Predation on Amphibians and Reptiles by Reintroduced Whooping Cranes (Grus americana) in Louisiana

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Notes and Discussion Piece

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Abstract.—Predation on reptiles and amphibians by whooping cranes (*Grus americanus*) is widely reported, but all published data are anecdotal or based on singular observations, and mostly refer to isolated predation events. Some observers consider reptiles and amphibians to only be occasional prey items of whooping cranes. I report observations that show reptiles and amphibians to be an important food source for reintroduced whooping cranes in Louisiana, particularly in spring months, in that they might become a significant source of high-value food during the cranes' nesting season.

Introduction

Presence of amphibians and reptiles (hereafter A&Rs) in the diet of cranes (Gruidae) is known mostly from anecdotal reports and opportunistic observations (Archibald and Meine, 1996). For the whooping crane (*Grus americana*), there are reports of feeding on frog eggs in Nebraska, killing but not eating snakes in Louisiana, and rarely catching frogs and snakes in Texas (Allen, 1952; Johnsgard, 1983; Gomez *et al.*, 2005). Recent studies of whooping crane diet in Texas do not mention predation on A&Rs (Hunt and Slack, 1989; Nelson *et al.*, 1996; Westwood and Chavez-Ramirez, 2005). Chavez-Ramirez *et al.* (1996) briefly mention whooping cranes in Texas scavenging snakes and lizards at recent burns. Zimorski *et al.* (2013) report four observations of whooping cranes consuming common snapping (*Chelydra serpentina*) and mud (*Kinosternon subrubrum*) turtles in Louisiana.

The whooping crane is an endangered species and a subject of extensive conservation efforts, therefore it is desirable to have a better understanding of the relative importance of various food items in its diet. Observations reported here suggest that A&Rs are a seasonally important food source for Louisiana whooping cranes.

Methods

Since 2010 captive-bred whooping cranes have been re-introduced to southwestern Louisiana. The cranes are equipped with GPS satellite transmitters (PTTs). PTT data were used to locate the birds and to examine the locations they had frequented without disturbing them.

Southwestern Louisiana is a lowland area with extensive wetlands. These wetlands are mostly used for agriculture, in which case they are divided into fields (often rectangular) 50–800 m wide separated by levees typically 0.5–1 m high and 1–5 m wide. Wider levees have dirt roads on top; the rest of the levees are usually covered with dense grass and herbaceous vegetation. The fields are mostly used for rotating rice and crawfish cultivation; therefore, at various times of year they can be occupied by planted rice or other crops, shallow ponds with emergent aquatic vegetation, herbaceous weeds, dry pastures, or mudflats. Natural wetlands are the remnants of natural prairie and are normally flooded to the depth of 10–50 cm. There are also deciduous forests, human settlements, and other types of habitat. The cranes, sometimes in mixed-age groups, mostly inhabit rice fields, crawfish ponds, and natural marshes, and occasionally also flooded forests, duck ponds, mudflats, fallow fields, and pastures (Louisiana Department of Wildlife and Fisheries, 2014).

The release area has bimodal climate with cool dry winters and hot humid summers. Typical day temperatures are 5–25 C in winter and 25–35 C in summer; typical nighttime temperatures are 0–10 C in winter and 20–25 C in summer. Although there is ample rainfall during all times of year (100–170 mm per month), the humidity is much higher in summer.

Observations using 60 × 80 scopes were conducted opportunistically during weekly checks on the birds' condition (with the focal bird chosen randomly) in October 2012–July 2013 with gaps in February and June due to logistical difficulties. The weather patterns during the observation period were typical for the study area (29°33′–30°45′N, 92–93°W.). All birds were juveniles or subadults (ages 9 mo to 3 y). Normally, the birds were observed at distances of 100–150 m (as required by the protocol), but one crane had to be observed in dense forested habitat at a distance of 70–100 m (such observations were deemed necessary as the only way of confirming the bird's well-being in places with limited visibility and poor PTT data

TABLE 1.—Whooping Crane (*Grus americana*) predation on reptiles and amphibians: numbers of predation events recorded during the observation period. Excluded from the table are March data for one bird observed consuming hundreds of spring peeper (*Podacris crucifer*) tadpoles and upland chorus frog (*Pseudacris feriarum*) froglets in that month. Observations were not conducted in February and June. In cases when a group of cranes was observed, only data for one focal animal were recorded at any given time

Month	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May	July	Total
Time observed (h)	10.83	9.25	7.58	2.67	4.00	4.67	5.00	3.00	51.33
Time foraging (h)	7.37	6.2	6.25	2.06	1.68	3.38	3.28	2.03	35.43
Predation events per 1 h of foraging	0.81	0.64	0.0	0.48	10.1	3.55	3.04	1.97	1.52
Southern leopard frog (*Limnobathes sphenocephalus*)	2	2	0	1	0	5	0	0	10
Bullfrog (*Rana catesbiana*)	1	0	0	0	11	2	1	1	16
Pig frog (*R. grylio*)	0	0	0	0	0	0	1	1	2
Unidentified frogs (Ranidae sp.)	2	1	0	0	3	2	6	1	15
Amphibians total	**5**	**3**	**0**	**1**	**14**	**9**	**8**	**3**	**43**
Water snakes (*Nerodia* sp.)	0	1	0	0	2	2	0	0	5
Ribbon snake (*Thamnophis sauritus*)	1	0	0	0	1	0	1	0	3
Cottonmouth (*Agkistrodon piscivorus*)	0	0	0	0	0	0	0	1	1
Carolina anolis (*Anoils carolinensis*)	0	0	0	0	0	1	0	0	1
Turtles (Emydidae sp.)	0	0	0	0	0	0	1[1]	0	1
Reptiles total	**1**	**1**	**0**	**0**	**3**	**3**	**2**	**1**	**11**
Total predation events	**6**	**4**	**0**	**1**	**17**	**12**	**10**	**4**	**54**

[1] A small hatchling not identified to species. The only turtle species observed at that location was the red-eared slider (*Trachemys scripta*)

reception; the dense vegetation was used by the observer to avoid detection by the crane). In most cases, only predation on relatively large animals (3–5 cm or more) could be recorded from those distances and even these predation events were only visible if there was no obstructing vegetation and the birds raised their heads to manipulate and swallow the prey. I recorded the duration of observation, duration of time spent foraging by focal birds (foraging behavior recognized by the birds performing probing movements with their bills), the number of observed predation events, and, when possible, the species, genus or at least order of the prey. In some cases, the predation events were too numerous and rapidly occurring to count; therefore, the number per 10 s was estimated and extrapolated to the total foraging time. Whenever possible, prey was identified visually during the predation events. In cases of rapid feeding on abundant small A&Rs, the prey species were identified by visiting the exact foraging location after the bird had moved out of visibility range. Bullfrogs (*Rana catesbiana*) and pig frogs (*R. grylio*) were mostly identified to species based on their known occurrence at a particular location as these two species do not normally occur in the same bodies of water in the study area. Due to the difficulty of identifying prey species and the necessity of devoting unbroken attention to the focal bird, only one crane could be observed at a time. All data on observation times and foraging times listed below are only for the focal birds.

To get a rough estimate of the numbers of potential prey items available to cranes, visual counts were conducted (except in February and June) at locations known from PTT data to have been used by the cranes (29°33′–30°45′N, 92–93°W). Four counts per month were conducted in October–January and six to eight counts per month were conducted in March–May and July. In agricultural habitats, which consisted of fields or ponds separated by levees, two 100 m long transects were walked at each location. One of these transects was walked in the field interior and the other along the edge of the nearest levee. Only one transect was walked in natural habitats. Walking was slow. Effort was made to minimize disturbance to cranes before seeing them and to identify the sources of rustling sounds in dense vegetation to see if they were attributable to A&Rs. Each transect typically took 5–20 min to walk, dependent on vegetation height and density. Although this method was not accurate enough to use for A&Rs population estimates, slow walking approximated the search behavior of the cranes and was considered the most practical way to obtain a rough estimate of the numbers of A&Rs available to the cranes and detectable by them.

The research was conducted under LSU IACUC permit A213-02 and Louisiana Dept. of Wildlife and Fisheries permit LNHP-12-096.

RESULTS

In over 50 h of observation, cranes spent approximately 35 h foraging, as typical for Gruidae (Archibald and Meine, 1996). The share of foraging in the time budget was generally consistent between individual birds, but elevated by approximately 25% in the bird observed in dense forest (*see* below). During that time, numerous, but irregularly distributed predation events involving at least ten prey species were recorded (Table 1).

In October–January, predation was rarely observed. As temperatures dropped, the frequency of recorded predation events decreased with none observed in December. The numbers of A&Rs observed during visual counts were also low (1.5/transect in November, 0.3/transect in January). Habitats used by cranes during that period included ponds and rice fields. All frogs were caught in ponds, while both snakes were caught in rice fields.

In February behavioral observations were not conducted. However, PTT data showed one of the cranes utilizing an unusual type of habitat consisting of small crawfish ponds surrounded by dense forest. These ponds were visited on the same week when PTT data was received and were found to be filled with very large numbers (possibly tens of thousands) of upland chorus frog (*Pseudacris feriarum*) tadpoles.

In March, one crane, a male less than 1 y old, started using dense floodplain forest on a daily basis. The forest was partially flooded with ponds containing very large numbers of spring peeper (*P. crucifer*) tadpoles and upland chorus frog froglets. When foraging the crane performed rapid probing movements and could be seen swallowing something every few seconds, indicating consumption of hundreds of tadpoles and froglets per hour. He stopped foraging in the forest when the ponds dried up in early April. The data on this male foraging in forest ponds were excluded from quantitative analysis because: (A) they were extremely imprecise, (B) they would heavily skew the results, and (C) it would be misleading to count tiny tadpoles and froglets jointly with much larger A&Rs recorded as prey during visual observations of other cranes. Other cranes observed during March also dramatically increased the intensity of predation on amphibians and reptiles. Almost all such predation events were recorded on levees separating ponds and/or fields. The birds were spending a lot of foraging time on levees compared to previous months (more than 50% as opposed to less than 20%). Visual counts showed the levees to be covered with basking frogs, snakes, and turtles with up to 40 animals visually counted per 100 m of a levee. Not counting the male using forest habitats, the frequency of observed predation events was still high (Table 1).

In April the frequency of observed predation events began to decrease. The birds continued to spend more than half of their foraging time on the levees, where all observed predation events took place. Visually recorded numbers of A&Rs on the levees remained high (10–20 per 100 m). Observed prey included one Carolina anolis (*Anoils carolinensis*), apparently constituting the first observation of predation on a lizard by a whooping crane. Except for one bullfrog predated in a crawfish pond, all animals were caught on levees.

In May the numbers of A&Rs observed on levees continued to decrease (3–10 visually counted per 100 m). Although some of the birds continued to hunt on levees, less than half of observed prey captures occurred on levees; the others took place in rice fields.

In July the visually recorded numbers of A&Rs were only slightly lower than in May (2–6 per 100 m). However, only four predation events were recorded. The decline could be due to higher abundance of invertebrate prey and/or higher agility of A&Rs at higher temperatures. Except for one pig frog caught in a natural wetland, all captures were in crawfish ponds.

DISCUSSION

Frogs, tadpoles, and snakes appear to be seasonally important prey items for Louisiana whooping cranes, particularly in March, when foraging cranes consumed 10 or more (up to hundreds) animals per hour. The actual numbers were probably much higher than those recorded because in most cases only large prey items could be observed, and even those were only seen under good viewing conditions.

Unfortunately, the data on foraging are only available for part of the year. There might be a second peak of A&R consumption in September, when they become less agile and more likely to bask.

One adult bullfrog can weigh more than 500 g. Average weights (g) for recorded prey species in Louisiana are: Southern leopard frog 22.8, bullfrog 95.0, pig frog 59.6, Carolina anolis 3.0, ribbon snake 24.4, common species of water snakes 83.0–600.0, cottonmouth 219.8. Ribbon snake populations can be as high as 61 per hectare. (J. Boundy, *in rev.*). In 2 h of foraging on a March morning, a crane hunting A&Rs could easily obtain more than 1 kg of high-protein food.

Apparently, at least in some cases, the abundance of A&Rs was the main factor in crane selection of foraging locations, important enough to entice the birds to use atypical habitats including dense floodplain forest, a habitat never before recorded for this crane species (Dinets, 2015). As the cranes reach breeding age, their use of A&Rs might change. However, I believe A&R use is more likely to increase rather than decrease as the birds become more experienced hunters with better knowledge of prey distribution in time and space and breeding puts additional demands on their protein intake.

Predation of A&Rs has never been systematically studied in other populations of the whooping crane, so it is unknown if the Louisiana population is unique in its high levels of A&Rs consumption. However, the ability of Louisiana cranes to utilize this abundant food source in spring months, combined with their unusual habitat flexibility (Dinets, 2015), might be important for future breeding attempts and thus beneficial for the success of the reintroduction program.

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