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Vie email: *Leah.A.Oberlin@usace.army.mil*

Dear Ms. Oberlin:

Audubon has reviewed the "Wildlife Risk Assessment for the Sugarland Wind Project: Palm Beach County, Florida" (September 21, 2012, hereafter "Risk Assessment") by Normandeau Associates, Inc. The Risk Assessment contains a large amount of work including new information. While Audubon is pleased to find some of our previous recommendations included in these efforts, we are concerned that the proposal still lacks sufficient detail and much of the analysis is flawed; as a result, the Corps cannot adequately evaluate the potential impacts of the project. In fact, the available data suggest the potential for substantial take is high; even with additional data, correct analysis, and an Avian and Bat Protection Plan (ABPP), we fear this project's impacts will be too great to be permitted. However, this burden of proof belongs to the applicant. Audubon recommends the Corps deny the permit based on the data provided, or defer its consideration until more complete data and accurate analysis are presented to inform this important decision.

Audubon is very supportive of appropriately sited wind energy because it does not create greenhouse gases and requires significantly less water than traditional forms of energy generation. We also have worked to ensure this desirable energy source does not create excessive collateral harm, especially to bird populations, by contributing nationally to the development of the U.S. Fish and Wildlife Service's ("USFWS") voluntary wind siting guidelines. Wind energy is not suitable in all locations. The footprint of the wind farm itself has impacts on wildlife and habitat, and the turbine operations present the opportunity for additional impacts. The Sugarland Wind Project will develop an ABPP to address management protocols, but that has not yet been provided for review. Many of the concerns raised in this letter may be able to be addressed in the ABPP, but it is our opinion that the Corps simply cannot evaluate the impacts of this proposal without detailed information about the facility's management protocols.

The main body of the Risk Assessment is 338 pages of review, analysis, and conclusions from information collected. It is followed by an additional eight Appendices with detailed information on some subjects. While we found the field studies contained objective and generally-reliable data, a lingering concern is the short pre-construction sampling period. Audubon and the USFWS recommended three years, however the applicant has only provided about one year of on-site sampling data. Other concerns arise from the logic of the final conclusions drawn from the data collected. Audubon expresses these concerns in seven main sections below and includes recommendations to make the conclusions more rigorous:

- Wood Stork risk assessment
- Everglade Snail Kite risk assessment
- Lumping diverse taxa into one risk category
- Assigning risk categories based on data collected
- Erroneous application of compensatory mortality hypotheses
- Episodic mortality events and sampling periods
- Other comments

Wood Stork risk assessment

The Wood Stork (Stork) is a long-standing priority species for Audubon and a species of special concern for the Corps' evaluation due to its endangered listing under the Endangered Species Act. The applicants' Risk Assessment did a good job reviewing relevant information about Storks and made predictions based upon them.

However, while the review was thorough, it does not support the conclusions in the Collision Risk section of, "The potential for collision-related mortality among Wood Storks as a result of the proposed project is low to moderate, and is not likely to have significant demographic or population-level effects at the regional, state, or national level." For one, Stork numbers are extremely variable in the Everglades Agricultural Area (EAA), making exposure risk difficult to quantify. Second, there are virtually no data on how Storks respond to turbines and many data indicating substantial time spent in the rotor-swept zone. Lastly, and perhaps most importantly, the prediction of no population level impacts is not based on any demographic data or analysis (survival, fecundity, sex ratios, etc.), making it an unsupported claim.

Stork populations have increased in certain regions in the United States, most notably smaller colonies in coastal wetlands in Georgia and South Carolina. The largest colony in the United States, the Corkscrew Swamp breeding colony, is in virtual collapse. There has been no Stork nesting at the Corkscrew colony in six of the last seven years. Across the Greater Everglades Ecosystem, wading birds and Storks in particular have been declining as documented in the 2012 South Florida Water Management District's Wading Bird Report which showed no successful nesting by Storks anywhere in South Florida outside a few nests in the Caloosahatchee River. Presently, the regional population is extremely unstable.

Storks have been selected as an ecosystem-wide indicator species for Everglades restoration, and its decline mirrors the disproportionate loss of shallow, seasonal wetlands from past and continued dredging, filling and drainage for human development. These short-hydroperiod wetlands play a critical role in timely nest initiation by this endangered species, and their loss creates a vacuum for Stork needs in the Greater Everglades landscape. Flooded EAA fields simulate this type of habitat, thus can attract large numbers of Storks. Adding wind turbines to an area that attracts Storks, whose population is in decline in the region, is a great concern to Audubon.

For species recovery of the Stork, Audubon science staff considers the Greater Everglades Ecosystem to be a significant portion of its range, based on the historic role this region has played for this species as a primary population base.

Recommendation: *We recommend the risk characterization for Storks be rated Highest Potential, due to the population instability in south Florida.*

Everglade Snail Kite risk assessment

The Risk Assessment judged Everglade Snail Kite (Kite) risk in the "lowest" category. One source of data was Kite telemetry data presented in Appendix 8. However, inferences over Kite risk from these ten birds are weak because of the limited sample size. More importantly, Kites sampled were banded in a different region of Florida (on West Lake Tohopekaliga and Lake Kissimmee), about 100 km from the proposed wind farm site. Similarly, the on-site wind farm surveys for Kites were conducted during a period of extremely depressed populations of Kites in the Southern Everglades area, which likely underestimates past populations of Kites or the increase in Kite populations expected to occur with successful Everglades restoration. The Risk Assessment also surmised that Kites in the EAA would be flying at low elevations, therefore being at low risk of impact. Yet Table 4-12 (p 90) reports the mean Kite altitude for six radio-tracked birds ranged from 69-142 m. The assumption that Kites in the EAA are likely to be below the rotor-swept zone is suspect because they may be moving between wetland systems and flying higher than the flight level of a "local" bird.

Recommendation: *We recommend the risk to Everglade Snail Kites be scored in the Highest Potential of Risk category. With the uncertainties noted above and the fact that the Kite population is so depressed, every bird is important, especially in the Greater Everglades region.*

Additional note: *Table 4-20 has no nesting data from 2006 to present. The Corps has data through 2012 and this should be obtained and included by Normandeau. This data will show the severe depression of Kite nests in the Everglades region in the past few years, during the Risk Assessment's survey period, which is germane to interpreting the observed number of Snail Kites near the proposed wind farm site.*

Lumping diverse taxa into a single risk category

The evaluation appropriately examines four taxa individually. However, Section 4.5 (Taxon-specific Analyses of Effects, Exposure, and Risk, p. 66) explains that other taxa were grouped into "… 14 taxonomically organized categories for the purpose of conducting in-depth analyses of exposure, effects, and risk. These categories were selected using two criteria, as follows:

> (1) Shared exposure and/or effects characteristics that provided biologically meaningful groupings for exposure and effects analyses.
> (2) Population declines, conservation importance, and/or legal protection status that resulted in a high degree of societal and/or legal importance for some taxa, in particular, four individual bird species (Wood Stork, Crested Caracara,

Everglade Snail Kite, Bald Eagle)."

While the convenience of grouping is clear, we disagree that the groups contain taxa with closely "shared exposure and/or effects characteristics." Each species differs from others in movement patterns, phenology, behavior, population size, population trend, and other aspects, so much so that lumping them into a single risk categorization subverts the stated intent of in-depth analysis. Can we reasonably expect that rotor mortality will have the same probability of occurrence, or same population effect, on rails, terns, and pelicans, because they all are in the "Other waterbird" category[1]? The Risk Assessment even quotes a passage from USFWS (2011) discussing types of variability that would warn against lumping multiple species.

> *"Collision risk to individual birds and bats at a particular wind energy facility may be the result of complex interactions among species distribution, relative abundance, behavior, weather conditions (e.g., wind, temperature) and site characteristics. Collision risk for an individual may be low regardless of abundance if its behavior does not place it within the rotor-swept zone. If individuals frequently occupy the rotor-swept zone but effectively avoid collisions, they are also at low risk of collision with a turbine (e.g., ravens). Alternatively, if the behavior of individuals frequently places them in the rotor-swept zone, and they do not actively avoid turbine blade strikes, they are at higher risk of collisions with turbines regardless of abundance. For a given species (e.g., Redtailed Hawk), increased abundance increases the likelihood that individuals will be killed by turbine strikes, although the risk to individuals will remain about the same. The risk to a population increases as the proportion of individuals in the population at risk to collision increases."*

Similarly, pg. 200 has the following passage discussing not only species differences, but annual differences within a single species,

> *"Interannual variability in songbird and similar species abundance at the site is potentially very high, as reflected by radical interannual abundance swings in Pearlstine's four-year avifaunistic study of the EAA (Appendix 4). Pearlstine documented particularly wide interannual swings in the abundance of the Icterid species that comprise the bulk of songbird and similar species abundance at the site, including Red-winged Blackbird (interannual abundance variation more than fourfold), Bobolink (interannual abundance variation more than 1000-fold), Boat-tailed Grackle (interannual abundance variation up to nearly 20-fold), and Brown-headed Cowbird (completely absent for three years, then very abundant in the fourth year). Many of the water-affiliated species that exhibited pronounced interannual abundance variation in the EAA in Pearlstine's study reached their peak abundance in 2011. However, songbird and similar species did not follow the same pattern, with three peaking in 2010, and one peaking in 2011 (Brown-headed Cowbird), suggesting that*

[1] The Risk Assessment differentiates these three groups into sub-categories of "poor flier," "acrobatic flier," and "thermal soarers", yet still lumped them into a single risk category.

interannual dynamics in these species may be driven by influences other than regional precipitation patterns and water/wetland availability that likely drives the regional distribution patterns and interannual abundance variation in many of the water-affiliated bird taxa."

With such variation in mind, the diversity contained in all the groups is of concern, especially for the "Songbirds and similar species" category that represents some 127 species from eight different Orders. Not only does each species have different mortality risks and impacts, the ability to predict impacts will depend greatly on the varying amount of information available on each species. Finally, some species are experiencing population declines and others increases, meaning mortality likely will affect their respective populations much differently.

Recommendation: *There are species-specific tables and discussions of birds and bats throughout the Risk Assessment. We recommend that a species-specific risk assessment be added to them, based not only on abundance and behavior, but on population demography and population trends as well.*

Assigning risk categories based on data collected

For every taxon examined, the Risk Assessment concluded that the impacts would have moderate, low or no "population-level" or "demographic changes." Yet the sampling in the Risk Assessment was based on presence and abundance, and did not examine "demographic" information, such as survival, fecundity, sex and age ratios, and so on. Nor did it analyze population levels and trends for individual species. Thus, very important demographic and population-level "conclusions" in the report lack fundamental supporting technical evidence or analysis.

To illustrate this problem, consider the conclusion that risk to bats is only low to moderate.
From Table 4-82 of the Risk Assessment, if one calculates the average number of Brazilian Free-tailed Bats detected from the upper radar detectors, and takes the four season average, then each detector averaged about 124 bat passes per night[2]. With an upward range of about 100 feet, the half circle area a radar detector would cover would be about 15,700 square feet. In comparison, the rotor-swept area per rotor is projected to be 84,500 square feet, about 5.4 times that area. Thus, if the upper radar sensors predict bat density in the rotor-swept zone well, the number of bat exposures per night could be 124 times 5.4 equaling 667 possible encounters per rotor. For 124 rotors, the projection would be 82,756 possible Free-tailed Bat/rotor encounters per night and more than **30 million** each year. Obviously this extrapolation has many assumptions, compares a three dimensional radar space to a two dimensional rotor space, and is subject to other error. Bats have low fecundity (do not breed until several years old and have only one or two pups per year), giving them low resiliency to persistent mortality, even if that mortality rate is low (National Research Council 2007). Audubon is concerned that anything near this level of bat exposures reflects significant cause for concern, yet without considering demographic data such as the

[2] From Table 4-82: ((82.46*0.3003)+(125.44*0.4088)+(297.28*0.4847)+(455.11*0.6023)) /4 = 124.

number of bats in the state, their population trends, fecundity, survival, sex ratios, how rotors might change survival, and other factors, drawing a conclusion of risk remains largely guesswork.

The Risk Assessment did approach the demographic questions with large amounts of presence and abundance data (and phenology), but uncertainties in other parameters still limit the ability to make strong inferences. Returning to the bat example, Free-tailed Bats are the predominant bat in the EAA and have mortality recorded at wind farms (Kerlinger et al. 2006, as cited in Table 4-83), but due to limited experience it remains unclear just how vulnerable they are to mortality (e.g., what percent of rotor/bat interactions will result in mortality?). One management practice to reduce bat mortality is to use higher cut-in speeds (Baerwald et al. 2009, Arnett et al. 2011), but this project plans to utilize lower cut-in speeds due to local wind patterns. Additionally, the cut-in speed recommendation is not based on Free-tailed bats, so will it still apply in Florida?

Given the high estimated exposure rate, uncertain vulnerability to turbines, plans for low cut-in speeds, and a lack of demographic data analysis, the statement that, "Indirect and cumulative effects are not likely to be significant for any species of bats," (page *xiii*) appears unsupported by the analysis, and is probably incorrect.

Throughout the Risk Assessment, the conclusion that mortality will not cause demographic impact is routinely invoked for taxa in a form of, "In no case is collision mortality expected to have significant demographic or population-level effects." As with the bat example, there are not adequate demographic data presented to justify it. Additional uncertainties inherent in making predictions make these claims even weaker.

Recommendation: *Either eliminate the claims of no demographic effects, or present demographic data and analysis to support it. For bat mortality concerns, the ABPP should include detection methods for bats, and estimates of how many nights the turbines might need to be stopped. Plus, the ABPP should add all times that turbines might need stopping for all species, and estimate whether the project remains economically viable.*

Erroneous application of compensatory mortality hypotheses

The Risk Assessment has a recurring, and incorrect, justification to assign low risk categories to species expected to incur wind-related mortalities. The hypothesis invoked is that if a mortality factor decreases a population, other factors can compensate by increasing it, termed "compensatory mortality." The statements occur in the form of, "Such mortality is automatically replaced in populations by excess reproduction, resulting in no net population decrease as long as the carrying capacity of the environment is not diminished (Nichols et al. 1984)," and was made for six groups of birds representing about different 120 species: Other Long-legged Waders, Shorebirds, Waterfowl, Other Waterbirds, Nocturnal Birds, and Swifts and Swallows. However, Nichols et al. 1984 specifically stated, "…the compensatory and additive hypotheses deal only with mortality and make no statement about reproductive rates or responses of recruitment rates to exploitation," thus clearly *not* invoking "excess reproduction" as part of their hypothesis testing. They clarified that, "The basic idea here is that as hunting mortality increases there is a compensating decrease in nonhunting mortality rate."

Nichols et al. 1984 is a classic paper, and one still could use the citation to argue that wind-related mortality could be compensatory with other mortality factors, as examined for hunting mortality. But their paper relied on Mallard data (*Anas platyrhynchos*) and they stated, "Most available evidence for Mallards favors the compensatory mortality hypothesis, although this evidence is much less conclusive for females than males," and continued,

> "There is very little evidence of the effect of hunting on species of ducks other than mallards. Reproductive rates, survival rates and other population characteristics of some other duck species differ sufficiently from those of mallards that it would be unwise to assume such species exhibit responses to hunting similar to those of mallards…these uncertainties make it impossible to produce a set of general concrete management recommendations."

Thus, the idea that increased reproduction will compensate for increased mortality is not supported by this reference, and extrapolating compensatory mortality for different species was specifically recommended against.

Recommendation: *Abandon compensatory hypotheses to justify added mortality.*

Episodic mortality events and sampling periods

A very important recommendation by Audubon and the USFWS was to include three years of monitoring, which has not been done. Some of the data mining, such as Dr. Pearlstine's EAA surveys, Kite tracking data, and the NexRad analyses, give multi-year information. However, important site-specific questions such as year-to-year bat numbers and movement, or local Kite activity, remain limited by one year of data. Previously we mentioned variability in numbers of the same species of birds due to myriad factors that make future exposure and mortality difficult to predict. The NexRad radar analysis interpreted migrant mortality as low risk because more birds follow coastal routes. Yet, the radar map on page 621 (Figure 1) shows a heavy migration across the wind farm area, and Figure 2 shows heavy use by migrants of the rotor-swept elevations, reflecting possible episodic events of consequence. Similarly, the Risk Assessment gives (all) Swallows and Swifts a "low to moderate" risk category. What was omitted in the discussion is the mega-flocks of Tree Swallows that winter in this region of Florida, whose estimated sizes are in the hundreds of thousands to millions (e.g., Pranty 2010, 2011, 2012). If one of these flocks enters the wind farm, severe mortality could happen quickly, indicating a risk category greater than low to moderate.

While even three years of data will not allow us to fully assess episodic events, it would yield useful information for estimating variability in animal patterns by season, location, and during different weather patterns. These data would be useful in developing a more robust ABPP, or demonstrate the site is not appropriate for a wind facility.

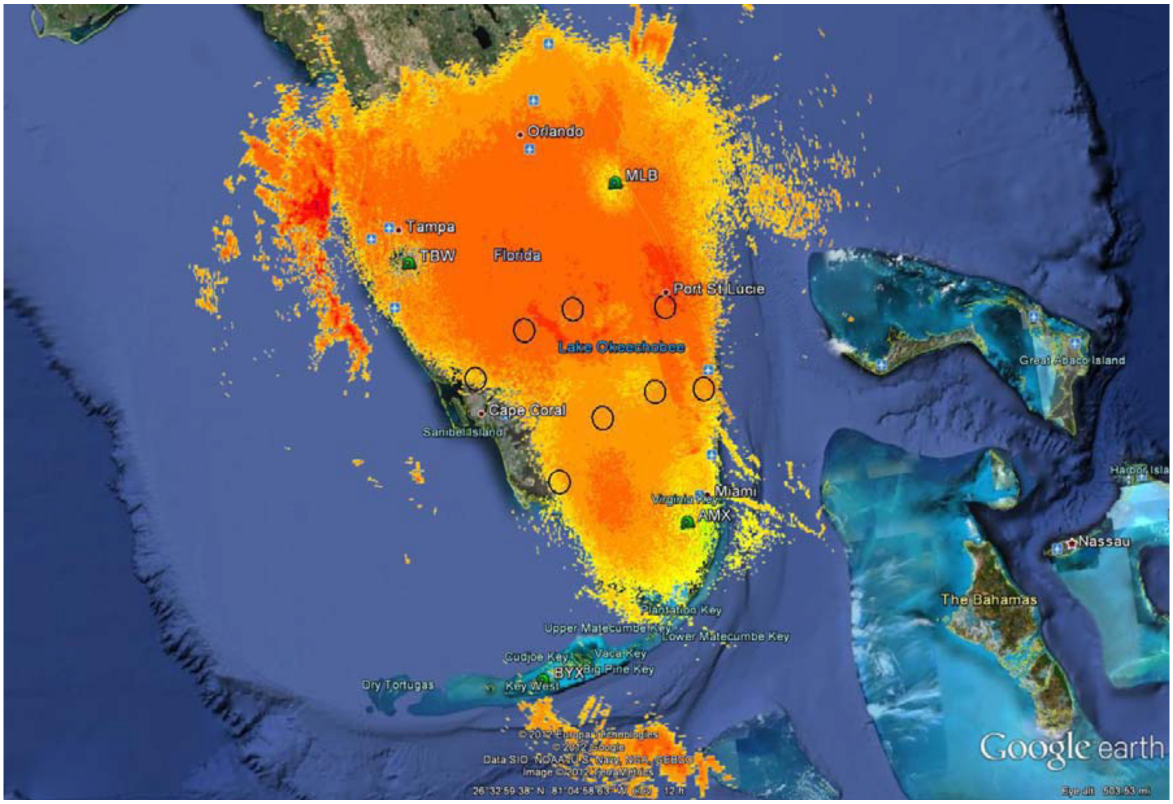

Fig.1: Heavy intensity spring migration (pg. 621 Risk Assessment)

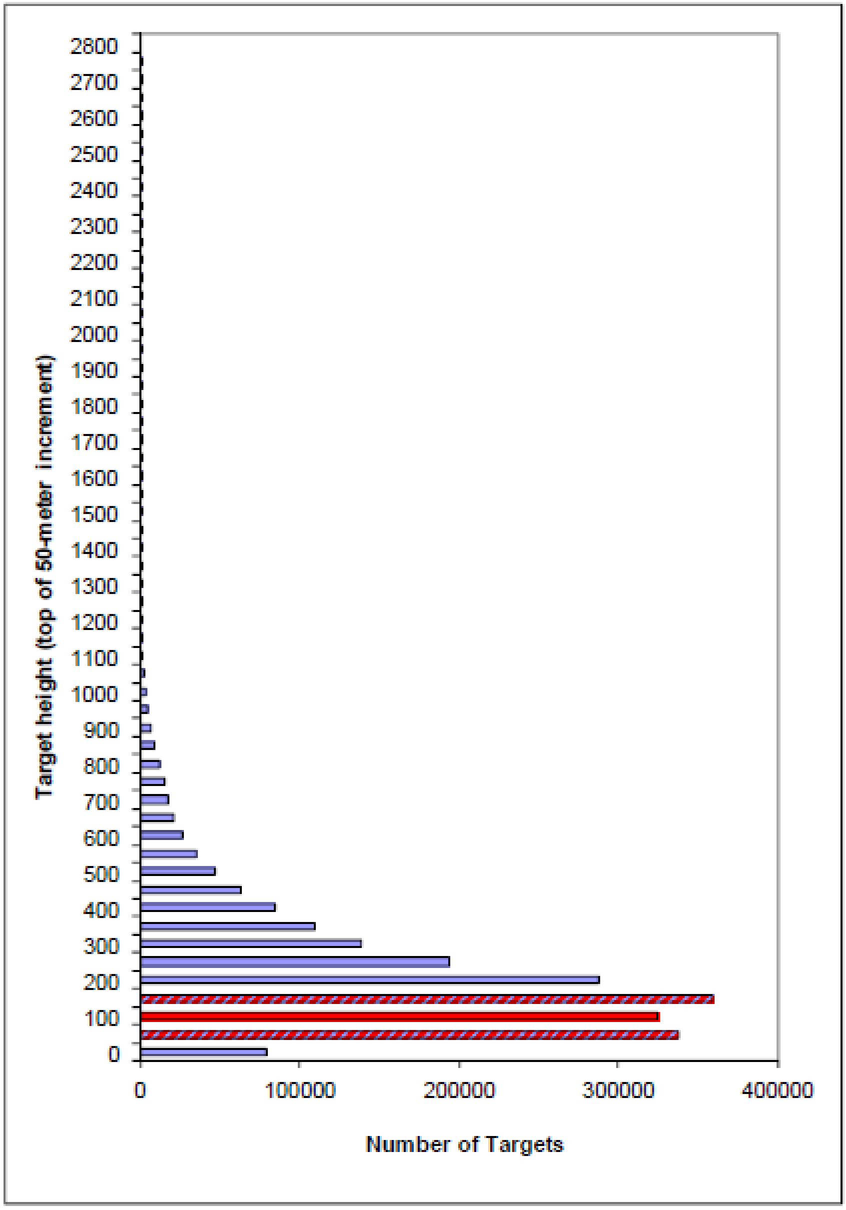

Figure 4-8. Number of targets occurring in each 50-meter increment at the proposed Sugarland Wind Project site, February 11 – March 31, 2012. Red indicates rotor swept heights, and red-blue hashed indicates altitudes partially within rotor swept heights.

Fig. 2 Of birds detected with radar, the most heavily used elevations are in the rotor-swept zone (reds).

Other comments

The applicant also frequently asserts that compared to the background disturbance of agricultural use, wind generation effects on birds will be de minimis. For example,

> *"The EAA is a habitat of intensive farming activity. Birds that use this area have been exposed to humans, farm machinery, and road activity for quite some time. No additional roads are expected to be necessary for construction of the wind farm. Therefore, it is expected that no significant additional disturbance will come from the construction and operation of wind turbines." P. 162*

While the intent of this statement may be to explain that humans coming and going while operating turbines will not be an additional disturbance, it reads like an assertion that the presence of turbines will add no additional disturbance. This is not substantiated by the evidence and statements like these throughout the document should be re-worded to clarify the assertion.

Comparing risk of rotors to other human structures

Audubon strongly cautions against an oft-used theme of comparing collision risk of rotor blades with other human structures such as towers, power lines, or buildings as a predictor of vulnerability. Storks, Kites, and all flying animals are accustomed to recognizing cliffs, trees and other fixed aerial objects. While large mortality events do occur with human fixed objects, those often are compounded by artificial light problems or unusual weather. Rotor blades are not fixed, hence do not present the same visual cues needed for avoidance, and being mobile, are more difficult to avoid. Indeed, the rotor tips can move faster than all but a few flying predators, which happen to use their superior speed to kill flying prey.

Bird numbers and Everglades Restoration

Everglades restoration projects currently under construction or in the planning phase are intended to reverse ecological declines in the Everglades and enable wading birds to return to historical nesting locations and nest in greater abundance. These projects, as well as the South Florida Water Management District Everglades water quality projects, will be located in the vicinity of the proposed wind farm. As a result, it is likely that populations of wading birds, and other birds, will increase dramatically in the future through this region. The Risk Assessment did not take this into account. These developments should be considered in permit approval.

Conclusion

In conclusion, as demonstrated above, many of the applicant's assertions underestimate the potential impacts of a wind facility sited in the EAA and some may be drastically underestimated. Further, it seems impossible for Audubon, the Corps, or any other interested party to meaningfully predict the potential impacts without greater detail regarding the facility's operation. These protocols will be spelled out in the ABPP, but it is not finished. We recommend that the document be completed and considered as part of the permitting process, prior to making a determination on requested permits. Yet even with an ABPP completed, the data suggest the potential for substantial take of important species such as Wood Storks, Everglade Snail Kites, Brazilian Free-tailed Bats, and other species awaiting individual risk analysis, and we fear these impacts will remain too great to be permitted. Audubon recommends the Corps deny the permit based on the data provided, or defer its consideration until more complete data and accurate analysis are presented to inform this important decision.

Sincerely

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