tering Bald Eagles have been reported feeding on freshwater clams under similar conditions of receding lake waters (Nielson, p. 93 *in* Wintering of the Migrant Bald Eagle in the Lower 48 States, Spencer, ed., Natl. Agric. Chem. Assoc., Washington, D.C., 1976).

Invertebrates are mentioned infrequently in Bald Eagle food habits literature and then only as insignificant prey items. The only other recorded observation of a freshwater bivalve serving as eagle food came from Dunstan and Harper's (J. Wildl. Manage. 39:140–143, 1975) study of prey remains at six eagle nests in Minnesota, where invertebrates (one clam [*Lampsilis* sp.] and one crayfish [*Cambarus* sp.]) accounted for 2% of the items collected. In western Washington, less than 2% of the food of nesting Bald Eagles was made up of crustaceans (Retfalvi, Condor 72:358–361, 1970). Most other reports are from Alaska, where an analysis of 435 eagle stomachs showed an average of less than 2% invertebrates (33 crabs [*Cancer magister*], one octopus, one shrimp and one amphipod) (Imler and Kalmbach, USDI Fish & Wildl. Serv., Circ. 30, 1955); on Kodiak Island three invertebrates (two blue mussels [*Mytilus* sp.] and one shrimp) were recorded in 114 food items (Grubb and Hensel, Murrelet 59:70–72, 1978); and on Amchitka Island less than 1% of the prey was found to be invertebrate (four octopi and one amphipod) (Sherrod et al., Living Bird 15:143–183, 1977). In 1936, in the Aleutian Islands, Murie (Condor 42:198–202, 1940) noted an apparently unusual 16% invertebrate composition (one squid, six snails, four crabs and one Nereid), but in 1937 no invertebrates were recorded.

This *Anodonta* was probably introduced from the Mississippi Valley in the 1930's or 1940's, through the glochidial stage on the gills of yellow perch (*Perca flavescens*) or northern pike (*Esox lucius*). We can only speculate from the abundance of broken shells below perches that the eagles used their hooked beaks and strong, sharp talons to break the molluscs apart, rather than dropping them onto rocks from the air as reported for other less well equipped scavengers such as gulls (*Larus* sp.) and crows (*Corvus* sp.) (Siegfried, S. Afr. J. Sci. 73:337–341, 1977; Zach, Behaviour 68:106—117, 1978). However, Golden Eagles (*Aquila chrysaetos*) have been documented using the aerial technique to break turtle shells (Fisher et al., Beitr. Vogelkd. 21:275–287, 1975).

Wintering Bald Eagles are opportunistic feeders, normally consuming fish, birds and mammals as available. Although data were insufficient for quantification, it appears that mussels comprised a notable portion of the eagles' diet at Upper Lake Mary during the study period. Other food items included waterfowl (American Coot [*Fulica americana*]), channel catfish (*Ictalurus punctatus*), northern pike, rainbow trout (*Salmo gairdneri*) and several unidentified mammals. It is unlikely that freshwater mussels are consistently a major prey item; however, they represent an alternate food source that may be heavily used when abundant and/or readily accessible.

The authors wish to thank D. Prigge, IV, for field assistance; D. Bancroft and J. Landry for helpful information on the mussels and fisheries of Upper Lake Mary; and T. Dunstan, H. Hudak, R. Knight, D. Spencer and R. Szaro for reviewing the manuscript. Funding was provided by the U.S.D.A. Forest Service, Southwestern Region, through the coordination of C. Kennedy.—TERYL G. GRUBB, *Rocky Mountain Forest and Range Experiment Station, Forestry Sciences Lab., Arizona State Univ., Tempe, Arizona 85287* AND MICHAEL A. COFFEY, *Resource Management, Sequoia-Kings Canyon National Park, Three Rivers, California 93271.* *Accepted 20 Feb. 1981.*

Wilson Bull., 94(1), 1982, pp. 85–87

Killdeers feeding on frogs.—On 13 July 1980 we observed several Killdeers (*Charadrius vociferus*) feeding on small anurans in an experimental fish pond near Starkville, Oktibbeha

FIG. 1. An adult Killdeer with *Hyla cinerea*.

Co., Mississippi. The approximately 10 m by 20 m pond was normally 1 m deep, but had been drained, leaving puddles of water over approximately 20% of its bottom. The bottom was free of vegetation. Schardien drove to the edge of the pond at 11:05. Two grown young and one adult Killdeers were present. Between 11:05 and 11:10 one of the young birds ate three anurans, one of which was positively identified as a green tree frog (*Hyla cinerea*). At 11:21 this same Killdeer ate another frog and two more Killdeers landed in the drained pond. Schardien remained at the pond until 11:39, during which time four more frogs were captured and eaten by an adult (Fig. 1) and two volant juveniles.

When Schardien and Jackson returned to the pond at 12:04, eight Killdeers were present. Between 12:04 and 12:36 at least 11 more anurans—some definitely *H. cinerea*—were captured. One unidentified anuran was captured and discarded. In between frog catching sorties, the Killdeers stood quietly, watching the grassy north perimeter of the pond where most of the frogs were captured. At times the Killdeers displayed and charged at one another. When a Killdeer sighted a frog, it rushed towards it, grasped it with its mandibles, and shook it. The frog appeared to die almost immediately. The Killdeers rushed from distances as great as 5 m to capture frogs; most attempts were successful. When a Killdeer rushed towards a frog, the other Killdeers were instantly alert and one or more of them would also rush to the scene. Once a frog was captured, attempts were often made to steal it. Twice frogs were eaten by a bird other than the one who caught it. Once a Killdeer knocked a frog from the bill of another bird and ate it. Two Killdeers were observed rinsing a frog before eating it and we observed several Killdeers running to the puddles as if intending to wash a frog, but eating it when pursued by other Killdeers. In at least two of these cases the bird drank after eating a frog.

We returned to the pond at 18:00 and found six Killdeers present; one continuously "pa-

trolled" the pond perimeter as if searching for frogs. One frog was caught during an hour of observation.

The food habits of Killdeers have been well studied in many parts of the country (e.g., New York: Eaton, Memoir 12, New York State Museum, Albany, New York, 1910:351; Nebraska: Aughey, First Rept., U.S. Entomol. Comm., App. 2, 1878:49; U.S.: McAtee and Beal, U.S.D.A. Farmer's Bull. No. 497 (revised) 1924:14–16). Food washing has been previously reported (Bunni, The Killdeer, *Charadrius v. vociferus* Linnaeus, in the breeding season: ecology, behavior, and the development of homoiothermism. Ph.D. dissertation, Univ. Michigan, Ann Arbor, Michigan, 1959:174), but to our knowledge the only previous report of Killdeers eating vertebrate prey is that of Weston (Auk 80:550–551, 1963) who saw a Killdeer eat dead minnows. A review of the literature for other charadriids suggests that the Black-bellied Plover (*Pluvialis squatarola*), the American Golden Plover (*P. dominica*), and the Snowy Plover (*Charadrius alexandrinus*), in rare circumstances will take vertebrates. These records included small fish (both *Pluvialis* species: Palmer, pp. 153–159 *in* The Shorebirds of North America, Stout, ed., Viking Press, New York, New York, 1967; Sprunt and Chamberlain, South Carolina Bird Life, Univ. South Carolina Press, Columbia, South Carolina, 1970), lizards (*P. dominica*) (Palmer 1967), and small frogs (*C. alexandrinus* in Egypt) (Latham, A General Synopsis of Birds, Vol. III, Leigh & Sotheby, London, England 1785:204). The involvement of several Killdeers and the frequency with which they ate frogs could have been related to the concentration of frogs along the edge of the drying pond and to the extremely hot, dry weather in the area which may have reduced arthropod food resources during the previous month.—BETTE J. SCHARDIEN AND JEROME A. JACKSON, *Dept. Biological Sciences, Box GY, Mississippi State Univ., Mississippi State, Mississippi 39762.* *Accepted 22 Dec. 1980.*

Wilson Bull., 94(1), 1982, pp. 87–89

Possible use of legs as dissipators of heat in flying Cliff Swallows.—Several authors have shown that unfeathered portions of the legs of passerine birds can function as dissipators of heat (Steen and Steen, Acta Physiol. Scand. 63:285–291, 1965; Tucker, J. Exper. Biol. 48:67–87, 1968; Murrish, Comp. Biochem. Physiol. 34:859–869, 1970; Frost and Siegfried, Zool. Afric. 10:101–108, 1975) but quantified description of leg extending behavior in a large number of wild passerines over a range of temperatures appears to be lacking.

The purpose of this paper is to document the range of temperatures at which wild Cliff Swallows (*Petrochelidon pyrrhonota*) extend their legs, probably to dissipate heat.

Methods.—I observed up to 138 post-breeding Cliff Swallows sunning on the roof of the Creston Valley Wildlife Interpretation Centre, approximately 10 km west of Creston, British Columbia, on warm, sunny days between 21 July and 7 August 1980. During the period I recorded the air temperature in direct sunlight using a thermometer held 1 m above ground level approximately 7–10 m from the swallows. The air temperature on the roof was recorded on only four occasions because it disrupted the swallows' sunning activity. I counted the number of Cliff Swallows that left the roof following a bout of sunning with their legs extended and retracted. I also recorded the proportion of Cliff Swallows with legs extended after sunning that panted upon perching in willows (*Salix* sp.).

Results and discussion.—When the air temperature and roof temperature exceeded approximately 21°C and 29°C, respectively, approximately 50% of the Cliff Swallows extended their legs (Fig. 1). Nearly all the swallows extended their legs at an air temperature of 28°C (roof temperature 38°C) (Fig. 1). The reasons why the Cliff Swallows extended their legs are unclear. Perhaps the swallows were simply cooling their feet. However, that Cliff Swallows