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FEEDING BEHAVIOR OF THE LEAST GREBE (*Tachybaptus dominicus*) UPON NEOTROPICAL RANIDS IN COSTA RICA

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Avian predation on amphibians can be considered an important evolutionary force for both taxa, and its documentation helps to elucidate aspects of evolution, ecology, and even conservation (Shea 1987, Wells 2010). But because these interactions are difficult to observe and quantify, the role of amphibians as dietary items of birds is still barely known in the Neotropics (Acosta and Morún 2014). For example, even when grebes (Podicipedidae) have been anecdotally reported to prey on aquatic amphibians (Shea 1987, Stiles and Skutch 1989, Kloskowski et al. 2010), data on habitat selection, diet, and feeding behavior of grebes are primarily from Old World and Nearctic regions (e.g., Shea 1987, Forbes and Sealy 1990, Wiersma et al. 1995, Kloskowski et al. 2010).

In Neotropical areas, such as Costa Rica, both natural and artificial lagoons and ponds provide habitat for waterbirds, including grebes (Stiles and Skutch 1989). The Least Grebe (*Tachybaptus dominicus*) is a widespread waterbird ranging from the southern United States of America to northern Argentina, including the Bahamas and Greater Antilles. In Costa Rica the subspecies *T. d. brachypterus* is distributed from lowlands to 1525 m ASL, but it is most common in the Central Valley and San Vito Region (Stiles and Skutch 1989). Artificial wetlands are also suitable habitat for amphibians, including the common upland frog *Lithobates (Rana) taylori (sensu lato)*, which ranges from 1000 to 1900 m ASL (Savage 2002). Here we present evidence that true frogs (Ranidae) are a frequent item in the diet, and document the behavior, of the Least Grebes at a middle elevation site in Costa Rica, because many aspects of the natural history of this species remain unknown (Konter 2014).

During various occasions from July 2014 to November 2014, we photographed predation events on *L. taylori* by Least Grebes in Parque de la Expresión Laguna Doña Ana, Paraíso district of Cartago Province, Costa Rica (9.832806' N, 83.878074' W (WGS84); 1354 m ASL) (Fig. 1).

Laguna Doña Ana is a seasonal pond from August to November that occurs within an 11 ha urban park, and is approximately 1 ha with a maximum depth of 1.2 m (pers. obs.). We observed Least Grebe adults and chicks swimming together in the pond during predation events.



Figure 1. Predatory and feeding behavior of Least Grebes in Laguna Doña Ana. A) Least Grebes killing an adult *L. taylori*. B, C) Least Grebe killing a tadpole of *L. taylori*. D) *L. taylori* dismembered by an adult Least Grebe while juveniles wait to be fed. E) Juvenile Least Grebe ingesting a tadpole delivered by an adult. Photographs: D. Jiménez.

Several times per hour adults made foraging dives, finding tadpole or adult *L. taylori* that were hidden under aquatic vegetation. The grebes captured them after a rapid pursuit, in agreement with what Jenni (1969) described for diving activity of the species in a nearby location (Turrialba, Cartago). Once an amphibian (adult or larva) was captured, the grebe proceeded to hold the prey by the belly and hit it against the water surface until the prey was dead or dying. It appeared that this behavior allowed dismemberment for easier consumption. The adult released the wounded or dead frog, and let it sink into the water, inciting its chicks to dive after the carcass. If chicks were unable to dismantle or ingest the prey by themselves, then an adult recovered the whole carcass, or pieces of it, and continued to manipulate the carcass until pieces of suitable size were produced which were fed directly to chicks (Fig. 1). Stiles and Skutch (1989) recorded aquatic insects, crustaceans, small fishes, and frogs as prey items of Costa Rican grebes, but none of these were identified to the species level. We determined the frog species was *Lithobates taylori* based on morphology, coloration, and distribution in Costa Rica (Savage 2002). Despite extensive documentation of predation on the genera *Lithobates* and *Rana* by vertebrates (Leighton 2006, Toledo et al. 2007, Wells 2010), to our knowledge, this is the first published record of predation upon *Lithobates* sp. by grebes in Central America and Antilles. Additionally, it is the first record of use of this anuran by adult grebes appearing to teach their chicks to dive and hunt.

In general, grebes are considered primarily fish eaters (Forbes and Sealy 1990, Wiersma et al. 1995, Kloskowski et al. 2010), but there are few native freshwater fishes at intermediate elevations in Costa Rica (Bussing 1998). Because similar grebes (e.g., *Tachybaptus ruficollis*) in Europe prefer ponds with an abundance of small prey (e.g., macroinvertebrates, small fishes, tadpoles and frogs) and prey abundance directly affects their population size (Kloskowski et al. 2010), ranids would offer an abundant food source for Least Grebe around 1300-2000 m in Costa Rica. Unfortunately, a large number of fish and amphibian species have disappeared from urban and suburban areas of the Central Valley of Costa Rica during the last 40 years because of habitat fragmentation (e.g., loss of ponds and temporary wetlands) or enigmatic decline (Acosta-Chaves 2013). Loss of habitat in this region, especially for waterbirds, may be behind an avifaunal decline that has been recently detected (Biamonte et al. 2011).

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