Little Blue Heron, Reddish Egret, Roseate Spoonbill, Tricolored Heron

Egretta caerulea, Egretta rufescens, Platalea ajaja, Egretta tricolor

Photographs (clockwise from top left): little blue heron, reddish egret, and tricolored heron by Jack Rogers; roseate spoonbill by FWC.

Species Overview

Status: The little blue heron (*Egretta caerulea*), reddish egret (*Egretta rufescens*), roseate spoonbill (*Platalea ajaja*), and tricolored heron (*Egretta tricolor*) (hereinafter "wading birds") are listed as state Threatened on Florida's Endangered and Threatened Species List.

Current Protections

68A-27.003(2)(a), F.A.C. No person shall take, possess, or sell any of the endangered or threatened species included in this subsection, or parts thereof or their nests or eggs except as allowed by specific federal or state permit or authorization.

68A-27.001(4), F.A.C. Take – to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct. The term "harm" in the definition of take means an act which actually kills or injures fish or wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. The term "harass" in the definition of take means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering.

State-Threatened wading birds, active nests, eggs, and young also are protected under the Federal Migratory Bird Treaty Act, Rule 68A-16.001, F.A.C., and Rule 68A-4.001, F.A.C.

Biological Background

Florida's Endangered and Threatened Species List includes 4 state-Threatened wading birds: the little blue heron, reddish egret, roseate spoonbill, and tricolored heron. The snowy egret (*Egretta thula*) and white ibis (*Eudocimus albus*) were removed from Florida's Endangered and Threatened Species List in 2017 and will be discussed in a separate set of Guidelines. This section describes the biological background for the 4 state-Threatened wading birds (hereafter, wading birds) and provides context for the following sections. This section focuses on the habitats that support essential behaviors for these species, threats faced by the species, and what constitutes take for the species. For more information about life history and conservation actions for wading birds, please refer to A Species Action Plan for Six Imperiled Wading Birds.

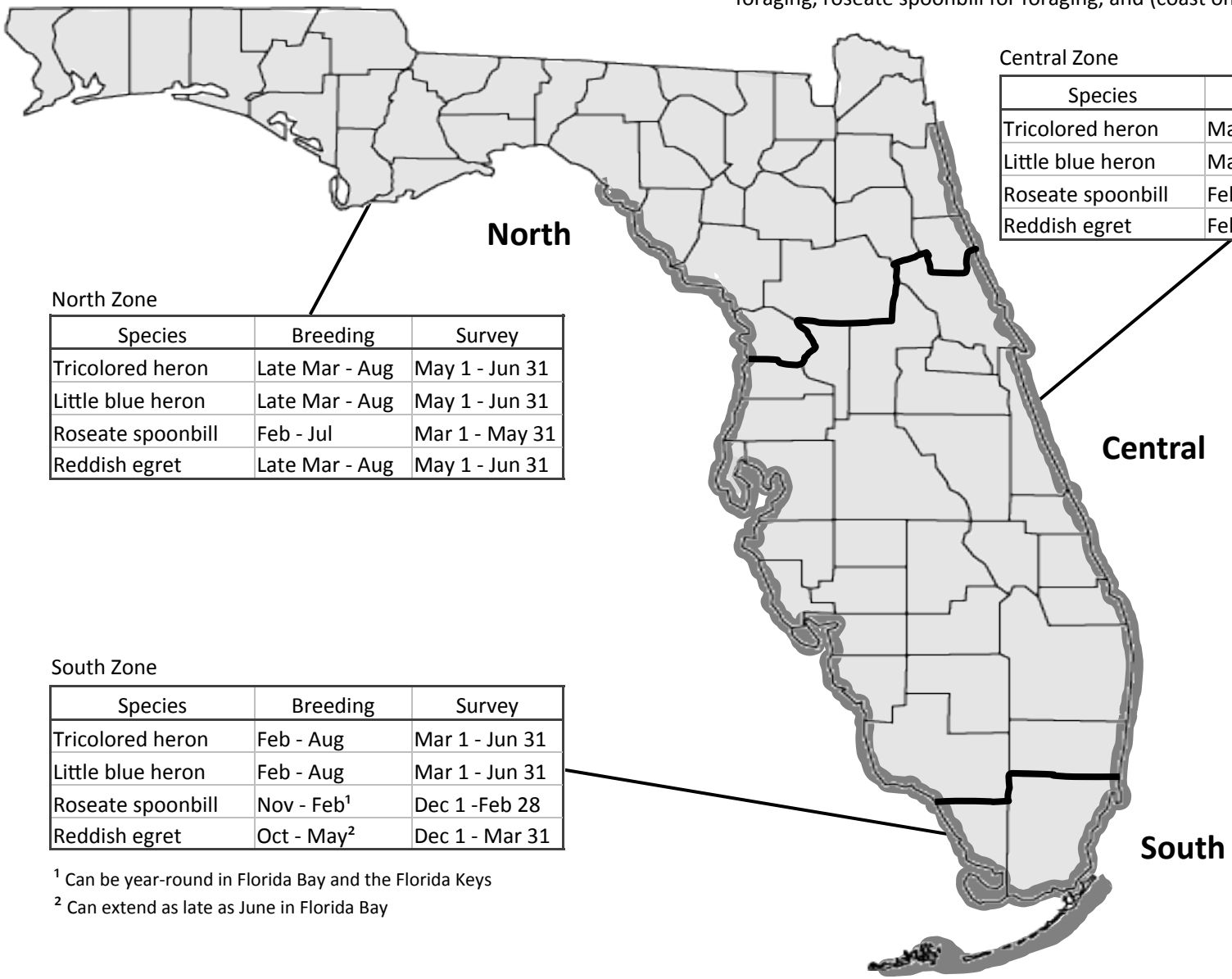
All 4 species are year-round residents in Florida (Greenlaw et al. 2014). Little blue herons, roseate spoonbills, and tricolored herons are found throughout the state, though roseate spoonbills currently nest only in peninsular Florida (Greenlaw et al. 2014; Florida Ornithological Society, unpublished data). Reddish egrets are found almost exclusively in coastal areas, with nesting occurring from south Florida to at least Levy County on the Gulf Coast and Brevard County on the Atlantic Coast (Lowther and Paul 2002, Cox et al. 2017*b*).

SPECIES CONSERVATION MEASURES AND PERMITTING GUIDELINES

State-Threatened Wading Bird Ranges, Breeding Seasons, and Recommended Survey Dates, by Zone

Portion of range used by all species for breeding and foraging

Portion of range used by tricolored heron and little blue heron for breeding and foraging, roseate spoonbill for foraging, and (coast only) reddish egret for foraging



Central Zone

Species	Breeding	Survey
Tricolored heron	Mar - Aug	Apr 15 - Jun 31
Little blue heron	Mar - Aug	Apr 15 - Jun 31
Roseate spoonbill	Feb - Aug	Feb 15 - Apr 31
Reddish egret	Feb - Aug	Mar 1 - Apr 31

North Zone

Species	Breeding	Survey
Tricolored heron	Late Mar - Aug	May 1 - Jun 31
Little blue heron	Late Mar - Aug	May 1 - Jun 31
Roseate spoonbill	Feb - Jul	Mar 1 - May 31
Reddish egret	Late Mar - Aug	May 1 - Jun 31

South Zone

Species	Breeding	Survey
Tricolored heron	Feb - Aug	Mar 1 - Jun 31
Little blue heron	Feb - Aug	Mar 1 - Jun 31
Roseate spoonbill	Nov - Feb[1]	Dec 1 -Feb 28
Reddish egret	Oct - May[2]	Dec 1 - Mar 31

[1] Can be year-round in Florida Bay and the Florida Keys

[2] Can extend as late as June in Florida Bay

Figure 1. Breeding season dates and recommended survey dates for state-Threatened wading birds in different zones of Florida (Cook 2013, 2014, 2016; Cook and Baranski 2017, 2018; Cook and Kobza 2010, 2011, 2012; Smith and Duvall 2017; Anderson 2018; personal communications with G. Anderson, V. Doig, J. Lorenz, A. Paul, K. Smith, M. van Deventer, R. Zambrano).

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Wading birds typically nest in multi-species colonies, though reddish egrets and tricolored herons also occasionally nest in small single-species groups or build solitary nests. The breeding season varies by species and by location within the state (Figure 1). Wading birds generally produce only a single brood per breeding season, but they will renest after nest failure during the season (Dumas 2000, Lowther and Paul 2002, Frederick 2013) and may return to a colony that was abandoned earlier in the same season if conditions improve (Dumas 2000). Incubation lasts 3-4 weeks, and, although wading birds are capable of sustained flight within 5-7 weeks of hatching, they remain dependent on the breeding site and their parents for 7-10 weeks after hatching (Table 1). All 4 species will leave the nest and explore nearby branches before they can fly.

Table 1. Approximate length of incubation period, and number of days that nestling and fledgling state-Threatened wading birds are dependent on parental feeding at the breeding site (Palmer 1962 [cited in Frederick 2002], Jenni 1969, Maxwell and Kale 1977, Werschkul 1979, White et al. 1982, Frederick et al. 1993, Rodgers 1996, Dumas 2000, Frederick 2002, Lowther and Paul 2002, Rodgers and Smith 2012, Frederick 2013).

Species	Incubation (days)	Post-hatching dependence on parental feeding at breeding site (days)	Total days from egg stage until no longer dependent on parental feeding at breeding site
Tricolored Heron	22-25	51-59	73-84
Little Blue Heron	21-24	Not well known	Not well known
Reddish Egret	26	56-70	82-96
Roseate Spoonbill	22-24	50-56	72-80

Habitat features that support essential behavioral patterns

Wading birds rely on wetlands and small islands for the essential behaviors of breeding, feeding, and sheltering. Wading birds build nests of sticks, twigs, and finer materials in trees or shrubs on islands or over standing water (FWC 2003). Characteristics of a suitable breeding site include woody vegetation capable of supporting a nest, absence of ground-predators, and proximity to foraging habitat (Rodgers and Smith 2012). Water surrounding breeding sites impedes mammalian predators, which can depredate nests and cause abandonment of an entire colony (Frederick and Collopy 1989*a*). Little blue herons and tricolored herons nest in a variety of woody vegetation such as cypress (*Taxodium distichum*), willow (*Salix* spp.), red maple (*Acer rubrum*), buttonwood (*Conocarpus erectus*), mangroves (most commonly *Rhizophora mangle*), and Brazilian pepper (*Schinus terebinthifolius*) (Ogden 1996*a*, Rodgers 1996). Little blue herons and tricolored herons nest in a variety of freshwater and marine habitats, though tricolored herons primarily nest in coastal habitat, and some nests occur on the ground on salt marsh islands (Ogden 1996*b*, FWC 2003, Rodgers and Smith 2012, Frederick 2013). Roseate spoonbills and reddish egrets in Florida nest primarily in mangroves or Brazilian pepper on coastal islands and spoil islands, though roseate spoonbills also nest in freshwater habitats (Bjork and Powell 1996, Dumas 2000, Hodgson and Paul 2010). At 4-7 weeks of age, young wading birds that have left the nest often congregate in shallow, open areas within or on the edges of the colony (Rodgers and Nesbitt 1979, Frederick et al. 1993, Paul 1996, Dumas 2000). These 4 species tend to nest below overhanging branches in the shaded area of the canopy, which can make them difficult to detect from the air (Jenni 1969, Dumas 2000, Rodgers et al. 2005). Wading birds roost communally at night in habitat similar to that used for nesting, often in multi-species assemblages (Dumas 2000, Frederick 2002).

Wading birds often reuse breeding sites when conditions remain favorable, with some breeding sites used every year for decades (Cook and Baranski 2018; A. Paul, personal communication). However, there is high interannual variability in breeding effort by wading birds resulting from variation in water levels (Frederick and Ogden 2001), and some breeding sites are not used every year. For example, the mean number of times that a colony was used per number of years of monitoring was 0.54 (median = 0.56) in long-term monitoring

of roseate spoonbills in Florida Bay (Cook and Baranski 2018). Over a 4-year period in southwest Florida, Bancroft and colleagues (1988) found that 14 of 37 wading bird colony sites (38%) were occupied in only 1 of the 4 years surveyed. Bryan and colleagues (2003) reported a turnover rate of 33% for wading bird breeding sites in the Upper St. Johns River Basin, with breeding sites frequently abandoned and then re-occupied in later years. Coastal breeding sites tend to be more stable than inland sites (Kushlan 1977, Ogden et al. 1980, Frederick 2002). For example, coastal breeding sites in central Florida that remain free of disturbances and predators have been used consistently every year for decades (A. Paul, personal communication).

Little blue herons, roseate spoonbills, and tricolored herons forage in a variety of shallow marine, brackish, or freshwater sites (freshwater non-forested wetlands, freshwater forested wetlands, non-vegetated wetlands, cultural-palustrine, subtidal, intertidal, and cultural-estuarine habitats, as well as the edges of lacustrine and riverine habitats as described in the Florida Land Cover Classification System [Kawula 2014], which crosswalks to the Florida Land Use Cover and Forms Classification System [Florida Department of Transportation 1999; see Appendix B in Kawula 2014]). Examples of these habitats include tidal ponds and sloughs; mudflats; mangrove-dominated pools; freshwater sloughs and marshes; the edges of rivers, streams, and lakes; and human-created canals and impoundments (Bjork and Powell 1996, Rodgers and Smith 2012, Frederick 2013). These species typically forage in water depths of 2-8 in (5-20 cm; Willard 1977, Powell 1987, Dumas 2000). Freshwater foraging areas are important for provisioning young (A. Paul, personal communication).

Throughout their range, reddish egrets are restricted to coastal areas and forage in shallow marine environments such as shallow tidal flats with unconsolidated bottom or patchy seagrass, mudflats, oyster reefs, sandbars, and sandy shorelines (Paul 1996, Lowther and Paul 2002, Green 2005, Bates et al. 2016, Gonzalez et al. 2016). Reddish egrets rely on a narrow set of foraging habitat conditions, including areas with water depths less than 8 in (20 cm) at low tide, and where seagrass cover, if present, is patchy or sparse (Lowther and Paul 2002, Bates and Ballard 2014, Geary et al. 2015, Bates et al. 2016, Gonzalez et al. 2016). Suitable foraging habitat is therefore limited in availability for this species.

During the breeding season, wading birds tend to forage near nesting colonies to decrease energy spent traveling (Kushlan 1986). For example, average foraging distance from breeding sites varied from 3-6 mi (4.5-10 km) for 3 little blue herons colonies in Florida (Bancroft et al. 1990), 3-8 mi (5-3 km) for South Florida colonies of tricolored herons (Bancroft et al. 1990, Strong et al. 1997), and 7.5 mi (12 km) for a roseate spoonbill colony in Florida Bay (Powell and Bjork 1990). Reddish egrets tend to nest within 3 mi (5 km) of suitable foraging habitat (Hill and Green 2011, Cox et al. 2019), and 80% of reddish egret foraging locations are within 15.5 mi (25 km) of breeding sites (Koczur 2017; Koczur, unpublished data).

Threats

Major threats identified in a Species Action Plan for Six Imperiled Wading Birds (FWC 2013) include loss of wetland habitat, habitat degradation due to changes in hydrology and water quality, disturbance at breeding sites, and elevated populations of native and non-native nest predators.

Wading birds need wetlands for essential behaviors of breeding, feeding, and sheltering; loss of wetlands to development and other activities is a major threat to these species. Coastal development and alterations in hydrology, for example, reduce habitat quality and quantity (Lorenz 1999, Lorenz et al. 2002, Lowther and Paul 2002, Lorenz 2014*a*, Lorenz 2014*b*), and shallow coastal sites are vulnerable to inundation due to climate change (Zhang 2011). As described above, wading birds require specific habitat conditions to support nesting, and some breeding sites have been re-used for decades (Cook and Baranski 2018). Therefore, loss of suitable breeding sites can threaten these species.

Reproductive success in wading birds is driven by foraging success (Frederick and Spalding 1994, Frederick 2002). Foraging success, in turn, is tied to water quality, water depth, prey density, and vegetation type and density (Gawlik 2002, Lantz et al. 2010). Wading birds require wetlands with a variety of hydroperiods to ensure access to adequate year-round forage (Gawlik 2002). Actions that result in altered hydrology, nutrient

enrichment or environmental contaminants, or that otherwise affect the timing, quantity, or quality of water in wetlands can have significant impacts on wading bird foraging and breeding success. For example, certain water management practices can result in higher salinity in estuaries, which can result in reductions in prey populations (Paul 1996, Lorenz 1999, Lorenz and Serafy 2006). Reducing water depth around nesting colonies can make them vulnerable to mammalian predators, and rapid increases in water levels in nearby foraging habitat can induce colony abandonment due to a decrease in prey density (Frederick and Collopy 1989*a*, *b*). Prolonged periods of inundation and extreme water depths can result in the degradation or permanent loss of water-tolerant woody vegetation in wading bird colonies. For example, an extreme high-water event in 1994-1995 in the Everglades resulted in extensive mortality of Carolina willow (*Salix caroliniana*) on tree islands that supported historic colonies (Frederick 1995, FWC unpublished data), and there has been essentially no regeneration of Carolina willow on those islands since that time (M. Ward, personal communication). Wading birds are also vulnerable to pesticides, heavy metals, and other environmental contaminants. For example, exposure to methylmercury can impair reproduction (Frederick and Jayasena 2010, Jayasena et al. 2011).

Human disturbance at breeding sites can significantly impair breeding. In response to disturbance, nesting birds may leave eggs and young unattended, thereby exposing eggs and young to predators, sun, and cold (Tremblay and Ellison 1979, Rodgers 1996). Examples of activities that may flush birds from their nests and may result in lower productivity include boating traffic, equipment operation, or passive recreational activities (e.g., wildlife viewing, paddling, photography, etc.; Rodgers and Smith 1995, Carlson and McClean 1996, Carney and Sydeman 1999, Bouton et al. 2005, Livezey et al. 2016).

Wading bird colonies are vulnerable to predators, such as raccoons (Rodger 1987, Frederick and Collopy 1989*b*). Predation management (e.g., precluding access by either managing hydrology or removing floating vegetation, removing predators that have accessed islands, etc.) is important to address this threat where it occurs.

Potential to Significantly Disrupt or Impair Essential Behavioral Patterns

Given the reliance of wading birds on coastal and freshwater wetlands for breeding, feeding, and sheltering, actions that result in loss of suitable wetlands can cause significant impairment of essential behaviors. Similarly, actions that modify wetlands through changes in timing, quantity, or quality of water can result in significant impairment of essential behaviors.

Activities may cause significant impairment of breeding if they result in wading birds flushing from active nests or result in loss or degradation of active or recent breeding sites (see definitions below), whether sites occur in natural or man-made habitat.

Take of Wading Birds

This section describes what constitutes take of wading birds under Rule 68A-27, F.A.C. For ways to avoid take (and thus avoid the need for a FWC permit) please see Measures to Avoid Take. Take of wading birds can be either incidental or intentional. **Incidental take** refers to take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. This type of take is prohibited without an incidental take permit or other authorization. Accidental death or injury of wading birds during construction is an example of incidental take. **Intentional take** is not incidental to an otherwise lawful activity and is prohibited without a scientific collecting permit or unless the take is authorized under certain circumstances involving risks to property or human safety. Capturing and handling wading birds for research is an example of intentional take.

The following terms, as defined below, are used throughout these guidelines:

- **Active nest**: A nest is considered active when supporting essential behavioral patterns, which occur from the point of nest building until young of the season become capable of sustained flight or

permanently leave the nest. Nest building includes a breeding pair exhibiting courtship behavior, carrying nest material, and/or engaging in construction or repair of a nest.

- **Breeding site**: The area used by wading birds for the essential behavior of breeding, including the substrate (e.g., vegetation) supporting nesting and the shallow, open areas immediately adjacent to (i.e., within 50 ft [15 m] of) the nesting substrate. Adjacent shallow areas are important for young birds after they leave the nest and before they are capable of leaving the breeding site (Rodgers and Nesbitt 1980, Frederick et al. 1993, Dumas 2000). Not all breeding sites will have shallow, open areas within 50 ft of the nest substrate.
- **Colony:** Refers to breeding sites that contain more than 1 nesting pair of birds.
- **Active breeding site**: Breeding sites with courtship behavior or nest-building activities, eggs, or young.
- **Recent breeding site**: Areas used for breeding at least once in the preceding 5 years. As noted in the Biological Background section, there is high interannual variability in breeding effort by wading birds, and some breeding sites are not used every year. For example, reddish egrets have been observed returning to a breeding site as many as 5 years after previous occupancy in coastal breeding sites (Hodgson and Paul 2011), and inland breeding sites tend to be even less stable than coastal ones (Kushlan 1977, Ogden et al. 1980, Frederick 2002). This definition may be revisited in future revisions of this document as new data become available.
  - Documented recent breeding sites can be found on the FWC's website at: http://geodata.myfwc.com/pages/upland
    If no data are available using this resource, and if surveys conducted in accordance with the recommended methodology do not discover an active breeding site, then the site is not considered a "recent breeding site."
  - The resource at the link above is intended to provide regulatory certainty regarding recent breeding sites. *However, please be aware that the FWC does not have comprehensive, statewide coverage of wading bird colonies, and an active breeding site may still be present on site.* Surveys using the methodology below are still highly recommended in potential nesting habitat to determine if an active breeding site is present.
- **Reddish egret Core Foraging Areas**: Areas within 15 mi (24 km) of reddish egret breeding sites that have been used for breeding at least once in the preceding 5 years. See below for information on how to locate Core Foraging Areas and to determine if suitable foraging habitat is present within the Core Foraging Area.

Take of state-Threatened wading birds may include any of the forms described below. For ways to avoid take or the need for a FWC permit, please see Measures to Avoid Take.

1. Actions result in take if they cause injury or death of wading bird adults, eggs, or young.
2. Actions that result in loss or modification of habitat within active or recent (i.e., used in the last 5 years) breeding sites (see definition above) cause take if the loss or modification significantly impairs breeding. Examples that may rise to the level of take include destroying, modifying, or removing nest substrate (i.e., the vegetation or material on which the nest rests) and reducing the extent of the shallow, open flats within 50 ft of the nest substrate.
3. Actions that render part or all of an active or recent breeding site unsuitable for breeding. Examples that may rise to the level of take include, but are not limited to the following:
   a. Precluding future use of the breeding site through alteration of water levels (e.g., killing or modifying the nest substrate through a significant increase or decrease of water via project

activities, reducing water levels in a manner that connects an island breeding site to land or that allows access to mammalian predators, etc.). Exceptions include precluding future use of the breeding site due to emergency water management actions necessary for human health and safety, such as flood control, as described in Other Authorizations for Take.

b. Reducing water quality through spills or pollutants at the breeding site in a manner that precludes future use of the breeding site.
c. Increasing the level of disturbance (see number 6 below) in future breeding seasons by erecting permanent structures (e.g., buildings, docks, boardwalks, roads, bridges) within 330 ft (100 m) of the breeding site is expected to cause take, unless similar activities already occur in comparable proximity to the nesting colony and are not resulting in take. Existing activities are "similar" if they are comparable in nature, size, duration, and intensity.
d. Using deterrents to keep wading birds from nesting at a recent breeding site.

4. For reddish egrets, loss or degradation of *suitable foraging habitat* within Core Foraging Areas can result in take via significant habitat modification because suitable foraging habitat is limited for this species. Suitable foraging habitat includes the following characteristics:
   a. Tidal flats (including mud or sand flats with or without seagrass), non-vegetated intertidal zone, or oyster bars (see Kawula 2014 for definitions),
   b. and including areas with water depths less than 8 in (20 cm) at low tide,
   c. and where seagrass cover, if present, is patchy or sparse (defined as "Patchy [Discontinuous] Seagrass" in FWC's Seagrass Florida dataset).

   The reddish egret Core Foraging Area dataset provides locations of Core Foraging Areas. The FWC highly recommends checking project sites within these locations to determine if suitable foraging habitat, as defined above, is present.

5. For little blue herons, tricolored herons, and roseate spoonbills, significant modification of foraging habitat may cause take. However, for these 3 species, wetland mitigation provided through the Department of Environmental Protection's (DEP) and the 5 Water Management Districts' Environmental Resource Permit (ERP) process will be considered sufficient to meet the requirements of Rule 68A-27.007, F.A.C., and no further FWC authorization for take of foraging habitat is required (see Other Authorizations for Take for more details). Projects not covered through ERP process that may cause take through significant modification of foraging habitat will be evaluated by the FWC on a case-by-case basis, unless specified in Examples of Activities Not Expected to Cause Take. For reddish egrets, projects permitted under the Joint Coastal Permit process may provide mitigation sufficient to meet the requirements of Rule 68A-27.007, F.A.C., and these projects will be considered on a case-by-case basis.

6. Ground, aerial, or water-based activities that result in birds flushing from (i.e., adults or nestlings moving from) active nests can result in take by significantly disrupting or impairing breeding. Activities that may cause take in this manner include, but are not limited to:
   a. Pedestrian traffic and operation of a personal watercraft (including paddle craft), vessel, or other vehicle within a 330 ft (100 m) buffer (Rodgers and Smith 1995, 1997) around active nests that result in birds flushing from active nests.
   b. Development activities within 330 ft (100 m) of an active nest that result in birds flushing from active nests. Such activities include, but are not limited to, dredging, clearing, grading, paving, bulldozing, digging, pile driving, building construction, and site preparation.
   c. Operation of unmanned or remotely controlled unmanned aerial systems (UAS) or boats within 200 ft (61 m) of a known active nest that result in birds flushing from active nests (See Appendix B for additional information about safe use of UAS around nesting wading birds). Please note that this includes the airspace 200 ft above the active nest. The 200-ft buffer

was determined based on literature review and expert opinion (Hanson et al. 2014, Drever et al. 2015, McEvoy et al. 2016, Barr 2017, M. Burgess, personal communication).

d. Operation of other manned or unmanned aircraft in a manner that results in flushing of birds from active nests or active breeding sites.

7. Intentionally and repeatedly forcing *roosting* or *foraging* wading birds to fly is considered take via harassment. This applies to instances when this is the purpose of the activity rather than incidental to an otherwise lawful activity.

8. Capturing, handling, or collecting wading birds or eggs constitutes take, as does banding, collecting, attaching auxiliary markers to, and drawing blood or other biological samples from wading birds.

Distribution and Survey Methodology

Figure 1 depicts the principal geographic range of the 4 wading bird species addressed in these Guidelines.

Counties: All counties in Florida.

Recommended Survey Methodology

Surveys are not required but are highly recommended in the circumstances described below. An initial site review is recommended to identify if potential wading bird nesting habitat is present on site or within 330 ft (100 m) of the site or to determine if suitable foraging habitat is present within a reddish egret Core Foraging Area. In many cases, an initial site review is conducted during another permitting process (e.g., ERP process). If potential nesting habitat is on an adjacent property within 330 ft of project activities, contacting the adjacent landowner is recommended, because the landowner may have information on the presence of a recent or active breeding site.

When the initial site review indicates that potential wading bird nesting habitat is present, surveys using the methodology described below are highly recommended to determine if an active breeding site is present, if an incidental take permit is needed to avoid unauthorized take, and the extent of take likely to occur. The recommended survey methodology focuses on nesting habitat rather than foraging habitat, because wetland mitigation provided through the ERP process will be considered sufficient to meet the requirements of Rule 68A-27.007, F.A.C., for loss of foraging habitat (with the exception of reddish egret core foraging areas), as described in Other Authorizations for Take. Before conducting surveys, potential permit applicants can refer to the dataset for recently active wading bird breeding sites to see if a recent breeding site has been identified on site. *Please be aware that this dataset is incomplete, and surveys are still highly recommended in potential nesting habitat to determine if an* active breeding site *is present*. Even if the site has been identified as a recent breeding site, surveys are still recommended to estimate the extent of take likely to occur from project activities, provided the breeding site is active. If active breeding sites are not observed using the survey methodology described below, and the site is not a recent breeding site in the dataset for recently active wading bird breeding sites, no FWC review or coordination is needed. Survey results are valid until October 1 of the following calendar year after the date on which surveys were completed, which provides additional time and flexibility for potential applicants.

Identifying active breeding sites through surveys conducted during the dates specified in Figure 1 can aid in development of appropriate avoidance, minimization, and mitigation measures. Surveys should take place for all species that may occur on site within each species' optimal survey dates (Figure 1). Please note that optimal survey dates vary among species and in different parts of the state, especially for reddish egret and roseate spoonbill. Observers should survey for all 4 species at coastal sites; inland, freshwater sites typically will not harbor reddish egrets. Aerial surveys generally are not acceptable for state-Threatened wading birds, because of the low detectability of dark-plumaged wading birds nesting in the shaded part of the canopy under overhanging branches (Frederick et al. 1996, Rodgers et al. 2005). Direct counts (under a limited set of

circumstances) or flight-line counts are recommended, using the methods described below:

1. **Direct Counts (only for small or narrow breeding sites)**

   Direct counts (i.e., counting all nests in a breeding site) conducted from a distance of at least 330 ft are recommended *only for small or narrow breeding sites*, in which the observer can see all the way through the vegetation to identify all nests. These surveys may be conducted closer to the breeding site if the survey effort is similar in nature, size, duration, and intensity to existing activities. Otherwise, direct counts conducted within 330 ft of a wading bird breeding site can result in take and should not be undertaken without a Scientific Collecting Permit from the FWC. Direct counts from a distance of at least 330 ft can occur at any time of day as long as there is adequate visibility. We strongly recommend at least 2 direct counts at least 1 month apart at a site to account for variability in the timing of nesting in the colony and to ensure that counts occur during the optimal window for each species likely to be present (Figure 1). For example, optimal survey dates do not overlap for roseate spoonbills and tricolored herons in the south zone, so multiple surveys will be necessary to ensure proper coverage for both species. Observers should record the following information:

   - Location/Project name – If a site does not already have a known established name, it should be assigned a unique name based on the project (e.g., Example Lake Development Island 1) that will be used in any subsequent observations/reports.
   - Colony latitude/longitude – Record the general location of the colony in decimal degrees (dd.ddddd), using map datum WGS 84.
   - Date – mm/dd/yy.
   - Observer – first and last name of observer.
   - Start time and end time of the survey.
   - Each species receives its own line of data, with the number of nests recorded per species.

2. **Flight-line Surveys (for colonies wide enough that observers cannot see through the vegetation)**

   If the colony is large or wide enough that observers cannot see through the vegetation from the recommended buffer distance, the FWC recommends flight-line surveys (Erwin and Ogden 1980, Erwin 1981, Cox et al. 2017*a*) as the best method for identifying breeding sites and estimating take that may occur from project activities. Flight-line surveys use counts of flights by adults to and from colonies to identify species presence and to estimate abundance. If flight-line surveys are impractical due to the nature of the site or other factors, the potential applicant should contact the FWC for technical assistance.

   For the best estimates of colony size, flight-line surveys should be conducted when most birds in a colony are incubating or have small chicks. During this stage in the nesting period, adults generally only switch nest duties once during the morning. Surveys during the nest-building or large nestling/fledgling stages will likely lead to an overestimate of nest numbers. Figure 1 provides the best dates for surveys to meet conditions described above. We strongly recommend at least 2 flight-line counts at least a month apart at a site to account for variability in the timing of nesting in the colony and to ensure that counts occur during the optimal window for each species likely to be present (Figure 1). For example, optimal survey dates do not overlap for roseate spoonbills and tricolored herons in the south zone, so multiple surveys will be necessary to ensure proper coverage for both species.

   Observers will visit colony sites by land and/or boat and will perform counts lasting 2 hours beginning approximately 1 hour after sunrise. Counts should be performed only under favorable weather conditions (i.e., good visibility, low wind, no rain). Surveys involve recording incoming and

outgoing flights from the colony. Flight-line counts require at least 2 observers, with observers stationed on opposite sides of a colony. Observers should maintain a distance of 330 ft (100 m) from active nests. Observers can be closer to active nests only if the survey effort is similar in nature, size, duration, and intensity to existing activities (e.g., if an existing man-made structure is closer than 330 ft [100 m] and gets substantial foot/vehicle traffic, then survey efforts from this structure would likely not create disturbance). Otherwise, flight-line surveys within 330 ft (100 m) of active nests can result in take and should not be undertaken without a Scientific Collecting Permit from the FWC.

A sample data sheet is provided in Appendix C for your use. It may be modified as necessary. Observers will independently record the following information:

Pre-survey information

- Location/Project name – If a site does not already have a known established name, it should be assigned a unique name based on the project (e.g., Example: Lake Development Island 1) that will be used in any subsequent observations/reports.
- Colony latitude/longitude – Record the general location of the colony in decimal degrees (dd.ddddd), using map datum WGS 84.
- Date – mm/dd/yy.
- Observer – first and last name of observer.
- Start time – time at the beginning of survey.
- Notes – note anything that might affect the count, such as problematic weather, or behaviors/nest stage that may affect the nest estimate (e.g., large chicks present, adults going in and out with nesting material); you may also record nests that are clearly observable from a distance (be sure to specify number by species if this is possible).

Survey information

Each species receives its own line of data. If a bird is known to have been observed more than once (e.g., an observer sees an individual land on a nest and then subsequently leave again, a bird flies back and forth repeatedly with nesting material) it should not be counted more than once. Make sure to record this behavior in the notes.

- Species – write out the species names of the birds observed.
- In/out – mark flight direction of each individual bird in the proper column with a tick mark, either into the colony or out of the colony. Birds that do not have noticeably direct flight to or from the colony (such as birds landing on nearby flats, circling, etc.) should not be counted. During the nest-building stage, adults visit the nest more frequently than birds incubating or feeding chicks. To avoid inflating numbers, birds carrying sticks should not be counted. Columns on the data sheet should be separated by adults, immatures and birds of unknown age (e.g., birds flying too fast to identify age).

Post-survey information

- End time – time at the end of survey.

To estimate number of nests per species, add the count of birds entering the colony to the count of birds leaving the colony, divide by 2 and then multiply by 1.5 (Cox et al. 2017*a*). For example, if observers counted 14 birds leaving the colony and 10 birds entering the colony, then the estimate of the number of nests for that species would be ((14+10)/2)*1.5 = 18 nests.

Flight-line surveys can over- or underestimate colony size under different circumstances (Erwin and Ogden 1980, Cox et al. 2017*a*). To account for this variability, FWC staff will place the estimates provided by the applicant into categories when evaluating the extent of take and the sufficiency of minimization and mitigation measures. Categories will include 1 to 5, 6 to 10, 11 to 25, 26 to 50, 51 to 100, 101 to 200, 201 to 400, 401 to 600, and greater than 601 nests for each species.

If surveys are conducted in the manner described above, pre-construction surveys (i.e., checking for presence of nesting wading birds immediately prior to project activities) are not necessary. However, please note that, if previously-undetected wading bird nests are found during project activities, avoidance of take is not feasible, and take is not authorized by an incidental take permit, the applicant should contact the FWC to discuss permitting options. Therefore, in cases where project planning surveys did not detect nesting wading birds but the site has potential nesting habitat, pre-construction surveys could be useful to reduce delays for projects occurring during the breeding season (Figure 1).

Recommended Conservation Practices

Recommendations are general measures that could benefit the species but are not required. No FWC permit is required to conduct these activities. For additional actions that benefit wading bird conservation, please see the Species Action Plan (FWC 2013).

- Manage breeding sites to restore and maintain conditions necessary for successful nesting.
  - Conduct predation management as necessary. For example, prevent mammalian predators, such as raccoons, from accessing breeding sites by restoring or maintaining open water through management of hydrology and/or floating vegetation. Management of floating vegetation should occur outside of the breeding season, and other forms of predation management must be done in a manner that avoids take.
  - Maintaining alligators around breeding sites when possible benefits wading birds by reducing access by mammalian predators (Burtner and Frederick 2017).
- Monitor wading bird colonies from an appropriate distance to identify threats.
- During water management activities in freshwater wetlands, maintain quality wading bird foraging habitat within 8 mi (13 km) of breeding sites during the breeding season (Figure 1) by ensuring availability of areas with water depths between 2-8 in (5-20 cm).
- When possible, continue to maintain a matrix of different wetland types on the landscape. Maintaining a diversity of wetlands provides accessible foraging habitat for all species of wading birds throughout the range of seasonal water-level fluctuations.
- Avoid, or minimize to the extent practicable, the application of pesticides and fertilizers and the loading of heavy metals and other contaminants.
- Follow Water Quality Best Management Practices (BMPs) and Forestry and Agricultural Wildlife BMPs during agricultural activities.
- Avoid placement of trash and other food sources that may attract mammalian nest predators near breeding sites.
- Design docks, piers, and similar recreational facilities with conservation measures to minimize threats from entanglement in fishing line. Examples include marked repositories or lidded trash cans for discarding fish carcasses, educational signage, and participation in the Monofilament Recovery and Recycling Program. Promote fishining line cleanup activities. Educate stakeholders to avoid feeding wading birds and other waterbirds, which can accidentally bring back fishing line to a colony.
- Remove fishing line from breeding sites to reduce the probability of entanglement, provided the removal occurs outside of the breeding season, with appropriate state and local authorizations, and with landowner permissions.
- Improve or create suitable foraging and nesting habitat on spoil islands.
- When creating new water features, consider including islands with vegetation suitable for wading bird nesting.
- Create shallow shelves on new water features to provide suitable foraging habitat. Please note that this practice is not recommended for highly urbanized areas or areas that may have high levels of environmental contaminants.

- For private landowners interested in attracting and managing habitat for wading birds on their properties, the FWC offers Florida's Safe Harbor Program, a voluntary conservation incentive plan that provides regulatory assurances against future land use restrictions in exchange for voluntarily implementing management practices. For more information, please visit http://MyFWC.com/safeharbor.

Measures to Avoid Take

Avoidance Measures that Eliminate the Need for FWC Incidental Take Permitting

The following measures will eliminate the need for an FWC incidental take permit. For more information on projects that may cause intentional take (e.g., capturing and handling for research, intentional take to ensure human safety), please visit the intentional take section of this document. Projects may avoid incidental take by:

- Avoiding acts that can kill or injure wading birds or eggs, and
- Avoiding acts that result in loss or modification of habitat within active or recent (i.e., used in the last 5 years) breeding sites (see definition above), and
- Avoiding actions that render an active or recent breeding site unsuitable for breeding (see the take section for examples), and
- Avoiding actions that result in loss or degradation of suitable foraging habitat (as described above) within reddish egret Core Foraging Areas, and
- Avoiding actions that result in loss or degradation of suitable wetlands (both freshwater and saltwater) used by wading birds for foraging, unless included below in Examples of Activities Not Expected to Cause Take or Other Authorizations for Take, and
- Maintaining a 330 foot (100 m) buffer around active nests for pedestrian traffic; operation of a personal watercraft, boat, or other vehicle; and development activities, and
- Maintaining a 200-foot (61 m) buffer (in vertical height as well as horizontal distance) from an active nest when operating an unmanned or remotely controlled UAS or boat, and
- Operating either manned or unmanned aircraft in a manner that does not result in flushing of birds from active nests or active breeding colonies.

Examples of Activities Not Expected to Cause Take

- Maintenance, alteration, or removal of: canals, levees, stormwater ditches, detention basins, retention systems, roadside swales, other artificial water bodies or water control structures, and appurtenant infrastructure or system components. This includes, but is not limited to dewatering, earthmoving, or vegetation clearing necessary for the performance of the activities as stated in this paragraph, provided activities occur outside of a 330-ft buffer around active wading bird nests and do not render a breeding site unsuitable for breeding.
- Project activities may be able to avoid take if similar activities already occur in comparable proximity to the nesting colony and are not resulting in take. Existing activities are "similar" if they are comparable in nature, size, duration, and intensity. Potential applicants should carefully document the existing activities on a site and whether project activities will increase the nature, size, duration, and intensity of activities beyond the existing levels to which the birds are habituated and accustomed. Potential applicants should be ready to present such information to FWC staff, if necessary, to justify how the activity is able to avoid take.
- Construction of a dock exempted from DEP permitting under Chapter 403.813, F.S., is not expected to result in significant modification of reddish egret ***foraging*** habitat. However please note that construction of any dock can cause take if conducted within 330 ft of an active nest or if it renders a breeding site unsuitable.
- Repair or maintenance of existing roadways, berms and levees, including but not limited to vegetation clearing, mowing necessary to maintain the level of service, or preservation of the

structural integrity of the facility within 330 ft of breeding sites, provided repairs occur outside of the breeding season and do not result in degradation to the breeding site (e.g., through changes in hydrology).

- Activities exempted from ERP permitting under Rule 62-33.00.051, F.A.C., are not expected to cause take via significant modification of ***foraging*** habitat. However, please note that these activities could potentially cause take if conducted within 330 ft of an active nest, if the activities result in loss or modification of an active or recent breeding site, or if the activities render a breeding site unsuitable for nesting. Projects permitted under the Joint Coastal Permit process may provide mitigation sufficient to meet the requirements of Rule 68A-27.007 for reddish egret, and these projects will be considered on a case-by-case basis.

This list is not an exhaustive list of exempt actions. If in doubt, please contact FWC's Species Conservation Planning staff at the appropriate regional office if you are concerned that you could potentially cause take. For private landowners, developers, consultants and government agencies proposing land use plans or development and construction projects with the potential to convert wildlife habitat to other land uses, technical assistance is available from the FWC *Office of Conservation Planning Services*. General information on fish and wildlife species and habitat conservation measures can be accessed through the Florida Wildlife Guide (http://myfwc.com/conservation/value/fwcg/), which includes planning tools for ecologically-based, landscape-level conservation. Project-specific requests for fish and wildlife coordination can be emailed to ConservationPlanningServices@MyFWC.com. Regionally assigned staff can assist with listed species coordination, pre-application project review, wildlife survey and other conservation recommendations.

Florida Forestry Wildlife BMP's and Florida Agricultural Wildlife BMP's

- Agriculture, as defined in Section 570.02, F.S., conducted in accordance with Chapter 5I-8, F.A.C., and the wildlife BMPs adopted in Rule 5I-8.001 and 5M-18.001, F.A.C., by the Department of Agriculture and Consumer Service pursuant to Section 570.94, F.S., is authorized and does not require a permit authorizing incidental take despite any other provision of Rule 68A-27.007 or 68A-27.005, F.A.C.
- Enrollment in the Notice of Intent process for the Florida Forestry Wildlife BMPs and Florida Agricultural Wildlife BMPs program and implementation of these BMPs provides a presumption of compliance with regard to incidental take of wading birds.
- Forestry and Agricultural Wildlife BMPs state to avoid heavy equipment operation (except for prescribed burning and related activities) within 330 ft (100 m) of active, known and visibly apparent little blue and tricolored heron colonies (2 or more nests), from February through May.

Other Authorizations for Take

- Emergency water management actions necessary for human health and safety, such as flood control.
- Activities within an airport security area in accordance with Rule 68A-9.012 F.A.C.
- If project activities result in take solely due to significant modification of ***foraging*** habitat of little blue heron, tricolored heron, and roseate spoonbill, wetland mitigation provided through the DEP and the 5 Water Management Districts' ERP process will be considered sufficient to meet the requirements of Rule 68A-27.007, F.A.C., and no further FWC authorization is required. However, please note:
  - Projects not covered through the ERP process that may cause take through significant modification of foraging habitat will be evaluated on a case-by-case basis.
  - This authorization does not apply to loss or degradation of reddish egret foraging habitat within Core Foraging Areas, as defined above.
  - This authorization does not apply to nesting habitat.
- As described in Rule 68A-27.007(2)(c), F.A.C., land management activities that benefit wildlife and are not inconsistent with FWC Management Plans are authorized and do not require a permit

authorizing incidental take. Aquatic habitat management activities and wildlife management activities are not considered inconsistent with management plans for imperiled wading birds, provided these actions (1) do not impact trees or shrubs that support active or recent (i.e., used in the past 5 years) breeding sites and (2) do not result in disturbance of active breeding colonies. Wildlife management activities include but are not limited to: exotic species removal, prescribed burning, roller chopping, and brush- and tree-cutting to improve wildlife habitat.

- In accordance with the Imperiled Species Management Plan's Policy on Nest Removal for Inactive Single-use Nests of State-Threatened Birds, no permit is required to destroy an inactive (i.e., no eggs or flightless young) wading bird nest as long as the proposed level of habitat modification or degradation is not deemed significant enough to result in take. Please note that this policy only applies to removal of the inactive nest, not to the substrate on which the nest sits, and thus would apply to only a very narrow set of circumstances.
- In accordance with local, state, and federal regulations (including, but not limited to, Federal Energy Regulatory Commission (FERC) Electric Reliability Standard FAC-003-4, National Electrical Safety Code (NESC) section 218, and Florida Public Service Commission (FPSC) mandates), routine vegetation maintenance activities within existing power line right of ways that avoid heavy equipment operation within 330 ft (100 m) of active, known and visibly apparent nests do not require a permit authorizing incidental take.
- Routine vegetation maintenance activities within existing highway right of ways that avoid heavy equipment operation within 330 ft (100 m) of active, known and visibly apparent nests do not require a permit authorizing incidental take.
- Use and reclamation of clay settling areas, as required by Rule 62C-16, F.A.C., provided such use or reclamation activities occur either outside of 330 ft of an active nest or during the non-breeding season when no active nests are present.
- In cases where there is an immediate danger to the public's health and/or safety, including imminent or existing power outages that threaten public safety, or in direct response to an official declaration of a state of emergency by the Governor of Florida or a local governmental entity, power restoration activities and non-routine removal or trimming of vegetation within linear right of way in accordance with vegetation management plan that meets applicable federal and state standards does not require an incidental take permit from the state.

Coordination with Other State and Federal Agencies

The FWC participates in other state and federal regulatory programs as a review agency. During review, FWC staff identifies and recommends measures to address fish and wildlife resource impacts and may provide recommendations for addressing potential impacts to state-listed species in permits issued by other agencies. If permits issued by other agencies adequately address all requirements for issuing a state-Threatened species take permit, the FWC will consider these regulatory processes to fulfill the requirements of Chapter 68A-27, F.A.C., with a minimal application process. This may be accomplished by issuing a concurrent take permit from the FWC, by a memorandum of understanding with the cooperating agency, or by a programmatic permit issued to another agency. These permits would be issued by the FWC based on the understanding that implementation of project commitments will satisfy the requirements of Rule 68A-27.007, F.A.C. However, as noted above in Other Authorizations for Take, if project activities result in take solely due to significant modification of foraging habitat for little blue heron, roseate spoonbill, or tricolored heron, wetland mitigation provided through the ERP process will be considered sufficient to meet the requirements of Rule 68A-27.007, F.A.C., and no further FWC authorization will be required. Exceptions are described above in Other Authorizations for Take. The existing ERP requirements for wetland mitigation include replacement of functional loss from impacts to wetlands, and the mitigation includes provisions for

perpetual conservation and management.

Review of Land and Water Conversion Projects with State-Listed Species Conditions for Avoidance, Minimization and Mitigation of Take

- FWC staff, in coordination with other state agencies, provide comments to Federal agencies (e.g., the Army Corps of Engineers) on federal actions, such as projects initiated by a federal agency or permits being approved by a federal agency.
- FWC staff works with landowners, local jurisdictions, and state agencies such as the Department of Economic Opportunity and the Florida Department of Transportation on land use decisions, including long-term planning projects like sector plans and transportation projects, projects in Areas of Critical State Concern, and large-scale comprehensive plan amendments.
- FWC staff coordinates with state agencies such as the DEP and the 5 Water Management Districts that issue ERPs. These permits cover activities such as dredging and filling in wetlands, flood protection, stormwater management, site grading, building dams and reservoirs, waste facilities, power plant development, power and natural gas transmission projects, oil and natural gas drilling projects, port facility expansion projects, some navigational dredging projects, some docking facilities, and single-family developments such as for homes, boat ramps, and artificial reefs.
  - During the ERP process, FWC staff may provide guidance on avoidance, minimization, and mitigation measures for wading birds.
  - FWC staff will also work with DEP, WMDs, and the applicants during the pre-application and ERP process to determine if mitigation required as part of the ERP will also satisfy the applicants' responsibilities under Rule 68A-27 F.A.C. and associated rule enforcement policies (see FWC Incidental take Permitting Process below).
  - Conservation benefit, as evaluated by considering factors listed in Rule 68A-27.007(2)(b), F.A.C., may be accomplished through avoidance, minimization, and mitigation measures included in an ERP.
  - For activities governed by both Chapter 373 Part IV, F.S., (ERP) and Chapter 378 Part II, F.S., (Conceptual Reclamation Plan [CRP]), the applicant may request FWC review of the DEP application, if it includes a Wildlife/Habitat Management Plan (WHMP), and it is submitted concurrently to DEP and FWC. A WHMP shall address all state-listed species observed or reasonably likely to occur on a project site. The application and WHMP will be reviewed by FWC staff to determine whether or not it complies with the requirements under Chapter 68A-27, F.A.C. and the standards in the FWC's Imperiled Species Management Plan, which provides further details about WHMPs.

FWC Permitting: Incidental Take

According to Rule 68A-27.001, F.A.C., incidental take is take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Activities that result in take to wading birds are prohibited without an incidental take permit from the FWC unless otherwise authorized (see above for activities that do not require a permit). Incidental take permit applications are available on the online permitting site, currently under the name "migratory bird nest removal." The applicant must be the landowner or an agent designated in writing by the landowner. Please note that permits will not be issued solely for proposed infrastructure (e.g., roads and utilities) that are part of a larger common development plan, project, plat, or subdivision. Issued permits must address all wading birds to be impacted on the entire project, development, plat, or subdivision site plan (the development footprint). Utility infrastructure may be permitted independently for system expansion or system improvements needed to support new customers or increased demand. *Applicants should be aware that the FWC typically does not issue permits for removal of active nests* (as defined above in this document), except in situations involving health and human safety.

In addition to state permits, the applicant is responsible for acquiring any necessary local or federal authorizations. Federal permits may be required from the U.S. Fish and Wildlife Service to comply with the Migratory Bird Treaty Act (16 USC 703-712). For example, removing an active nest may require a federal permit in addition to the state permit under certain circumstances. Issuance of a state permit does not constitute federal authorization.

The FWC may issue permits when there is a scientific or conservation benefit to the species and only upon showing by the applicant that the permitted activity will not have a negative impact on the survival potential of the species. Scientific benefit, conservation benefit, and negative impacts are evaluated by considering the factors listed in Rule 68A-27.007(2)(b), F.A.C. These conditions are usually accomplished through a combination of avoiding take when practicable, minimizing take that is unavoidable, and mitigating for the permitted take. The sections below describe the minimization measures and mitigation options available as part of the incidental take permit process for take of wading birds. This list is not an exhaustive list of options.

Minimization Options

The suite of options below can help to reduce or minimize take of the species and lessen the mitigation necessary to counterbalance take. All of the options below assume that adhering to avoidance measures that eliminate the need for FWC permitting described above is not possible, and that some level of take may occur.

Seasonal, Temporal, and Buffer Measures

- When activities must occur within 330 ft of active or recent breeding sites, conduct activities outside of the nesting season (i.e., when adults, eggs, and/or young are not present) to minimize impacts. Typical nesting season dates are provided in Figure 1. However, applicants should be aware that some reddish egret nesting activity may occur almost year-round in Florida Bay and the Florida Keys.
- If activities must be conducted during the nesting season:
  - Minimize the number of trips and the length of time for construction and other activities involving foot traffic and operation of a personal watercraft, boat, heavy equipment, or other vehicle within a 330 ft (100 m) buffer around active nests (Rodgers and Smith 1995, 1997).
  - If the project must occur within the buffer, minimize the time spent within the buffer around occupied breeding habitat during the nesting season. Scheduling activities in early morning or, if necessary, late afternoon minimizes exposure of eggs and chicks to harmful heat-stress and/or sun exposure if adults are flushed off of the nest.

Design Modification

- Preserve, or minimize impacts to, active and recent breeding sites where possible.
- Design development projects so that resultant structures or activities are sited as far as possible from active or recent breeding sites.
- Minimize amount of suitable foraging habitat lost or degraded.
- When removing invasive non-native species used by wading birds as nesting substrate, remove the vegetation in a phased fashion to minimize the amount of nesting habitat lost in any given breeding season, and replace removed vegetation with native species that provide suitable nesting substrate.
- Design water control structures and other project activities to minimize changes in timing, quantity, or quality of water that could degrade suitable foraging or nesting habitat.
- Design type and placement of waste receptacles and other potential food sources to minimize attractants for mammalian and avian nest predators near active or recent breeding sites.
- Design docks, piers, and similar recreational facilities with conservation measures to minimize threats from monofilament entanglement. Examples include marked repositories or lidded trash cans for discarding fish carcasses, educational signage, and participation in the Monofilament

Recovery and Recycling Program.

- Maintain or create deeper water areas around nesting colonies in order to reduce accessibility to predators, while retaining the shallow flats used by young birds immediately adjacent to the colony.

Method Modification

- When working within 330 ft (100 m) of an active nest, provide a visual barrier between project activities and the breeding site where feasible.
- Provide pre-construction training about wading bird protections to contractors, sub-contractors, and other project personnel.
- Use DEP best management practices for sedimentation and erosion control to minimize impacts to water quality (e.g., turbidity). Avoid materials that could result in entanglement of wildlife.
- Minimize the use of pesticides, fertilizers, or other potential environmental contaminants near wetlands.
- Minimize disruption of water flow to upper marshes/littoral zones during the wet season. Also, minimize rapid increases or decreases in water flows to these areas when possible.
- When activities must occur within active or recent breeding sites, reduce the extent to which vegetation in the site is impacted.
- When activities must occur within active or recent breeding sites, conduct activities outside of the nesting season to minimize impacts to active nests, eggs, and young.
- If activities must be conducted during the nesting season, refer to the Seasonal or Temporal Restrictions above to minimize impacts.

Mitigation Options

Please note that mitigation must provide scientific or conservation benefit to the specific species taken by project activities (e.g., actions that result in take of reddish egrets must provide mitigation that benefits reddish egrets). Mitigation is scalable depending on the impact, with mitigation options available for take that significantly impairs or disrupts essential behavioral patterns. This list of mitigation options is not exhaustive. Programmatic permits are possible and will be evaluated on a case-by-case basis. In some cases, mitigation provided through the ERP process may satisfy the requirements of Rule 68A-27, F.A.C., as described in Coordination with Other State and Federal Agencies. All mitigation contributions support wading bird conservation actions consistent with the Species Action Plan for Six Imperiled Wading Birds (FWC 2013) or those identified by FWC subject matter experts as emerging needs for the species.

Scientific Benefit

The following research and monitoring projects will provide scientific benefit, provided FWC staff approve the objectives and methods submitted as part of the permit application.

- Develop scientifically rigorous methods to effectively survey breeding populations of dark-plumaged wading birds.
- Implement an annual monitoring program using FWC-approved protocols for at least 10 years for wading bird colonies in underserved regions of the state (e.g., interior peninsular and panhandle colonies). Please note that local-scale monitoring (e.g., monitoring of 1 or a few nesting colonies) is insufficient to provide “scientific benefit.”
- Carry out a long-term (≥5 years) demographic study using either color-banding or transmitter technology to examine survival and dispersal of adults and fledged chicks across the state.
- Model the impact of climate change (sea-level rise, temperature change, and change in rainfall) on the nesting and foraging habitat of state-Threatened wading birds, particularly on the Gulf Coast. This could include a spatiotemporal assessment of foraging habitat near priority reddish egret colonies, as determined through coordination with FWC staff.

- Test potential climate change adaptation methods designed to benefit wading birds.
- Develop and implement a statewide framework for use of citizen science data to monitor non-breeding wading bird populations.

Habitat

- **Protection or restoration of active or recent breeding sites**. Examples include, but are not limited to: breakwaters or vegetation plantings to protect breeding sites from eroding, restoring open water around the site to reduce predation (while retaining shallow areas used by young birds), planting of water tolerant tree species to help mitigate for losses resulting from deviations in normal water management operations, long-term commitment for predation management (in a manner that avoids take), restoration of spoil islands or tree islands, hydrologic restoration to enhance breeding sites, etc.
- **Restoration of potential wading bird foraging habitat or restoration of historic breeding sites** on public or private conservation lands through hydrologic restoration, fire, planting of native wetland plants, mechanical techniques, or control of invasive exotic vegetation.
- **On-site preserve areas** that protect existing active or recent breeding sites, along with a commitment for long-term management with a habitat management plan.
- **On-site preserve areas** with sufficient, suitable foraging habitat to counterbalance take and a commitment for long-term management with a habitat management plan to sustain habitat quality.
- **Fee simple acquisition, mitigation bank credits, or other conservation easements** of potential habitat, with a commitment for long-term management and a habitat management plan, in areas with sufficient foraging and/or nesting habitat to counterbalance take.
- Support for or long-term commitment to use **habitat management techniques** (e.g., fire, control of hydrology, treatment of invasive non-native species) that maintain habitat conditions suitable for the species taken.
- **Creation** of potential wading bird foraging habitat with a commitment for long-term management and a habitat management plan.

Please note that when removal of invasive non-native species used by wading birds is deemed necessary, removal of nesting substrate should be conducted in a phased fashion, and vegetation should be replaced with appropriate native species that provide suitable nesting substrate.

Funding

- Mitigation may take the form of a financial contribution to the Fish and Wildlife Foundation of Florida's Imperiled Species Permitting Conservation Fund. Mitigation funding will be used to fund priority actions included in or consistent with the objectives of the Species Action Plan for Six Imperiled Wading Birds.

Information

- Mitigation can be used to support research, monitoring, or educational projects included in or consistent with the objectives of the Species Action Plan for Six Imperiled Wading Birds. This form of mitigation can be part of a mitigation package but shall not be the sole form of mitigation unless included above under Scientific Benefit.

Programmatic Options

- Multi-year or long-term permits are possible and will be considered on a case-by-case basis. Examples include, but are not limited to, large-scale ecological restoration projects or public works projects. Programmatic permits similar to Safe Harbor Agreements are possible for landowners concerned that a temporary activity may attract nesting wading birds.

Multispecies Options

- The ERP process can serve as a multi-species option for wading birds and other species that use wetlands and are considered wetland-dependent species in the Applicant's Handbook. In many circumstances, mitigation provided through the ERP process may be sufficient to cover take of multiple state-Threatened wetland-dependent species.

Assembling a mitigation package

When assembling a mitigation package, applicants should evaluate: (1) what is the extent of take that will occur, and (2) how much mitigation would be necessary to counterbalance the take and provide an additional benefit to the species? Mitigation for actions that significantly impair or disrupt breeding must at least replace the productivity lost due to the action. The appropriate amount and duration of mitigation will depend on the impact. For example, if an action results in a single-occurrence take of 10 tricolored heron nests, mitigation would have to be sufficient to replace those 10 nests and provide an additional benefit. However, if an action results in permanent loss of a breeding site used by 10 tricolored heron pairs, mitigation would have to counterbalance more than just a one-time loss of 10 nests. The following provides additional guidance:

- If impacts are small (e.g., loss of only a portion of a breeding site, loss of a small breeding site, one-time actions that result in take when birds are flushed from active nests), some examples of options for counterbalancing take include one-time restoration of open water around a breeding site, planting water tolerant species to restore a portion of a breeding site, short-term predation management, contributing to project designed to protect a breeding site from erosion, or small-scale hydrologic restoration of foraging habitat immediately surrounding a breeding site. Providing a financial contribution sufficient to pay for any of the above options also is acceptable.
- For larger impacts (e.g., loss of a large breeding site, actions that result in take when birds are repeatedly flushed from active nests), counterbalancing take may require larger-scale mitigation options, such as repeated restoration treatments to restore and maintain open water around a breeding site, restoration of spoil islands or tree islands, long-term predation management, large-scale erosion control projects, on-site preserves with long-term protection of existing breeding sites, or more extensive hydrologic restoration or foraging habitat restoration immediately surrounding a breeding site. Providing a financial contribution sufficient to pay for any of the above options also is acceptable.
- Please note that protection, restoration, creation, or management of foraging habitat may be acceptable to mitigate for take that impairs or disrupts breeding. However, the applicant must provide a strong justification that the foraging habitat is sufficient to replace lost productivity and provide an additional benefit to the species.

The mitigation options outlined in the pages above may be combined by the applicant when creating a mitigation package. Additional mitigation options may be considered by the FWC's Protected Species Permitting Office, provided the applicant can provide sufficient justification of scientific or conservation benefit.

FWC Permitting: Intentional Take

Intentional take is not incidental to otherwise lawful activities. Per Chapter 68A-27, F.A.C., intentional take is prohibited and requires a permit. For state-Threatened species, intentional take permits may only be considered for scientific or conservation purposes (defined as activities that further the conservation or survival of the species taken). Permits are issued for state-Threatened species following guidance in Rule 68A-27.007(2)(a), F.A.C. Intentional take is authorized under certain circumstances that involve risks to property or human safety, such as on airport property (see above).

Risks to Property or People

Intentional take for Human Safety

- Rule 68A-9.012, F.A.C., describes circumstances under which wading birds may be taken on airport property without further state authorization for an imminent threat to aircraft or human safety.
- Permits will be issued only under limited and specific circumstances, in cases where there is an immediate danger to the public's health and/or safety, including imminent or existing power outages that threaten public safety, or in direct response to an official declaration of a state of emergency by the Governor of Florida or a local governmental entity. Applications submitted for this permit must include all information that is required from any other applicant seeking a permit, along with a copy of the official declaration of a state of emergency, if any.

Aversive Conditioning

- Not applicable for wading birds.

Scientific Collecting and Conservation Permits

Scientific collecting permits may be issued for wading birds using guidance found in Rule 68A-27.007(2)(a), F.A.C. Activities requiring a permit include any research or educational use that involves capturing, handling, or marking wildlife; approaching or entering wading bird breeding sites for scientific purposes; conducting biological sampling; or other research that may cause take. Applicants can apply for scientific collecting permits on the FWC's online permitting site.

Research activities requiring a permit include any projects that involve capturing, handling, or marking wading birds; approaching or entering wading bird breeding sites for scientific purposes; conducting biological sampling; or other activities that may cause take. Scientific collecting permit applications should include a justification of how the project furthers the conservation or survival of the species; objectives and scope of the project; detailed description of project methods, including duration, sample size, disposition of individuals, and capture/handling procedures; coordination with others conducting similar work in Florida; and expertise, qualifications, and resources available to accomplish project objectives. Appendix A provides a reference for those developing permit applications for research or monitoring that requires working near or within wading bird breeding sites, and Appendix B provides guidance for those developing applications for surveying wading birds using UAS.

Scientific collecting permit applications involving **captive possession** for any period of time must include a full explanation of whether the facility has the appropriate resources for accomplishing the objectives and for maintaining the animals in a safe and humane manner. Applications for **educational use** of live wading birds must include an evaluation by an independent rehabilitator and a veterinarian demonstrating that the individual cannot be released into the wild; must demonstrate appropriate educational use; and must include information about the ability of the applicant(s) to conduct the educational activities, their history of performing such activities, and resources for maintaining wading birds. Appropriate educational use means that the wading birds must be housed at a non-profit scientific or educational facility, must be on public display with the intent of conservation education whenever the facility is open to the public (provided the bird is in good health), and must not be displayed for commercial purposes (i.e., any manner that implies personal use or that promotes or endorses any product, merchandise, good, service, business or organization). Additionally, applicants that wish to possess live wading birds for educational purposes must abide by caging requirements (Rule 68A-6, F.A.C.) and obtain a license for exhibition/public sale (372.921 Florida Statutes).

For **possession of dead wading birds, or their parts or infertile eggs**, an applicant must meet the definition of appropriate educational use provided above, except that specimens may be housed in a manner appropriate

for their preservation, provided they are still accessible for public use. Permits may be issued to display a specimen if the specimen was obtained via a rehabilitation facility or was encountered dead.

Although issuance of a state permit does not depend on the possession of **local or federal authorizations**, permittees must obtain all necessary local and federal authorizations before executing the state permit. Please note federal permits may be required from the U.S. Fish and Wildlife Service to comply with the Migratory Bird Treaty Act and may be required from the United States Geological Survey (USGS) Bird Banding Lab for banding, color-marking, specific capture methods, sampling of blood/tissues, collection of feathers, and attachment of transmitters or other data gathering mechanisms. Federal salvage permits are also required to collect any dead individuals (i.e., mortality not due to research activities or incidental take from research activities) or parts of deceased individuals, including feathers and tissues.

Considerations for Issuing a Scientific Collecting Permit

FWC staff considers the following questions when evaluating Scientific Collecting Permit applications, based on the factors outlined in Rule 68A-27.007(2)(a), F.A.C. The bullets under each question provide guidance to permit applicants for assembling a complete application:

1) Is the purpose adequate to justify removing the species (if the project requires this)?
   - Permits will be issued if the identified project is consistent with the goal of Species Action Plan for Six Imperiled Wading Birds (i.e., improvement in status that leads to removal from Florida's Endangered and Threatened Species List), or addresses an identified data gap important for the conservation of the species.
2) Is there a direct or indirect effect of issuing the permit on the wild population?
   - Applicants must include detailed methods, including measures taken to minimize take. Applications also should include proposed sample size and disposition of individuals, as appropriate.
   - Trapping, capturing and handling wading birds may impact the wild populations' ability to forage, breed, or rear young. Applications proposing these activities must include trapping and handling protocols. Trapping and handling protocols should identify measures to lessen stress for captured individuals and to lessen the impacts to wading bird populations.
   - Methodologies for any collection of tissues such as blood should be clearly spelled out, including measures taken to reduce stress/injury to the birds.
   - Entering breeding sites can result in take of eggs or young birds at both target nests and at nearby nests of the same species or other species of wading birds. Abandonment of the breeding site also may occur if proper precautions are not in place. Applicants that propose to work near or within breeding sites must include measures for minimizing disturbance to target nests, neighboring nests, and the colony as a whole. Appendix A provides a reference for applicants.
3) Will the permit conflict with a program intended to enhance survival of species?
   - Applications must include clear objectives to ensure that the project does not conflict with other conservation efforts for the species.
   - Coordination with land managers and partners (county, city, state or national) should be addressed in the application to demonstrate that the project will not conflict with other efforts for the species.
   - Applications should identify the project location, such as where trapping or handling will occur (privately owned or public lands).
   - Applicants that propose to approach or enter breeding sites must justify that the level of disturbance to breeding birds will not conflict with objectives of the Species Action Plan for Six Imperiled Wading Birds and other relevant conservation efforts for the species.
4) Will purpose of permit reduce likelihood of extinction?

- Projects consistent with the goal of the Species Action Plan for Six Imperiled Wading Birds or that fill identified data gaps in species life history or management may reduce the likelihood of extinction.
- Applications must include clear project objectives and justification of why the proposed project has a scientific or conservation purpose, including how the project advances conservation of the species.

5) Have the opinions or views of other scientists or other persons or organizations having expertise concerning the species been sought?
6) Is applicant expertise sufficient?
   - Applicants must have prior documented experience or training with this or similar species, and applicants should have met all conditions of previously issued permits.
   - The application should describe the qualifications (e.g., experience or training) of all project participants and the resources and facilities available to conduct the proposed work.

Relevant to all Scientific Collecting for Wading Birds:

- Permit amendment and renewal applications must be "stand alone" (i.e., include all relevant information on objectives and methods, even if previously submitted for a predecessor permit).
- Applications must include a proposal that clearly states the objectives and scope of work of the project, including a justification of how the project will result in a conservation or scientific purpose that benefits the species. The proposal also must include a thorough description of the project's methods, time frame, and final disposition of all individuals. Please refer to the section above for additional information.
- Scientific collecting permit applications must include detailed qualifications or training for all individuals that will be capturing or handling wading birds. For those likely to submit multiple applications over time, the FWC strongly encourages applicants to upload minimum qualifications as part of an application for a self-issuing Registered Agent permit in the online permitting site. The FWC also encourages applicants to include qualifications of sub-permittees in the Registered Agent permit. This approach will allow applicants to upload minimum qualifications only once rather than repeatedly uploading them in each scientific collecting permit application.
- Flight-line counts do not need a permit, provided surveyors remain outside of buffer distances identified above and the birds do not flush from active nests or active breeding areas. Conducting activities within the buffer distances or causing birds to flush from active nests or active breeding sites can result in take by significantly disrupting or impairing breeding.
- Aerial surveys with a UAS do not need a permit if operated greater than 200 ft (61 m) from active nests. *However, please note that approaching or entering a colony to retrieve a UAS that has landed or crashed could result in take, which is prohibited without a permit*. See Appendix B for more information.
- Aerial surveys in manned vehicles do not need a permit, provided flight altitude is above that which would cause birds to flush from active nests or active breeding sites. Causing birds to flush from active nests or active breeding sites can result in take by significantly disrupting or impairing breeding.
- Appendix A provides a reference for applicants that wish to approach or enter an active breeding site for monitoring or research.
- Passive observations (such as those involved in behavioral studies) of foraging, roosting, and nesting birds do not need a permit provided observers remain outside the identified buffer distances and the birds do not flush from active nests or active breeding sites. Conducting activities within the buffer distances or causing birds to flush from active nests or active

breeding sites can result in take by significantly disrupting or impairing breeding.

- Non-destructive habitat sampling near foraging, roosting, and nesting birds does not need a permit provided observers remain outside the identified buffer distances in active breeding sites and nesting birds do not flush. Conducting activities within the buffer distances or causing birds to flush from active nests or active breeding sites can result in take by significantly disrupting or impairing breeding.
- Any mortality should be reported to the FWC, and FWC staff will provide guidance on proper disposal of specimens in the permit conditions.
- A final report should be provided to the FWC in the format specified in the permit conditions.

Additional information

The recently active wading bird breeding sites dataset, and the reddish egret Core Foraging Area map are available at http://geodata.myfwc.com/pages/upland.

Information on economic assessment of these Guidelines can be found at http://myfwc.com/wildlifehabitats/imperiled/management-plans/

Contact

For permitting questions or to report mortalities, contact the FWC at (850) 921-5990 or WildlifePermits@myfwc.com. For more regional information visit http://myfwc.com/contact/fwc-staff/regional-offices.

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Appendices

Appendix A. Guidance for Researchers Applying for Permits to Work Near or Within Wading Bird Colonies

Conducting research or monitoring near (e.g., within 330 ft by foot or vehicle, but see Examples of Activities Not Expected to Cause Take) or within a wading bird breeding site with active nests can result in take and should only be conducted under a Scientific Collecting Permit from the FWC. In mixed species colonies, take of state-Threatened wading birds can occur even if the focus of the project is on non-state-listed species. In response to disturbance, nesting birds may leave eggs and young unattended, thereby exposing eggs and young to predators, sun, and cold (Tremblay and Ellison 1979, Rodgers 1996). Colony abandonment also is possible. Therefore, project personnel should use appropriate caution to minimize take while working near or within an active wading bird breeding site.

This appendix is meant to assist researchers with submitting complete applications for a Scientific Collecting Permit for monitoring or research conducted near or within wading bird colonies.
Conditions will vary depending on the colony and the project objectives, and this appendix should not be construed as a comprehensive set of minimization measures. Please note that adhering to the following guidance minimizes take but is not a substitute for a permit. Permit applications should include a proposal that contains a justification of how the project furthers the conservation or survival of the species; objectives and scope of the project; detailed description of project methods, including duration, sample size, disposition of individuals, and capture/handling procedures (if applicable); coordination with others conducting similar work in Florida; and expertise, qualifications, and resources available to accomplish project objectives.

In the permit application, researchers should include the weather conditions and times of day during which work will occur, along with a justification for how these conditions minimize the potential for take.
Research or monitoring near or within colonies should be conducted in mild weather conditions with low wind, no rain, and moderate temperatures (ideally around 75-88ºF). Eggs and chicks exposed to the sun can become much hotter than the ambient temperature. Often, mild conditions occur between sunrise and 10:00 a.m. However, in some locations or situations (e.g., cloudy days), milder conditions may extend further into the day. For example, in parts of the state with earlier nesting, cold mornings can be dangerous for chicks and may warrant waiting until temperatures warm up later in the morning. There are other advantages to working in the morning hours. Older chicks of some species often regurgitate food when disturbed, but this is much less likely during early morning hours before they have been fed (P. Frederick, personal communication). For afternoon or evening visits, regurgitation can mean that the chicks are giving up an important and perhaps the only meal of the day, facing a long night without food. Roseate spoonbills are less likely to regurgitate food (J. Lorenz, personal communication).

Permit applicants should include protocols for minimizing disturbance when entering and exiting the colony.
Project personnel should choose entrance and exit points that minimize disturbance to the colony. For example, when possible, personnel can enter and exit at different locations, or design pathways to prevent flushing birds off the same nest more than once. If a colony must be accessed via a boat or airboat, staff should operate the boat to minimize engine noise and park sufficiently far from the colony to avoid physical disturbance of nests from propeller wash. When leaving the colony, participants should avoid potential propeller blasts to nests and should slowly increase the speed of the boat to avoid sudden, loud noises.

In the permit application, researchers should describe measures that will be taken to minimize the amount of time that nesting birds will be disturbed.

The appropriate amount of time will depend on the size of the colony and the agitation level of the birds. As project participants work from one end to another in a colony, adults and chicks are able to settle down as participants move through. During each visit, investigators should note the size of the radius of disturbance surrounding their activity, the size of which can vary between visits and can depend on the health of birds. Investigators should move through a colony such that no nest is in the radius of disturbance for more than 30 minutes.

The proposal should contain measures that will be implemented to reduce disturbance while moving through the colony.

For example, personnel should move quietly, while wearing dull colored clothing, and should keep noise, amount and volume of conversation, and sudden movements to a minimum. Participants can avoid direct eye contact with birds when possible. Moving slowly is critical. Projects should minimize the number of project personnel to the extent practicable.

If permit applicants intend to work in colonies during the early part of the nesting season, before most nests have eggs, applications should provide sufficient justification (e.g., experience, training, minimization measures) that the work can be conducted safely.

Appropriate protocols and minimization measures will vary depending on project objectives and the species present in the colony. Some species, such as white ibis, have a very low threshold for disturbance during nest building and early egg laying and may abandon the colony if work is conducted before most nests contain eggs. Other species, such as small herons and wood storks, appear to be more tolerant during egg laying. If sensitive species are present or project objectives do not require entering colonies in the early part of the nesting season, it is best to refrain from entering the colony until most nests have eggs. There are a number of cues that can be observed from nearby the colony that will help ascertain incubation behavior. Birds in incubation are very quiet compared to courting birds, so a lot of noise outside of late evening and early morning hours may indicate courtship and nest building. Also, high levels of traffic into and out of the colony are typical of courting and nest-building stages, and birds may often be carrying nest material during this time. Wading bird colonies in Florida have various levels of synchrony both within and among species, and one should not expect all birds to be in the same nesting stage. Participants can try to get a sense of what the majority of birds are doing. In large colonies, there may be high asynchrony across the colony, but high synchrony within particular geographic sectors. If the sectors are large enough, it may be possible to work in one without disturbing another. Finally, the stage of incubation can be assessed by quick walking visits within the colony. For example, if sensitive species are present and the first 10 nests seen all have 0 or 1 egg, it is best to get out of the colony and try again in a week (eggs are laid every other day). If the majority have 3 or more eggs, then most of the birds may be in incubation.

If permit applicants intend to work in colonies with older nestlings, applications should provide sufficient justification (e.g., experience, training, minimization measures) that the work can be conducted safely.

Older nestlings of some species may jump from the nest when disturbed, and permit applicants should include measures that will be taken to minimize risks. Ibises and anhingas are particularly prone to this behavior. For great egret, black-crowned night-heron, and great blue heron, nestlings are more likely to jump at 21 days of age or older, and white ibis and small herons are more likely to jump at 14 days of age or older (P. Frederick, personal communication). It is unclear whether these chicks can get back to the nest, but they likely are more vulnerable to predation by alligators when in the water or close to the ground. To minimize risk, personnel should move slowly past nests with chicks and alter their path to avoid the most advanced nests. Participants should avoid eye contact as much as possible with older nestlings, look at them obliquely when possible, and avoid staring. If the canopy is low, project activities occur late in the breeding season, or

nesting is highly asynchronous, nestling displacement is more likely and unacceptable levels of take become more probable. Appropriate protocols and minimization measures will vary depending on project objectives and the species present in the colony.

Permit applicants should describe protocols for dealing with the presence of potential nest predators. For example, researchers should avoid entering colonies if avian predators (e.g., crows) are present. While crows are not able to force attending adults to leave their nests, they will follow researchers through the colony, preying upon nest contents before the displaced parents can return to the nest (Frederick and Spalding 1994). Excessive flagging may attract predators, even if researchers do not observe potential nest predators while in the colony. For nest marking, keep any markers small and below the nest bowl. Even a few crows can have a big impact because they often quickly cache the eggs they steal, and an individual crow can destroy many nests during a single researcher visit.

As noted above, applicants should include capture/handling procedures (if applicable), including measures taken to minimize stress. Minimization measures will vary depending on the project but should be clearly spelled out for all project activities that could result in injury (e.g., capture techniques, processing time, methods for collection of blood or other tissues, methods for collection of boluses, etc.). For example, if warm temperatures are a concern, the legs of chicks can be misted with a water-filled spray bottle. When researchers are handling nestlings that regurgitate food, placing an equal amount of small fish in the nest bowl can reduce impacts (chicks readily consume fish left on the nest bowl; D. Gawlik, personal communication).

M. Cook, P. Frederick, D. Gawlik, and J. Lorenz made important contributions to this appendix.

Appendix B. Guidance for Using Unmanned Aerial Systems (UAS) Near Wading Birds

Guidance for Recreational or Commercial Use of UAS Near Wading Birds

The following guidance applies to uses of UAS other than for scientific surveys of nesting wading birds, which are covered in a separate section below.

1. Be aware that wading birds are protected by both State and Federal law.
   - Your use of UAS could lead to impacts that violate these laws (e.g., the federal Migratory Bird Treaty Act; state Rules 68A-4, 68A-16, and 68A-27, F.A.C.). Wood storks also are protected under the federal Endangered Species Act.
   - Flushed birds can lose valuable energy, and flushing birds from nests leave the eggs and young vulnerable to predators and the elements.
   - Transiting your UAS from its takeoff or landing location to a focal target area can result in inadvertent flushing of bird species, which could result in Incidental Take.

2. Check current rules and notices on the property.
   - Use of UAS is prohibited on some properties and requires permits on others.
   - Keep the privacy of others in mind during all UAS flights.

3. Be familiar with FAA rules regarding operation of UAS.
   - Always remain within line-of-sight of your UAS while flying.
   - Flying your UAS even at relatively low altitudes can be a violation of federal airspace regulations.

4. Check for birds before you fly.
   - Check with people that know, such as the property's resource manager, to inquire if sensitive or nesting birds may be present along the entirety of your intended UAS flightpath from takeoff to landing.
   - Perform a pre-flight check birds immediately before takeoff to determine the location of any nearby birds.

5. Maintain UAS at least 200 ft away from active nests of wading birds on Florida's Endangered and Threatened Species List.
   - If you cannot maintain this distance, we recommend that you contact the FWC's Protected Species Permitting Office to discuss an Incidental Take Permit.
   - Please note that this includes the airspace above the active nest.

6. Avoid launching your UAS directly at birds.
   - Birds are more likely to be disturbed by UAS running at full throttle as they gain altitude.
   - Launch and land your UAS away from birds, and preferably out of their sight.

7. Avoid changing direction, speed, or altitude above or in the vicinity of birds.
   - Banking motions and changes in altitude, speed, or direction can make your UAS behavior appear like a predator to birds.
   - Special care should be take when using a fixed-wing UAS whose profile could be perceived as an aerial predator.
   - Birds are less likely to view your UAS as a threat if you fly over them at a fixed direction, speed, and altitude.

8. Launch and land your UAS > 600 ft from birds (and preferably out of sight).

- Birds are particularly frightened by UAS as they take off or land.
- Please note that approaching or entering a colony to retrieve a UAS that has landed or crashed could result in take, which is prohibited without a permit.

9. Cease UAS activity immediately if you observe birds flushing or becoming agitated.
   - Signs of disturbance include birds moving away from the UAS as it passes overhead, decreasing other natural behaviors to watch the UAS, or nodding their heads up and down to continuously size up the distance between themselves and the UAS.

Guidance for Using UAS to Survey Nesting Wading Birds

1. Using a UAS to conduct surveys of nesting state-Threatened wading birds has the potential to result in take, because disturbed birds may flush from nests, leaving eggs and young unattended and exposed to predators, sun, and cold. Take of state-Threatened species is prohibited without a Scientific Collecting Permit from the FWC.

2. Maintain UAS at least 200 ft away from active nests of state-Threatened wading birds. Please note that this includes the airspace 200 ft above the active nest. If you cannot maintain this distance, we recommend that you contact the FWC's Protected Species Permitting Office to discuss a Scientific Collecting Permit. The 200 ft buffer was determined based on literature review and expert opinion (Hanson et al. 2014, Drever et al. 2015, McEvoy et al. 2016, Barr 2017, M. Burgess, personal communication).
   1. We recommend the following when conducting surveys of wading birds using UAS:
      - Avoid launching your UAS directly at birds.
        - Birds are more likely to be disturbed by objects coming straight toward them.
      - Avoid changing direction, speed, or altitude above or near birds.
        - Banking motions and changes in altitude or direction can make your UAS appear like a predator to birds. These maneuvers should occur away from birds.
        - Take special care when surveying using a fixed-wing UAS whose silhouette could be perceived as an aerial predator.
      - Launch and land your UAS > 600 ft from birds (and preferably out of sight).
        - Birds are particularly frightened by UAS as they take off or land.
      - Conduct a trial flight before a formal survey to assess bird behavior before, during, and after the flight.
      - Conduct the survey under mild weather conditions in case any birds leave the nest and avoid conducting the survey if potential nest predators (e.g., crows) are in the area.
      - Begin by flying at the maximum allowable UAS flight ceiling (typically 400 ft above ground level) over the focal birds using a straight-line transect. Once an initial pass has been made without noticing bird disturbance, lower the aircraft altitude by approximately 50 ft at a location away from the target birds, and then make another straight-line pass over the birds. Continue repeating this process until an altitude of no less than 200 ft is reached, an ideal altitude for your UAS sensor payload is achieved, or the birds exhibit signs of disturbance, whichever occurs first.
      - Increase your UAS altitude immediately if you observe signs of bird disturbance, such as birds moving away from the UAS, decreasing other normal behaviors to watch the UAS, or nodding their heads up and down to continuously size up the distance between themselves and the UAS. If the signs of disturbance continue after a subsequent pass at a higher altitude, immediately abort the survey.
      - Stop the activity immediately if you observe birds flushing from nests.
      - Use a second person to act as a spotter to ensure the UAS is at the correct altitude and to look

out for behavioral responses from the birds.

2. Please note that approaching or entering a colony to retrieve a UAS that has landed or crashed could result in take, which is prohibited without a permit.

M. Burgess made important contributions to this appendix.

Appendix C. Example data sheet for flight-line surveys for state-Threatened wading birds

Wading Bird Colony Flightline Survey

Location/Project Name: _____ Latitude: _____ Longitude: _____

Date: _____ Observers: _____ Start Time: _____ End Time: _____

Notes:

Species	Adult		Immature		Unknown	
	In	Out	In	Out	In	Out

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