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NEST COMPONENTS OF CRESTED CARACARAS (*Caracara cheriway*) BREEDING IN FLORIDA

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Crested Caracaras (*Caracara cheriway*) are medium-sized raptors in the family Falconidae with a wide distribution ranging from South and Central America, Mexico, and the southernmost United States (Morrison and Dwyer 2012) where they occur in Texas and Arizona, with an isolated population in south-central Florida (Morrison and Dwyer 2012). Crested Caracaras primarily inhabit open grassland and improved pastures planted and managed specifically for cattle forage (Morrison and Humphrey 2001). In south-central Florida, these habitats are at risk of being converted to other land uses and, as a result, the resident population of Crested Caracaras is listed as threatened by the U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service 1987) and the state of Florida (Florida Game and Freshwater Fish Commission 1997).

While the breeding biology of Florida's Crested Caracara population has received some attention (see Morrison 1999) detailed descriptions of its nesting habits are limited because nests are often inaccessible to researchers. For example, nests can be located in nest trees at a height of up to 17 m (Morrison and Dwyer 2012) and are often located on privately owned land (Morrison and Humphrey 2001). As a result, previous studies of Crested Caracara nesting habits in Florida have focused on nest site characteristics such as tree species, nest height and orientation, and surrounding vegetation that can be recorded while causing minimal disturbance to the nest site (Morrison et al. 1997, Morrison 2007). Unlike many other Falconiformes, Crested Caracaras build well-constructed nests by actively collecting and weaving plant material into bulky, round structures (Morrison and Dwyer 2012). However, the structural components of Crested Caracara

nests in Florida have been largely unexplored. Here, we provide the first detailed analysis of nesting materials used by Crested Caracaras in south-central Florida based on our dissection of three Crested Caracara nests. Information regarding the specific materials used by Crested Caracaras to construct nests may be important to consider when developing habitat restoration and conservation plans for this threatened population.

Methods

While monitoring breeding Crested Caracaras across south-central Florida during 2011 and 2012 we found three Crested Caracara nests on the ground directly below known nest trees; all of which were Cabbage Palms (*Sabal palmetto*). Each nest was found after periods of strong wind which presumably dislodged them. We discovered Nest One on 10 May 2011 in Glades County, Florida (27° 04.13', -080° 59.03') in an improved pasture occupied by cattle, Nest Two on 27 January 2012 in Highlands County, Florida (27° 13.32', -081° 12.09') on top of a canal levee adjacent to an area dominated by citrus groves, and Nest Three on 7 March 2012 in Highlands County, Florida (27° 08.39', -081° 12.93') in an unimproved pasture also occupied by cattle. Since we discovered nests in the same year that they were constructed (J. A. Smith and M. N. Scholer, pers. obs.), we considered all nests to be new rather than re-used for more than one breeding season.

We assumed that all nests had been fully constructed since (1) Nest One contained prey items suggesting that it had been used by the resident adults to raise young, (2) behavioral observations indicated that the onset of incubation had occurred at Nest Two, and (3) eggs had been laid in Nest Three, which were subsequently destroyed after the nest was dislodged (J. A. Smith and M. N. Scholer, pers. obs.). To ensure that we collected the entire nest for our analysis, we visually assessed nest trees for signs of nesting material and searched for nest components within a 10 m radius of each nest tree. Although all of the nests had been partially damaged as a result of falling on to the ground, each nest had a clear open cup and consisted of a single structural layer (see Hansell 2000) comprised primarily of intertwined woody stems, vines and herbaceous shrub stems. None of the nests had nest lining.

To investigate the materials used in nest construction in more detail, we dissected each nest into its component parts which were then identified to the most precise taxonomic group possible and weighed to calculate fresh mass. We then dried nest components to a constant weight in a drying oven (Fisher Scientific, Pittsburg, Pennsylvania) at 60° C.

Results

Stems from herbaceous shrubs made up the largest proportion of all three nests; although, the most commonly used species differed between nests. Flat-top Goldenrod (*Euthamia graminifolia*) made up the largest proportion of Nest One (29.83%; Table 1), whereas Shrubby False Buttonweed (*Spermococe verticillata*), a non-native species, and knotweed (*Polygonum* sp.) made up the largest proportions of nests Two and Three (47.26% and 80.98%, respectively; Table 1). Vines also occurred in all three nests with Virginia Creeper (*Parthenocissus quinquefolia*) being the dominant vine species (Table 1). Grasses were

Table 1. List of materials found in Crested Caracara (*Caracara cheriway*) nests breeding in south-central Florida in 2011 and 2012 (n = 3). Dry nest mass is given following each nest number.

Nest	English name	Scientific name	Description	Status	Mass (%)
One (1383g)	Flat-top Goldenrod	*Euthamia graminifolia*	Herbaceous shrub	Native	29.83
	Unidentified	N/A	Unidentified	N/A	23.80
	Virginia Creeper	*Parthenocissus quinquefolia*	Vine	Native	14.48
	Bigpod Sesbania	*Sesbania herbacea*	Legume	Native	9.18
	Knotweed	*Polygonum* sp.	Herbaceous shrub	Native	4.52
	Unidentified vine	*Smilax* spp.	Vine	Native	4.10
	Shrubby False Buttonweed	*Spermacoce verticillata*	Herbaceous shrub	Non-native	3.56
	Carpetgrass	*Axonopus* sp.	Grass	Native	2.30
	Prey remains[1]	N/A	Prey remains	N/A	2.25
	Brazilian Pepper	*Schinus terebinthifolius*	Woody stems	Non-native	1.66
	Synthetic materials[2]	N/A	Synthetic materials	N/A	1.55
	Sicklepod	*Senna obtusifolia*	Legume	Non-native	1.47
	Unidentified grass	Grass spp.	Grass	Native/non-native	0.56
	Live Oak	*Quercus virginiana*	Woody stems	Native	0.33
	Cutleaf ground-cherry	*Physalis angulata*	Herbaceous shrub	Native	0.31
	Balsam Apple	*Momordica balsamina*	Vine	Non-native	0.07
Two (2627.5g)	Shrubby False Buttonweed	*Spermococe verticillata*	Herbaceous shrub	Non-native	47.25
	Carpetgrass	*Axonopus* sp.	Grass	Native	15.10
	Unidentified	N/A	Unidentified	N/A	13.80
	Roughhairy Indigo	*Indigofera hirsuta*	Herbaceous shrub	Non-native	9.32
	Bigpod Sesbania	*Sesbania herbacea*	Herbaceous shrub	Native	5.55
	Cabbage Palm (roots)	*Sabal palmetto*	Woody roots	Native	2.90

[1] Prey remains = cow dung, Wild Boar (*Sus scrofa*) skin and hair.
[2] Synthetic material = baler twine.
[3] Prey remains = cow dung, Armored Catfish (*Callichthys callichthys*) head and pelvic fins, Wild Boar (*Sus scrofa*) skin and hair.
[4] Synthetic material = baler twine, electrical wire, metal wire.

Table 1. (Continued) List of materials found in Crested Caracara (*Caracara cheriway*) nests breeding in south-central Florida in 2011 and 2012 (n = 3). Dry nest mass is given following each nest number.

Nest	English name	Scientific name	Description	Status	Mass (%)
	Prey remains[3]	N/A	Prey remains	N/A	1.39
	Caesarweed	*Urena lobata*	Herbaceous shrub	Non-native	1.23
	Virginia Creeper	*Parthenocissus quinquefolia*	Vine	Native	0.95
	Virginia Pepperweed	*Lepidium virginicum*	Herbaceous shrub	Native	0.78
	Synthetic materials[4]	N/A	Synthetic materials	N/A	0.73
	Flat-top Goldenrod	*Euthamia graminifolia*	Herbaceous shrub	Native	0.46
	Blackberry	*Rubus* sp.	Briar	Native	0.19
	Bahiagrass	*Paspalum notatum*	Grass	Non-native	0.16
	Virginia Buttonweed	*Diodia virginiana*	Herbaceous shrub	Native	0.07
	Bermudagrass	*Cynodon dactylon*	Grass	Non-native	0.05
	Unidentified legume	*Fabacea* spp.	Legume	Native/non-native	0.05
	Turkey-tangle Frogfruit	*Phyla nodiflora*	Herbaceous shrub	Native	0.02
Three (1901.9g)	Knotweed	*Polygonum* sp.	Herbaceous shrub	Native	80.98
	Flat-top Goldenrod	*Euthamia graminifolia*	Herbaceous shrub	Native	12.67
	Unidentified	N/A	Unidentified	N/A	4.83
	Virginia Creeper	*Parthenocissus quinquefolia*	Vine	Native	0.45
	Eastern Poison Ivy	*Toxicodendron radicans*	Vine	Native	0.36
	Blackberry	*Rubus* sp.	Briar	Native	0.34
	Live Oak	*Quercus virginiana*	Woody stems	Native	0.29
	Arcadian St. Johnswort	*Hypericum edisonianum*	Herbaceous shrub	Native	0.09
	Bahiagrass	*Paspalum notatum*	Grass	Non-native	0.03
	Muscadine	*Vitis rotundifolia*	Vine	Native	0.02

[1]Prey remains = cow dung, Wild Boar (*Sus scrofa*) skin and hair.
[2]Synthetic material = baler twine.
[3]Prey remains = cow dung, Armored Catfish (*Callichthys callichthys*) head and pelvic fins, Wild Boar (*Sus scrofa*) skin and hair.
[4]Synthetic material = baler twine, electrical wire, metal wire.

also present in all three nests and were woven throughout the nest structures. Carpet-grass (*Axonopus* sp.) was the predominating grass in nests One and Two and Bahiagrass (*Paspalum notatum*), a non-native species, was the most commonly occurring grass in Nest Three (Table 1). Other nest components included various non-native species of legumes such as Sicklepod (*Senna obtusifolia*) and Roughhairy Indigo (*Indigofera hirsuta*), woody stems of Live Oak (*Quercus virginiana*), woody roots from Cabbage Palms, blackberry briars (*Rubus* sp.) and synthetic materials (Table 1).

Discussion

As in our study, Crested Caracaras in other populations have also been found to construct their nests from a wide range of plant species with herbaceous shrubs often being the most commonest. For example, twigs from the herbaceous species Broomwood (*Gutierrezia sarothrae*) were common in Crested Caracara nests found in southern Texas (Dickinson and Arnolds 1996) and in Baja California Rama Parda (*Ruellia peninsularis*) occurred in 69% of 13 nests (Rivera-Rodriguez and Rodriguez-Estrella 1998). Nests constructed in Baja California also commonly contained vines, including Coral Vine (*Antigonon leptopus*) and synthetic materials (Rivera-Rodriguez and Rodriguez-Estrella 1998); a finding shared by our study. Furthermore, in accordance with our results, nests constructed in southern Texas contained species of briar including Macartney Rose (*Rosa bracteata*), Dewberry (*Rubus trivialis*), and woody stems of Yaupon (*Ilex vomitoria*) (Dickinson and Arnolds 1996).

It is likely that Crested Caracaras primarily use herbaceous shrubs, woody stems, and briars to construct their nests since they are relatively rigid, can be securely placed in a tree and, therefore, provide structural support for the nest contents. In comparison, grasses and other more flexible plant materials may be used to weave and secure together the larger, less flexible plant materials such as herbaceous shrub stems. Synthetic materials such as baler twine, electrical wire and metal wire may also serve a similar function. In contrast, nesting materials used by other caracara species throughout Central and South America are not consistent with those used by Crested Caracaras. Whittaker (1996) notes that nests of Black Caracaras (*Daptrius ater*), as well as Red-throated Caracaras (*D. americanus*), are constructed with large woody twigs more similar in form to nests constructed by hawks of the genera *Buteo* and *Accipiter.* Other species of caracaras, such as Yellow-headed Caracaras (*Milvago chimachima*), are suspected of using nests previously built by other bird species or, in some cases, utilizing nesting cavities in trees or other man-made structures (Johansson et al. 1999).

Our results indicate that Crested Caracaras in south-central Florida construct their nests using a wide range of native and non-native plant species. While our study did not specifically compare used versus available plant material, the variability of plants found in Crested Caracara nests suggests that they are constructed from the most readily accessible materials within the territory of each breeding pair. However, little is known about nest material selection by Crested Caracaras. Therefore, future studies should focus on how nesting material availability within Crested Caracara territories influences nest composition. Results from such studies may provide valuable information that can be used in the planning of habitat restoration and conservation plans for the threatened population of Crested Caracaras in south-central Florida.

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