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FORAGING AND FOOD-STORING OF AMERICAN CROWS IN FLORIDA

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Despite their being among the most well known of birds, many aspects of the lives of American Crows (*Corvus brachyrhynchos*) have been little studied, possibly due to their wariness. My wife and I have studied crows for several years (1981-1983) in a situation where they are relatively tame. In this paper I report on our studies of foraging, including the roles of food-storing. There have been only a few brief descriptions of food-storing (George and Kimmel 1977, Hess 1978), as far as I am aware. Bent (1946) gave a short description of the foraging of the Florida Crow (*C.b. pascuus*). What has interested me particularly has been the way the crows at our study site, which are cooperative breeders (Kilham in prep.), varied their foraging during two years of drought (1981-1982) followed by a year of excessive rainfall (1983).

METHODS AND STUDY SITE

The study was conducted in January-May 1981-1983 at the Hendrie cattle ranch, 24 km south of Lake Placid, Florida. The ranch was flat and cattle kept the grass short and the groves of live oaks (*Quercus virginiana*) and cabbage palms (*Sabal palmetto*) free of low branches and undergrowth. The crows were very tame because of years of protection from hunting and other disturbances. We further encouraged their tameness by feeding corn at the end of each morning's observations. Because the crows had to share the corn with wild Turkeys (*Meleagris gallopavo*), Sandhill Cranes (*Grus canadensis*), and feral hogs (*Sus scrofa*), I do not believe that the feedings affected their behavior or energetics to any extent. Feeding enabled us to count the crows, which included two groups of cooperative breeders (Kilham in prep.) of 8-10 birds each. The crows defended group territories of about 50 ha separated by a common boundary. In addition to foraging in the oak groves and pastures, the crows flew into red maple (*Acer rubrum*), bay (*Persea* spp.), and magnolia (*M. virginiana*) swamps, which were dry during the drought.

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OBSERVATIONS

We observed crows turning over dry cow dung. During the months we studied crows, dry pats were more prevalent in dry years when they became hard on top while retaining moisture underneath. A crow walking in a pasture might suddenly hop, run, or both in hurrying to a cow pat. The crows also flipped over clumps of sod uprooted by feral hogs. The largest objects turned over were the fallen leaves of cabbage palms, a feat that often required shoving with their body as well as flapping their wings.

Crows attacked cabbage palms to dislodge prey. In doing so, they acted cooperatively, with one or two pounding on the hard leaf stalks with their bills or landing noisily on the dry leaves above, while 1-4 crows stood below, looking up, ready to seize whatever might fall. The largest catch from a palm tree that I identified was a snake about 25 cm long. Crows, although attacking palms in the dry years, did so particularly in March 1983, when flooding of fields and woods restricted their foraging elsewhere.

The crows spent much time walking about alone or in well scattered groups, stopping here and there, but seeming to find little for the time spent. I had an impression that the crows had leisure time, even in the dry years, and that this was one way of spending it. It was difficult, however, to determine at any distance, even in short grass, what a crow might be catching. Of crows that perched close to me in a grove, one knocked a long-horn beetle (*Cerambycidae*) and another a large wolf spider (*Lycosidae*) to the ground before seizing it. In pastures I occasionally saw crows running or flying wildly back and forth as if trying to catch grasshoppers. Although the crows sometimes stooped at American Robins (*Turdus migratorius*) and Killdeer (*Charadrius vociferus*) and once tried to catch a small bird struggling in the wind, a robin-sized bird was the only one that I saw a crow carry in its bill and later tear to pieces. The crows caught what I believe were young cotton rats (*Sigmodon hispidus*) on three occasions. Once, a crow, flying low over a pasture, suddenly hovered and dropped to seize the rat in its bill.

Crows eat sand, as do Blue Jays (*Cyanocitta cristata*) (Kilham 1960). I recognized them doing so four times, three times on a beach by a water hole and once by a stream.

In dry years, crows used behaviors I saw little of or not at all in wet years. These included scavenging the heads of exotic walking

catfish (*Clarias batrachus*) caught by river otter (*Lutra canadensis*); feeding on lice of cattle and feral hogs; and attacking young or weakened individuals of large mammals (Kilham 1982a,b and in prep.). Other methods of foraging peculiar to the drought period were digging in the bottom of a dried up marsh, standing by the heads of feral hogs as they rooted in pastures, and feeding, usually by 4-5 crows at a time, on the berries of wax myrtles (*Myrica cerifera*).

Live oak acorns were especially abundant in 1982, and I found crows still feeding on them almost daily in January and February of the wet year 1983. A crow might find an acorn on the ground or fly up into an oak to pick three or four before flying to the pasture with them in its buccal pouch. Once perched on a large cow pat or other "anvil", with an acorn held in its toes, a crow pounded it to pieces. Acorns were also pounded against tree branches.

The crows preyed heavily on frogs during the months of rainfall. After catching frogs in swamps or flooded pastures, the crows usually took them to a dry pasture to pound and devour them. A crow flew toward me on 1 April 1983 with a frog that escaped when the crow landed. After recapturing it, the crow took 8 min to pound, partly devour it, and store what remained. Even small frogs were torn apart before swallowing.

I noted crows (n=11) with walking catfish 13-20 cm long between mid-January and mid-February, when water levels were high and favorable for their capture. I was watching two crows in a shallows where water flowed from a ditch, when the two began running back and forth. One seized a catfish and flew off with it. A crow on 11 February caught a catfish in grass flooded by a nearby swamp. It had hardly started pounding it when a Red-shouldered Hawk (*Buteo lineatus*) swooped down to seize the catfish and, after facing a circle of five excited crows for a few minutes, carried it to an oak. Such kleptoparasitism was not rare, for I noted other instances of it in the dry years (Kilham 1982c). The largest prey I noted a crow working on was an amphiuma (*Amphiuma means*) with a body length of 40 cm minus the head.

When sitting by one nest, I was able to watch crows coming to pick thin, wire-like earthworms 4 cm long, from the wet undersurfaces of sod clumps uprooted by hogs.

The crows spent much of their time well dispersed and foraging more or less alone. But if one crow caught something that required it to stop for a few moments, one or two other crows might fly or walk over. When the prey was anything large or unusual, other

crows flew in almost immediately. On 2 February 1983, seven crows surrounded one that had captured a song bird. They stood with their heads low, and I expected a fight. The crow with the bird walked away after a minute, then flew, pursued briefly by a few crows, until it reached a place where it could feed on its prey alone. I never saw a fight over food. Whatever a crow caught, it kept, regardless of its social status.

When we scattered corn seven to nine crows usually came immediately and filled their buccal pouches before flying 7-100 m away to store the food. Once alone, crows might put their bills into a depression, empty the corn into it, then cover it over with a few quick snatches at dry grass or other debris close by. Occasionally a crow would unload all of the corn with shakes of the head, taking up only a portion, move away 4-7 m to cache it, then return to do the same with another portion. I seldom (n=3) saw crows storing acorns.

Animal prey was likewise stored, especially during the wet year when crows caught frogs or catfishes, items larger than a single crow could eat at once. A crow on 3 March 1983, tearing up a frog held under its toes, walked in four different directions to store portions of it before flying off with what remained. Another crow, after working on a catfish, stuffed 15 cm of its body and tail into a tuft of grass. After covering it with 4-5 pieces of dry turf and cow dung, it returned to conceal the head elsewhere. In attempts to hide the body of the amphiuma, a crow used pieces of dung and a pad of turf 10-12 cm across. Crows did not appear to have difficulty recovering what they stored. One crow, landing 5 m away near where I had seen a fish cached a few hours previously, walked a few steps then ran and hopped directly to where the food was hidden.

Prey was also stored in trees, in the instances (n = 16) I watched, in the long needle tufts of the air plant *Tillandsia setacea*. Most of this caching was in trees within 30 m of a nest where a female was about to lay or was already incubating. A female incubating on 14 March kept giving begging calls as if hungry. When no crow came to feed her, she flew directly to an air plant, level with the nest and 12 m away. She took out the dried remains of a frog, ate it for 2 min, then returned to her nest. At another nest a crow dropped to the ground to catch a yellow-green snake about 25 cm long and carry it into the depths of an oak. The same crow, identified by a broken tail feather, was back on the same oak on the following morning, this time perching above what I supposed was 15 cm of

the same snake. After flying to feed the female on the nest, the crow returned to store the remainder of the snake in an air plant. Crows usually covered such items with bits of debris. On 23 February 1983, when a breeding male came to his mate on the nest, he paused a minute, then dropped to the ground to disgorge the contents of his buccal pouch. After storing half of it a short distance away, he took the remainder and flew to feed his mate. I only saw animal prey stored by nests. I never saw corn fed to an incubating female but if a female saw a crow storing corn from where she sat on the nest, as I noted on 2 occasions, she might fly over and eat it.

Discussion

A feature of the foraging of the crows was that I saw no robbery of one crow by another regardless of its social rank. A similar situation has been noted by Woolfenden and Fitzpatrick (1977) for Scrub Jays (*Aphelocoma coerulescens*) and by Mech (1970) for wolves (*Canis lupis*). Being widespread, the habit may be a crucial one for animals that are cooperative breeders. If robbed of food consistently, juveniles or other subordinates might soon disperse. The surrounding of a crow that had made a capture by other crows was, I suggest, a way information was shared. The incoming crows could form a search image of what any crow might capture for itself.

The territories of crows at the ranch (Kilham in prep) functioned, I think, in their getting to know one area well, a situation which, as shared among the members of a cooperatively breeding group, might have survival value in coping with competitors. Storage for *Corvus* species have been described by Kallander (1978) for the Rook (*C. frugilegus*) and by Simmons (1970) and Hewson (1981) among others, for the Carrion Crow (*C. corone*). With the American Crows on the ranch, storage seemed to be a way of extending harvests in the presence of immediate competition. Cowie et al. (1981) have noted that Marsh Tits (*Parus palustris*), in meeting competition from larger species, may resort to similar strategies of hoarding on a temporary basis. Most birds that store food are territorial. Swanberg (1951) has reported this for the Thick-billed Nutcracker (*Nucifraga caryocactes*) and I (Kilham 1959) for wintering Red-headed Woodpeckers (*Melanerpes erythrocephalus*). A territory enables hoarders to retain possession of what they have (Roberts 1979). A feature of crows at the ranch was the way they stored prey in trees and used it, later, to feed the incubating females.

SUMMARY

In a study on a cattle ranch in Florida, I found that two groups of cooperatively breeding American Crows foraged differently in years of drought than in a year of excessive rainfall. Some methods such as turning over cow dung and ransacking cabbage palms for miscellaneous prey occurred in all years. The largest prey caught with any regularity were walking catfish. What an individual crow caught it retained; the crows never robbed each other. They stored surplus food regularly, sometimes on the ground and sometimes in air plants in trees. Some of the latter stores were placed near nests and were used to feed incubating females. The two groups of crows studied were territorial. The survival values of food storing in relation to food competitors is discussed.

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REVIEW

Proceedings 1981 crane workshop.—James C. Lewis, editor. (1982). Tavernier, Florida, National Audubon Society. viii + 296 pp. $25.00.—This volume contains 29 of the 30 papers presented at the 1981 Crane Workshop held 25-27 August in Grand Tetons National Park, Wyoming, and 10 additional papers submitted for publication. As a summary of current research on Sandhill and Whooping cranes, it includes papers on migration, population status, nesting, roosting, diet, and on various aspects of captive propagation and reintroduction into the wild.

Two articles are of special interest to Floridians. Stephen A. Nesbitt summarizes the fragmentary history of Whooping Cranes in the southeastern U.S. and especially Florida and outlines a plan to establish a non-migratory population of Whooping Cranes in Florida using resident Florida Sandhill Cranes as foster parents. The three prospective release sites are Three Lakes Ranch Wildlife Management Area (WMA) (Osceola Co.), J. W. Corbet W. M. A. (Palm Beach Co.), and Cecil M. Webb W. M. A. (Charlotte Co.). If the project proceeds on schedule, eggs laid by captive Whooping Cranes at Patuxent Research Center will be first placed in Florida Sandhill nests in spring 1984.

In the second article, Lawrence H. Walkinshaw summarizes his observations made on 135 nests of Florida Sandhill Cranes in Osceola, Okeechobee, and Polk counties during 1938, 1945, 1960, and 1966-1981.

Anyone interested in cranes will want to own this volume. Ornithologists are indebted to The National Audubon Society for publishing this volume as well as the Proceedings of the 1978 Crane Workshop.—**Fred E. Lohrer**, Archbold Biological Station, Route 2, Box 180, Lake Placid, Florida 33852.