



To: Kate Guerena Watts, Florida Keys National Wildlife Refuges Complex

From: Ken Meyer, Avian Research and Conservation Institute, 352-514-5606, meyer@arcinst.org

Post-hurricane assessment - Great White Heron aerial nest surveys in the Florida Keys National Wildlife Refuges Complex

This protocol and schedule are based on an internal USFWS 28-page report “*Distribution and population trend of nesting great white herons (Ardea herodias occidentalis) in the Florida Keys National Wildlife Refuges Complex, 1986-2009*” by Tom Wilmers, Wildlife Biologist, 31 March 2010.

We will replicate the aerial nesting surveys of Great White Herons (GWHEs) that Wilmers performed from 1986 to 2009 in the Florida Keys National Wildlife Refuge Complex (FKNWRC). Wilmers conducted annual aerial counts of active nests (structure with adult[s] or young) from October to March, encompassing the peak nesting months of November to February. Each survey included close, low-altitude inspection of 42 islands or named chains of islands (each of the latter consisting of three to 14 islands, e.g., Content Keys, Lower Harbor Keys, Marquesas Keys) from East Bahia Honda Key west to the Marquesas Keys, a linear distance of 97 kilometers. This consists of all the islands in Key West National Wildlife Refuge (KWNWR) and about two-thirds of the islands in Great White Heron National Wildlife Refuge (GWHNWR). The remaining islands in GWHNWR are within military airspace and, thus, are inaccessible.

Wilmers’ (2010) recommended two to five surveys for a given nesting season. He conducted his surveys annually, but he did not comment on how frequently such an annual survey should be repeated. One challenge in planning the surveys was, and remains, the broad temporal distribution of nest-initiation dates for GWHE, and for wading birds in general, in southern Florida. General knowledge and our own direct experience helping to develop a population-monitoring protocol for Reddish Egrets indicate that nesting phenology for wading birds is more variable in Florida Bay and the Florida Keys than anywhere else in Florida. Furthermore, nesting records from National Audubon’s decades-long monitoring of wading bird populations in Florida Bay and the upper Florida Keys suggest that nest initiations have become even more variable in the last 5 to 10 years. Each of the surveys we conduct in late 2017 and early 2018 will consist of a 3-day operation including a round-trip ferry flight between Gainesville, Florida and Marathon, Florida; two flights beginning on each of two successive mornings (about 6 hours flight time each, plus one refueling stop). Each day’s activities will cover about half the targeted islands and include pre- and post flight activities (e.g., route-mapping, preparing and securing the aircraft, camera installation and check-out). Data downloads and nest counts from the photographs will occur after each 3-day trip.

The aircraft will be a Cessna 172 owned and operated by ARCI and flown by ARCI’s commercial/instrument-rated pilot, Joe DiRodio. Each flight will include one ARCI observer/camera operator, Ken Meyer. ARCI has used this airplane, pilot, observer and camera equipment for over

140 hours of terrestrial, aquatic, and marine aerial-photo surveys since mid-2014 for documenting sea turtles and their nests, bird roosts and nesting colonies, aquatic mammals, and vegetation change.

During each flight, we will photograph all single- and multi-species nesting colonies and make direct visual counts of at least one-third of the colonies where GWHE are thought to be present. The visual and photographic counts will be used in combination to estimate the detection and identification probabilities of each method that will enable us to apply a correcting factor for comparing our photographic estimates of nest abundance with Wilmers' prior visual estimates.

Products to the FKNWRC will consist of summary reports after each flight and a final report within 90 days of completion of the last survey flight for the 2017-2018 nesting season. Along with narrative descriptions of each survey (e.g., times, weather, unusual conditions or challenges) the final report will include digital databases with date, time, island location, coordinates (derived post-flight with reference to aerial imagery), numbers of GWHE nests per colony (there may be multiple colonies, or aggregates of nesting birds, per island), and notes (e.g., nesting stage, estimated relative proportions of adults and nestlings, estimated stage of the nesting cycle). We also will assess our 2017-2018 results in relation to Wilmers' (2010) 2009-2010 counts, the last breeding season in which he surveyed. This should help FKNWRC determine the frequency at which future GWHE nest surveys should be conducted (e.g., annually versus every 3 years, etc.).

The expenses for each survey (i.e., one 3-day operation that could be conducted two to five times per year) will consist of the following:

1. Airplane flight time: **\$3,150**
21 hours (9 hours round-trip ferry time + 12 hours [6 hours per day] in the study area) @ \$150 per hour, including photography equipment
2. Staff salaries: **\$2,050**
Pilot and observer – 3 days each @ \$280 per day including insurance and payroll costs
Photo interpretation – 2 days @ \$185 per day with insurance and payroll costs
3. Local lodging for pilot and observer for 3 nights: **\$450**
6 room-nights @\$75 per room-night
4. Rental car for local ground transportation: **\$195**
6 days at \$65 per day
5. *Per diem*: **\$204**
3-days each @ \$34 per day for pilot and observer.

The total cost for one 3-day survey will be \$6,049. We recommend a total of three (**\$18,147**) or four (**\$24,196**) surveys for the 2017-2018 nesting season distributed over the period 12 November 2017 to 20 February 2018. Following Wilmers' (2010) recommendation, the highest of the four replicated nest counts will be used as the total estimate of active GWHE nests for the 2017-2018 nesting season.