GENERAL NOTES

Bald Eagle Predation on Nocturnal Seabirds.—Bald Eagles (*Haliaeetus leucocephalus*) are opportunistic predators and scavengers (Retfalvi 1970, Dunstan and Harper 1975, Sherrod et al. 1975, Grubb and Coffey 1982). In Alaska most eagles depend primarily on fish (Ofelt 1975, Grubb and Hensel 1978), but those residing near large seabird colonies rely heavily on marine birds for food (Murie 1940, Krog 1953, Sherrod et al. 1976). In this note we describe the contents of 24 pellets regurgitated by Bald Eagles and speculate on the methods used by eagles to obtain nocturnal, burrow-dwelling seabirds.

Our observations were made from 10–12 June 1977 on Petrel Island, which is part of the Forrester Island National Wildlife Refuge, about 140 km southwest of Ketchikan, Alaska. Petrel Island is about 65 ha, rises to an elevation of 100 m, and is heavily forested with Sitka spruce (*Picea sitchensis*). The island is riddled with nesting burrows of Fork-tailed and Leach's storm-petrels (*Oceanodroma furcata, O. leucorhoa*), and Cassin's Auklets (*Ptychoramphus aleuticus*). The number of active burrows averaged 2.7/m^2 over much of the island in 1976. Estimates of breeding populations for these species on the island in 1976 were: 689,000 Leach's Storm-Petrels, 89,000 Fork-tailed Storm-Petrels, and 23,000 Cassin's Auklets (Sowls et al. 1978). Other nesting species which were potential Bald Eagle prey included Pelagic Cormorants (*Phalacrocorax pelagicus*), Black Oystercatchers (*Haematopus bachmani*), Glaucous-winged Gulls (*Larus glaucescens*), Common Murres (*Uria aalge*), Pigeon Guillemots (*Cepphus columba*), Ancient Murrelets (*Synthliboramphus antiquus*), Rhinoceros Auklets (*Cerorhinca monocerata*), Tufted Puffins (*Fratercula cirrhata*), Horned Puffins (*Fratercula corniculata*), and several passerines (Willett 1915).

We observed up to 10 Bald Eagles on Petrel Island on 10 June 1977; most were immatures. A pair nested on the island in 1977.

On 10 June 1977, we collected 24 Bald Eagle pellets from hundreds that lay scattered over the island. Analysis of the pellets suggested that nocturnal seabirds, notably Cassin's Auklets, were important prey of Bald Eagles (Table 1). Superficial examination of additional decomposing pellets suggested that all were composed primarily of feathers and small bones. Bald Eagles also were observed capturing or carrying Glaucous-winged Gull chicks (2), a Leach's Storm-Petrel, a black rockfish (*Sebastes melanops*), and a Northern Fulmar (*Fulmarus glacialis*).

We suspected that eagles were excavating seabirds from burrows because we found several areas where surface soil was disturbed by digging. No land mammals larger than a mouse (*Peromyscus sitkensis*), a vole (*Microtus coronarius*), and a shrew (*Sorex obscurus*) occur on this island group and it seems likely that birds were responsible. The diggings did not seem characteristic of the burrowing species of seabirds. Our suspicions were reinforced when, on several occasions, we flushed up to 6 eagles from the ground in the forest during the day. D. J. Forsell (pers. comm.) confirmed that Bald Eagles are capable of digging when he observed an immature eagle excavating a Tufted Puffin burrow in the eastern Aleutian Islands. G. V. Byrd (cf. Trapp 1979) reported Glaucous-winged Gulls inspecting storm-petrel burrow entrances for unwary adults and chicks. Bald Eagles may combine a similar strategy with excavation of shallow burrows to capture storm-petrels.

Bald Eagles on Petrel Island were active just before dark and were frequently observed flying above and within the forest at this time. On the night of 12 June two immature Bald Eagles were discovered roosting 10 m from the ground in dead spruce trees. At 01:30 a third immature eagle was found roosting on a 1 m high spruce stump. Several incriminating storm-petrel feathers were stuck to its head and bill. The eagle appeared unwilling to fly in the darkness, but upon our close approach it crashed clumsily through the underbrush. Two freshly killed Leach's Storm-Petrels were found near the roost. Presumably the eagle had captured the storm-petrels shortly after they began to arrive at the colony or emerge from their burrows. Storm-petrels and auklets are so numerous on Petrel Island that eagles on the ground could probably capture them at night through chance encounter alone. E. P. Bailey and D. R. Nysewander (pers. comm.) independently observed Bald Eagles chasing storm-petrels on the ground at night on St. Lazaria Island near Sitka, Alaska.

TABLE 1. Relative importance of prey in 24 Bald Eagle pellets from Petrel Island in June 1977.

Species	No. & % of pellets in which prey occurred		No. & % of prey in pellets	
	No.	%	No.	%
Fork-tailed Storm-Petrel[1]	2	6	2	5
Leach's Storm-Petrel[1]	6	17	6	15
Unid. Storm-Petrel[1]	4	11	4	10
Common Murre	1	3	1	3
Cassin's Auklet[1]	14	40	18	46
Rhinoceros Auklet[1]	2	6	2	5
Tufted Puffin	1	3	1	3
Unid. Alcidae	2	6	2	5
Unid. Bird	2	6	2	5
Unid. Mammal	1	3	1	3

[1] Nocturnal at breeding colony.

Bald Eagles may use several methods to secure seabirds on Petrel Island. Ancient Murrelets, Cassin's Auklets, Rhinoceros Auklets, and Tufted Puffins may occasionally be taken directly from the water. Auklets are also captured after they are injured by striking trees during their incoming flights at night (Heath 1915). We observed both Cassin's Auklets and Rhinoceros Auklets sitting stunned on the ground after forcefully striking trees at night. Storm-petrels could only be taken by Bald Eagles on land as they are too small and agile for an eagle to catch in flight and are only seen near their colonies at night.

The abundance of bird remains in Bald Eagle pellets on Petrel Island as well as our observations of eagles at night suggest that nocturnal seabirds are the principal prey of eagles on Petrel Island in the summer. We suggest that the large number of Bald Eagles attracted to this small island, particularly immatures which are not restricted to nest sites, and their unique feeding strategies are directly related to the abundance of nocturnal seabirds.

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A Scale for Weighing Birds at Habitual Perches.—Repeated weight measurements of adult birds in the wild are often difficult to obtain because of problems associated with trapping and disturbing the birds. Body weights for only 2 species of the world's raptors have been followed through the breeding season (Newton 1979); daily and seasonal weight change for other bird species are only slightly better known (see Palmer 1963). As weight is usually considered a measure of a bird's condition, weight changes are useful data since they may reflect the energetic costs associated with a particular activity and/or a bird's foraging efficiency (Drent and Daan 1980). The simple and non-disturbing method for obtaining accurate weights of wild birds described here should thus prove helpful to field ornithologists.

We designed and tested a compact, weatherproof, and relatively inexpensive electronic scale for birds at perches. This scale takes advantage of the fact that many birds use habitual perches and will often shift to artificial perches if these are placed at their habitual sites (Hall et al. 1981; pers. obs.). Our balance uses a transducer which is easily incorporated into an artificial perch and from which remote readings of weight can be made. We used 2 such scales during studies of breeding Ospreys (*Pandion haliaetus*), and found the method accurate and effective. We think the method could also be used with other birds. Although Sibly and McCleery (1980) have developed an electronic balance for remote weighing of ground-nesting birds, their method does not appear readily modified to weigh birds at perches.

Design and construction.—The perch-scale consists of 2 main units: (1) the perch, incorporating the transducer (Fig. 1); and (2) the batteries, amplifier (Fig. 2), and recorder unit, which are easily contained in a 14 × 28 × 17.5 cm weatherproof army surplus ammunition box. A bird landing on the perch deflects the tranducer, a metal beam with 4 deflection sensing strain gauges bonded to it, via the plunger. As the tranducer deflects, the strain gauges change resistance which develops a voltage proportional to weight. This voltage is then read remotely. The 2 units are portable (ca. 8 kg with batteries), and easily installed at a site (Fig. 3).

The scale's accuracy is improved if perch length is kept short so a bird remains centered over the plunger when it lands on the perch; such centering minimizes friction between the plunger and its guide. Silicon spray or a hard wax applied to the plunger also helps reduce friction. A 24-cm perch gave accurate weights and was adequate for Ospreys to feed and rest on. We experimented with a more expensive plunger mechanism (a machined stainless steel plunger contained by teflon bushings within the guide), but found that precision was not improved enough to justify the added cost and effort.

The perch unit base can be quickly attached to a perch site using C-clamps or duct tape. It helps to modify a perch site so that the perch base rests on a firm, flat surface which keeps the perch steady and perpendicular. We installed wooden perch sites beside 18 Osprey nests (Fig. 3), along with "mock" perch-scales (wooden perches that roughly resembled the scales), to ensure rapid installation and acceptance of our scales as we moved them among nests. However Ospreys often accepted perch-scales quickly without being previously exposed to "mock" perches.

The perch unit can be weatherproofed by sealing the strain gauges with a film of