

Species Conservation Guidelines
South Florida

Audubon's Crested Caracara

The Species Conservation Guidelines (Guidelines) for Audubon's crested caracara (*Polyborus plancus audubonii* (= *Caracara cheriway audubonii*)) (caracara) provides a tool to assist the user in determining if their project may adversely affect caracaras. Here we describe actions which might have a detrimental impact on the caracara and how these effects can be avoided or minimized.

The Fish and Wildlife Service (Service) suggests review of the following papers for synopses of caracara ecology: *South Florida Multi-Species Recovery Plan* (Service 1999) and the *Recommended Management Practices and Survey Protocols for Audubon's Crested Caracara* (*Caracara cheriway audubonii*) (Morrison 2001). Below is a summary of some life history aspects of this species which are pertinent to the Guidelines process.

Life History

The caracara is a resident, diurnal, and non-migratory species that occurs in Florida as well as the southwestern U.S. and Central America. Only the Florida population, which is isolated from the remainder of the species, is listed as threatened under the Endangered Species Act. This large long-lived raptor breeds from September through June with the primary season being November through April (Morrison 1999). Morrison and Humphrey (2001) found that caracaras prefer to nest in cabbage palms (*Sabal palmetto*) surrounded by open habitats with low ground cover and low density of tall or shrubby vegetation in Florida. Peak egg laying takes place from late December through early February (Morrison 1999). Incubation lasts for about 32-33 days and young fledge at 43-56 days after hatching (Layne 1996, Morrison 1996). Juveniles leave the natal area and can be found roosting in large groups (50 or more) in large palm and oak trees (Morrison 2001).

Habitat

The Florida population commonly occurs in dry or wet prairie areas with scattered cabbage palms (*Sabal palmetto*). It may also be found in lightly wooded areas. Scattered saw palmetto (*Serenoa repens*), scrub oaks (*Quercus geminata*, *Q. minima*, *Q. pumila*), and cypress (*Taxodium* spp.) may also be present. Widespread changes in land use may have caused a change in habitat use in this subspecies. Morrison and Humphrey (2001) found a strong association of caracara home ranges with improved pasture. The presence of seasonal wetlands may be an important factor in the attractiveness of these pastures to caracaras (Service 1999). There is no critical

habitat designated for this species.

Distribution

Historically, this subspecies was a common resident in Florida from northern Brevard County, south to Lake Okeechobee. It has been reported as far north as Nassau County, and as far south as Collier County and the lower Florida Keys in Monroe County. Caracara may be found in Charlotte, Collier, Hardee, Hendry, Martin, Monroe, Palm Beach, Polk, and St. Lucie Counties, but the region of greatest abundance for this subspecies is a five-county area north and west of Lake Okeechobee, including Desoto, Glades, Highlands, Okeechobee, and Osceola Counties. Figure 1 shows the consultation area where we primarily expect projects to impact the caracara.

Telemetry data (Morrison, unpubl. data) show several communal gathering areas for juvenile caracaras in south-central Florida. These gathering areas are not always at the same location, but are known to occur in a several general areas marked on Figure 1. The largest gathering area includes the floodplains and adjacent pasture lands on both sides of the Kissimmee River. Other smaller areas were identified in Highlands and Glades Counties (Fig. 1). Both the consultation and gathering areas are important in determining whether a project may affect caracaras.

Determination

A flowchart is provided to guide you in determining your project's impacts on the caracara (Fig. 2). You should have a project description and a habitat maps. The map should have the project boundaries and a 1,500-m (4,920 ft) buffer surrounding the property. This buffer will help identify any off-site caracara territories that may overlap onto the property. Compare your project location with the consultation area map (Fig. 1). If the project is not in the caracara consultation area then the project should have no effect on the caracara and the Federal action can proceed.

Within the consultation area, there are special gathering areas used by juvenile caracara (Fig. 1). If the project is within a gathering area, then activities may affect the caracara and conservation measures may be needed (see below). Major habitat modification in these areas may require formal consultation.

It is important to determine whether a project site has suitable habitat. Suitable habitat for the caracara includes wet and dry prairies with scattered saw palmetto, scrub oak, or cypress. In addition, improved and semi-improved pastures and range lands may be considered suitable habitat. Heavily forested areas are not considered a suitable habitat. If the project is within the consultation area, and no suitable habitat is present, then no effect is anticipated to the caracara and Federal action can proceed.

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If the project occurs within the consultation area, and suitable habitat is present, the Service presumes the habitat is occupied and activities in this area may affect the caracara. In this case a caracara nest survey will confirm whether or not caracaras nest on the property. Guidelines on how to survey for caracara nests can be found in Appendix B. If the survey does not detect caracara nests, then no effect from the project is anticipated on the caracara.

If the surveys detected a caracara nest or available information indicates the presence of a nest at the project site, then the project may affect the caracara and further consultation with the Service is warranted. If appropriate conservation measures are implemented by the project then the project is not likely to adversely affect the caracara. If conservation measures can not be implemented or take of a caracara may occur then the project is likely to adversely affect the caracara and formal consultation should be initiated.

Conservation Measures

When a nest is present a series of conservation measures for activities in primary and secondary zones are provided below. These Guidelines can be used to modify project activities to avoid or minimize impacts and result in the project not likely adversely affecting the caracara.

Management Zones

In evaluating project impacts to the caracara in south Florida, the Service defines a primary zone as 300 m (985 ft), and a secondary zone as 1,500 m (4,920 ft) outward from the nest tree. Protection of the primary zone is very important particularly during the nesting season, and must be maintained in order to provide conditions for successful reproduction. Impacts during the active nesting period can be avoided by timing of activities near the nest site. Conservation measures that help reduce the impact of a project on the caracara and that are compatible with caracara survival are as follows:

Non-nesting Season (May to October)

- Maintain nest tree and other trees in the zone. This should include dead trees that are often used for perching and roosting. The nest and the nest tree are protected year-round by both Federal and State law and removal or other means of physical damage is prohibited.
- Maintain ground vegetation to provide cover for fledglings as they learn to fly.
- Maintain pasture, grassland, and wetlands that are necessary for caracara foraging. Typical land management practices, such as, cattle grazing, burning, and mowing are allowed during the non-nesting season. Man-made wetlands, such as, ditches and canals, are important feeding sites and also should be maintained. New construction that will increase the level of

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disturbance may adversely affect caracaras.

- Avoid use of chemicals toxic to wildlife, including pesticides, fertilizers, or herbicides.

Nesting Season (November to April)

Caracaras are most sensitive to disturbance during nest building, incubation, and early nestling stages (first 3 to 4 weeks). There are additional conservation measures during this time to minimize impacts to the caracara.

- Normal agricultural activities should be limited during this season. Once the nestlings fledge normal activities can resume.
- In general, human activities in this zone should be limited including low flyovers by aircraft.

Secondary Zone - The secondary zone encompasses an area extending outward from the end of the primary zone (300 m (984 ft) from the nest) to 1,500 m (4,920 ft). This zone is generally defined as the foraging territory in which the nest site is located. This secondary zone is used by caracaras for the collection of nest material, roosting, and feeding. The average caracara home range is 1250 ha (Humphrey and Morrison 1997). This amount of suitable habitat contiguous to the nest site may be required to maintain the ecologic function of the nesting territory.

Conservation measures for this zone are directed at maintaining the foraging capacity of the area.

- Maintain pasture, grassland, and wetlands that are necessary for caracara foraging. Typical land management practices, such as, cattle grazing, burning, and mowing can be done throughout the year. Man-made wetlands, such as, ditches and canals, are important feeding sites and also should be maintained. Conversion of pasture and wetland habitats in this zone to row crops, sugarcane, citrus groves, pine plantations, or hardwood forest may adversely affect caracaras. Normal ranching and agricultural operations (including sod farming), hiking, bird watching, fishing, camping, picnicking, hunting, and recreational off-road vehicle use are allowed in the secondary zone.
- Limit use of chemicals toxic to wildlife, including pesticides, fertilizers, or herbicides, as they may impact the caracara through it's food supply.

Habitat Enhancements

If potential nest trees are lacking in an otherwise suitable habitat, planting of cabbage palms can improve the habitat for caracaras. Caracaras prefer open grasslands or unimproved pasture. Tall, thick, or scrubby ground cover can be improved through prescribed burning or mechanical vegetation removal.

Gathering Areas

Though no specific locations within these gathering areas are used continuously, they are important staging areas for caracaras during the first year after leaving their natal territory. The following are recommended guidelines for activities within these areas:

- habitat conversion other than traditional agricultural and ranching activities should be limited within the gathering area;
- large trees, both living and dead, should be retained as roost and perch trees;
- incorporate land management practices that keep ground cover vegetation short, which may include cattle grazing, burning, mowing, or roller chopping; and
- plant cabbage palm tree clusters (minimum of three trees spaced close together) in areas lacking potential nest and perch trees.

Examples of how conservation measures may be implemented are as follows:

Non-nesting Season

The project avoids habitat modification in the primary and secondary zones, with any acceptable land uses in these zones occurring outside the nesting season. These zones were formulated to protect the caracara from excessive human disturbance. Ideally the project footprint can be modified not to impact the conservation zones. If the primary zone can be set aside by conservation easement, or other protective covenant as an environmentally sensitive area then we can assure the use of the site by the caracara throughout its life. Within the primary zone, it is important to retain suitable trees for nesting, such as cabbage palms, and other large trees for perching and roosting. Also, maintain natural ground cover that can be used by fledglings as cover.

In both zones, suitable habitat such as grasslands, pasture, and man-made wetlands (ditches and ponds) within pastures, should be maintained. New buildings, roads, power lines or canals, in the zones may adversely affect caracaras. As the secondary zone is important to foraging, conversion of pasture and wetland habitats to row crops, sugarcane, citrus groves, pine plantations, or hardwood forest may adversely affect caracaras. Chemicals harmful to wildlife should be avoided in the conservation zones. During the non-nesting season, normal agricultural operations, exotic species control, and other wildlife enhancement activities can occur in both zones. If the above conservation measures are incorporated into a caracara management plan the project is not likely to adversely affect the caracara.

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Nesting Season

Caracaras are most sensitive to human disturbance during the nesting season between November and April (Morrison 2001). As such, unnecessary human entry and aircraft flyovers should be avoided within the primary zone and flyovers should be prohibited during this period. If necessary, project activities can occur during the nesting season, after the hatchlings have fledged. It can take as little as 11 weeks from egg laying to fledging. A site monitor should be used to determine when fledging occurs and project activities can begin. During the nesting season, normal agricultural operations, exotic species control, and other wildlife enhancement activities can occur in the secondary zone. If the above conservation measures are incorporated into a caracara management plan the project is not likely to adversely affect the caracara.

Modifications to Conservation Measures

The Service believes that there are very few circumstances that biologically justify modification of the conservation measures. However, some caracaras are very tolerant of human activity. In these cases, biological data, such as habitat use, flight patterns, and foraging areas can be used to justify modifications to conservation measures. This data must include a biological evaluation of the monitoring data and why the proposed modifications would not adversely affect the nesting caracaras. This information should be incorporated as a component of the caracara management plan. If the data in the caracara management plan biologically support the request to modify the conservation measures, then the project is not likely to adversely affect the caracara and concurrence of this determination may be requested from the Service.

On-site Habitat Enhancement

For projects that propose modification to habitat in the primary or secondary zones, the Service would normally require formal consultation. But if surveys indicate that the habitat quality has degraded as a result of exotic species invasion, lack of fire, or other anthropogenic actions, then on-site habitat enhancement may be possible to offset loss of function that would result from project impacts.

If the habitat modification is small, and on-site habitat enhancements are proposed to improve habitat quality in the remainder of the zones, then a determination could be made that the project is not likely to adversely affect the caracara. Proposed modifications and enhancements should be incorporated in a caracara management plan. This plan also needs a monitoring program to document the success of the enhancement actions.

Nest Abandoned or Blown Down

Caracara nests are protected both by Federal and State laws. In situations where nests are blown down, or damaged during storm events, the caracara will usually rebuild the nest during the next

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nesting season in the same tree or in an adjacent tree. In certain circumstances, several years may pass before a new nest is constructed. A nest should not be considered abandoned until it is not used for three consecutive breeding seasons or no other active nests are found within 0.5 km (0.31 mi) of the nest. The nest site should be protected as per the non-nesting season conservation measures. These should be documented in a caracara management plan. If a nest is found to be abandoned by the above criteria, then the project is not likely to adversely affect the caracara.

Nest off-site, but secondary zone overlaps onto the project

Caracaras may nest off-site but within 1,500 m (4,920 ft) of the project boundary. The secondary zone area that overlaps onto the site should be protected by measures listed above. If possible, the off-site management zone area should be protected through conservation easements. A survey of activity patterns could be completed to determine if the birds make use of resources on the property. If the birds do not make use of the project area or if conservation measures for the area of overlap were included in a caracara management plan, then the project is not likely to adversely affect the caracara.

Habitat Protection in Gathering Areas

Within gathering areas, if the conservation measures listed above are incorporated into a caracara management plan then the project is not likely to adversely affect the caracara. Major habitat modification such as conversion of pasture and wetland habitats to row crops, sugarcane, citrus groves, pine plantations, or hardwood forest may be harmful and therefore warrant formal consultation. Prudent modification of the project with the aforementioned conservation measures will reduce the potential for harm to the point that formal consultation will not be necessary. The Service recommends early consultation to identify issues and options available to reduce the project's impact on the caracara.

Habitat Modification in the Conservation Zones

If the project:

- modifies substantial habitat within the conservation zones;
- requires intrusion into the primary zone; or
- could result in loss of eggs in the nest, nestlings, or nest tree, then formal consultation is required.

During construction, an on-site monitor will be required to determine if project activities are disturbing the caracara. There are many options to minimize adverse effects and reduce incidental take. Actions that may be appropriate to minimize harmful effects could include habitat enhancement, muffling of equipment, less intrusive construction methods, and other project-specific recommendations. Prudent modification of the project with these

recommendations can avoid formal consultation and expedite the project's completion. The Service recommends early consultation to identify issues and options available to reduce the project's impact on the caracara.

Reports

Survey Report

Survey protocols for caracara can be found in Appendix B and Morrison (2001). The goal of the survey is to provide a complete count of all caracara nesting pairs within the project area and develop an approximate territory or home range map for each nesting pair. The survey report should include the following, as applicable:

- A. Field data sheets with:
 - 1. dates with starting and ending times of all surveys conducted;
 - 2. weather conditions during all surveys, including average temperature, wind speed and direction, visibility, and precipitation; and
 - 3. total number of caracara nests found and number of caracaras observed in each location.

- B. An aerial photograph or vegetation map depicting:
 - 1. the entire area of interest;
 - 2. nest locations, primary and secondary zones;
 - 3. habitat descriptions; and
 - 4. locations of all caracaras seen or heard while conducting the survey or at any other time, including flight direction.

Biological Evaluation Report

If the project may affect the caracara, a biological evaluation will be helpful for determining whether formal consultation is necessary. Guidelines for this report can be found in Service (2004).

Caracara Management Plan

If a project may adversely affect the caracara, a management plan can identify conservation measures, habitat enhancements, and monitoring that will help minimize adverse effects to caracaras. The following should be considered when assessing project effects to the caracara:

- What is the level of use of the project area by the caracara? You may need to conduct surveys.

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- How is the area used? Why is the caracara there? Are they transient, foraging, perching, roosting, or nesting, etc?
- What effect will the project have on the caracara's foraging areas in all areas influenced by the project?
- What actions are proposed to minimize potential effects to the caracara? This should include monitoring and enhancement actions, if any.

The management plan should be a component of the initiation package (Service 2004).

Literature Cited

- Humphrey, S.R. and J.L. Morrison. 1997. Habitat associations, reproduction, and foraging ecology of Audubon's crested caracara in south-central Florida. Florida Game and Freshwater Fish Commission Nongame Program Project No. NG91-007. Tallahassee, Florida.
- Layne, J.N. 1996. Audubon's crested caracara. Pages 197-210 in J.A. Rodgers, H.W. Kale, and H.T. Smith, editors. Rare and endangered biota of Florida. vol. 5: birds. University Press of Florida; Gainesville, Florida.
- Morrison, J.L. 1996. Crested caracara (*Caracara plancus*) in A. Poole and F. Gill, editors. The birds of North America, No. 249. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and the American Ornithologists' Union, Washington, DC.
- Morrison, J.L. 1999. Breeding biology and productivity of the crested caracara in Florida. Condor 101:505-517.
- Morrison, J.L. 2001. Recommended management practices and survey protocols for Audubon's crested caracaras (*Caracara cheriway audubonii*) in Florida. Technical Report No. 18. Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida, (Appendix A).
- Morrison, J.L. and S.R. Humphrey. 2001. Conservation value of private lands for Crested Caracaras in Florida. Conservation Biology 15(3):675-684.
- U.S. Fish and Wildlife Service (Service). 1999. South Florida multi-species recovery plan. Atlanta, Georgia. <http://verobeach.fws.gov/Programs/Recovery/vbms5.html>
- U.S. Fish and Wildlife Service (Service). 2004. Guide to a complete initiation package. South Florida Ecological Services Office, Vero Beach, Florida. (see SLOPES Introduction Appendix A). <http://verobeach.fws.gov/index.htm>.

GIS Layers

Consultation Area	Caracara_ca	shape file
Gathering Areas	Caracara_ga	shape file

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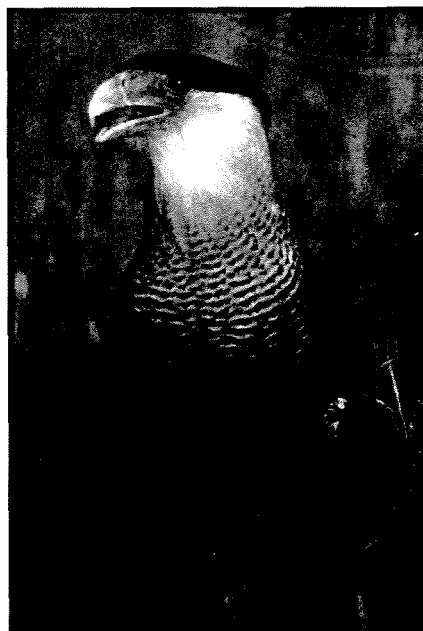
APPENDIX A

**Recommended Management Practices and Survey Protocols
for Audubon's Crested Caracaras (*Caracara cheriway audubonii*) in Florida**

**Recommended Management Practices
and Survey Protocols for Audubon's
Crested Caracara (*Caracara cheriway
audubonii*) in Florida**

TECHNICAL REPORT NO. 18

Joan L. Morrison



September 2001



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**Recommended Management Practices
and Survey Protocols for Audubon's
Crested Caracara (*Caracara cheriway
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INTRODUCTION

This document was published and issued by the Florida Fish and Wildlife Conservation Commission (FFWCC) but was prepared in consultation with experts on the crested caracara and with biologists from both the FFWCC and the U.S. Fish and Wildlife Service. The purpose of this document is to provide recommendations for management practices that would benefit the caracara in Florida by developing, maintaining, and/or enhancing environmental conditions required for the species' survival and well being. The management practices recommended here are advisory in nature, to be used by a variety of constituents including private landowners and land managers who may have an interest in managing their lands in ways compatible with the caracara's survival. These management practices, if carried out, should avoid or minimize detrimental human-related impacts on crested caracaras and should foster persistence of the species in Florida. This document also provides general biological information about the species and protocols for surveying for nests and for monitoring known nest sites.

BIOLOGICAL INFORMATION ABOUT THE SPECIES

The crested caracara (*Caracara cheriway*; hereafter, caracara), is a unique raptor/scavenger from the family Falconidae that reaches the northern limit of its geographic range in the southern U.S. (Fig. 1). The subspecies occurring in the U.S. is Audubon's crested caracara (*C. c. audubonii*) (Brown and Amadon 1968, American Ornithologists' Union 1983). In Florida, this raptor occurs as an isolated population in the south-central region of the state.

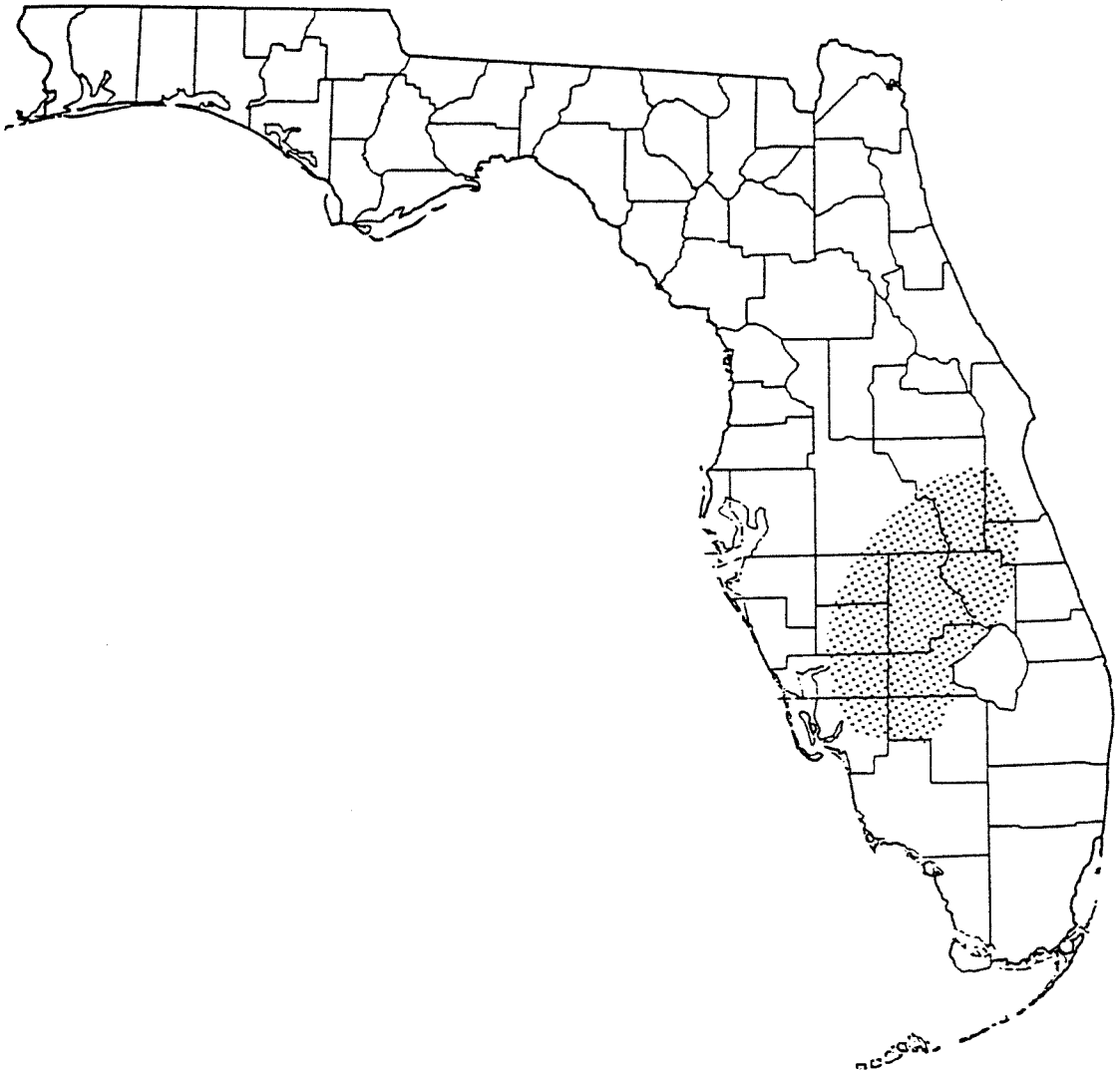


Fig. 1. Currently known breeding range of the crested caracara in Florida.

Caracaras in Florida were formerly documented to inhabit native prairie in Florida's central region. The species has been reported from the Kissimmee, Caloosahatchee, and upper St. Johns river basins, and the Kissimmee prairie (Bryant 1859, Scott 1892, Phelps 1912, Bailey 1925, Nicholson 1929, Howell 1932, Bent 1938, Sprunt 1954). Few historic nesting records are available, however. Notable changes in land use patterns have occurred throughout central Florida in recent years and, as a result, the status of this population has become a subject of concern. The caracara's range in Florida is now considerably smaller than was historically reported (Stevenson and Anderson 1994, Layne 1996), and this raptor apparently now occurs almost exclusively on privately owned cattle ranches in the south-central part of the state (Morrison and Humphrey 2001). The size of this population is unknown but is probably at least 500 (Layne 1996) or greater (J. Morrison, unpublished data). Populations comprised of 500 or fewer individuals may be more susceptible to extinction due to stochastic demographic or environmental events (Shaffer 1981).

All available evidence suggests that the most serious threat to Florida's caracara population is loss or degradation of nesting and feeding habitat. Such loss is most commonly due to conversion of pasture and other grassland habitats and wetlands to citrus, sugar cane, other agriculture, and urban development. Adult caracaras exhibit high site- and mate-fidelity; therefore, extensive loss of habitat within the home range, particularly of the nesting site itself, may cause the pair to abandon that home range, or at least the nesting site. Caracaras use some agricultural lands for foraging (J. Morrison, unpublished data); however, these habitats will not support resident, breeding caracaras if nesting habitat is not available. It is currently not known what degree of nesting or foraging habitat loss within a home range will cause permanent movement of a pair out of their home range.

Home Range

Florida's caracaras are resident, remaining year-round on home ranges that consist of the nesting territory and feeding habitat. Home ranges of caracaras in Florida average approximately 1,200 ha (3,000 acres) in size (Morrison 1997a) and represent an area within a radius of approximately 2–3 km (1.2–1.9 miles) from the nest. Adult caracaras typically forage throughout their home range during both nesting and non-nesting seasons. The nesting territory itself may be considered to be approximately the 25% core area of the home range, within an average radius of 1.0 km (0.6 mile) from the nest. This core area is where the resident pair spends most of its time during the nesting season (Morrison 1997a). The nesting territory is strongly defended by the pair during the nesting season. Adult caracaras spend more time farther from the nest and are rarely defensive around the nesting site during the non-nesting

season (Morrison 1997a). Other areas within the home range that are not near the nest itself are regularly used by the caracaras for collecting nesting material, roosting, loafing, and feeding.

Nesting

The crested caracara has a nesting ecology similar to that of bald eagles (*Haliaeetus leucocephalus*). Caracara pairs are generally monogamous and highly territorial, and exhibit strong fidelity to their breeding site, even nesting in the same tree year after year. Long-term observational data on occupancy of home ranges by caracaras in Florida indicate that as long as the nesting site and surrounding feeding habitat are not substantially altered, the home range will remain continuously occupied (J. Layne, unpublished data) and the pair will make an annual breeding attempt (Morrison 1999). Adult caracaras are highly intolerant of other adult caracaras within the nesting territory and particularly near the nest site, although caracaras of the juvenile age classes (fledgling to 3 years of age) may be tolerated at feeding areas that are not near the nest tree.

Timing.—Breeding activity can occur from September through June in Florida, with the primary season being November through April. Peak egg laying occurs from late December through early February, and incubation ranges from 31 to 33 days (Morrison 1999). The total breeding cycle (nest building, egg laying, incubation, nestling, and post-fledging dependency periods) is approximately 25 weeks in length, although sometimes up to 2 months elapse between completion of nest building and commencement of egg laying. The nestling period covers approximately 7–8 weeks, and the post-fledging dependency period is approximately 8 weeks (Morrison 1999).

Crested caracaras are capable of making more than 1 nesting attempt during a single breeding season. Pairs frequently produce a replacement clutch following nest failure in the incubation or early nestling stages (Morrison 1999). Early-season nesting pairs (those that lay their first clutch before March 1) may raise a second brood, but this occurs in less than 10% of the population, annually (Morrison 1998). Second-brood clutches may be laid as late as March and April. Second-brood young fledge as late as July and may remain with their parents through the rest of the summer and into the fall.

Nesting Habitat.—The crested caracara is primarily a bird of open habitats. Its nesting habitat in Florida consists of large expanses of pastures, grasslands, or prairies dotted with numerous shallow ponds and sloughs and single or small clumps of live oaks (*Quercus virginiana*), cabbage palms (*Sabal palmetto*), and cypress (*Taxodium* spp.). Cabbage palms are favored as

nest trees; equally chosen are single, isolated trees or trees within a group of 3–10. Caracaras nest only occasionally in oak and cypress trees. Most striking about caracara nesting habitat is the physical structure of the landscape—low, short, ground vegetation; scattered trees; and minimal or absent understory or shrub layer. Caracaras in Florida historically nested in native wet prairie habitat, particularly adjacent to marshes associated with the Kissimmee and St. Johns rivers (Nicholson 1929, Bent 1938). Caracaras are now found regularly in “improved” pastures, grasslands heavily managed for forage production for cattle (Morrison 1997a). Exotic forage grasses dominate these improved pastures, and regular mowing, burning, and high-density grazing maintain the low vegetative structure.

The Nest.—Caracara nests can generally be seen by looking up directly into the nest tree from alongside the trunk. Nests are bulky, loosely woven structures typically composed of long, slender, dried pieces of vines, weed stalks, briars, twigs, and fruiting clusters of palm. Nests are round or oval in shape and are about 2 feet in diameter. Nests typically face south to southeast within the nest tree.

Number of Nest Trees Used.—The nest site that originally attracts the pair of breeding caracaras is of critical importance. Pairs may use the same tree year after year, even if the old nest is lost. It is not uncommon for nests to be blown from trees by storms, after which the resident pair typically rebuilds a new structure in the same tree. If an old structure remains, the pair typically builds a new structure on top of it. Caracara pairs sometimes have 2 or 3 alternate nest trees that may be used in different years or for a second nesting effort within the same year. All nest trees used by a given pair are typically situated in the same general vicinity (usually within 0.5 km [0.3 mile] of each other). A new pair will often use one of the originally used nest trees when a member of a pair dies or is replaced (J. Morrison, unpublished data).

Feeding

Crested caracaras obtain their food from a variety of habitats, including improved pastures, newly plowed or burned fields, dairies, and around dwellings and farm buildings. They scavenge along roads and at slaughterhouses, poultry houses, and urban dumps. Caracaras also forage regularly in a variety of wetland habitats. The types of wetlands that provide good feeding conditions for caracaras include the extensive networks of drainage ditches and small ponds and wetlands found within improved pastures, drying marshes or stock ponds, shallow roadside or agricultural ditches, and marshes associated with river oxbows. Caracaras occasionally forage in agricultural lands including sod and cane fields and citrus groves but

do not spend most of their foraging time in these habitats (J. Morrison, unpublished data). Groups of up to 20 juvenile caracaras are often seen feeding in citrus groves during the fall, although the seasonality of this behavior is not understood.

The crested caracara is considered a scavenger because it is most easily observed feeding on carrion along roadsides. However, this raptor actually exhibits a broad diet, feeding on insects associated with carrion and dung in pastures as well as on a wide variety of vertebrate and invertebrate prey, much of which it captures live. Prey includes rats, mice, skunks, rabbits, squirrels, piglets, snakes, frogs, lizards, sirens, nestling birds, birds' eggs, turtles, fish, crayfish, beetles, grasshoppers, and worms.

Roosting

Adult caracaras frequently perch on the tallest trees or snags or on telephone poles within their home range. Breeding adult caracaras typically roost in trees near or within the nest stand. Groups of up to 50 or more juvenile caracaras roost in groups of palm and oak trees. These roosts occur on ranches or they may be near gathering areas (see below), particularly along the Kissimmee River floodplain. During the non-breeding season, roosts containing up to 30 juveniles may even be found within the home range of a nesting pair, although not generally within the nesting territory itself.

The Juvenile Period

Young caracaras fledge from January through July with the peak of fledging occurring in March and April. Juvenile caracaras have a long fledgling dependency period, remaining dependent on their parents for the first 2–3 months after fledging from the nest (Morrison 1996). Beginning about 3 months post-fledging, juveniles begin to explore locations outside the natal home range but continue to return to that home range. Following the exploratory phase, juveniles become nutritionally independent but are tolerated by the adults and may remain on their natal home range until the adults begin another breeding effort the following year. The home range used by juvenile caracaras until permanent departure mirrors that of their parents. Permanent departure from the natal home range can occur from 11 to 45 weeks post-fledging.

Age at first reproduction for Florida's crested caracaras is 3 years, although probably not all 3-year-olds attain a territory and begin breeding. Juvenile caracaras are characterized by a medium to dark brown and buffy white plumage (Wheeler and Clark 1995). They do not attain the black and

white adult plumage until about 4 years of age. Juvenile caracaras primarily use improved pasture and grassland habitats and associated wetlands for foraging.

Gathering Areas

After departing from their natal home ranges, young caracaras are nomadic throughout the population's range in south-central Florida, but they regularly use temporary settling areas called gathering areas. Juvenile caracaras typically travel between gathering areas and may remain for days to weeks at any one site (J. Morrison, unpublished data). Juvenile caracaras explore throughout the population's range, then return to spend varying lengths of time in the gathering areas. Even individuals from home ranges on the periphery of the population's range eventually find their way to these gathering areas. Because individuals move between areas it is difficult to monitor numbers at the gathering areas; therefore, the numbers of juveniles and floaters (adult non-breeders) in this population are not known.

Tolerance of Human Activity and Disturbance

Caracaras exhibit a wide range of tolerance of human activities. Some may be quite tolerant of buildings and of the occasional presence of people, livestock, machinery, and vehicles in their home range. Particular pairs may endure a wide range of potential impacts to their habitat resulting from altered patterns of human activity. The nature and extent of impacts on nesting and feeding habitat or on the birds themselves will depend largely on the current situation within each home range and on previous exposure of the resident pair to human activity. Whether or not a caracara pair will be affected by an activity generally depends on the patterns of activity. Some human influence may already be present in any particular home range. If the caracaras have been nesting successfully at these sites, it would be mainly altered patterns of activity that might impact their nesting behaviors and success.

Caracaras are most sensitive to human disturbance during the nesting season, particularly during the late incubation and early nestling stages, although pairs may abandon a nest if disturbed frequently during the nest-building stage. More nests fail during the last week of incubation and the first 2 weeks of the nestling stage than at any other time during the nesting cycle, at least prior to fledging (Morrison 1999). Nests may be abandoned if disturbed during hatching. Increased activity around the nest at hatching may also attract predators such as American crows (*Corvus brachyrhynchos*), which can take small chicks.

Nesting occurs during the winter months; therefore, eggs and small chicks may die quickly from exposure if adults are frequently forced off the nest or are kept off for long periods. Adults are more tolerant of human activity occurring near the nest after the chicks have hatched and become partially feathered than during the period between nest construction and the third or fourth week of the nestling stage. Adult caracaras are particularly sensitive to human disturbance when attempting to deliver food to nestlings. They will not approach the nest if human activity is occurring nearby. Prevention of food deliveries has the most potential for serious consequences when nestlings are very young and must be fed frequently.

Caracaras generally flush from nests during incubation or early nestling stages when the disturbance source is within 300 m (1,000 feet) of the nest (J. Morrison, unpublished data). Flushing occurs at greater distances as the amount and frequency of disturbance increases, for example with subsequent visits to the nest area. If certain activities occur within approximately 300 m of the nest during the nesting season (November through April), they may have detrimental impacts on caracara nesting activities and success. Significant changes in activity levels or in habitat near the nest could result in the breeding pair leaving that nest site and moving to another site, even if these activities occur during the non-breeding season. If habitat changes occur over a wide area within the overall home range, the breeding pair might abandon the home range altogether.

RECOMMENDED MANAGEMENT PRACTICES FOR CRESTED CARACARA HABITAT IN FLORIDA

Following are recommendations for management practices that would benefit the crested caracara in Florida. These practices could be used by landowners and land managers interested in developing, maintaining, and enhancing habitat suitable for caracaras, and they pertain to habitat both near the nest site and throughout the home range. Objectives of these management practices are to (1) protect the nest site itself, (2) minimize disturbance around the nest that might compromise the nest site, (3) conserve important feeding areas nearby and away from the nest site, (4) protect important areas of cover for the fledglings during the post-fledging dependency period, and (5) improve and enhance habitat, when possible.

- 1) Retain pasture and grassland habitats and natural and man-made wetlands (i.e., ditches and ponds) within pastures.
- 2) Do not remove nest trees or other live trees within 300 m (1,000 feet) of a nest tree. Harvest of palm trees for human consumption should occur farther than 300 m from a known nest tree.
- 3) Retain dead trees, which are often used for perching and roosting, within 300 m (1,000 feet) of a nest tree.
- 4) Planting palm trees in areas lacking potential nest trees might attract new caracara pairs into an area. Potential nest trees should be at least 5 m (16 feet) in height and have full, closed crowns. At least 3 trees should be planted close together in a group.
- 5) Retain ground vegetation within 300 m (1,000 feet) of a nest tree. Clumps of taller grasses and small shrubs are regularly used as cover by chicks after they fledge from the nest. Chicks are vulnerable for the first few weeks after fledging because they do not fly well. They spend most of their time on the ground hiding under vegetation and perching on low branches in trees. Limiting disturbance to ground vegetation near a nest tree will ensure adequate cover for fledglings.
- 6) Cattle grazing, burning, mowing, and roller chopping are land management activities that are compatible with caracara survival. These activities keep ground cover vegetation short, which allows the caracaras to easily walk through grassland habitats when foraging. Caracaras are quite terrestrial compared to other raptors and frequently walk in grassland and along wetland habitats in search of food. Caracaras frequently walk behind tractors during plowing and feed on insects disturbed by the activity. They follow the front of grass fires and remain at burned sites for several days, feeding on animals killed by the fire. Continuing the above

management activities will enhance foraging habitat by limiting growth of tall, thick, or shrubby ground vegetation that is not used as frequently by foraging caracaras. Reductions in these management activities may cause widespread growth of thick, tall, or shrubby ground vegetation.

- 7) Wetland maintenance and ditch cleaning are management activities compatible with caracara survival. Caracaras are attracted by ditch-cleaning operations and feed on fish, turtles, sirens, and other animals exposed by these activities. They also steal food from wading birds that feed along these ditches.
- 8) In a known home range, particularly near a nest site, care should be taken to avoid use of chemicals toxic to wildlife, including pesticides, fertilizers, or herbicides. Care should also be taken to keep these chemicals from being introduced into wetlands and waterways.
- 9) Construction activities (including increased vehicle traffic other than normal agricultural operations; earth stockpiling; vehicle parking; equipment or materials storage; or development of new agricultural, commercial, industrial, or residential sites) typically cause changes in human activity levels and in habitat that may affect nesting caracaras. Although roads, canals, and some agricultural lands may provide seasonal food resources, their construction near the nest, particularly during the early phases of the nesting cycle (nest building, egg laying, incubation, early nestling), could disturb the pair and cause them to abandon the nesting territory.
- 10) Some activities such as fence-building, moving cattle, and normal vehicle and agricultural operations can occur in the home range year-round. Careful timing of these activities within 300 m (1,000 feet) of the nest can minimize the impacts of such activities during the nesting season. These activities should be limited near the nest, particularly during nest building, incubation, and early nestling (first 2–3 weeks) stages.
- 11) Mortality of juvenile caracaras is particularly high along roads, which they frequent in search of carrion. Increasing the number of roads within a home range increases risk of collision with vehicles. Care should be taken along all roads to minimize mortality of caracaras by posting signs, lowering speeds, and watching for birds.

SURVEY PROTOCOL FOR FINDING CARACARA NESTS

As land use changes continue in south-central Florida, the need increases for a standardized and effective protocol for assessing the presence of nesting caracaras or of gathering areas at targeted project sites. Survey techniques for caracaras must provide accurate information on territorial occupancy and breeding. This protocol is intended for use by individuals required to survey new habitat for breeding pairs.

Caracaras are not often visible to a casual observer even in known occupied, active, nesting territories, particularly during certain times of the day and of the year. Casual roadside surveys can grossly underestimate occupancy rates for caracara territories. The probability of seeing a caracara on a roadside survey in a known occupied territory can be as low as 30%, even during the breeding season (Morrison 1995). This protocol is intended to assist individuals in maximizing opportunities for finding nesting pairs and determining breeding status. If possible, surveys should be conducted by a qualified biologist, hereby defined as one who has had previous experience with caracaras, including observations and, preferably, radio tracking. Ideally, this person will have been trained by a qualified caracara researcher in monitoring, observation, and data collection techniques for caracaras, so that surveys will be carried out in a standardize manner.

Timing of Surveys

The timing of nesting activity can vary greatly from year to year; nesting can occur any time during September through June. Surveys for territory occupancy or to find new breeding pairs are best conducted during the months of January, February, and March, when nesting within the overall population is at its peak and adults are most likely to be feeding nestlings. Surveys made earlier than January could unduly disturb the birds and result in nest abandonment. Caracaras are most sensitive during the nest building, incubation, and early nestling stages of the nesting cycle. Caracaras can also be easily observed in the territory after the chicks fledge from the nest. The peak of fledging for this population occurs during March and April.

Surveys are best conducted early in the morning or late in the afternoon. Caracaras are most actively nest building, foraging, and feeding young between sunrise and about 1100 hours, and again, between about 1600 hours and sunset. Caracaras are rarely active during the heat of midday, especially in the summer months. They roost in trees that are often far from the nest site; thus they are rarely visible. Surveys conducted from May through October, particularly in new habitat for the purpose of finding new breeding pairs, are

not likely to be productive because of the caracaras' reduced activity levels during these months. Nests from even the most recent nesting season may be hard to find because they may have blown out of the nest tree. Any rain that occurred after nesting season would likely destroy most signs of activity around the nest tree. Also, after the chicks fledge, the family spends less time near the nest site, making them more difficult to find and observe. Surveys conducted during November and December may be productive, but probably will be more so in known territories. Pairs are most likely to be building nests during these months, but do not spend as much time near the nest as they do after egg laying. Additionally, pairs are quite sensitive to disturbance during the nest building and incubation stages, so surveys conducted early in the breeding season have the potential to excessively disturb nesting pairs.

Duration of Surveys

When surveying for caracaras in areas where the nest site is not known, observers should remain in each area for 2–4 hours during each visit. Observers should remain in the vehicle and watch for caracaras over a wide area of suspected habitat. Observations may be made on consecutive days, but ideally should be conducted at least 2 weeks apart and during the months of January through March. Observations made in this manner will usually yield information on territorial occupancy and even the nest site after only 3 visits, if the site is active. If the entire territory cannot be surveyed from a road, areas containing palm trees should be searched by foot if access is feasible. Observations should be conducted in an area at least twice a month for at least 3 consecutive months before it is considered to be unoccupied by caracaras.

Searching for Nests

Caracaras are very site faithful, even to particular nest trees. Most caracaras nest in cabbage palms (Morrison 1997*b*). The nest structure can easily be seen by looking up directly into the palm from alongside the trunk. Signs that a suspected nest is active are feces and prey remains below the nest, chicks calling from the nest, or defensive behavior by the adults when the observer is near the tree. Nests will most likely be facing south to southeast within the nest tree. Nest trees are generally over 5 m (16 feet) in height; have large, full, closed crowns; and are typically on the southeastern to southwestern edge of a group of trees. Nests may also be in lone, free-standing palm trees, in groups of 2–10 palms, or (rarely) in tall, emergent palms in the middle of a large hammock. Oaks and cypress should be checked also, but these are likely to be used as nest trees only if few palms are available within a large area of otherwise suitable pasture and wetland habitat.

When searching for new breeding pairs, efforts should first concentrate on areas of large contiguous pasture habitat containing scattered palms and oaks and numerous wetlands. Observations should be conducted from a position where a large area of suitable habitat can be viewed. If possible, observations should also be made from cover, such as a vehicle, so that disturbance to the pair can be minimized. Searching should focus on observing adult behavior (e.g., carrying sticks or food) that would suggest nesting activity. Caracaras exhibit little size and no plumage dimorphism (Morrison and Maltbie 1999), and these behaviors are not gender specific.

Other behaviors of adults can be used to find nests. During incubation, the adult not currently incubating often will perch high and visibly in a tall tree within 300 m (1,000 feet) of the nest. Adult caracaras exhibit little defense behavior near their nest, but if the chicks are large (5–8 weeks), adults may remain close to the nest and exhibit rattle and cackle vocalizations and the head-throwback display (Morrison 1996). Nest searching using playback tapes, a technique used successfully for surveys of other raptors, is not likely to be effective for caracaras because they do not respond to such tapes. Their vocalizations do not carry far in open habitats. Most vocalizations are used in situations of immediate contact or proximity of individuals, such as copulation, aggression towards a nest predator, or when feeding alongside other caracaras or vultures.

When a nest is found, the contents can be checked using an extendible pole with a mirror attached or by direct observation. If a nest is not found immediately in an area where adult caracaras are known to occur, another visit should be made to that territory within 1 month after the first visit. Use of carrion as bait can also facilitate nest finding, determining territory occupancy, and determining the breeding status of a known pair. A carcass or other large piece of carrion can be set in a suspected area the night before a planned observation period. If caracaras are in the area, they will usually find and begin feeding upon the carcass just after sunrise the following morning. Individuals can then be observed when they return to the nest site.

Nest Monitoring

Subsequent to finding a caracara nest in a new area, monitoring of the nest may be required to obtain information on breeding chronology and reproductive success. If a monitoring program is initiated in conjunction with a land development program, refer to the monitoring protocol which follows.

MONITORING PROTOCOL FOR KNOWN CARACARA TERRITORIES

Because a major management goal is to monitor the status of Florida's caracara population, it is important to monitor known caracara territories as well as attempt to find new ones. Objectives of monitoring known territories are (1) determining whether territories remain occupied year after year, (2) determining whether the same individuals occupy and breed in the same territories year after year, (3) determining whether pairs successfully fledge young year after year, (4) determining how many young are fledged per pair per year, and (5) for long-term monitoring programs, evaluating any changes in habitat use by resident caracaras in conjunction with habitat changes in their home range. Procedures for monitoring in known territories are similar to those for surveying for nesting pairs in new habitat, but the difference is that monitoring occurs in areas where nest and foraging locations may already be known.

For any monitoring program for crested caracaras in Florida, a qualified biologist should visit the territory on a regular basis (i.e., at least once per month). A qualified biologist is one who has had previous experience with caracaras, including observations and, preferably, radio tracking. Ideally, this person would be trained by a qualified caracara researcher in monitoring, observation, and data collection techniques for caracaras, so that any monitoring program initiated in conjunction with a land development project would be standardized with respect to other ongoing long-term monitoring of crested caracaras in south-central Florida.

Nest Finding and Monitoring Reproductive Success

Timing of Monitoring to Determine Territorial Occupancy and Breeding Status.—Monitoring at known caracara territories is best conducted during January, February, and March, when nesting within the overall population is at its peak and adults are most likely to be feeding nestlings. Caracaras can also be easily observed in the territory after chicks fledge from the nest, which peaks for this population during March and April.

Monitoring is best conducted early in the morning or late in the afternoon. Caracaras are most actively nest building, foraging, and feeding young between sunrise and about 1100 hours and again between about 1600 hours and sunset. Caracaras are rarely active during the heat of midday, especially during the summer months. They roost in trees and often far from the nest site, thus they are rarely visible. Monitoring conducted from May through October may be more difficult because of the caracaras' reduced activity levels during

these months. After the chicks fledge, the family spends less time near the nest site so the observer may have to visit more areas within the home range to find and observe the caracaras. Whereas surveying for new nests is not likely to be as productive in November and December, monitoring during these times may be productive in territories with known nest locations. Pairs are most likely to be building nests during these months.

Duration of Monitoring Sessions.—To find active nests in known territories, all known nest trees should be checked first. If a nest is not immediately found, observers should position themselves where known nest trees can be observed and then remain in the vehicle while watching for caracaras over a wide area of suspected habitat. Observations made in this manner will usually yield information on territorial occupancy and even the nest site after only 3 visits, if the site is active. When a nest is found, nest contents can be checked using an extendible pole with a mirror attached or by direct observation.

Additional monitoring sessions may be needed if the nest is not found during the first monitoring session. Each session should span approximately 2–4 hours and ideally should be conducted at least 2 weeks apart from December through March. During the second visit, the search area for the nest should be broadened to include all potential nest sites within 0.5 km (0.3 mile) of the traditional site. Sometimes a pair moves its nest site, particularly if habitat degradation has occurred within the nesting territory or near the traditional nest site, or if one member of the pair dies. Usually, however, if the home range remains occupied, adults will be seen within 3 visits to the nesting territory. A third visit should be made, if necessary, within 2 weeks of the second visit. If no adults are seen or no nest is found after 3 visits, with at least 1 visit made in each of 3 consecutive months from November through April, the home range may be considered temporarily unoccupied. However, if both members of a pair die, the site would likely be taken over by another pair if no habitat degradation occurs, so an apparently unoccupied site should be monitored the following breeding season.

Monitoring for Habitat Use

To evaluate habitat use by caracaras in known territories, monitoring sessions should occur at least monthly year-round for a minimum of 3 years when associated with habitat conversion or a land development project. Because caracaras are site faithful, responses to habitat changes or noticeable changes in nesting behaviors or success may not become apparent within only 1, 2, or even 3 years of observation. During each visit the biologist should remain in the territory for at least 4 hours beginning at sunrise, or beginning in

late afternoon and extending into early evening, but before dark. Any radio-tagged individuals should be tracked during this period and foraging activity, habitats used, and locations recorded. If no individuals are radio tagged, the observer should search for caracaras within the project area. These individuals should be followed and observed during the monitoring period and their foraging activity, habitats used, and locations recorded.

Other Monitoring Considerations

The major limitation to finding new nesting territories and monitoring known nests is the fact that most caracaras in Florida now occur on privately owned land. Permission must always be obtained from the landowner before entering the property of interest. Private lands and the requests of landowners, such as not driving in certain areas and observing gate closures, must always be respected. Less restricted access facilitates nest searching on public lands, but searching may be more difficult because of habitat differences such as smaller areas of short-grass pasture habitats and larger areas of thick, tall, or shrubby ground vegetation, which caracaras typically do not use.

Reporting Banded Individuals

Sightings of banded caracaras made during any survey or monitoring period provide valuable information regarding individual survival and habitat use. Sightings, along with supporting information, may be reported to the Florida Fish and Wildlife Conservation Commission or the U.S. Fish and Wildlife Service. If a banded caracara is found dead, the band number and color combination should be reported to the U.S. Fish and Wildlife Service.

CURRENT STATUS OF THE CRESTED CARACARA IN FLORIDA

Currently, Florida's population of Audubon's crested caracaras is listed as Threatened both federally (U.S. Fish and Wildlife Service 1987) and by the state of Florida (Logan 1997). This listing was afforded primarily because this population is believed to be isolated from any other caracara populations and of small size, therefore is of evolutionary and conservation concern, and because suitable caracara habitat in Florida has been declining rapidly in recent years. Under this listing, the caracara is protected from activities that would directly harm an individual or its habitat.

Persons with further interest in the legal statutes that afford protection for Florida's crested caracaras should review the federal Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.); the federal Migratory Bird Treaty Act (16 U.S.C. 703-711); and Rules 68A-4.001 and 68A-27.011 of the state of Florida Wildlife Code.

LITERATURE CITED

- American Ornithologists' Union. 1983. Check-list of birds of North America. Sixth edition. American Ornithologists' Union, Washington, D.C., USA.
- Bailey, H. H. 1925. The birds of Florida. Williams and Wilkins, Baltimore, Maryland, USA.
- Bent, A. C. 1938. Life histories of North American birds of prey. Part 2. U.S. National Museum Bulletin No. 167.
- Brown, L. H., and D. Amadon. 1968. Eagles, hawks, and falcons of the world. McGraw-Hill, New York, New York, USA.
- Bryant, H. 1859. Birds observed in east Florida south of St. Augustine. Proceedings of the Boston Society of Natural History 7:5–21.
- Howell, A. 1932. Florida birdlife. J. J. Little and Ives, New York, New York, USA.
- Layne, J. N. 1996. Crested caracara. Pages 197–210 in J. Rogers Jr., H. W. Kale II, and H. Smith, editors. Rare and endangered biota of Florida. Volume 5: Birds. University Press of Florida, Gainesville, Florida, USA.
- Logan, T. 1997. Florida's endangered species, threatened species, and species of special concern. Florida Game and Fresh Water Fish Commission. Tallahassee, Florida, USA.
- Morrison, J. L. 1995. Habitat associations, reproduction, and foraging ecology of Audubon's crested caracara. Quarterly Report. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida, USA.
- _____. 1996. Crested caracara (*Caracara plancus*). In A. Poole and F. Gill, editors. The birds of North America, No. 249. Academy of Natural Sciences, Philadelphia, Pennsylvania, and American Ornithologists' Union, Washington, D.C., USA.
- _____. 1997a. Reproductive ecology and habitat associations of Florida's crested caracaras (*Caracara plancus audubonii*). Dissertation, University of Florida, Gainesville, Florida, USA.

- _____. 1997*b*. Habitat associations, reproduction, and foraging ecology of Audubon's crested caracara. Final Report. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida, USA.
- _____. 1998. Effects of double brooding on productivity in crested caracaras. *Auk* 115:979–987.
- _____. 1999. Breeding biology of the crested caracara in Florida. *Condor* 101:505–517.
- _____, and S. R. Humphrey. 2001. Conservation value of private lands for crested caracaras in Florida. *Conservation Biology* 15:675–684.
- _____, and M. Maltbie. 1999. Methods for gender identification in crested caracaras. *Journal of Raptor Research* 33:128–133.
- Nicholson, D. J. 1929. The Audubon caracara, a little known bird in Florida. *Florida Naturalist* 2:67–69.
- Phelps, F. M. 1912. A March list from the Caloosahatchee River and Lake Okeechobee. *Wilson Bulletin* 24:117–125.
- Scott, W. E. 1892. Notes on the birds of the Caloosahatchee region of Florida. *Auk* 9:209–218.
- Shaffer, M. L. 1981. Minimum population sizes for species conservation. *BioScience* 31:131–134.
- Sprunt, A., Jr. 1954. Audubon's caracara. *Florida Naturalist* 27:99–101, 119.
- Stevenson, H. M., and B. H. Anderson. 1994. *The birdlife of Florida*. University Press of Florida, Gainesville, Florida, USA.
- U.S. Fish and Wildlife Service. 1987. Endangered and threatened wildlife and plants; threatened status for the Florida population of the Audubon's crested caracara. Final Rule. *Fed. Reg.* 52:25229–25231.
- Wheeler, B. K., and W. S. Clark. 1995. *A photographic guide to North American raptors*. Academic Press, San Diego, California, USA.

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APPENDIX B

Survey Protocol for Finding Caracara Nests

SURVEY PROTOCOL FOR FINDING CARACARA NESTS

This supplemental information is provided for further guidance on surveying for caracara nest based on the protocol in Morrison (2001). There is the highest probability of success in finding caracara nests during the period January to April. This period covers the time when most birds are feeding the nestlings and become more visible to observers. Surveys should start in January and continue through April to provide adequate data to conclude that a caracara nest does not occur on site. Once all nests on the site are found the survey can be terminated. Surveys should be conducted by a biologist with caracara experience as the birds can be hard to find and identify at long distances. The protective area for the caracara is 1,500 m (4,920 ft) around the nest. The area surveyed should include the project area and a 1,500-m buffer to account for off-site territories that might overlap onto the project area. All areas of suitable habitat within the project area and buffer should be initially surveyed for 1 day. If the area is large or the view obstructed more than 1 day or multiple observers may be needed to completely survey the area.

The observer should position themselves in a location where the largest open area (unobstructed by trees) can be viewed. The survey area should be no more than about 500 ha, which is the largest area easily observable from one point. An aerial photograph of the property and buffer zone can be used to identify areas of suitable habitat and map observation blocks to facilitate surveying the whole area. Use the map and a site visit to select strategic points where caracaras are more likely to be seen going to and from potential nesting sites. From a stationary position search for caracara activity, especially birds moving to the nest tree carrying sticks or food. Watch for other birds, such as American crows (*Corvus brachyrhynchos*), red-tailed hawks (*Buteo jamaicensis*), and turkey vultures (*Cathartes aura*), that might elicit an aggressive response from caracaras present. Nesting caracaras will often chase potential predators away from the nest; thus, revealing their presence. Also circling vultures can indicate the presence of naturally occurring carrion that may attract caracaras. If a potential nesting tree is detected then the observer can reposition to improve observing the bird's behavior. Weather condition should

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be adequate to clearly view the whole area. The area should be viewed from sunrise to 11AM and again 3 hours before sunset. During midday potential nest trees can be examined close up for evidence of nests (Morrison 2001). The area viewed during each survey should be marked on a site map. All caracara activity observed should be recorded by time of day and distinguished between juvenile and adult birds. Record flight direction to identify foraging areas and the nesting tree. Mark any nesting tree locations on a map and obtain GPS coordinates. Weather conditions including temperature, wind speed and direction, cloud cover, visibility, and precipitation, should be recorded at the start and end of each survey period.

If no nests are found during the initial survey then return and repeat the survey in 2 weeks. Continue to repeat the survey at a 2-week interval through the end of April or until a nest is found. If the survey starts after January and no nests are found the earlier part of the survey should be completed during the next nesting season to insure that early nesting birds are not missed.

The opportunity for caracara observation can be enhanced by placing fresh meat (or road kills) along the property border overnight and observing the bait site during the morning survey. These birds can be followed back to their nest trees. For more details on caracara activities and habits see Morrison (2001).

Literature Cited

Morrison, J.L. 2001. Recommended management practices and survey protocols for Audubon's crested caracaras (*Caracara cheriway audubonii*) in Florida. Technical Report No. 18. Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida.

Crested Caracara

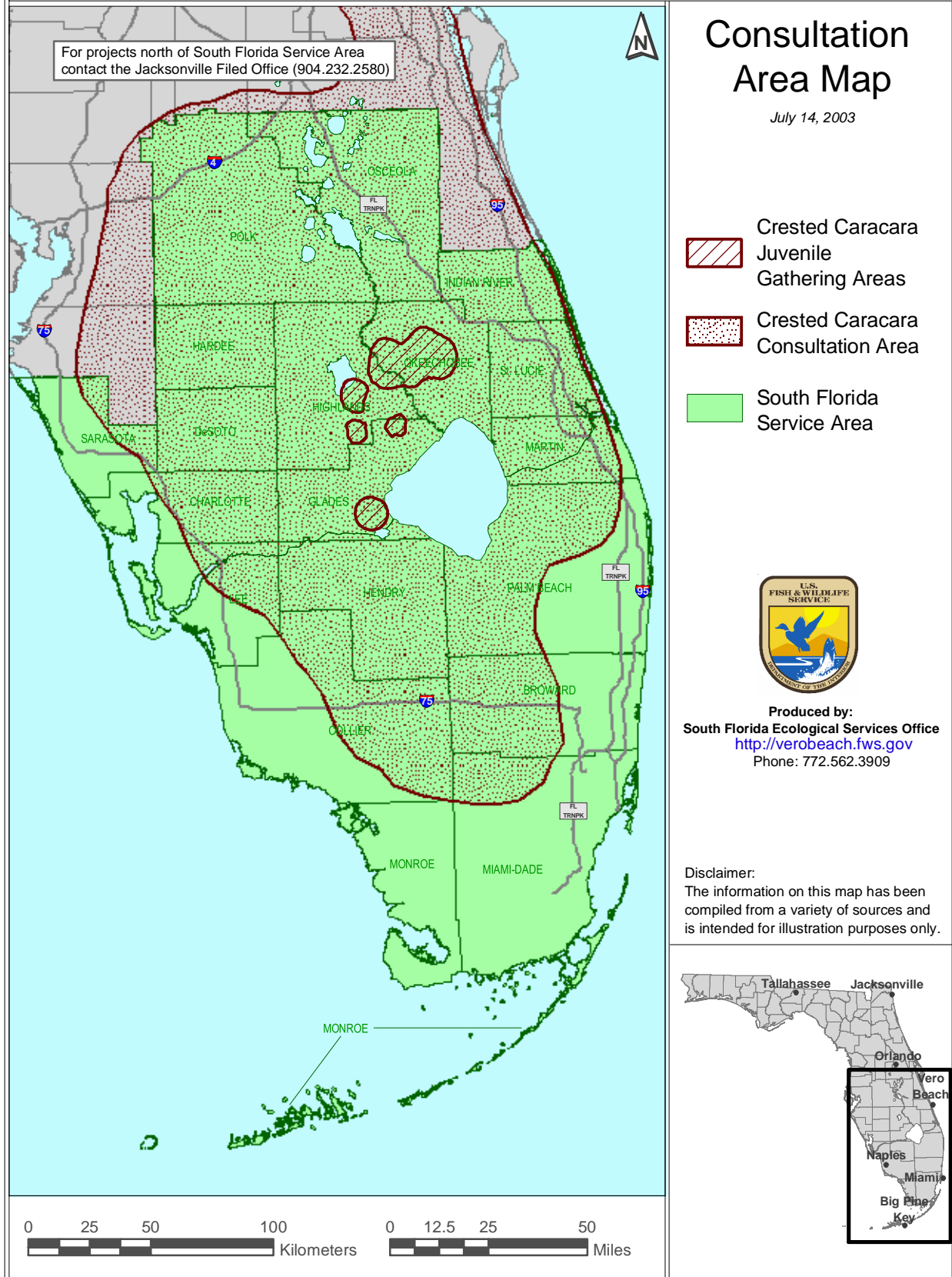


Figure 1.

Crested Caracara Monitoring Field Data Form

Date: _____ Start Time _____ Stop Time _____ Monitor _____

Site Name and Location: **Include latitude and longitude**, section, township, and range, and county.

Weather Data

Time	Temp	Wind Speed/Direction	% Cloud Cover	Cloud Type	Rain
Start					
Finish					

Flight Data

#	Age A/Im	Time	Description

Nesting Data: Observed Activity

(perching, preening, courtship, feeding, nest building, incubation, head color change, head throwback, diving)

#	Age A/Im	Time	Description

General Observations

(crested caracara reaction to passing planes, trains, trucks, pedestrians, other birds, etc.)

#	Age A/Im	Time	Description

Standard Local Operating Procedures for Endangered Species Audubon's Crested Caracara



Start Here

STEP 1

- Project Description
- Habitat Description
- Checked County List?

STEP 2

- ✓ Check Consultation Area Map
- ✓ Check Suitable Habitat

STEP 3

Inside Consultation Area

No

Yes

STEP 4

No Effect

Suitable Habitat

No

Yes

Nest within 1,500 m / 4,920 ft or Aggregation Present

No

Yes

Survey Habitat For Nests and aggregations.

Recommended Management Practices for Caracaras (Morrison 2001)

Can not avoid or implement Conservation Measures

Likely to Adversely Affect

Formal Consultation

Conservation Measures

- Conservation measures implemented.
- Actions proposed outside nesting season.

- Conservation measures implemented.
- During nesting season.
- Site monitor.

- Conservation measures modified with supporting data

- Minimal habitat modification in primary or secondary zones.
- On-site enhancement and restoration.

Not Likely to Adversely Affect
Request Concurrence

Service Response

Yes

No

Likely to Adversely Affect

Formal Consultation

Proceed with Action

No Effect

Proceed with Action

Figure 2.