

PREDATION OF A PACIFIC TREE FROG (*PSEUDACRIS REGILLA*) BY AN AMERICAN ROBIN (*TURDUS MIGRATORIUS*) ON SAN JUAN ISLAND, WASHINGTON

THOR HANSON

ABSTRACT—The diet of the American Robin (*Turdus migratorius*) consists largely of fruit and invertebrates. Rarely, predation of small vertebrates has also been reported, including attacks on, and/or consumption of, snakes, a skink, fish, shrews, a field mouse, a salamander, and frogs. Few observations have included a prolonged interaction, leaving unanswered questions about how the prey are subdued, killed, and eaten. Here I describe an 8-min encounter between an adult male Robin and a Pacific Tree Frog (*Pseudacris regilla*), including plausible prey-dropping, pursuit, bill-pouncing, pecking, and beating the frog against the ground. The frog was killed, but not consumed, apparently because it was too large to swallow whole and the Robin failed to open or dismember the carcass. This marks the first reported attack by a Robin on a Pacific Tree Frog, and the first confirmed Robin kill of any frog species.

Key words: American Robin, Pacific Tree Frog, predator-prey interaction, prey-dropping, *Pseudacris regilla*, *Turdus migratorius*, unusual prey item, San Juan Island, Washington

The American Robin (*Turdus migratorius*) ranks among the most familiar birds in North America. As such, its dietary habits are well established. Robins are omnivorous, with a diet proportionally higher in fruit in autumn and winter and higher in invertebrates in spring and summer (Wheelwright 1986; Levey and Karasov 1992). An analysis of stomach contents from 1900 individuals collected between 1885 and 1950 yielded fruits of 51 genera in 28 families, and insects from at least 107 families, as well as earthworms, spiders, millipedes, and other invertebrates (Wheelwright 1986). Rarely, predator-prey interactions between Robins and small vertebrates have also been reported. These include the killing and consumption of a Five-lined Skink (*Eumeces fasciatus*) (Vanderhoff 2007), various indeterminate juvenile trout (Michael 1934; Kimball 1944), and salmon smolts (*Oncorhynchus* spp.) (Bayer 1980). Less conclusive observations include: failed attacks on a garter-snake (*Thamnophis* spp.) (Bent 1964) and a Red-

legged Frog (*Rana aurora*) (Preston 2005); an attack on a Red-bellied Snake (*Storeria occipitomaculata*) that the observer interrupted (James 2011); consumption of a dead, indeterminate field mouse (Sprot 1926) and a dead gartersnake (Erickson 1978); and several instances where the Robin carried off its prey before the kill and/or consumption could be confirmed (for example: Marshall 1921, gartersnake; Binger 1932, gartersnake; Penny and Knapton 1977, indeterminate shrew [*Sorex* spp.]; Leighton 2006, Columbia Spotted Frog [*Rana luteiventris*]; Thompson and Waterstrat 2016, indeterminate salamander). Predation has also been assumed in several examples of Robins provisioning nestlings with vertebrates, including a juvenile gartersnake (as cited in Guthrie 1932), and 2 indeterminate shrews (Powers 1973). Here I report on another unusual predation event: an 8-min interaction between a Robin and a Pacific Tree Frog (*Pseudacris regilla*) that resulted in the death, but not the ingestion, of the frog.

The Pacific Tree Frog is a common hylid frog species across the Pacific Northwest, found from sea level up to 8000 ft (2438 m) in elevation in forests, meadows, and other habitats near wetlands suitable for breeding (Nussbaum and others 1983; Corkran and Thoms 2006). Adults are small (<50 mm SVL) and terrestrial outside of the spring breeding period, hunting flies, beetles, spiders, and other invertebrates on the ground or in shrubs and low trees. Known predators include gartersnakes, American Bullfrogs (*Lithobates catesbeianus*), Raccoons (*Procyon lotor*), and various birds including herons, eagles, owls, small raptors, and kingfishers (Nussbaum and others 1983; Ehrlich and others 1988). The observation described here occurred in the post-breeding period, but after 6 wk without rainfall, when drought-like conditions may have partially confined the frogs to dense vegetation and other moist microsites (Jorgensen 1997).

On 25 July 2021 at 07:42, I observed an adult male American Robin prey upon a Pacific Tree Frog alongside a rural road on San Juan Island, Washington State (UTM: Zone 10T, 496669 E, 5369537 N, WGS84, San Juan County). The road lay between forest and grazed pasture and Pacific Tree Frogs are relatively abundant in the area, with at least 4 breeding ponds within 500 m of the sighting. I had an unobstructed view of the interaction from a distance of approximately 10 m, aided by 10 × 40 binoculars. The Robin had the live frog in its bill when I noticed it perched in a roadside thicket. It then flew up to a height of approximately 4 m over the road, at which point it either dropped the frog intentionally, or the frog wriggled free. The frog then fell to the pavement and the bird followed it down and immediately began pursuing it across the ground, repeatedly lunging in and pecking from different angles in a behavior that has been described as “bill pouncing” (Heppner 1965; Thompson and Waterstrat 2016). The frog’s movements were uncoordinated, as if it had been injured by the fall or during the initial capture, which I did not witness. But it reached the mowed grass alongside the road before the Robin’s repeated attacks rendered it immobile. After approximately 90 s, there was no sign of movement from the frog and the Robin no longer hopped backward after each bill-pounce. It continued pecking the frog vigorously, and also began lifting it into the air and beating it against the ground in an apparent attempt to soften or dismember the carcass. This behavior continued long enough for me to count 27 pecks or lift-and-beat motions in a 1-min period. Over the course of the interaction, I estimate that the Robin struck the frog ≥ 150 times. After approximately 6 min this activity slowed, and the Robin spent the last full minute of the encounter standing still beside the dead frog before flying off at 07:50. I waited and watched until 07:55, but the Robin did not return. I then collected the frog.

Examination confirmed the preyed-upon specimen as an adult Pacific Tree Frog of average size (3.75 g; 38-mm SVL). Strike marks from the Robin’s bill were clearly visible as dark discolorations on the frog’s skin (Fig. 1). Bill-strikes were concentrated on the dorsal surface, particularly on the back just behind the head, but were also visible on all limbs. None of the strikes pierced the frog’s skin. All limbs and digits were



FIGURE 1. Pacific Tree Frog killed by an American Robin. Strike marks from Robin’s bill clearly visible as dark streaks on back and limbs of frog. Photo by Thor Hanson.

intact, as were the eyes and the tongue. There was no evidence that the Robin ingested any part of the frog.

Several aspects of this interaction expand our knowledge of American Robin predatory behavior. It marks the 1st report of Robin predation on a Pacific Tree Frog, and the first confirmed kill of any frog species. Preston (2005) observed a Robin chase an adult Red-legged Frog for approximately 10 s and pounce upon it once before it escaped beneath a log, and Leighton (2006) saw a Robin attack and carry off a juvenile Columbia Spotted Frog. In the current instance, the fact that the Robin failed to eat any part of the frog after 8 min of effort may help explain why such behavior is rare. Optimal foraging theory describes predation as a balance between costs (time and/or exertion) and benefits (caloric uptake) (for example, Winterhalder 1983; Stein and others 1984). Previous observers have reported Robins eating vertebrate prey whole (for example, Sprot 1926; Powers 1973), and successfully beating open small fish carcasses to extract the viscera (Bayer 1980). In this case, however, the Robin made no attempt to swallow the entire frog, suggesting that it perceived the carcass as too large. The bird was also unable to pierce the frog’s skin or otherwise open the body, meaning considerable time and effort was invested with no caloric reward. Individual learning about food quality is well documented among birds (for example, Skelhorn and Rowe

2010; Hämäläinen and others 2020), and that information can be transmitted socially within and among species (Hämäläinen and others 2021). So if the negative energy balance observed in this interaction is a common result in attacks on frogs, then such interactions would be unlikely to persist outside of occasional individual experimentation. It is also possible, however, that more effort or another technique would have opened the frog carcass. Vanderhoff (2007), for example, observed a juvenile Robin kill and tear bites from a Five-lined Skink, and Erickson (1978) watched a Robin tearing flesh from a dead gartersnake.

Another intriguing aspect of this interaction occurred when the frog fell from the Robin's bill onto the road. I was unable to see precisely how the Robin was gripping the frog, and whether or not it squirmed free or was intentionally released. The pattern of the Robin's flight was suggestive, however, as it swooped sharply upward from the shrub thicket over the road rather than flying directionally toward another perch. If intentional, this represents an unusual example of prey-dropping, a technique for opening or softening food more closely associated with corvids, larids, and various raptors (Cristol and Switzer 1999). The 1 previously published report of similar behavior by an American Robin does appear to signal intent, because the prey item, a snake, was dropped onto a road 4 times in rapid succession (Bent 1964). Clearly, there is more to be learned about the predatory behaviors of Robins, a reminder that even the most common species remain worthy of attention.

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- 351 False Bay Drive, Friday Harbor, WA 98250 USA; thor@rockisland.com. Submitted 5 August 2021, accepted 11 October 2021. Corresponding Editor: Joan Hagar.

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