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Ice fishing by wintering Bald Eagles in Arizona.—Northern Arizona winters vary within and between years with occasional heavy snows (up to 0.6 m) and extreme cold (overnight lows -18 to -29°C) interspersed with dry periods, mild temperatures (daytime highs reaching 10°C), and general loss of snow cover at all but highest elevations. Lakes in the area may freeze and thaw partially or totally several times during a winter. The freezing and thawing of 1000-ha, 2-m deep Mormon Lake, 34 km south of Flagstaff, Arizona, during the winter of 1994–95 set the stage for the unusual Bald Eagle (*Haliaeetus leucocephalus*) ice fishing behaviors we describe.

Traditional ice fishing.—We here use “traditional” in the anthropomorphic sense, i.e., breaking a hole in the ice and waiting for fish to come within striking distance. On 22 Dec. 1994, when Mormon Lake was 100% frozen over from an early cold spell, we observed an adult Bald Eagle land near shore and begin intermittently jumping up and down on the ice for about 1 min. It broke the ice creating a 0.6-m diameter opening without falling into the water. Then it flapped onto an unbroken edge. It removed a chunk of ice from the opening with its foot, before moving 2 m away to stand among emergent reeds (*Carex* sp. and *Juncus* sp.). After about 2 min, the eagle hopped to the open water hole, grabbed a 10-cm (estimated) fish, and flew back to the reeds to feed. After four head-to-foot feeding movements, the adult was flushed by a second adult and an immature eagle landing nearby.

Subsequently, between 2–8 February 1995 when Mormon Lake was again 70–95% fro-

zen, we had corroborating observations of two adult eagles breaking holes in the ice four times and four immature eagles jumping into existing holes five times. Three of these efforts resulted in prey capture and feeding (overall success including initial observation, 40%). We saw no immatures create their own fishing holes. This type of foraging was uncommon and limited to conditions of thin ice in near-shore shallows (<0.3 m). Inadvertent breakthroughs that also occurred on thin ice during landings were readily differentiated from intentional ice breaking. Eagles showed no interest in such spots, usually appeared startled, and upon regaining their balance, quickly flew away with no evidence of prey.

Ice scavenging.—When Mormon Lake froze shore-to-shore in December 1994, there was an extensive die-off of fathead minnows (*Pimephales promelas*), an introduced bait species which had been flourishing since a 1990 drought. As the lake thawed and refroze through January 1995, dead minnows were caught in the surface ice. By early February, we observed large numbers of both adult and immature Bald Eagles (>100) scattered on the lake ice along with small groups of Common Ravens (*Corvus corax*) picking minnows out of the frozen surface. Foraging was characterized by an occasional peck at the ice and/or a single head-to-foot movement. Also, there were no antagonistic interactions between foraging eagles. All three behaviors indicated small, "one-bite" prey. Except under ideal lighting conditions, we rarely were able to see the 4–6-cm minnows from our vantage points 0.4–0.8 km away. Positive identification was possible only after a visit to the lakeshore ice. Occasionally foraging eagles would grasp minnows in their talons and make a short flight before landing to eat. Ice-scavenging eagles consistently moved around on the frozen lake, but there was always more idle standing than either active foraging or flying.

Small-hole scavenging.—Another visit to the lakeshore ice in mid-February revealed a third unusual foraging behavior involving 3–5-cm holes and the plentiful fathead minnow carcasses. Walking near shore on the 7.5-cm thick ice where a dozen eagles had been earlier, we were surprised to find no minnows on the surface. Instead, we found numerous small holes where emergent twigs and vegetation were growing in the shallow water (<0.5 m deep) and protruding through the ice. Apparently because of wind and wave action, ice immediately around stems was less than 2.5 cm thick. Most holes were centered on a stem; however, small ice chips scattered around the holes indicated they had been actively chipped out and did not form naturally. Approximately 30% of the holes had minnows floating in them, many with multiple carcasses. Two species of small (approximately 1-cm diameter), dead, freshwater snails (*Planorbella tenius* and *Physa virgata*) were also floating in some of the holes. In addition, we discovered minnows were visible floating up under the clear, unbroken but thinner, ice surrounding stems.

Although we could never discern Bald Eagles chipping these scavenging holes, we believe they did so because they were the only species consistently seen near the holes during our extensive observations. We hypothesize that as minnows frozen in the ice surface were depleted and as the foraging surface melted, scavenging eagles turned to the remaining shoreline ice and chipped holes with their beaks where they could see dead minnows floating up under the surface. Between 12–17 February, we recorded at least six adult and six immature eagles pulling minnows and/or snails out of small holes in the ice. They either reached down and grabbed the prey in their beaks, flap-hopped above the hole and grabbed the item in their talons, or used a combination of both techniques. Some eagles moved rapidly from hole to hole, consuming as many minnows as possible, while others defended preferred foraging spots.

Walking on the relatively thin ice, we found our movements and body weight caused water and often accompanying minnows to squirt out of nearby scavenging holes. Apparently, eagles discovered this same phenomenon, perhaps when trying to grab prey items with their talons. On 17 February, we observed two adults and two immatures separately

and repeatedly hopping up and down near scavenging holes. These individuals normally walked to an opening, ate, and moved on. But if unsuccessful, they might poke at a hole with their beaks four-to-five times, try the hole with their talons one to two times, then simply hop up and down in the same area two-to-three times, until finally they were able to grab a minnow out of the target hole.

Temporal foraging perches.—The last form of “ice fishing” was more subtle than the previous behaviors, yet it enabled wintering Bald Eagles to use prey and habitat that might not have otherwise been accessible. By mid-February, Mormon Lake was 95% ice-free during daylight hours. However, on typically calm, cold nights, a smooth, thin sheet of ice formed across the lake surface. On calm days it would persist until mid-day. The temporary but recurring ice was sufficient to support foraging Bald Eagles among the numerous emergent patches of marsh grass (*Scirpus* sp.) scattered across the lake. During early morning hours, most eagles at Mormon Lake were out on the ice among these grasses. Landing eagles often slid on the smooth surface and frequently broke through the thin veneer, but otherwise there was no indication of the unexpected circumstance facilitating their foraging among the clumps of marsh grass.

On 14 February at 09:50 MST, we recorded 18 adults and 59 immatures on the morning lake ice. By 16:00, only 23 eagles remained around the entire lake shore. None was seen among the marsh grass, where most had been in the morning and where no ice remained. The value of temporal ice became evident when we discovered the water depth at these clumps of marsh grass consistently exceeded 1 m, well beyond wading depth for Bald Eagles. Yet, scavenging eagles were able to take advantage of dead minnows and small snails caught down among, or living on, the emergent grasses, which otherwise blocked normal aerial foraging on these prey items when no ice was present. Foraging among these grasses consisted of individuals slowly walking around, looking down at the ice surface and/or vegetation, and occasionally bending down to pick up very small prey items, which we suspected were most often snails from their abundance and size. This is the second documented occurrence of eagles in the area feeding on molluscs. In 1978, Bald Eagles wintering at Lake Mary (10 km north of Mormon Lake) foraged on freshwater mussels (*Anodonta corpulenta*; Grubb and Coffey, *Wilson Bull.* 94:84–85).

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