Nettion crecca</i>)	1	.3	1	1
Old-squaw, <i>Clangula hyemalis</i>	10	3.1	5	3
Harlequin Duck, <i>Histrionicus histrionicus</i>	1	.3	1	1
Pacific Eider, <i>Somateria v-nigra</i>	4	1.2	4	1
Red-breasted Merganser, <i>Mergus serrator</i>	1	.3	1	1
Bald Eagle, <i>Haliaeetus leucocephalus</i> (nestling)	1	.3	1	1
Ptarmigan, <i>Lagopus rupestris</i>	1	.3	1	1
Glaucous Gull, <i>Larus hyperboreus</i>	2	.6	1	2
Glaucous-winged Gull, <i>Larus glaucescens</i>	27	8.3	12	6
Kittiwake, <i>Rissa tridactyla</i>	2	.6	1	2
Murres, <i>Uria aalge</i> , <i>U. lomvia</i>	22	6.7	9	12
Pigeon Guillemot, <i>Cephus columba</i>	4	1.2	3	2
Ancient Murrelet, <i>Synthliboramphus antiquus</i>	9	2.8	6	4
Paroquet Auklet, <i>Cyclorhynchus psittacula</i>	8	2.4	5	3
Crested Auklet, <i>Aethia cristatella</i>	37	11.3	13	11
Least Auklet, <i>Aethia pusilla</i>	3	.9	2	2
Horned Puffin, <i>Fratercula corniculata</i>	13	4.6	7	7
Tufted Puffin, <i>Lunda cirrhata</i>	21	6.4	9	5
Raven, <i>Corvus corax</i>	2	.6	2	1
	280	86.0		

Item	Total number of individuals	Per- centage	Number of nests in which found	Greatest number in one nest
Mammals				
Blue Fox, <i>Alopex</i> sp.	1	.3	1	1
Aleutian Ground Squirrel, <i>Citellus p. ablusus</i>	22	6.7	3	14
House Rat, <i>Rattus norvegicus</i>	1	.3	1	1
Domestic Sheep	1	.3	1	1
	25	7.6		
Fishes				
<i>Plagyodes</i> sp.	4	1.2	4	1
Greenling, <i>Hexagrammos</i> sp.	4	1.2	3	2
Atka Mackerel, <i>Pleurogrammus monopterygius</i>	9	2.8	6	4
Alaska Cod, <i>Gadus macrocephalus</i>	1	.3	1	1
Sculpin (Cottidae)	1	.3	1	1
Dolly Varden Trout, <i>Salvelinus malma</i>	1	.3	1	1
	20	6.1		
	325			

These data concerning the 399 food items taken in two seasons from 28 nests, distributed at regular intervals throughout the entire chain of islands, should be representative and significant.

Birds.—It will be noted that birds constitute the major part of the Bald Eagle's diet, amounting to 86.0 per cent in 1937, although in 1936 they formed only 58.9 per cent. The lower percentage recorded for 1936 was no doubt caused by the fact that the data for that year were obtained to a greater degree from pellets, which revealed more invertebrate items than would be found in direct nest examination, and as these were listed on a par with others, the percentage of birds would be correspondingly lowered. Furthermore, these invertebrates were recorded only from nests on Unimak and Amak islands, where there are extensive beaches, and where such items may more readily be picked up by the eagles. It is likely that the material obtained in 1937, consisting of 325 items, is somewhat more representative of the Bald Eagle's diet in the Aleutian Islands as a whole.

Certain it is that birds are the chief food, and this would be expected in view of their supremacy in the fauna of the Aleutian Islands. It is significant also that the eagles prey extensively on so-called sea birds, which are the most plentiful there, the most numerous ones in the 1937 material being shearwaters, fulmars, cormorants, Glaucous-winged Gulls, murre, Ancient Murrelets, Paroquet Auklets, Crested Auklets, and Horned and Tufted puffins. Fulmars lead the list, though shearwaters also are taken often. Numerous auklets are captured, and cormorants and Glaucous-winged Gulls pay a fairly heavy toll to the eagle.

Undoubtedly some of these birds are taken as carrion. Fly pupa cases were found in some of the samples. But in numerous instances the plumage of the bird remains was fresh and showed no evidence of having rolled on the beach. It would seem that the eagle is capable of capturing various species, including the abundant fulmars and gulls, as well as the fast-flying auklets. The lumbering cormorant should be easy prey.

It is noticeable that few ducks were taken. A probable reason for this is the great abundance of sea birds, which thus act as buffers. Among the ducks, Oldsquaws seemed to fall prey most readily, though they were present in only a few localities.

Mammals.—The percentage of mammals in the diet requires explanation. Small rodents are not available on most of the islands. Ground squirrels have been introduced on Kavalga Island for fox food, and the eagles apparently take full advantage of that

supply. These rodents are not available on the other islands where nests were examined, except on Unimak Island. House rats are common on Rat Island. Probably on only three other islands could these be found by eagles.

Domestic sheep wool was found in one nest near Umnak Island, where a large herd of sheep is kept.

It is known that eagles will feed on stranded whales and seals, but such items did not appear in the nests.

Fishes.—The Bald Eagle's appetite for fish is well known, and the percentage of such remains found in the material studied would seem to be low. Probably many of the fishes are found as carrion on the beaches. This would seem to be necessary in the case of cod as well as of *Plagyodes*. We found the latter washed up on the beach on several occasions.

At times fishes were seen at the surface of the water under circumstances that would permit capture by an eagle. This was particularly true of the Atka mackerel. Whether sculpins or greenlings can be picked up in shallow waters is not known. They may be available occasionally in tide pools.

ECONOMIC STATUS OF THE EAGLE

For a number of years Alaska has paid a one-dollar bounty on eagles. A few persons in southeastern Alaska have made eagle hunting a commercial, part-time project. Eagle claws serve, in a measure, as legal tender. A store in Kodiak displayed a sign, "Eagle Feet Bought Here." Certain natives had taken very young birds in the nest and were raising them, temporarily as pets, but eventually to be turned in for the bounty.

Such universal application of an eagle bounty is the result of the general opinion that the eagle is harmful to man's interests, and this opinion must surely rest on a number of direct observations. The obvious sincerity of certain informants, both white men and natives, could leave no doubt that they had seen good evidence of eagle depredations. But when they were questioned on the extent of such depredations, the information became uncertain. Here lies the crux of the eagle question. There are many good single observations. But there has been little if any quantitative study, and we have had little basis for evaluation.

The present data apply only to the Aleutian chain. We had no opportunity to work on eagles east of the end of the Alaska Peninsula, least of all in southeastern Alaska, where such study is most needed. Our studies appear ample for an evaluation of the eagle's status in the Aleutian Islands, at least through the spring and summer.

The eagle has been charged with undue destruction of salmon. In the Aleutians as a whole the salmon, although present in moderate numbers, are not conspicuous in the fauna and not available on a large scale. Therefore, that problem does not arise except in the vicinity of False Pass, at the extreme east end of the group of islands. Special work, for which we lacked the necessary time, would be desirable there.

Domestic sheep wool was found once each year in a single nest near Umnak Island. The man in charge there had no complaints against the eagle, and I could learn of no actual depredations. Sheep are not present west of Umnak Island.

Depredation on blue foxes has been charged to the eagle, and this was cited by many with whom we talked. Here is a problem particularly applicable to the Aleutian Islands, since most of the islands have been leased for raising foxes. The blue foxes run wild, forage for themselves, and are usually trapped at two or three-year intervals. They would seem to be vulnerable to eagle attack, living as they do on the beaches of treeless islands. Also, Aleut natives told us that eagles do take young foxes. Accordingly we gave special attention to the eagle-fox relationship.

Although most of the eagle nests examined were on islands occupied by foxes, we found a fox pup in only one nest, on Rat Island. On a percentage basis this is .3 per cent of the eagle diet, and even this possibly is carrion.

On Amchitka Island, within 200 yards of an eagle's nest containing no fox remains, a family of young foxes was living unmolested. There was another fox family at a somewhat greater distance in the opposite direction. Foxes were seen on the beach within easy reach of eagles on Kavalga Island. Many such instances could be cited. In fact, on Rat Island, where the young fox was found in the eagle's nest, there were two other nests with no trace of fox fur, and foxes were plentiful within easy reach of all of these.

Several dead foxes had been found on the beaches, and it is probable that eagles would find some of these, though they should be capable of catching live ones also. At any rate, the evidence shows that eagles are not a serious menace to the blue foxes in the Aleutian Islands. An excellent fur crop is generally harvested on islands with suitable productive beaches.

There were some reports among the natives that eagles kill young sea otters. I can believe that natives have actually seen sea otter remains in eagle nests. Their accounts were convincing. But when questioned on *how many* had ever been found thus, their replies were vague, and they could give no satisfactory information. We found no trace of the sea otter in nests or pellets, though we did find sea otter fur in a few blue fox droppings. We also found several adult sea otter skeletons from which the flesh had been eaten by eagles or foxes or both. These no doubt had been carrion. The natives themselves occasionally find a baby sea otter on the beach that has been a victim of the surf or has died from some other natural cause. Eagles also must find some of these. It is well known that sea otter carcasses are occasionally washed up on the beach.

The sea birds on which the Bald Eagles feed so extensively are sufficiently numerous to withstand the drain occasioned by a few pairs of eagles on any given island. Clashes with man's economic interests occur so seldom and on so small a scale that they are negligible. Therefore, in the Aleutian Islands at least, the food habits of the Northern Bald Eagle are harmless so far as man's commercial interests are concerned.

Bureau of Biological Survey, Jackson, Wyoming, February 19, 1940.