# Supplemental Information for the Snowy Egret

# Biological Status Review Report

The following pages contain peer reviews received from selected peer reviewers, comments received during the public comment period, and the draft report that was reviewed before the final report was completed

March 31, 2011

# Table of Contents

Peer review #1 from Dr. Dale Gawlick ..... 3
Peer review #2 from Dr. Jaime Collazo ..... 14
Letters and emails received during the solicitation of information from the public period of September 17, 2010 through November 1, 2010 ..... 15
Email from Neil Langenberg ..... 15
Email from Diane Erdely ..... 18
Email from Kurt Snyder ..... 20
Email from Mark Rachal ..... 21
Email from Ann Hodgson ..... 23
Copy of the Snowy egret BSR draft report that was sent out for peer review ..... 38

**Peer review #1 from Dr. Dale Gawlick**

**From:** Dale E. Gawlik
**To:** Imperiled
**Subject:** Imperiled species review Snowy Egret
**Date:** Thursday, January 13, 2011 8:44:49 AM
**Attachments:** Snowy Egret Final Draft BSR 11-17-10-1.docx

Dear Brad,

Please find attached my review of the BSR for Snowy Egret. My comments are inserted directly in the document.
Sincerely,
Dale Gawlik
--
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Dr. Dale E. Gawlik
Associate Professor and Director
Environmental Sciences Program
Department of Biological Sciences
Florida Atlantic University
777 Glades Road
Boca Raton, FL 33431-0991

**From:** Dale E. Gawlik
**To:** Rodgers, James
**Cc:** Murphy, Caly; Lister, Pamela
**Subject:** Re: Follow up on snowy egret review
**Date:** Friday, January 14, 2011 10:15:55 AM

Jim,

Yes, I think that given the constraints of the criteria for evaluation, your recommendation to delist the snowy egret was justified. However, I also have some concerns that the criteria used for evaluation might not be protective enough of a species that specializes in high quality wetlands. I understand my latter point was not part of your charge.

Take care.

Dale
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

**Biological Status Review**
**for the Snowy Egret**
**(*Egretta thula)***

## EXECUTIVE SUMMARY

The Florida Fish and Wildlife Conservation Commission (FWC) directed staff to evaluate all species listed as Threatened or Species of Special Concern as of September 1, 2010. Public information on the status of the snowy egret was sought from September 17, 2010 to November 1, 2010. The three member biological review group met on November 3 – 4, 2010. Group members were James A. Rodgers (FWC lead), Peter C. Frederick (University of Florida), and Mike Cook (South Florida Water Management District). In accordance with rule 68A-27.0012 F.A.C, the Snowy Egret Biological Review Group was charged with evaluating the biological status of the snowy egret using criteria included in definitions in 68A-27.001(3), F.A.C. and following the protocols in the *Guidelines for Application of the IUCN Red List Criteria at Regional Levels Version 3.0 (2003)* and *Guidelines for Using the IUCN Red List Categories and Criteria Version 8.1 (2010)*. Please visit http://myfwc.com/WILDLIFEHABITATS/imperiledSpp_listingprocess.htm to view the listing process rule and the criteria found in the definitions.

The Biological Review Group concluded from the biological assessment that the snowy egret no longer meets criteria for listing. Based on the literature review, information received from the public, and the biological review findings, FWC staff recommends the snowy egret does not meet the criteria for listing as state threatened.

This work was supported by a Conserve Wildlife Tag grant from the Wildlife Foundation of Florida.

## BIOLOGICAL INFORMATION

**Taxonomic Classification** – Snowy egrets (*Egretta thula*) are members of the Family Ardeidae, which include other egrets, herons, and bitterns. Some authorities recognize two subspecies, the nominate *E. t. thula* and *E. t. brewsteri* (Parsons and Master 2000). The breeding range of the former is eastern North America, south through Central America, and all of South America. The latter subspecies breeds in western North America and Baja California (Parsons and Master, 2000). Previously, the species was placed in the monotypic genus *Leucophoyx*.

**Geographic Range and Distribution** – Snowy egrets are found throughout the western hemisphere (Parsons and Master 2000). The breeding range of the species extends along the coastlines and interior freshwater wetlands of the U.S. south to South America, with some breeding suspected as far north as Nova Scotia on the Atlantic coast (Parsons and Master 2000). Snowy egrets occur throughout Florida but become rarer in the western panhandle region (Runde 1991, Kale et al. 1992, Gawlik 1999, Rodgers et al. 1999, Frederick and Ogden 2001, Florida Fish and Wildlife Conservation Commission 2003, Drugger et al. 2005, Cook and Kobza 2009). The population estimate for snowy egrets is >143,000 individuals in North America (Kushlan et al. 2002, IUCN 2010).

**Life History References** – Rodgers et al. 1996, Smith 1997, Parsons and Master 2000, Frederick and Ogden 2001, Gawlik 2002, Hoyer et al. 2005, Master et al. 2005.

**Comment [DEG1]:** Two other life history refs that might be useful: Ryder 1978 Breeding distribution, movements and mortality of snowy egrets in North America.; Strong et al. 1997 Hydrologic constraints on tricolored heron and snowy egret resource use.

## BIOLOGICAL STATUS ASSESSMENT

**Threats** – Snowy egret populations suffered huge losses during the plume trade of the late 1800s and early 1900s, but populations rebounded following hunting and trade regulations (Rodgers et al. 1996, Parsons and Master 2000, Kushlan et al. 2002, Hunter et al. 2006). Current threats to the species are not well understood, but coastal development, recreational disturbance at foraging and breeding sites, environmental degradation, human disturbance, and increased pressure from predators are primary concerns (Rodgers et al. 1996, Kushlan et al. 2002, Stolen 2003). Similar to other wading birds that depend on fragile estuaries and wetlands for foraging and breeding, snowy egrets are at risk of exposure to persistent contaminants such as heavy metals and pesticides (Rodgers 1997, Spalding et al. 1997). Snowy egrets compete for nesting sites with growing numbers of cattle egrets, which can be aggressively territorial at colony sites, but the relationship to productivity is not well understood (Parsons and Master, 2000). Other potential threats to snowy egret populations are alterations to the hydrology of foraging areas, and oil spill impacts to critical breeding, foraging and roosting sites.

**Statewide Population Assessment** – Florida is home to both wintering snowy egrets and resident, breeding individuals (Mikuska et al. 1998, Rodgers et al. 1996). The number of breeding snowy egrets in the state rebounded following protection measures and hunting prohibitions enacted in the early 1900s. However, Runde (1991) noted a decrease in the snowy egret population in Florida from >51,000 individuals in the late 1970s to <14,000 in the late 1980s. Aerial surveys of wading bird populations have been shown to include error margins that raise questions about their validity and usefulness in determining trends (Rodgers et al. 2005, Frederick et al. 2006, Conroy et al. 2008, Green et al. 2008). Annual surveys of breeding pairs of snowy egrets in the Everglades region have indicated that nesting numbers for wading birds can by highly variable from season to season (Frederick and Ogden 2001). Nearly 2,830 pairs of snowy egrets nested in the three Water Conservation Areas and Everglades National Park in 2009 compared to a 3-year running average of 4,400 pairs for the 2005–2007 seasons (Cook and Kobza 2009).

**Status Review** - In our review of the snowy egret's status, the Biological Review Group made the following assumptions and conclusions:

- Generation time: Most birds breed at 2 years of age. Maximum known age of a recovered banded bird was 14 years. Maximum age probably is about 25 years of age. Calculation of generation time based on the mid-point of breeding to maximum age at death: 22-2=20/2=10 years with generation time estimated as 10+2=12 years of age. Therefore, time period for evaluation of change/trend analysis is 3x12=36 years or begin the time period at 1974.
- Extent of occurrence (EOO): The species mostly occurs throughout the entire state of Florida (total about 94,000 $km^2$ or 59,000 $miles^2$) except for western panhandle and extreme NC region of state (i.e., Columbia, Clay, and Union counties and adjacent regions) where few colonies are known or located. In summary, the EOO is larger than the 20,000 $km^2$ delineation.

- Area of occupancy (AOO): Using the general premise that area of wetland typically makes up about 1/3 the total land area, the AOO is at least 16,000 $km^2$ or 10,000 $miles^2$.

- Quality and status of wading bird survey data: While a white-plumaged species, snowy egrets tend to nest under the tree canopy making them difficult to detect during aerial surveys using fixed wing aircraft (Rodgers et al. 2005, Frederick et al. 2006, Conroy et al. 2008), which is the primary method to survey wading birds over a large area such as the entire state. There also is the potential to not to be able to distinguish snowy egrets from other white-plumaged nesting associates when both species nest in the same colony. Rodgers et al (2006) found the probability of detecting any of the intermediate-sized day herons within a colony was <50%. Only ground counts (typical of surveys in the Everglades and Florida Bay) will result in accurate nest counts. Breeding Bird Survey (BBS) surveys may not accurately detect wading birds if the routes do not occur in wetlands to sufficiently detect these species. These short comings may result in undercount of actual species presence.

**Comment [DEG2]:** The one-third rule of thumb for wetland area seems unnecessarily imprecise and maybe a little high. A better estimate could be obtained from the state land cover maps or National Wetland Inventory figures. One of my very old NWI reports uses a fig of 29% for percent of Florida that is wetland and the number is lower now. A separate and possibly more important issue is that there is no easy way to evaluate the decline in quality of wetlands, which has been drastic in some wetlands. In any case, it seems that the continued loss of wetland area and function in Florida is not given much weight when considering risk to species over the long term. Perhaps this is because of the structure of the IUCN process for evaluation, which emphasizes population size.

**Biological Status Review for the Snowy Egret**—The review group concluded the snowy egret no longer met any criteria for listing. See Table 1 for details.

**Regional Application**—The review group concluded there was no change in the recommendation for the snowy egret. See Table 2 for details.

## LISTING RECOMMENDATION

Staff recommends that the snowy egret be removed from the list as it does not meet any of the criteria for listing as described in 68A-27.001(3) F.A.C.

## SUMMARY OF THE INDEPENDENT REVIEW

To be added later.

## LITERATURE CITED

Conroy, M. J., J. T. Peterson, O. L. Bass, C. J. Fonnesbeck, J. E. Howell, C. T. Moore and J. P. Runge. 2008. Sources of variation in detection of wading birds from aerial surveys in the Florida Everglades. Auk 125: 731–743.

Cook, M. I., and M. Kobza (Editors). 2009. South Florida Wading Bird Report, Volume 15. South Florida Water Management District, Everglades Division. West Palm Beach, Florida.

Dugger, B. D., S. L. Melvin, and R. S. Finger. 2005. Abundance and community composition of waterbirds using the channelized Kissimmee River floodplain, Florida. Southeastern Naturalist 4: 435-446.

Florida Fish and Wildlife Conservation Commission. 2003. Florida's breeding bird atlas: A collaborative study of Florida's birdlife. http://myfwc.com/bba/docs/bba_SNEG.pdf (Accessed 10/13/2010).

Frederick, P. C., and J. C. Ogden. 2001. Pulsed breeding of long-legged wading birds and the importance of infrequent severe drought conditions in the Florida Everglades. Wetlands 21: 484-491.

Frederick, P. C., J. A. Heath, R. Bennetts, and H. Hafner. 2006. Estimating nests not present at the time of breeding surveys: an important consideration in assessing nesting populations. Journal of Field Ornithology 77: 212-219.

Gawlik, D.E. (Editor). 1999. South Florida Wading Bird Report, Volume 5, Issue 1. South Florida Water Management District, Everglades System Research Division. West Palm Beach, Florida.

Gawlik, D. E. 2002. The effects of prey availability on the numerical response of wading birds. Ecological Monographs 72: 329-346.

Green, M. C., M. C. Luent, T. C. Michot, C. W. Jeske, and P. L. LeBerg. 2008. Comparison and assessment of aerial and ground estimates of waterbird colonies. Journal of Wildlife Management 72: 697-706.

Hoyer, M. V., S. K. Notestein, T. K. Frazer, and D. E. Canfield, Jr. 2005. A comparison between aquatic birds of lakes and coastal rivers in Florida. Hydrobiologia 567: 5–18.

Hunter, W. C., W. Golder, S. L. Melvin, and J. A. Wheeler. 2006. Southeast United States regional waterbird conservation plan. U.S. Fish and Wildlife Service, Atlanta, Georgia.

IUCN. 2010. International Union for Conservation of Nature and Natural Resources. The IUCN Red List of Threatened Species. http://www.iucnredlist.org/apps/redlist/details/144666/0 (Accessed 10/13/2010).

Kale, H. W., II, B. Pranty, B. M. Stith, and C. W. Biggs. 1992. The atlas of the breeding birds of Florida. Final Report. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.

Kushlan, J. A., M. J. Steinkamp, K. C. Parsons, J. Capp, M. A. Cruz, M. Coulter, I. Davidson, L. Dickson, N. Edelson, R. Elliot, R. M. Erwin, S. Hatch, S. Kress, R. Milko, S. Miller, K. Mills, R. Paul, R. Phillips, J. E. Saliva, B. Syderman, J. Trapp, J. Wheeler, and K. Wohl. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1. Waterbird Conservation for the Americas. Washington, D.C.

Master, T. L., J. K. Leiser, K. A. Bennett, J. K. Bretsch, and H. J. Wolfe. 2005. Patch selection by snowy egrets. Waterbirds 28: 220-224.

Mikuska, T., J. A. Kushlan, and S. Hartley. 1998. Key areas for wintering North American herons. Colonial Waterbirds 21: 125-134.

Parsons, K. C., and T. L. Master. 2000. Snowy Egret (*Egretta thula*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/489 (Accessed 10/13/2010).

Rodgers, J. A., Jr., P. S. Kubilis, S. A. Nesbitt, M. F. Delany, R. K. Felix, Jr., J. Swain, K. T. Bowman, and J. B. Dodge. 1999. Atlas of breeding sites for colonial waterbirds in Florida during 1999. Final report. Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida.

Rodgers, J. A., Jr., H. W. Kale, II, and H. T. Smith, editors. 1996. Snowy Egret. Pages 420-431 *in* Rare and Endangered Biota of Florida, Volume V. Birds. University Press of Florida, Gainesville, Florida.

Rodgers, J.A., Jr. 1997. Pesticide and heavy metal levels of waterbirds in the Everglades agricultural area of south Florida. Florida Field Naturalist 25: 33-41.

Rodgers, J. A., Jr., P. S. Kubilis, and S. A. Nesbitt. 2005. Accuracy of aerial surveys of waterbird colonies. Waterbirds 28: 230-237.

Runde, D.E. 1991. Trends in wading bird nesting populations in Florida 1976–1978 and 1986–1989. Final performance report, Nongame Wildlife Program. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.

Smith, J. P. 1997. Nesting season food habits of 4 species of herons and egrets at Lake Okeechobee, Florida. Colonial Waterbirds 20: 198-220.

Spalding, M. G., C. K. Steible, S. F. Sundlof, and D. J. Forrester. 1997. Metal and organochlorine contaminants in tissues of nestling wading birds (Ciconiiformes) from southern Florida. Florida Field Naturalist 25: 42-50.

Stolen, E. D. 2003. The effects of vehicle passage on foraging behavior of wading birds. Waterbirds 26: 429-436.

**Table 1. Biological status review information findings for the snowy egret in Florida.**

| Biological Status Review Information<br>Findings | | Species/taxon: | Snowy Egret | |
|---|---|---|---|---|
| | | Date: | 11/04/10 | |
| | | Assessors: | Rodgers, Cook, Frederick | |
| | | Generation length: | 12 years | |
| **Criterion/Listing Measure** | **Data/Information** | **Data Type*** | **Criterion Met?** | **References** |
| *Data Types - observed (O), estimated (E), inferred (I), suspected (S), or projected (P). Criterion met - yes (Y) or no (N). | | | | |
| **(A) Population Size Reduction**, ANY of | | | | |
| (a)1. An observed, estimated, inferred or suspected population size reduction of at least 50% over the last 10 years or 3 generations, whichever is longer, where the causes of the reduction are clearly reversible and understood and ceased[1] | Since 1974, numbers have fluctuated. Numbers range from 1,500 nests (3,000 individuals) in early 1990s to about 3,000 nests (6,000 individuals) during the 2000s in ENP/Everglades. Probably a minimum of 20,000 individuals in Florida. | O | N | Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis. |
| (a)2. An observed, estimated, inferred or suspected population size reduction of at least 30% over the last 10 years or 3 generations, whichever is longer, where the reduction or its causes may not have ceased or may not be understood or may not be reversible[1] | 1988-89 surveys suggest decreases from previous survey in 1970s but was categorical survey and the decline probably has occurred but not as much as 30%. | O | N | Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis. |
| (a)3. A population size reduction of at least 30% projected or suspected to be met within the next 10 years or 3 generations, whichever is longer (up to a maximum of 100 years) [1] | 2010 to 2046 time period: two major possible threats to the species are sea level rise (=reduction in freshwater marsh habitat along coasts) and reduced freshwater discharge into coastal estuaries that will reduce primary estuarine foraging habitat. Less rainfall will have impacts on freshwater habitats through Florida and discharge to estuarine habitats, both which will increase salinity and probably result in reduced quality of foraging sites. The degree of impact of these variables probably will negative but the amount is difficult to predict at this time. | I | N | No modeling or sources to support these threats or suspicions. While sea level rise may reduce the available freshwater foraging habitat the percent change on the species can't be determined at this time. |

**Comment [DEG3]:** Yes, however, the amount of wetland habitat on which this species is dependent has clearly decreased and is expected to continue to decrease.

| | | | | |
|---|---|---|---|---|
| (a)4. An observed, estimated, inferred, projected or suspected population size reduction of at least 30% over any 10 year or 3 generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased or may not be understood or may not be reversible.[1] | See A3 above. | I | N | Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis. |
| [1] based on (and specifying) any of the following: (a) direct observation; (b) an index of abundance appropriate to the taxon; (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat; (d) actual or potential levels of exploitation; (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites. | | | | |
| **(B) Geographic Range**, EITHER | | | | |
| (b)1. Extent of occurrence < 20,000 $km^2$ (7,722 $mi^2$ ) OR | Probably >45,000 $miles^2$. | S | N | See EOO on notes tab. |
| (b)2. Area of occupancy < 2,000 $km^2$ (772 $mi^2$ ) | Probably >10,000 $miles^2$. | S | N | See AOO on notes tab. |
| AND at least 2 of the following: | | | | |
| a. Severely fragmented or exist in ≤ 10 locations | | | | |
| b. Continuing decline, observed, inferred or projected in any of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent, and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals | | | | |
| c. Extreme fluctuations in any of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals | | | | |
| **(C) Population Size and Trend** | | | | |
| Population size estimate to number fewer than 10,000 mature individuals AND EITHER | Probably a minimum of 20,000 individuals in Florida. | E | N | Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis. |
| (c)1. An estimated continuing decline of at least 10% in 10 years or 3 generations, whichever is longer (up to a maximum of 100 years in the future) OR | | | | |
| (c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following: | | | | |

**Comment [DEG4]:** As mentioned above it would be good to get a more precise estimate

**Comment [DEG5]:** NWI will show loss of habitat. The bigger problem may be how much the quality of habitat has declined.

**Comment [DEG6]:** The authors correctly note early on that the number of individuals fluctuates widely. I would mention it here as well.

| | | | | |
|---|---|---|---|---|
| a. Population structure in the form of EITHER | | | | |
| (i) No subpopulation estimated to contain more than 1000 mature individuals; OR | | | | |
| (ii) All mature individuals are in one subpopulation | | | | |
| b. Extreme fluctuations in number of mature individuals | | | | |
| **(D) Population Very Small or Restricted**, EITHER | | | | |
| (d)1. Population estimated to number fewer than 1,000 mature individuals; OR | Probably a minimum of 20,000 individuals in Florida. | E | N | Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis. |
| (d)2. Population with a very restricted area of occupancy (typically less than 20 $km^2$ [8 $mi^2$]) or number of locations (typically 5 or fewer) such that it is prone to the effects of human activities or stochastic events within a short time period in an uncertain future | See A1, B1, and B2 above. | E | N | Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis. |
| **(E) Quantitative Analyses** | | | | |
| e1. Showing the probability of extinction in the wild is at least 10% within 100 years | Not available. | | N | |

| Initial Finding (Meets at least one of the criteria OR Does not meet any of the criteria) | Reason (which criteria are met) |
|---|---|
| Does not meet any criteria. | |
| | |
| Is species/taxon endemic to Florida? (Y/N) | N |
| If Yes, your initial finding is your final finding. Copy the initial finding and reason to the final finding space below. If No, complete the regional assessment sheet and copy the final finding from that sheet to the space below. | |
| | |
| Final Finding (Meets at least one of the criteria OR Does not meet any of the criteria) | Reason (which criteria are met) |
| Does not meet any criteria. | |

**Table 2. Biological status review information for the regional assessment for the snowy egret.**

| | | |
|---|---|---|
| 1 | Biological Status Review Information<br>Regional Assessment | Species/taxon: Snowy Egret |
| 2 | | Date: 11/4/10 |
| 3 | | Assessors: Rodgers, Cook, Frederick |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | Initial finding | Supporting Information |
| 9 | | |
| 10 | 2a. Is the species/taxon a non-breeding visitor? (Y/N/DK). If 2a is YES, go to line 18. If 2a is NO or DO NOT KNOW, go to line 11. | No, breeds in Florida. |
| 11 | 2b. Does the Florida population experience any significant immigration of propagules capable of reproducing in Florida? (Y/N/DK). If 2b is YES, go to line 12. If 2b is NO or DO NOT KNOW, go to line 17. | Do not know. |
| 12 | 2c. Is the immigration expected to decrease? (Y/N/DK). If 2c is YES or DO NOT KNOW, go to line 13. If 2c is NO go to line 16. | |
| 13 | 2d. Is the Florida population a sink? (Y/N/DK). If 2d is YES, go to line 14. If 2d is NO or DO NOT KNOW, go to line 15. | |
| 14 | If 2d is YES - Upgrade from initial finding (more imperiled) | |
| 15 | If 2d is NO or DO NOT KNOW - No change from initial finding | |
| 16 | If 2c is NO or DO NOT KNOW- Downgrade from initial finding (less imperiled) | |
| 17 | If 2b is NO or DO NOT KNOW - No change from initial finding | No change. |
| 18 | 2e. Are the conditions outside Florida deteriorating? (Y/N/DK). If 2e is YES or DO NOT KNOW, go to line 24. If 2e is NO go to line 19. | |
| 19 | 2f. Are the conditions within Florida deteriorating? (Y/N/DK). If 2f is YES or DO NOT KNOW, go to line 23. If 2f is NO, go to line 20. | |
| 20 | 2g. Can the breeding population rescue the Florida population should it decline? (Y/N/DK). If 2g is YES, go to line 21. If 2g is NO or DO NOT KNOW, go to line 22. | |
| 21 | If 2g is YES - Downgrade from initial finding (less imperiled) | |
| 22 | If 2g is NO or DO NOT KNOW - No change from initial finding | |
| 23 | If 2f is YES or DO NOT KNOW - No change from initial finding | |
| 24 | If 2e is YES or DO NOT KNOW - No change from initial finding | |
| 25 | | |
| 26 | Final finding | |

**Additional notes**

**Generation time**: Most birds breed at 2 years of age. Maximum known age of recovered banded bird was 14 years. Maximum age probably is about 25 years of age. Calculation of generation time based on the mid-point of breeding to maximum age at death: 22-2=20/2=10, generation time is 10+2=12 years of age. Therefore, time period for evaluation of change/trend analysis is 3x12=36 years or begin the period at 1974.

**Extent of occurrence**: Mostly the entire state of Florida (total 59,000 miles2) except for western panhandle and extreme NC region of state (i.e., Columbia, Clay counties region) where few colonies are known/located. In summary, the EOO is still larger than the 20,000 km2 delination.

**Area of occupancy**: Using the general presence of wetlands typically makes up about 1/3 the total area, the AOO is at least 10,000 miles2.

**Comment [DEG7]:** Same comment as above on improving the estimate.

**Quality and status of wading bird survey data**: While a white-plumaged species, snowy egrets tend to nest under the tree canopy making them difficult to detect during aerial surveys using fixed wing aircraft, which is the primary method to survey wading birds over a large area such as the entire state. There also is the potential to not to be able to separate snowy and cattle egrets when both species nest in the same colony. Rodgers et. al (2006) found the probability of detecting any of the intermediate-sized day herons within a colony was <50%. Only ground counts (typical of surveys in the Everglades and Florida Bay) will result in accurate nest counts. Breeding Bird Survey (BBS) surveys may not accurately detect wading birds if the routes do not occur in wetlands to sufficiently detect these species. These short comings may result in undercount of actual species presence.

**Peer review #2 from Dr. Jaime Collazo**

**From:** Jaime A. Collazo
**To:** Imperiled
**Subject:** Snowy Egret Review
**Date:** Tuesday, January 11, 2011 11:09:26 AM

Dear Dr. Haubold:

Many thanks for the opportunity to review the biological status packet for the Snowy Egret. After looking at the summarization of information, familiarity with the literature, and direct experience with the species in Florida and the Caribbean, I concur with the assessment and recommendation by panel of experts reviewing the status of the species. Evidence NO longer justifies keeping the Snowy Egret as a State Threatened Species.

I have two general comments/recommendations. First, the FWC should continue to support research aimed at improving large-scale surveys. Many of the problems undermining their value have been identified (e.g., Conroy et al. 2008); following up on recommendations to remedy some of those challenges should be prioritized. Second, predicting population status from 2010 to 2046 is not possible at this time as pointed out. I recommend that the FWC continues its involvement with the emerging USGS Climate Science Centers and USFWS/State Land Conservation Cooperatives as these should have land use and land cover projections based on a variety of climate change scenarios in 2-3 years. A state-wide habitat threat/risk analysis might be an appropriate proxy to assess species (e.g., Snowy) vulnerability.

Finally, I congratulate you and your staff on a well drafted documented. Only one typo found—under “status review”, specifically “extent of occurrence (EOO)”…located was misspelled as “llocated.”

Please let me know if you have any questions?!

Sincerely
Jaime
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Jaime A. Collazo, Professor
Campus Box 7617, Dept. of Biology
225 David Clark Labs
North Carolina State University
Raleigh, North Carolina 27695-7617

**Letters and emails received during the solicitation of information from the public period of September 17, 2010 through November 1, 2010**

**Email from Neil Langenberg**

**Florida's Imperiled Species – Biological Status Review**

Department of Environmental Protection
Coastal and Aquatic Managed Areas
Charlotte Harbor Aquatic Preserves
Punta Gorda, Florida 33955

October 14, 2010

Please find attached rookery monitoring data for the Biological Status Review regarding Florida's imperiled species requested by the Florida Fish and Wildlife Conservation Commission. Data was collected from rookery islands in 2008, 2009 and 2010 by staff from Charlotte Harbor Aquatic Preserves (CHAP) and J.N. "Ding" Darling National Wildlife Refuge (USFWS). The study area is located in southwest Florida, within Lee County, more specifically, the lower Charlotte Harbor area including Pine Island Sound Aquatic Preserve, Matlacha Pass Aquatic Preserve, and portions of J.N. Ding Darling NWR complex. Colonial bird nesting activities were documented by direct counts of active nests via boat during the breeding season. Counts reflect the maximum number or peak estimates of adults with nest by species. Data listed is only for the following imperiled species; Tricolored heron (TRHE), Little blue heron (LBHE), Snowy egret (SNEG), Reddish egret (REEG), White ibis (WHIB), and the Brown pelican (BRPE).

Neil Langenberg
Environmental Specialist
Florida Department of Environmental Protection
Charlotte Harbor Aquatic Preserves
12301 Burnt Store Rd
Punta Gorda, Fl 33955
941-575-5861x102

**Table 1. Colonial nesting bird survey peak estimates for Pine Island Sound AP, Matlacha Pass AP and J.N "Ding" Darling NWR complex between February and August 2010.**

| COLONY (ISLAND) | Lat | Long | TRHE | LBHE | SNEG | REEG | WHIB | BRPE |
|---|---|---|---|---|---|---|---|---|
| Bodiford Key | 26.4977 | -82.1125 | 0 | 0 | 0 | 1 | 0 | 18 |
| Broken Isl. N | 26.6768 | -82.1940 | 1 | 0 | 3 | 0 | 0 | 62 |
| Fish Hut Island | 26.5467 | -82.1245 | 0 | 0 | 0 | 0 | 0 | 5 |
| Givney Key | 26.5144 | -82.0552 | 2 | 0 | 1 | 0 | 14 | 1 |
| Hemp Key | 26.6004 | -82.1525 | 8 | 1 | 2 | 1 | 0 | 72 |
| Lower Bird Island | 26.5125 | -82.0330 | 0 | 0 | 2 | 0 | 0 | 37 |
| N. of York Island | 26.4945 | -82.1043 | 2 | 0 | 2 | 0 | 0 | 8 |
| N. E. of York Island | 26.4939 | -82.1021 | 2 | 0 | 0 | 0 | 0 | 0 |
| NW of Mason Island | 26.5545 | -82.1252 | 0 | 0 | 0 | 0 | 0 | 2 |
| N. W. of Pumpkin Key | 26.5660 | -82.1279 | 0 | 0 | 0 | 0 | 0 | 1 |
| Skimmer Island | 26.5101 | -82.0250 | 7 | 0 | 33 | 2 | 0 | 72 |
| SW of Mason Island | 26.5534 | -82.1249 | 0 | 0 | 0 | 0 | 0 | 1 |
| S. W. of Pumpkin Key | 26.5642 | -82.1276 | 0 | 0 | 0 | 0 | 0 | 1 |
| Tarpon Bay Keys | 26.4573 | -82.0745 | 5 | 0 | 9 | 0 | 0 | 34 |
| Useppa Oyster Bar | 26.6522 | -82.2144 | 9 | 1 | 1 | 3 | 0 | 100 |
| TOTAL | | | 36 | 2 | 53 | 7 | 14 | 414 |

**Table 2. Colonial nesting bird survey peak estimates for Pine Island Sound AP, Matlacha Pass AP and J.N "Ding" Darling NWR complex between March and July 2009.**

| COLONY (ISLAND) | Lat | Long | TRHE | LBHE | SNEG | REEG | WHIB | BRPE |
|---|---|---|---|---|---|---|---|---|
| Bodiford Key | 26.4977 | -82.1125 | 0 | 0 | 0 | 0 | 0 | 6 |
| Broken Isl. E | 26.6782 | -82.1920 | 0 | 0 | 0 | 0 | 0 | 1 |
| Broken Isl. N | 26.6768 | -82.1940 | 1 | 0 | 1 | 1 | 0 | 10 |
| BrokenIsl. S | 26.6741 | -82.1944 | 2 | 0 | 1 | 0 | 0 | 60 |
| Givney Key | 26.5144 | -82.0552 | 0 | 0 | 0 | 0 | 108 | 2 |
| Hemp Key | 26.6004 | -82.1525 | 5 | 0 | 0 | 0 | 0 | 56 |
| Lumpkin Island | 26.6015 | -82.0526 | 2 | 1 | 1 | 0 | 0 | 1 |
| N. of York Island | 26.4945 | -82.1043 | 3 | 0 | 3 | 1 | 1 | 0 |
| Skimmer Island | 26.5101 | -82.0250 | 0 | 1 | 0 | 1 | 0 | 44 |
| Tarpon Bay Keys | 26.4573 | -82.0745 | 7 | 5 | 8 | 5 | 0 | 40 |
| Useppa Oyster Bar | 26.6522 | -82.2144 | 1 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | | | 21 | 7 | 14 | 8 | 109 | 220 |

**Table 3. Colonial nesting bird survey peak estimates for Pine Island Sound AP, Matlacha Pass AP and J.N "Ding" Darling NWR complex between March and July 2008.**

| COLONY (ISLAND) | Lat | Long | TRHE | LBHE | SNEG | REEG | WHIB | BRPE |
|---|---|---|---|---|---|---|---|---|
| Broken Isl.E | 26.6782 | -82.192 | 0 | 0 | 0 | 1 | 0 | 30 |
| Broken Isl. N | 26.6768 | -82.1940 | 1 | 1 | 2 | 0 | 4 | 16 |
| Broken Isl. S | 26.6741 | -82.1944 | 0 | 2 | 1 | 2 | 0 | 92 |
| Crescent Island | 26.5978 | -82.0637 | 0 | 0 | 0 | 0 | 0 | 7 |
| Givney Key | 26.5144 | -82.0552 | 6 | 4 | 4 | 0 | 201 | 9 |
| Hemp Key | 26.6004 | -82.1525 | 14 | 3 | 2 | 4 | 0 | 153 |
| Lower Bird Island | 26.5125 | -82.0330 | 0 | 0 | 0 | 0 | 0 | 37 |
| Lumpkin Island | 26.6015 | -82.0526 | 15 | 10 | 5 | 1 | 0 | 0 |
| Skimmer Island | 26.5101 | -82.0250 | 2 | 1 | 2 | 0 | 0 | 35 |
| Tarpon Bay Keys | 26.4573 | -82.0745 | 8 | 14 | 13 | 3 | 10 | 32 |
| TOTAL | | | 46 | 35 | 29 | 11 | 215 | 411 |

**Email from Diane Erdely**

**From:** Diane Erdely
**To:** Imperiled
**Subject:** Imperiled species
**Date:** Tuesday, October 05, 2010 10:19:24 AM

Hello Gentlemen:

My name is Diane Erdely. I live in the community of Solivita, zip code 34759. We straddle the Polk/Osceola County lines. The community, which will consist of about 600 homes when completed, was built with lots of conservation area, and many retention ponds, some of large size. We also have two golf courses. We are within a few miles of the Nature Conservancy's Disney Wilderness preserve. We see some of the imperiled species here on a regular basis.

Florida Sandhill Crane
Very common here. There are at least five breeding pairs in our development. One pair who has had chicks in the past was not successful this year. Several pair successfully raised 2 chicks this year, and one pair raised 1 chick. Have also seen a pair along Marigold Avenue (Marigold and Pleasant Hill Rd.), and sevearl pair on Pleasant Hill Road between here and Kissimmee. I am sure you have the information on the FSC's in The DWP, as we have helped with the survey there.

Limpkin
Often seen around the lakes here. Breed on the property. Several broods have been seen in the development and just outside. At one point this summer, there was a flock of 10 wandering around the area.

Little Blue Heron
Very common around the lakes in this development. There is a little blue rookery by a small natural pond within the development. They have been very successful for several years, raising easily 20 chicks at a time..standing room only.

Osprey
Seen daily flying over the lakes. Don't know the location of a nest.

Snowy Egret
Common. Seen almost daily around the lakes.

Tricolor Heron
Seen occasionally around the lakes.

White Ibis
Common. Seen daily in small flocks, including immature.
Hope this is helpful to you.

PS. We also see swallow-tail kites daily in season. Thery are gone now.

**Email from Kurt Snyder**

**From:** Kurt Snyder
**To:** Imperiled
**Subject:** Florida Imperiled Species - Living in Port Orange Florida
**Date:** Tuesday, October 19, 2010 2:04:37 PM

Hello,

I read in the FWC Newsletter about the Biological Status Review being made concerning Florida Imperiled Species. I live in the Cypress Head Golf Course Community in Port Orange, Florida. We have six different species included on the Imperiled Species List that are full time residents here, and one other bird on the list that occasionally has been spotted here. I am not sure if this is the kind of information you are looking for, but if so, let me know and I can provide you with further details.

Here is a list of the 6 species we have at Cypress Head year round:
Florida Sandhill Crane (a dozen or more adult birds, and at least four that were born this spring)
Little Blue Heron (a dozen or more adult birds)
Osprey (two or three adult pairs)
Snowy Egret (5-10 adult birds)
Tricolored Heron (5-10 adult birds)
White Ibis (at least three dozen adult birds and many immature birds born this spring)

Also, for the last three years we have observed one or two Roseate Spoonbills that have stopped for a day or so. If this information is what you are looking for, I would be happy to provide additional details.

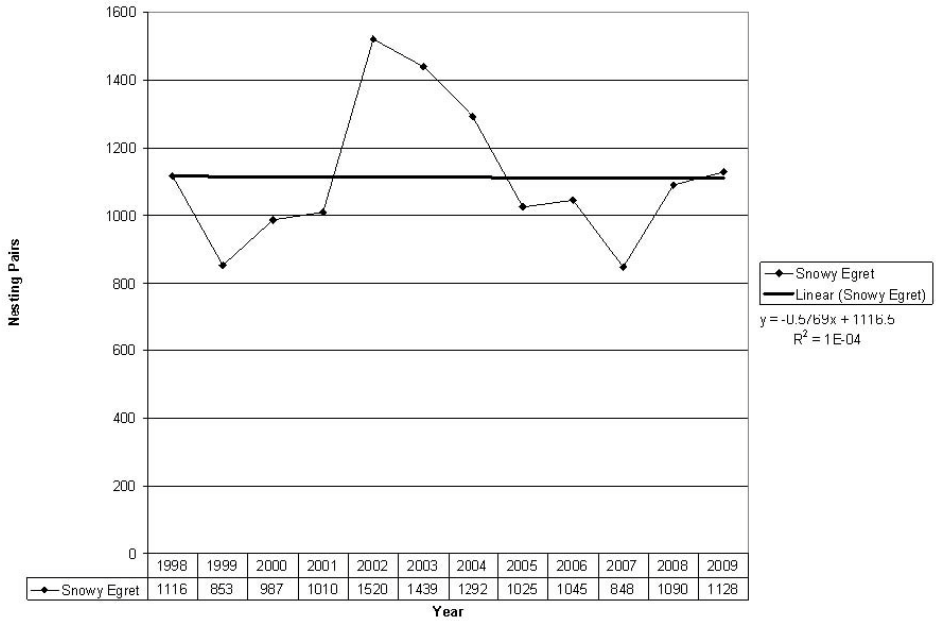
Best regards,

Kurt Snyder

**Email from Mark Rachal**

**From:** RACHAL, Mark
**To:** Imperiled
**Cc:** HODGSON, Ann
**Subject:** Snowy Egret trends
**Date:** Tuesday, November 02, 2010 11:06:20 AM

We estimated the number of birds at the Ozona Spoil East, Dunedin Sand Key West, Don Cesar and Citrus Park colonies in 2009 by taking an average of the 2008 and 2010 nesting data for each site. There is a high count in 2002 of 1520 nesting pairs and a general decrease in the number of birds going forward. Preliminary results from the 2010 surveys show a lower total number of nesting pairs.




Ann B. Hodgson, PhD
Gulf Coast Research Director
Florida Coastal Islands Sanctuaries
Audubon of Florida
410 S. Ware Blvd., Ste. 702
Tampa, FL 33619

Mark Rachal
Field Biologist

Audubon of Florida
Florida Coastal Islands Sanctuaries Program
410 Ware Blvd., Suite 702
Tampa, FL 33619

**Email from Ann Hodgson**

**From:** HODGSON, Ann
**To:** Imperiled
**Cc:** WRAITHMELL, Julie
**Subject:** Status of colonial waterbird populations in the Tampa Bay area from 1984-2009
**Date:** Friday, October 29, 2010 5:20:28 PM
**Attachments:** Hodgson-twenty_five_years-06-21-10.pdf

Attached is our recent report:

TWENTY-FIVE YEARS AFTER BASIS: AN UPDATE ON THE CURRENT STATUS AND RECENT TRENDS OF COLONIAL WATERBIRD POPULATIONS IN TAMPA BAY

Ann B. Hodgson, Audubon of Florida, Florida Coastal Islands Sanctuaries, 410 S. Ware Boulevard, Suite 702, Tampa, Florida 33619, ahodgson@audubon.org

Ann F. Paul, Audubon of Florida, Florida Coastal Islands Sanctuaries, 410 S. Ware Boulevard, Suite 702, Tampa, Florida 33619, apaul@audubon.org

Representatives of 4 orders dominate the avifauna of Tampa Bay: pelecaniformes (pelicans, cormorants, anhingas); ciconiiformes (herons, ibis, spoonbills, storks); anseriformes (waterfowl); and charadriiformes (shorebirds, gulls, and terns). The first bay-wide assessment of colonial waterbird populations was presented at BASIS by Paul and Woolfenden (1985). Twelve of the 22 colonies they reported have been abandoned since due to various causes of habitat loss or disturbance and c. 59,000 pairs (mostly Laughing Gulls) nested on 5 colonies that no longer support very large populations. After 1985, 50 new colonies became active, including 15 inland colonies, of which 16 were abandoned later. Using annual breeding bird surveys, we provide recent trends in the populations of 30 bird species breeding in Tampa Bay, 13 of which receive enhanced conservation protection through their listing by federal or state agencies. The Tampa Bay breeding population totals 30,000-58,000 nesting pairs, averaging 39,000 annually. The 2009 nesting population (all species) was 58,500 at 44 colonies. Up to 50% of the total colonial waterbird nesting occurs in Hillsborough Bay; the remainder is distributed at colony sites around Tampa Bay. Human disturbance has become the most significant cause of nesting failure annually, accompanied by anthropogenically-induced predator population increases and urban development affecting the number and ecological integrity of estuarine and palustrine wetland foraging sites. We provide a suite of habitat and population management recommendations that should be implemented to conserve the bay's avifauna. Please cite the information as:

Hodgson, A. and A. Paul. 2010. Twenty-Five Years after Basis I: An Update on the Current Status and Recent Trends in Bird Colonial Waterbird Populations of Tampa Bay, in: Cooper, S.T. (ed.). 2010. Proceedings, Tampa Bay Area Scientific Information Symposium, BASIS 5: 20-23 October 2009. St. Petersburg, FL. 538 pp.

Please call if you have further questions.
best, Ann

Ann B. Hodgson, Ph. D., P.W. S.
Gulf Coast Ecosystem Science Coordinator
Audubon of Florida
Florida Coastal Islands Sanctuaries Program
410 Ware Blvd., STE 702
Tampa, FL 33619

**TWENTY-FIVE YEARS AFTER BASIS: AN UPDATE ON THE CURRENT STATUS AND RECENT TRENDS OF COLONIAL WATERBIRD POPULATIONS IN TAMPA BAY**

Ann B. Hodgson, Audubon of Florida, Florida Coastal Islands Sanctuaries, 410 S. Ware Boulevard, Suite 702, Tampa, Florida 33619, ahodgson@audubon.org

Ann F. Paul, Audubon of Florida, Florida Coastal Islands Sanctuaries, 410 S. Ware Boulevard, Suite 702, Tampa, Florida 33619, apaul@audubon.org

**ABSTRACT**

Representatives of 4 orders dominate the avifauna of Tampa Bay: pelecaniformes (pelicans, cormorants, anhingas); ciconiiformes (herons, ibis, spoonbills, storks); anseriformes (waterfowl); and charadriiformes (shorebirds, gulls, and terns). The first bay-wide assessment of colonial waterbird populations was presented at BASIS by Paul and Woolfenden (1985). Twelve of the 22 colonies they reported have been abandoned since due to various causes of habitat loss or disturbance and c. 59,000 pairs (mostly Laughing Gulls) nested on 5 colonies that no longer support very large populations. After 1985, 50 new colonies became active, including 15 inland colonies, of which 16 were abandoned later. Using annual breeding bird surveys, we provide recent trends in the populations of 30 bird species breeding in Tampa Bay, 13 of which receive enhanced conservation protection through their listing by federal or state agencies. The Tampa Bay breeding population totals 30,000-58,000 nesting pairs, averaging 39,000 annually. The 2009 nesting population (all species) was 58,500 at 44 colonies. Up to 50% of the total colonial waterbird nesting occurs in Hillsborough Bay; the remainder is distributed at colony sites around Tampa Bay. The Cockroach Bay-Terra Ceia Bay, Hillsborough Bay, Johns Pass, and Lower Tampa Bay Important Bird Areas are listed by Audubon of Florida among its 100 Important Bird Areas in Florida. Lower Tampa Bay and Hillsborough Bay were designated by Birdlife International and the National Audubon Society, Inc. in 2003 and 2009, respectively, as "Important Bird Area of Global Significance". Human disturbance has become the most significant cause of nesting failure annually, accompanied by anthropogenically-induced predator population increases and urban development affecting the number and ecological integrity of estuarine and palustrine wetland foraging sites. We provide a suite of habitat and population management recommendations that should be implemented to conserve the bay's avifauna. Hodgson and Paul

**INTRODUCTION**

The species richness of colonial waterbirds that nest in the Tampa Bay estuarine system is unique, as many birds of temperate North America breed here, as well as some typically "tropical" birds (Reddish Egrets, Roseate Spoonbills) that do not nest further north, and some species that nest only in low numbers anywhere in Florida (Caspian, Royal, Sandwich, and Gull-billed terns) (Howell 1932, Paul and Woolfenden 1985, Paul and Schnapf 1997, Paul and Paul 2005, Hodgson, Paul and Rachal 2006).

Within Tampa Bay, colonial waterbirds (pelecaniformes [pelicans, cormorants, anhingas]; ciconiiformes [herons, ibis, spoonbills, storks]; and charadriiformes [shorebirds, gulls, and terns]) nest preferably on small islands that are off-shore, separated by open water and deep channels with tidal currents that discourage predatory mammals from swimming to them, and

have no resident mammalian predators. Large numbers of birds of many species may breed at a single site. Generally, sites occupied by larids are sparsely vegetated sand or shell beaches or dredged spoil material, while pelecaniform and ciconiiform birds nest where shrubs or trees are available (Schreiber and Schreiber 1978). Thirteen species are currently listed by the state and federal wildlife management agencies to receive elevated regulatory protection. Several other species that nest in the watershed, although not formally listed, are very rare (Willet, Wilson's Plover, Gull-billed, Caspian, Royal, and Sandwich terns) and warrant comparable protection. The importance of Tampa Bay's bird community has been widely recognized by national and international authorities. The Cockroach Bay-Terra Ceia Bay, Hillsborough Bay, Johns Pass, and Lower Tampa Bay Important Bird Areas (IBAs) are listed by Audubon of Florida among its 100 Important Bird Areas in Florida, and BirdLife International and the National Audubon Society recognized Lower Tampa Bay and Hillsborough Bay as globally-significant IBAs in 2003 and 2009, respectively.

In this paper, we briefly summarize the current status and population trends of 30 species of birds nesting in the Tampa Bay system, mostly colonial but also some territorial nesters that often select sites within a mixed species colony, review current management programs to protect them, and provide conservation recommendations to maintain stable populations in the future.

**METHODS**

We (Florida Coastal Islands Sanctuaries [FCIS]) surveyed colonial waterbird colonies and territorial shorebirds from 1985 to 2009 in Tampa Bay, using direct nest counts or flight line counts, and counting nesting pairs and productivity (chicks/nest) when possible (Buckley and Buckley 1976; King 1978; Erwin and Ogden 1980, Portnoy 1980; Erwin 1981, Paul et al. 2004). Laughing Gulls were censused using a circular plot technique and extrapolating nesting density among areas of similar nesting density (Patton and Hanners 1984). We added colony locations to the survey schedule as they were discovered. We also included 15 bird colonies that occur on the bay's periphery at inland locations within the Tampa Bay Estuary Program's watershed boundaries in Hillsborough, Pasco, and Polk counties, but not colonies outside the watershed in Clearwater Harbor and St. Josephs Sound, although they contribute to the regional population (Agency on Bay Management 1995). Numbers of colonies surveyed varied inter-annually contingent on colony activity, personnel, weather, and other constraints. English and scientific names follow the Check-list of North American Birds 7th edition (American Ornithologists' Union 1998) and 50$^{th}$ Supplement (Chesser et al. 2009).

**RESULTS**

In Tampa Bay, 58,424 nesting pairs of colonial birds (all species), 42.7% of which were Laughing Gulls, bred at 44 colonies in 2009 (Table 1). The 10 year (2000-2009) mean number of nesting pairs (all species) was 44,141 (SD 10,946.57), and the mean number of active colonies was 32 (SD 6.88) (Table 2).

Of the 71 colonies mapped in the Tampa Bay watershed, 22 were discussed in BASIS, of which 12 (54.5%) were abandoned ("winked out") later for various reasons (altered habitats [e.g., urban development, plant succession], predators, human disturbance) since 1985, including 5 colonies that supported most of the gull population (Figs. 1, 2, 3). In the past 25 years we located and surveyed 50 new sites undescribed in 1985; however, 16 colonies (32.0%) subsequently collapsed and were abandoned. Cumulatively, the inland colonies supported 10.0% of the regional population. Of the initial 22 colonies, all but six were islands (Paul and

Woolfenden 1985). Five were small colonies of Yellow-crowned Night-Herons or Great Blue Herons nesting high in tall oak trees or slash pines near the bay, and the last site was the shore of the Howard Frankland Causeway, where the Florida Department of Transportation planted the roadside in the early 1990s to discourage Black Skimmers from nesting and causing traffic hazards. All recently-active colonies were islands, except the Mobbly powerlines, scattered oystercatcher territories in Apollo Beach, and the Cockroach Bay borrow pit.

In 1985, the Alafia Bank Bird Sanctuary, Washburn Sanctuary, and Tarpon Key National Wildlife Refuge were the three largest mixed colonies of pelecaniforms, herons and ibis in the region. In 2009, pelicans nested at only four sites, Washburn Sanctuary had very few pairs since 2004, and Tarpon Key was abandoned in 2005, so that the three largest colonies with similar species composition were Egmont Key National Wildlife Refuge and State Park (33,700 pairs, of which 300 were pelicans and >25,000 were larids), the Richard T. Paul Alafia Bank Bird Sanctuary (10,500 pairs, only 150 pairs of pelicans), and Alligator Lake (745 pairs), which had no pelicans.

**Table 1. Colony characteristics and management status of colonial waterbird colonies in Tampa Bay, Florida, USA, in 2009.**

| Colony Number | *Name* | Bay Segment | Taxa | Species *(n)* | Pairs *(n)* | Abandoned after 1984 | New since 1984 | Ownership / Management | Protected status | Regional population (%) | Active within last 5 yrs? | *Latitude* | *Longitude* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | Dogleg Key | BCB | P, Ci | 12 | 296 | | X | FDEP-AP / FCIS | Y | 0.51 | Y | 27.8021 | -82.7618 |
| 26 | Johns Pass, Little Bird Key | BCB | Ci | 1 | 2 | | | Suncoast Seabird Sanctuary | Y | 0.00 | Y | 27.7932 | -82.7777 |
| 27 | Johns Pass, Middle Bird Island | BCB | Ci | 2 | 5 | | | FDEP-AP | Y | 0.01 | Y | 27.7913 | -82.7739 |
| 28 | Johns Pass, Eleanor Island | BCB | Ci | | | X | | City of Treasure Island | Y | 0.00 | Y | 27.7878 | -82.7738 |
| 29 | South Pasadena Marker 34 | BCB | L | | | X | X | City of Pasadena | | 0.00 | N | 27.7431 | -82.7299 |
| 30 | Sunset Beach | BCB | L | | | X | X | City of Treasure Island | N | 0.00 | N | 27.7391 | -82.7565 |
| 31 | Don CeSar Colony | BCB | P, Ci | 6 | 50 | | X | Private | N | 0.09 | Y | 27.7059 | -82.7352 |
| 32 | Bayway Spoil | BCB | L | | | X | | Developed | N | 0.00 | N | 27.7094 | -82.6995 |
| 33 | Indian Key NWR | BCB | Ci | | | X | X | USFWS NWR | Y | 0.00 | Y | 27.7011 | -82.6909 |
| 34 | Little Bird Key NWR | BCB | Ci | 5 | 16 | | X | USFWS NWR | Y | 0.03 | Y | 27.6852 | -82.7169 |
| 35 | Cow and Calf Islands | BCB | P, Ci | 2 | 9 | | X | FDEP-AP | | 0.02 | Y | 27.6856 | -82.6916 |
| 36 | Darling Key | BCB | P, Ci | 3 | 17 | | X | FDEP-AP | | 0.03 | Y | 27.6765 | -82.6813 |
| 37 | Jackass Key NWR | BCB | P, Ci | 4 | 30 | | X | USFWS NWR | Y | 0.05 | Y | 27.6693 | -82.7177 |
| 38 | Tarpon Key NWR | BCB | P, Ci | | | X | | USFWS NWR | Y | 0.00 | N | 27.6666 | -82.6932 |
| 39 | Whale Island NWR | BCB | P, Ci | | | X | X | USFWS NWR | Y | 0.00 | N | 27.6626 | -82.6930 |
| 40 | Shell Key County Preserve | BCB | Ch | | | | | Florida / Pinellas County | Y | 0.00 | Y | 27.6645 | -82.7445 |
| 41 | Mule Key NWR | BCB | P, Ci | | | X | X | USFWS NWR | Y | 0.00 | Y | 27.6619 | -82.7178 |
| 42 | Listen Key NWR | BCB | P, Ci | | | X | X | USFWS NWR | Y | 0.00 | N | 27.6596 | -82.7179 |
| 43 | Sister Key | BCB | P, Ci | | | X | X | Florida / Pinellas County | | 0.00 | N | 27.6503 | -82.7312 |
| 44 | Ft. DeSoto Park | LTB | L, Ch | | | X | X | Pinellas County | Y | 0.00 | N | 27.6488 | -82.7433 |
| 45 | Egmont Key NWR/State Park | LTB | P, Ci, Ch | 10 | 36,521 | | X | USFWS NWR / Florida State Parks | Y | 62.51 | Y | 27.5894 | -82.7614 |

| Colony Number | *Name* | Bay Segment | Taxa | Species *(n)* | Pairs *(n)* | Abandoned after 1984 | New since 1984 | Ownership / Management | Protected status | Regional population (%) | Active within last 5 yrs? | *Latitude* | *Longitude* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | Little Bayou Bird Island | MTB | P, Ci | 10 | 140 | | X | FDEP-AP / FCIS | Y | 0.24 | Y | 27.7196 | -82.6312 |
| 47 | Coffeepot Bayou Bird Island | MTB | P, Ci | 14 | 612 | | X | Private | Y | 1.05 | Y | 27.7916 | -82.6241 |
| 48 | Gandy Radio Tower | OTB | | | | X | X | Unknown | N | 0.00 | N | 27.8772 | -82.5902 |
| 49 | Howard Frankland | OTB | L | | | X | | FDOT | N | 0.00 | N | 27.9046 | -82.6335 |
| 50 | Cooper's Point | OTB | | | | X | | Pinellas County / City of Clearwater | N | 0.00 | N | 27.9730 | -82.6891 |
| 51 | Alligator Lake | OTB | P, Ci | 12 | 745 | | | City of Safety Harbor / Pinellas County | Y | 1.27 | Y | 27.9813 | -82.6990 |
| 52 | Philippe Park | OTB | Ci | | | X | | Pinellas County | N | 0.00 | N | 28.0053 | -82.6778 |
| 53 | Mobbly Bay Powerlines | OTB | P | 1 | 19 | | X | Progress Energy | N | 0.03 | Y | 28.0038 | -82.6677 |
| 54 | Courtney Campbell Causeway | OTB | L | | | X | X | FDOT | N | 0.00 | N | 27.9736 | -82.5958 |
| 55 | Wilson Property/Grand Hyatt | OTB | Ci | | | X | | Private | N | 0.00 | N | 27.9654 | -82.5514 |
| 56 | Sunset Park | OTB | | | | X | | City of Tampa | N | 0.00 | N | 27.9374 | -82.5201 |
| 57 | Westshore | OTB | | | | X | | City of Tampa | N | 0.00 | N | 27.9002 | -82.5361 |
| 58 | McKay Bay | HB | | | | X | X | City of Tampa / TPA | Y | 0.00 | N | 27.9371 | -82.4143 |
| 59 | Hooker's Point | HB | | | | X | X | TPA | Y | 0.00 | N | 27.9076 | -82.4338 |
| 60 | Tampa Port Authority Spoil Island 2D | HB | Ch | 9 | 2,152 | | | TPA / FCIS | Y | 3.68 | Y | 27.8805 | -82.4313 |
| 61 | Fantasy Island | HB | Ch | 1 | 1 | | | TPA / FCIS | Y | 0.00 | Y | 27.8683 | -82.4253 |
| 62 | Spoil Area C | HB | L, Ch | | | X | X | Mosaic | Y | 0.00 | N | 27.8571 | -82.4003 |
| 63 | Richard T. Paul Alafia Bank Bird Sanctuary | HB | P, Ci, Ch | 16 | 6,234 | | | Mosaic / FCIS | Y | 10.67 | Y | 27.8483 | -82.4106 |
| 64 | Tampa Port Authority Spoil Island 3D | HB | Ch | 2 | 23 | | | TPA / FCIS | Y | 0.04 | Y | 27.8331 | -82.4352 |

| Colony Number | *Name* | Bay Segment | Taxa | Species *(n)* | Pairs *(n)* | Abandoned after 1984 | New since 1984 | Ownership / Management | Protected status | Regional *population* (%) | Active within last 5 yrs? | *Latitude* | *Longitude* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 65 | Port Redwing | HB | L, Ch | | | X | X | TPA | Y | 0.00 | N | 27.8132 | -82.3951 |
| 66 | Fishhook Spoil Island | HB | Ch | 2 | 13 | | | TPA / TECO | Y | 0.02 | Y | 27.8024 | -82.4152 |
| 67 | Apollo Beach Oystercatchers | HB | Ch | 2 | 15 | | X | Private | N | 0.03 | Y | 27.7733 | -82.4318 |
| 68 | Mouth of Little Manatee River | MR | P, Ci | | | X | | FDEP Cockroach Bay Aquatic Preserve | N | 0.00 | N | 27.7160 | -82.4823 |
| 69 | Cockroach Bay Preserve | MTB | Ch | 1 | 30 | | X | ELAPP | Y | 0.05 | Y | 27.6955 | -82.5079 |
| 70 | Hole in the Wall, Cockroach Bay Preserve 1 | MTB | Ci | | | | X | ELAPP | Y | 0.02 | Y | 27.6811 | -82.5183 |
| 71 | Hole in the Wall, Cockroach Bay Preserve 2 | MTB | Ci | 1 | 20 | | X | ELAPP | Y | 0.02 | Y | 27.6799 | -82.5198 |
| 72 | Hole in the Wall, Cockroach Bay Preserve 3 | MTB | Ci | | | | X | ELAPP | Y | 0.02 | Y | 27.6764 | -82.5169 |
| 73 | Piney Point | MTB | P, Ci | 14 | 2,795 | | X | SWFWMD | Y | 4.78 | Y | 27.6505 | -82.5462 |
| 74 | Manbirtee Key | MTB | Ci, Ch | 4 | 24 | | | MCPA / FCIS | Y | 0.04 | Y | 27.6359 | -82.5740 |
| 75 | Two Brothers Island | LTB | Ci | | | X | | Private | N | 0.00 | N | 27.5935 | -82.5847 |
| 76 | Skyway Bridge Least Tern colony | LTB | L | | | X | X | FDOT | N | 0.00 | N | 27.5808 | -82.6090 |
| 77 | Miguel Bay Colony | LTB | P, Ci | | | | X | FDEP-AP / FCIS | Y | 0.00 | Y | 27.5708 | -82.5995 |
| 78 | Passage Key | LTB | P, Ci, L, Ch | | | X | | USFWS NWR | Y | 0.00 | Y | 27.5545 | -82.7404 |
| 79 | Nina Washburn Sanctuary | TCB | P, Ci | 7 | 52 | | | FCIS | Y | 0.09 | Y | 27.5527 | -82.5999 |
| 80 | Washburn Junior/Terra Ceia Bay Little Bird Key | TCB | P, Ci | 14 | 407 | | X | FDEP Terra Ceia Aquatic Preserve / FCIS | Y | 0.70 | Y | 27.5285 | -82.6015 |
| 81 | Dot Dash Dit Colony | MR | P, Ci | 13 | 2,360 | | | Private / Florida / FCIS | Y | 4.04 | Y | 27.4993 | -82.5243 |
| 82 | Heath Yellow-crowned Night-Heron Colony | HC | Ci | 1 | 5 | | X | Private | N | 0.01 | Y | 27.8772 | -82.3129 |
| 83 | Office/Ferman Bird Colony | HC | P, Ci | 8 | 74 | | X | Private | Y | 0.13 | Y | 27.9448 | -82.3417 |

| Colony Number | *Name* | Bay Segment | Taxa | Species *(n)* | Pairs *(n)* | Abandoned after 1984 | New since 1984 | Ownership / Management | Protected status | Regional *population* (%) | Active within last 5 yrs? | *Latitude* | *Longitude* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 84 | Robles Park | HC | Ci | 4 | 31 | | X | City of Tampa | Y | 0.05 | Y | 27.9740 | -82.4550 |
| 85 | Corporex Colony | HC | P, Ci | 7 | 94 | | X | Private | N | 0.16 | Y | 27.9786 | -82.3857 |
| 86 | East Lake Island | HC | P, Ci | 5 | 14 | | X | Florida Audubon Society | Y | 0.02 | Y | 27.9922 | -82.3784 |
| 87 | Temple Crest/Orange Lake/Wargo Bird Colony | HC | P, Ci | 8 | 51 | | X | City of Tampa / TPA | N | 0.09 | Y | 28.0193 | -82.4174 |
| 88 | River Cove Yellow-crowned Night-Heron colony | HC | Ci | | | | X | Hillsborough County | N | 0.02 | Y | 28.0192 | -82.4486 |
| 89 | Citrus Park Bird Colony | HC | P, Ci | 9 | 486 | | X | Private | N | 0.83 | Y | 28.0699 | -82.5834 |
| 90 | Heron Point | PaC | P, Ci | 7 | 57 | | X | Private | N | 0.10 | Y | 28.2157 | -82.4349 |
| 91 | Saddlebrook | PaC | P, Ci | 3 | 48 | | X | Private | Y | 0.08 | Y | 28.2277 | -82.3297 |
| 92 | Cypress Creek Preserve | HC | P, Ci | 11 | 3,294 | | X | ELAPP | Y | 5.64 | Y | 28.1629 | -82.3975 |
| 93 | Cross Creek Colony | HC | P, Ci | 2 | 8 | | X | Private | N | 0.01 | Y | 28.1424 | -82.3520 |
| 94 | Medard County Park | HC | P, Ci | 10 | 477 | | X | Hillsborough County | Y | 0.82 | Y | 27.9218 | -82.1630 |
| 95 | Alafia River Corridor Preserve | HC | P, Ci | 5 | 46 | | X | ELAPP | Y | 0.08 | Y | 27.8756 | -82.1053 |
| 96 | Wood Lake/Somerset Lake | PoC | P, Ci | 14 | 1,151 | | X | City of Lakeland / Private | Y | 1.97 | Y | 28.0036 | -81.9311 |
| | Totals | | | | 58,424 | 27 | 48 | | | 100.00 | | | |

Taxa: P-pelecaniformes, Ci-ciconiiformes, Ch-charadriiformes, L-larids.
Values are number of species, nesting pairs, and % of 2009 regional nesting population.
Abbreviations: ELAPP – Environmental Lands Acquisition & Protection Program, FDEP-AP - Florida Department of Environmental Protection Aquatic Preserves, FDOT – Florida Department of Transportation, MCPA – Manatee County Port Authority, TPA – Tampa Port Authority, USFWS NWR - U. S. Fish & Wildlife Service National Wildlife Refuge.


Figure 1. Bird colonies in the Tampa Bay, Florida, USA, ecosystem from 1984-2009 (colonies 1-24 are excluded because they are not in the Tampa Bay watershed).


Figure 2. Bird colonies in Boca Ciega Bay, Florida, USA, from 1984-2009.


Figure 3. Bird colonies in Terra Ceia Bay, Florida, USA, from 1984-2009.

Table 2. Nesting pairs (no./species) of 30 colonial waterbirds and shorebirds and assessment of recent population trends in Tampa Bay, Florida, USA, from 2000-2009.

| Species | Mean | SD | Population trend |
|---|---|---|---|
| Brown Pelican | 1,024 | 326.15 | 45 is the major nesting site since 2004 when 79 and 38 collapsed; widespread also at several smaller colonies, declining |
| Double-crested Cormorant | 455 | 68.48 | Widely distributed at 7 sites; shifted from 79 and 38 when they collapsed; stable |
| Anhinga | 334 | 93.11 | Widely distributed at 7 sites; stable |
| Least Bittern | 2 | 1.69 | Uncommon – nesting at 4 or more freshwater sites with large cattail stands; under-surveyed |
| Great Blue Heron | 217 | 61.80 | Widely distributed at 10 heronries, and various misc. sites; stable |
| Great Egret | 740 | 148.15 | Nesting at 18 sites, >100 prs at 63, 81, 25, 47, and I-25 (Clearwater Harbor) in that order; stable |
| Snowy Egret | 923 | 193.63 | c. 75% decline since 1970s (Ogden 1978), stable last 10 yrs; 73 increased to 300 prs |
| Little Blue Heron | 315 | 88.92 | Nesting at 73, 63, and 94, and other sites; declined since 1950s with freshwater wetland loss, stable last 10 yrs |
| Tricolored Heron | 788 | 178.87 | Widespread at all mixed heronries; c. 60% of the population at 3 colonies: 73, 63 and 51; stable |
| Reddish Egret | 57 | 21.19 | Nesting at 6 sites: 63 largest group; 51 – only known freshwater site; c. 16% of state popn in Tampa Bay |
| Cattle Egret | 4,146 | 2,836.85 | Abundant at 63, 73, 51, 92, and 81; increasing since 1980s. |
| Green Heron | 29 | 12.01 | Nesting at 11 sites, notably 73, and other solitary locations; stable |
| Black-crowned Night-Heron | 112 | 52.27 | Nesting at the major heronries, notably 73, and inland sites; stable |
| Yellow-crowned Night-Heron | 73 | 39.58 | Nesting in mixed heronries, other small groups in tall coastal trees in residential areas; declining since 1980s; recent decline more rapid |
| White Ibis | 9,180 | 3,464.63 | Most common endemic wading bird; dependent on El Niño cycles and prey concentrated as freshwater wetlands draw down; most nesting at 63 and 73 |
| Glossy Ibis | 285 | 102.58 | Nesting only at 63, 73, and 92; formerly approx. 50% were at 79; require shallow freshwater wetlands, stable to declining |
| Roseate Spoonbill | 329 | 111.26 | Exponential increase at 63 since 1975; radiated to 11 sites in the past 5 yrs; popn not stabilized |
| Wood Stork | 212 | 116.93 | Nesting only at 81, plus inland colonies 92, 93, 86, 95, and 89 |
| Snowy Plover | 0.4 | 1.26 | Rarely nesting at 44, 40, 45 and usually unsuccessful due to disturbance |
| Wilson's Plover | 25 | 20.68 | Spottily distributed in salterns and suitable bare habitat; 74 recently important; stable, prob. under-surveyed |
| American Oystercatcher | 91 | 13.58 | C. 72 prs in Hillsborough Bay on spoil island shorelines (60, 63, 64, 66), the rest at widespread sites; stable, approx. 21% of state popn nests in Tampa Bay |
| Black-necked Stilt | 32 | 31.35 | Nesting sporadically at 60, 64, 69 around drying algae mats; rare |
| Willet | 34 | 14.43 | Rare and inconspicuously distributed in salt marshes and dune vegetation; under-surveyed |
| Laughing Gull | 19,698 | 8,741.13 | Nesting only at 60, 64 and 45; approx. 50% decline since early 1980s. Tampa Bay hosts c. 20% of entire southeast U. S. popn |
| Gull-billed Tern | 8 | 5.69 | A few pairs annually, often with Black Skimmers, nearly annually at 60 or 64 |

| Species | Mean | SD | Population trend |
|---|---|---|---|
| Caspian Tern | 83 | 10.57 | Most nesting at 60, 64; formerly 63; Hillsborough Bay colony is the state's largest |
| Royal Tern | 3,618 | 1,857.76 | Nesting formerly at 63 and 78; now at 45 and Hillsborough Bay 60 or 64; increasing since 1990s |
| Sandwich Tern | 811 | 341.14 | All at 45 in 2009; formerly Hillsborough Bay (60, 64, or 63); pass. increasing |
| Least Tern | 116 | 91.38 | Most natural habitat lost, recently c. 80% are rooftop nesters; declining; most nesting on beaches unsuccessful due to human disturbance |
| Black Skimmer | 406 | 192.24 | In the last five years, skimmers nested at 60, 64, 45, 78, 40, and 29; stable, but in some years, zero nesting success |

Values are mean and standard deviation of nesting pairs; see Table 1 for colony identification numbers.

## DISCUSSION

Species richness (30 species) of the regional colonial waterbird population did not change in Tampa Bay from 1985 to 2009, with every endemic species and introduced Cattle Egrets represented. This community remains the largest and most significant colonial waterbird population in Florida outside of the Everglades. The Laughing Gull population has diminished by around 50% since the 1980s and is now concentrated in Hillsborough Bay and Egmont Key. These populations have persisted despite significant and continuing alteration of shoreline habitats, bay bottom, and freshwater wetlands, although recent population declines in Brown Pelicans, Laughing Gulls, Least Terns, and Snowy Plovers suggest that, as elsewhere in Florida, progressive urbanization threatens to further reduce the ecological integrity of the Tampa Bay ecosystem. Roseate Spoonbills and Reddish Egrets, extirpated as nesting species from Tampa Bay until the mid-1970s, have increased significantly, while widely expanding their distribution among suitable habitats in the bay, and Wood Stork, and Royal and Sandwich tern populations have increased slightly. The other pelecaniformes, ciconiiformes, charadriiformes and larids have remained relatively stable. The inland colonies are particularly important for small herons and Wood Storks.

Five additional species are found uniquely in coastal habitats: Clapper Rails, Mangrove Cuckoos, Gray Kingbirds, Black-whiskered Vireos, and Prairie Warblers. Clapper Rails occur in low and high marsh and require expansive areas of continuous cover, areas which are diminishing as the shoreline has been developed. Black-whiskered Vireos have virtually disappeared from Tampa Bay since c. 1991. Mangrove Cuckoos were found annually in mangroves in Boca Ciega Bay, Weedon Island, and Terra Ceia Bay in some years, but are infrequent now. Prairie Warblers are more widely distributed along Tampa Bay mangrove shorelines. Although Gray Kingbirds may also nest in uplands beyond the mangroves, all five species are primarily coastal birds whose populations have decreased in recent years. The four estuarine passerines are susceptible to nest parasitism by increasing populations of Brown-headed Cowbirds.

Paul and Woolfenden (1985) identified a number of biotic and abiotic stressors that influence bird abundance in Tampa Bay. In the decades leading up to the 1980s, coastal habitat loss dominated. In the 1990s, with the large increase in registered watercraft, the most significant issues to have emerged are anthropogenic disturbances from the increasing numbers of recreational boaters and beachgoers that: "…present a vast potential for annual disturbance of breeding birds", as predicted by Paul and Schnapf (1997:94), continued dredge and fill activities that have had both beneficial and negative effects for colonial waterbirds and beach-nesting species, continued loss of palustrine wetlands (particularly short hydroperiod and ephemeral "prairie ponds"), the trend toward reducing the spatial distribution of palustrine wetlands by condensing them into stormwater ponds and mitigation banks from the natural patterns that birds cue to throughout the landscape, and extremely high populations of meso-carnivores (raccoons, to a lesser extent opossums and, potentially, coyotes and invasive exotic herptiles).

***Management Initiatives***

Through site-specific management initiatives by FCIS at Audubon-owned and leased sanctuaries, Audubon's Project ColonyWatch, which engages volunteers to observe and protect colonies in cooperation with site managers, and a continuous effort to expand colony management partnerships among agencies and private landowners, most of the now active colonies have been posted, are managed during the year to control predators and remove entangling fishing line during the Tampa Bay Watch and Audubon Monofilament Cleanup, are regularly surveyed to establish colony species composition and productivity, and are intermittently patrolled. However, with the dramatic increase in public recreation on the water, this program is insufficient to fully protect most colonies. In the past five years we have also implemented a series of inter-agency workshops for law enforcement marine units about the biology, habitat requirements, and laws protecting colonial waterbirds.

***Management Recommendations***

Environmental education – In collaboration with land managers and management partners, continue to produce and distribute to the public boaters guides describing the bay's natural resources and protected areas, and present informational talks about the bay's avifauna.

Colony management - Continue current management activities, and establish and enforce spatial buffers around colonies to prevent site disturbance. Increase enforcement of wildlife protection laws.

Habitat management - Manage existing sites to provide required habitats; the spoil islands in the Hillsborough Bay Important Bird Area support some of the largest colonies of pelicans, herons, ibis, gulls, and oystercatchers in the state. Many nesting colony sites have been abandoned and fewer new sites will be available in the future given the development density. Currently functioning sites must be carefully protected.

Habitat restoration – Continue to acquire land and restore coastal ecosystems to replace the large areas of coastal mangroves, salterns, intertidal mudflats, and freshwater wetlands that have been lost; restore tidal creeks and re-establish altered coastal drainage patterns.

Wetland protection - The loss of both coastal estuarine and inland palustrine wetlands by drainage or alteration has been a dominant cause of population declines of colonial birds regionally and statewide. Locally, habitat fragmentation, seasonal wetland draw downs, and consolidation of freshwater wetlands decreases wetland functioning in the landscape, and

reduces forage availability, which particularly affects successful nesting of White Ibis, small herons, and Wood Storks.

Sea level rise – Participate in the dialogue about climate change and potential effects of sea level rise; include in future conservation planning initiatives acquisition of lands and sites that will not be affected by increasing water levels.

Maintaining the vibrant, diverse colonial waterbird population in Tampa Bay in the future will be more challenging than during the past three decades since BASIS, and much more difficult than in the decades preceding widespread coastal development. Despite 25 years of intensive public outreach and environmental education activities by Audubon and others, sedulous volunteers in Audubon's Project ColonyWatch and in the Florida Shorebird Alliance providing colony guardianship, and expanded coordination between non-governmental, local, county, state, and federal wildlife protection programs, human disturbance is an incessant threat to the persistence of local bird colonies. More protective regulations, more enforcement, and heightened public cooperation will all be needed to protect the spectacular, charismatic bird populations of Tampa Bay.

**ACKNOWLEDGMENTS**

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**LITERATURE CITED**

Agency on Bay Management (ABM). 1995. Pp. 44-46 *in* State of Tampa Bay, 1994. Tampa Bay Regional

Planning Council, St. Petersburg, FL, USA. American Ornithologists' Union. 1998. Check-list of North American Birds, Seventh edition. American

Ornithologists' Union, Washington, D. C., USA.

Buckley, P. A., and F. G. Buckley. 1976. Guidelines for the protection and management of colonially nesting waterbirds. N. Atl. Reg. Office Nat. Park Serv., Boston, MA, USA.

Chesser, R. T., R. C. Banks, F. K. Barker, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, D. F. Stotz, and K. Winker. 2009. Fiftieth Supplement to the American Ornithologists' Union Check-list of North American Birds. Auk 126:705-714.

Douglass, N., and Clayton, L. C. 2004. Survey of breeding American oystercatcher (*Haematopus palliatus*) populations in Florida. Florida Fish and Wildlife Conservation Commission, Bureau of Wildlife Diversity Conservation: Avian Biological Surveys Report, Lakeland, FL.

Erwin, R. M. 1981. Censusing wading bird colonies: an update on the "flight-line" count method. Colonial Waterbirds 4:91-95.
Erwin, R. M., and J. C. Ogden. 1980. Multiple-factor influences upon feeding flight rates at wading bird colonies (Alias: are flight-line counts useful?). Proceedings of the 1979 Colonial Waterbird Group 3:225-234.
Hodgson, A. B., and A. F. Paul. 2009. Fishhook Spoil Island, Hillsborough Bay, Florida: management plan and recommendations. Audubon of Florida Florida Coastal Islands Sanctuaries Program, Tampa, FL. Tampa Port Authority, Tampa, FL, USA
Hodgson, A. B., A. F. Paul, and J. Kowalski. 2008. The effects of dredged spoil material offloading on bird nesting at Tampa Port Authority Spoil Island 2D from 1997 to 2007. Audubon of Florida Florida Coastal Islands Sanctuaries Program, Tampa, FL, and K2 Engineering, Inc., Riverview, FL, USA. Tampa Port Authority, Tampa, FL, USA.
Hodgson, A. B., A. F. Paul, and M. L. Rachal. 2006. Chapter 14: Birds *in* Bay Environmental Monitoring Report 2000-2005. Tampa Bay Estuary Program, Tampa, FL, USA.
Hodgson, A. B., A F. Paul, and M. L. Rachal. 2008. American oystercatcher nesting in Hillsborough Bay, Florida: Population trends 1990-2007 and management recommendations. Florida Coastal Islands Sanctuaries, Tampa, FL. Tampa Port Authority, Tampa, FL, USA.
Howell, A. H. 1932. Florida Bird Life. Coward-McCann, New York, USA.
King, K. A. 1978. Colonial wading bird survey and census techniques. Pp. 155-159 *in* Wading Birds. A. Sprunt IV, J. C. Ogden, and S. Winkler (Eds.). Nat. Audubon Soc. Res. Report No.7. New York, USA.
Parsons Engineering Science, Inc. 1998. McKay Bay Water Quality Management Plan. Final Report prepared for the Surface Water Improvement and Management Program of the Southwest Florida Water Management District with funding assistance provided by the US EPA, Tampa, FL, USA.
Patton, S. R., and L. A. Hanners. 1984. The history of the Laughing Gull population in Tampa Bay, Florida. Fl. Field Naturalist 12:49-57.
Paul, R., and A. Paul. 2005. Status of coastal bird populations of the Tampa Bay system. P. 19 (abstract) *in* Proceedings, Tampa Bay Area Scientific Information Symposium, BASIS 4. S. F. Treat (Ed.). 27– 30 October 2003. St. Petersburg, FL, USA.
Paul, R. T., A. F. Paul, B. B. Ackerman, and P. C. Frederick. 2004. Evaluating the potential for flight-line counts as a tool for counting nesting wading birds (Ciconiiformes). Grant #01ERGR005. U. S. Geological Survey, St. Petersburg, FL, USA.
Paul, R., and A. Schnapf. 1997. Maintaining stable populations of colonial waterbirds in the Tampa Bay system. Pp. 91-94 *in* Proceedings: Tampa Bay Area Scientific Information Symposium 3 1996. S. Treat (Ed.). Oct. 21-23, 1996. Clearwater, FL, USA.
Paul, R. T., and G. E. Woolfenden. 1985. Current status and recent trends in bird populations of Tampa Bay. Pp. 426-447 *in* Proceedings: Tampa Bay Area Scientific Information Symposium 1982. S. F. Treat, J. L Simon, R. R. Lewis, and R. L Whitman, Jr. (Eds.). Bellwether Press, Minneapolis, MN, USA.
Portnoy, J. W. 1980. Census methods for Gulf Coast waterbirds. Trans. Linn. Soc. 9:127-134.
Schreiber, R. W., and E. A. Schreiber. 1978. Colonial Bird Use and Plant Succession on Dredged Material Islands in Florida. Vol. I, Sea and wading bird colonies. U. S. Army Engineers Waterways Experiment Station Tech. Rep. D-78-14.

**From:** HODGSON, Ann
**To:** Imperiled
**Cc:** WRAITHMELL, Julie; Rodgers, James
**Subject:** RE: BRPE trend data
**Date:** Tuesday, November 02, 2010 1:24:07 PM
**Attachments:** Audubon Tampa Bay colony descriptions and map.doc

The data presented below were acquired at colonial waterbird colonies throughout the Tampa Bay region (Pinellas, Hillsborough, Manatee, Sarasota, and Polk counties) during annual colonial waterbird nesting surveys conducted by Audubon of Florida's Florida Coastal Islands Sanctuaries in cooperation with land management partners, as shown on the attached table and map.

Ann B. Hodgson, Ph. D., P.W. S.
Gulf Coast Ecosystem Science Coordinator
Audubon of Florida
Florida Coastal Islands Sanctuaries Program
410 Ware Blvd., STE 702
Tampa, FL 33619

Hodgson, A. and A. Paul. 2010. Twenty-Five Years after Basis I: An Update on the Current Status and Recent Trends in Bird Colonial Waterbird Populations of Tampa Bay, in: Cooper, S.T. (ed.). 2010. Proceedings, Tampa Bay Area Scientific Information Symposium, BASIS 5: 20-23 October 2009. St.
Petersburg, FL. 538 pp.

Table 1. Colony characteristics and management status of colonial waterbird colonies in Tampa Bay, Florida, USA, in 2009.

| Colony Number | *Name* | Bay Segment | Taxa | Species *(n)* | Pairs *(n)* | Abandoned after 1984 | New since 1984 | Ownership / Management | Protected status | Regional *population* (%) | Active within last 5 yrs? | *Latitude* | *Longitude* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | Dogleg Key | BCB | P, Ci | 12 | 296 | | X | FDEP-AP / FCIS | Y | 0.51 | Y | 27.8021 | -82.7618 |
| 26 | Johns Pass, Little Bird Key | BCB | Ci | 1 | 2 | | | Suncoast Seabird Sanctuary | Y | 0.00 | Y | 27.7932 | -82.7777 |
| 27 | Johns Pass, Middle Bird Island | BCB | Ci | 2 | 5 | | | FDEP-AP | Y | 0.01 | Y | 27.7913 | -82.7739 |
| 28 | Johns Pass, Eleanor Island | BCB | Ci | | | X | | City of Treasure Island | Y | 0.00 | Y | 27.7878 | -82.7738 |
| 29 | South Pasadena Marker 34 | BCB | L | | | X | X | City of Pasadena | | 0.00 | N | 27.7431 | -82.7299 |
| 30 | Sunset Beach | BCB | L | | | X | X | City of Treasure Island | N | 0.00 | N | 27.7391 | -82.7565 |
| 31 | Don CeSar Colony | BCB | P, Ci | 6 | 50 | | X | Private | N | 0.09 | Y | 27.7059 | -82.7352 |
| 32 | Bayway Spoil | BCB | L | | | X | | Developed | N | 0.00 | N | 27.7094 | -82.6995 |
| 33 | Indian Key NWR | BCB | Ci | | | X | X | USFWS NWR | Y | 0.00 | Y | 27.7011 | -82.6909 |
| 34 | Little Bird Key NWR | BCB | Ci | 5 | 16 | | X | USFWS NWR | Y | 0.03 | Y | 27.6852 | -82.7169 |
| 35 | Cow and Calf Islands | BCB | P, Ci | 2 | 9 | | X | FDEP-AP | | 0.02 | Y | 27.6856 | -82.6916 |
| 36 | Darling Key | BCB | P, Ci | 3 | 17 | | X | FDEP-AP | | 0.03 | Y | 27.6765 | -82.6813 |
| 37 | Jackass Key NWR | BCB | P, Ci | 4 | 30 | | X | USFWS NWR | Y | 0.05 | Y | 27.6693 | -82.7177 |
| 38 | Tarpon Key NWR | BCB | P, Ci | | | X | | USFWS NWR | Y | 0.00 | N | 27.6666 | -82.6932 |
| 39 | Whale Island NWR | BCB | P, Ci | | | X | X | USFWS NWR | Y | 0.00 | N | 27.6626 | -82.6930 |
| 40 | Shell Key County Preserve | BCB | Ch | | | | | Florida / Pinellas County | Y | 0.00 | Y | 27.6645 | -82.7445 |
| 41 | Mule Key NWR | BCB | P, Ci | | | X | X | USFWS NWR | Y | 0.00 | Y | 27.6619 | -82.7178 |
| 42 | Listen Key NWR | BCB | P, Ci | | | X | X | USFWS NWR | Y | 0.00 | N | 27.6596 | -82.7179 |
| 43 | Sister Key | BCB | P, Ci | | | X | X | Florida / Pinellas County | | 0.00 | N | 27.6503 | -82.7312 |
| 44 | Ft. DeSoto Park | LTB | L, Ch | | | X | X | Pinellas County | Y | 0.00 | N | 27.6488 | -82.7433 |
| 45 | Egmont Key NWR/State | LTB | P, Ci, Ch | 10 | 36,521 | | X | USFWS NWR / Florida | Y | 62.51 | Y | 27.5894 | -82.7614 |

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| Colony Number | *Name* | Bay Segment | Taxa | Species *(n)* | Pairs *(n)* | Abandoned after 1984 | New since 1984 | Ownership / Management | Protected status | Regional *population* (%) | Active within last 5 yrs? | *Latitude* | *Longitude* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Park | | | | | | | State Parks | | | | | |
| 46 | Little Bayou Bird Island | MTB | P, Ci | 10 | 140 | | X | FDEP-AP / FCIS | Y | 0.24 | Y | 27.7196 | -82.6312 |
| 47 | Coffeepot Bayou Bird Island | MTB | P, Ci | 14 | 612 | | X | Private | Y | 1.05 | Y | 27.7916 | -82.6241 |
| 48 | Gandy Radio Tower | OTB | | | | X | X | Unknown | N | 0.00 | N | 27.8772 | -82.5902 |
| 49 | Howard Frankland | OTB | L | | | X | | FDOT | N | 0.00 | N | 27.9046 | -82.6335 |
| 50 | Cooper's Point | OTB | | | | X | | Pinellas County / City of Clearwater | N | 0.00 | N | 27.9730 | -82.6891 |
| 51 | Alligator Lake | OTB | P, Ci | 12 | 745 | | | City of Safety Harbor / Pinellas County | Y | 1.27 | Y | 27.9813 | -82.6990 |
| 52 | Philippe Park | OTB | Ci | | | X | | Pinellas County | N | 0.00 | N | 28.0053 | -82.6778 |
| 53 | Mobbly Bay Powerlines | OTB | P | 1 | 19 | | X | Progress Energy | N | 0.03 | Y | 28.0038 | -82.6677 |
| 54 | Courtney Campbell Causeway | OTB | L | | | X | X | FDOT | N | 0.00 | N | 27.9736 | -82.5958 |
| 55 | Wilson Property/Grand Hyatt | OTB | Ci | | | X | | Private | N | 0.00 | N | 27.9654 | -82.5514 |
| 56 | Sunset Park | OTB | | | | X | | City of Tampa | N | 0.00 | N | 27.9374 | -82.5201 |
| 57 | Westshore | OTB | | | | X | | City of Tampa | N | 0.00 | N | 27.9002 | -82.5361 |
| 58 | McKay Bay | HB | | | | X | X | City of Tampa / TPA | Y | 0.00 | N | 27.9371 | -82.4143 |
| 59 | Hooker's Point | HB | | | | X | X | TPA | Y | 0.00 | N | 27.9076 | -82.4338 |
| 60 | Tampa Port Authority Spoil Island 2D | HB | Ch | 9 | 2,152 | | | TPA / FCIS | Y | 3.68 | Y | 27.8805 | -82.4313 |
| 61 | Fantasy Island | HB | Ch | 1 | 1 | | | TPA / FCIS | Y | 0.00 | Y | 27.8683 | -82.4253 |
| 62 | Spoil Area C | HB | L, Ch | | | X | X | Mosaic | Y | 0.00 | N | 27.8571 | -82.4003 |
| 63 | Richard T. Paul Alafia Bank Bird Sanctuary | HB | P, Ci, Ch | 16 | 6,234 | | | Mosaic / FCIS | Y | 10.67 | Y | 27.8483 | -82.4106 |

Hodgson, A. and A. Paul. 2010. Twenty-Five Years after Basis I: An Update on the Current Status and Recent Trends in Bird Colonial Waterbird Populations of Tampa Bay, in: Cooper, S.T. (ed.). 2010. Proceedings, Tampa Bay Area Scientific Information Symposium, BASIS 5: 20-23 October 2009. St. Petersburg, FL. 538 pp.

| Colony Number | *Name* | Bay Segment | Taxa | Species *(n)* | Pairs *(n)* | Abandoned after 1984 | New since 1984 | Ownership / Management | Protected status | Regional *population* (%) | Active within last 5 yrs? | *Latitude* | *Longitude* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64 | Tampa Port Authority Spoil Island 3D | HB | Ch | 2 | 23 | | | TPA / FCIS | Y | 0.04 | Y | 27.8331 | -82.4352 |
| 65 | Port Redwing | HB | L, Ch | | | X | X | TPA | Y | 0.00 | N | 27.8132 | -82.3951 |
| 66 | Fishhook Spoil Island | HB | Ch | 2 | 13 | | | TPA / TECO | Y | 0.02 | Y | 27.8024 | -82.4152 |
| 67 | Apollo Beach Oystercatchers | HB | Ch | 2 | 15 | | X | Private | N | 0.03 | Y | 27.7733 | -82.4318 |
| 68 | Mouth of Little Manatee River | MR | P, Ci | | | X | | FDEP Cockroach Bay Aquatic Preserve | N | 0.00 | N | 27.7160 | -82.4823 |
| 69 | Cockroach Bay Preserve | MTB | Ch | 1 | 30 | | X | ELAPP | Y | 0.05 | Y | 27.6955 | -82.5079 |
| 70 | Hole in the Wall, Cockroach Bay Preserve 1 | MTB | Ci | | | | X | ELAPP | Y | 0.02 | Y | 27.6811 | -82.5183 |
| 71 | Hole in the Wall, Cockroach Bay Preserve 2 | MTB | Ci | 1 | 20 | | X | ELAPP | Y | 0.02 | Y | 27.6799 | -82.5198 |
| 72 | Hole in the Wall, Cockroach Bay Preserve 3 | MTB | Ci | | | | X | ELAPP | Y | 0.02 | Y | 27.6764 | -82.5169 |
| 73 | Piney Point | MTB | P, Ci | 14 | 2,795 | | X | SWFWMD | Y | 4.78 | Y | 27.6505 | -82.5462 |
| 74 | Manbirtee Key | MTB | Ci, Ch | 4 | 24 | | | MCPA / FCIS | Y | 0.04 | Y | 27.6359 | -82.5740 |
| 75 | Two Brothers Island | LTB | Ci | | | X | | Private | N | 0.00 | N | 27.5935 | -82.5847 |
| 76 | Skyway Bridge Least Tern colony | LTB | L | | | X | X | FDOT | N | 0.00 | N | 27.5808 | -82.6090 |
| 77 | Miguel Bay Colony | LTB | P, Ci | | | | X | FDEP-AP / FCIS | Y | 0.00 | Y | 27.5708 | -82.5995 |
| 78 | Passage Key | LTB | P, Ci, L, Ch | | | X | | USFWS NWR | Y | 0.00 | Y | 27.5545 | -82.7404 |
| 79 | Nina Washburn Sanctuary | TCB | P, Ci | 7 | 52 | | | FCIS | Y | 0.09 | Y | 27.5527 | -82.5999 |

Hodgson, A. and A. Paul. 2010. Twenty-Five Years after Basis I: An Update on the Current Status and Recent Trends in Bird Colonial Waterbird Populations of Tampa Bay, in: Cooper, S.T. (ed.). 2010. Proceedings, Tampa Bay Area Scientific Information Symposium, BASIS 5: 20-23 October 2009. St. Petersburg, FL. 538 pp.

| Colony Number | *Name* | Bay Segment | Taxa | Species *(n)* | Pairs *(n)* | Abandoned after 1984 | New since 1984 | Ownership / Management | Protected status | Regional *population* (%) | Active within last 5 yrs? | *Latitude* | *Longitude* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80 | Washburn Junior/Terra Ceia Bay Little Bird Key | TCB | P, Ci | 14 | 407 | | X | FDEP Terra Ceia Aquatic Preserve / FCIS | Y | 0.70 | Y | 27.5285 | -82.6015 |
| 81 | Dot Dash Dit Colony | MR | P, Ci | 13 | 2,360 | | | Private / Florida / FCIS | Y | 4.04 | Y | 27.4993 | -82.5243 |
| 82 | Heath Yellow-crowned Night-Heron Colony | HC | Ci | 1 | 5 | | X | Private | N | 0.01 | Y | 27.8772 | -82.3129 |
| 83 | Office/Ferman Bird Colony | HC | P, Ci | 8 | 74 | | X | Private | Y | 0.13 | Y | 27.9448 | -82.3417 |
| 84 | Robles Park | HC | Ci | 4 | 31 | | X | City of Tampa | Y | 0.05 | Y | 27.9740 | -82.4550 |
| 85 | Corporex Colony | HC | P, Ci | 7 | 94 | | X | Private | N | 0.16 | Y | 27.9786 | -82.3857 |
| 86 | East Lake Island | HC | P, Ci | 5 | 14 | | X | Florida Audubon Society | Y | 0.02 | Y | 27.9922 | -82.3784 |
| 87 | Temple Crest/Orange Lake/Wargo Bird Colony | HC | P, Ci | 8 | 51 | | X | City of Tampa / TPA | N | 0.09 | Y | 28.0193 | -82.4174 |
| 88 | River Cove Yellow-crowned Night-Heron colony | HC | Ci | | | | X | Hillsborough County | N | 0.02 | Y | 28.0192 | -82.4486 |
| 89 | Citrus Park Bird Colony | HC | P, Ci | 9 | 486 | | X | Private | N | 0.83 | Y | 28.0699 | -82.5834 |
| 90 | Heron Point | PaC | P, Ci | 7 | 57 | | X | Private | N | 0.10 | Y | 28.2157 | -82.4349 |
| 91 | Saddlebrook | PaC | P, Ci | 3 | 48 | | X | Private | Y | 0.08 | Y | 28.2277 | -82.3297 |
| 92 | Cypress Creek Preserve | HC | P, Ci | 11 | 3,294 | | X | ELAPP | Y | 5.64 | Y | 28.1629 | -82.3975 |
| 93 | Cross Creek Colony | HC | P, Ci | 2 | 8 | | X | Private | N | 0.01 | Y | 28.1424 | -82.3520 |
| 94 | Medard County Park | HC | P, Ci | 10 | 477 | | X | Hillsborough County | Y | 0.82 | Y | 27.9218 | -82.1630 |
| 95 | Alafia River Corridor Preserve | HC | P, Ci | 5 | 46 | | X | ELAPP | Y | 0.08 | Y | 27.8756 | -82.1053 |
| 96 | Wood Lake/Somerset Lake | PoC | P, Ci | 14 | 1,151 | | X | City of Lakeland / Private | Y | 1.97 | Y | 28.0036 | -81.9311 |
| | Totals | | | | 58,424 | 27 | 48 | | | 100.00 | | | |


Pasco County
Polk County
Hillsborough County
Pinellas County
Manatee County
Old Tampa Bay
Middle Tampa Bay
Lower Tampa Bay
Upper Boca Ciega Bay
Lower Boca Ciega Bay
Hillsborough Bay
Terra Ceia Bay
Manatee River
Gulf of Mexico
0 5 10 Kilometers
Legend
Basis I Colonies
Post Basis I Colonies
Abandoned Colonies
Tampa Bay Watershed Basins
Audubon OF FLORIDA

**Copy of the Snowy egret BSR draft report that was sent out for peer review**

**Biological Status Review**
**for the Snowy Egret**
**(*Egretta thula)***

## EXECUTIVE SUMMARY

The Florida Fish and Wildlife Conservation Commission (FWC) directed staff to evaluate all species listed as Threatened or Species of Special Concern as of September 1, 2010. Public information on the status of the snowy egret was sought from September 17, 2010 to November 1, 2010. The three member biological review group met on November 3 – 4, 2010. Group members were James A. Rodgers (FWC lead), Peter C. Frederick (University of Florida), and Mike Cook (South Florida Water Management District). In accordance with rule 68A-27.0012 F.A.C, the Snowy Egret Biological Review Group was charged with evaluating the biological status of the snowy egret using criteria included in definitions in 68A-27.001(3), F.A.C. and following the protocols in the *Guidelines for Application of the IUCN Red List Criteria at Regional Levels Version 3.0 (2003)* and *Guidelines for Using the IUCN Red List Categories and Criteria Version 8.1 (2010)*. Please visit http://myfwc.com/WILDLIFEHABITATS/imperiledSpp_listingprocess.htm to view the listing process rule and the criteria found in the definitions.

The Biological Review Group concluded from the biological assessment that the snowy egret no longer meets criteria for listing. Based on the literature review, information received from the public, and the biological review findings, FWC staff recommends the snowy egret does not meet the criteria for listing as state threatened.

This work was supported by a Conserve Wildlife Tag grant from the Wildlife Foundation of Florida.

## BIOLOGICAL INFORMATION

**Taxonomic Classification** – Snowy egrets (*Egretta thula*) are members of the Family Ardeidae, which include other egrets, herons, and bitterns. Some authorities recognize two subspecies, the nominate *E. t. thula* and *E. t. brewsteri* (Parsons and Master 2000). The breeding range of the former is eastern North America, south through Central America, and all of South America. The latter subspecies breeds in western North America and Baja California (Parsons and Master, 2000). Previously, the species was placed in the monotypic genus *Leucophoyx*.

**Geographic Range and Distribution** – Snowy egrets are found throughout the western hemisphere (Parsons and Master 2000). The breeding range of the species extends along the coastlines and interior freshwater wetlands of the U.S. south to South America, with some breeding suspected as far north as Nova Scotia on the Atlantic coast (Parsons and Master 2000). Snowy egrets occur throughout Florida but become rarer in the western panhandle region (Runde 1991, Kale et al. 1992, Gawlik 1999, Rodgers et al. 1999, Frederick and Ogden 2001, Florida Fish and Wildlife Conservation Commission 2003, Drugger et al. 2005, Cook and Kobza 2009).

The population estimate for snowy egrets is >143,000 individuals in North America (Kushlan et al. 2002, IUCN 2010).

**Life History References** – Rodgers et al. 1996, Smith 1997, Parsons and Master 2000, Frederick and Ogden 2001, Gawlik 2002, Hoyer et al. 2005, Master et al. 2005.

**BIOLOGICAL STATUS ASSESSMENT**

**Threats** – Snowy egret populations suffered huge losses during the plume trade of the late 1800s and early 1900s, but populations rebounded following hunting and trade regulations (Rodgers et al. 1996, Parsons and Master 2000, Kushlan et al. 2002, Hunter et al. 2006). Current threats to the species are not well understood, but coastal development, recreational disturbance at foraging and breeding sites, environmental degradation, human disturbance, and increased pressure from predators are primary concerns (Rodgers et al. 1996, Kushlan et al. 2002, Stolen 2003). Similar to other wading birds that depend on fragile estuaries and wetlands for foraging and breeding, snowy egrets are at risk of exposure to persistent contaminants such as heavy metals and pesticides (Rodgers 1997, Spalding et al. 1997). Snowy egrets compete for nesting sites with growing numbers of cattle egrets, which can be aggressively territorial at colony sites, but the relationship to productivity is not well understood (Parsons and Master, 2000). Other potential threats to snowy egret populations are alterations to the hydrology of foraging areas, and oil spill impacts to critical breeding, foraging and roosting sites.

**Statewide Population Assessment** – Florida is home to both wintering snowy egrets and resident, breeding individuals (Mikuska et al. 1998, Rodgers et al. 1996). The number of breeding snowy egrets in the state rebounded following protection measures and hunting prohibitions enacted in the early 1900s. However, Runde (1991) noted a decrease in the snowy egret population in Florida from >51,000 individuals in the late 1970s to <14,000 in the late 1980s. Aerial surveys of wading bird populations have been shown to include error margins that raise questions about their validity and usefulness in determining trends (Rodgers et al. 2005, Frederick et al. 2006, Conroy et al. 2008, Green et al. 2008). Annual surveys of breeding pairs of snowy egrets in the Everglades region have indicated that nesting numbers for wading birds can by highly variable from season to season (Frederick and Ogden 2001). Nearly 2,830 pairs of snowy egrets nested in the three Water Conservation Areas and Everglades National Park in 2009 compared to a 3-year running average of 4,400 pairs for the 2005–2007 seasons (Cook and Kobza 2009).

**Status Review** - In our review of the snowy egret's status, the Biological Review Group made the following assumptions and conclusions:

- Generation time: Most birds breed at 2 years of age. Maximum known age of a recovered banded bird was 14 years. Maximum age probably is about 25 years of age. Calculation of generation time based on the mid-point of breeding to maximum age at death: 22-2=20/2=10 years with generation time estimated as 10+2=12 years of age. Therefore, time period for evaluation of change/trend analysis is 3x12=36 years or begin the time period at 1974.
- Extent of occurrence (EOO): The species mostly occurs throughout the entire state of Florida (total about 94,000 $km^2$ or 59,000 $miles^2$) except for western panhandle and extreme NC region of state (i.e., Columbia, Clay, and Union counties and adjacent

regions) where few colonies are known or llocated. In summary, the EOO is larger than the 20,000 $km^2$ delineation.

- Area of occupancy (AOO): Using the general premise that area of wetland typically makes up about 1/3 the total land area, the AOO is at least 16,000 $km^2$ or 10,000 $miles^2$.

- Quality and status of wading bird survey data: While a white-plumaged species, snowy egrets tend to nest under the tree canopy making them difficult to detect during aerial surveys using fixed wing aircraft (Rodgers et al. 2005, Frederick et al. 2006, Conroy et al. 2008), which is the primary method to survey wading birds over a large area such as the entire state. There also is the potential to not to be able to distinguish snowy egrets from other white-plumaged nesting associates when both species nest in the same colony. Rodgers et al (2006) found the probability of detecting any of the intermediate-sized day herons within a colony was <50%. Only ground counts (typical of surveys in the Everglades and Florida Bay) will result in accurate nest counts. Breeding Bird Survey (BBS) surveys may not accurately detect wading birds if the routes do not occur in wetlands to sufficiently detect these species. These short comings may result in undercount of actual species presence.

**Biological Status Review for the Snowy Egret**—The review group concluded the snowy egret no longer met any criteria for listing. See Table 1 for details.

**Regional Application**—The review group concluded there was no change in the recommendation for the snowy egret. See Table 2 for details.

## LISTING RECOMMENDATION

Staff recommends that the snowy egret be removed from the list as it does not meet any of the criteria for listing as described in 68A-27.001(3) F.A.C.

## SUMMARY OF THE INDEPENDENT REVIEW

To be added later.

## LITERATURE CITED

Conroy, M. J., J. T. Peterson, O. L. Bass, C. J. Fonnesbeck, J. E. Howell, C. T. Moore and J. P. Runge. 2008. Sources of variation in detection of wading birds from aerial surveys in the Florida Everglades. Auk 125: 731–743.

Cook, M. I., and M. Kobza (Editors). 2009. South Florida Wading Bird Report, Volume 15. South Florida Water Management District, Everglades Division. West Palm Beach, Florida.

Dugger, B. D., S. L. Melvin, and R. S. Finger. 2005. Abundance and community composition of waterbirds using the channelized Kissimmee River floodplain, Florida. Southeastern Naturalist 4: 435-446.

Florida Fish and Wildlife Conservation Commission. 2003. Florida's breeding bird atlas: A collaborative study of Florida's birdlife. http://myfwc.com/bba/docs/bba_SNEG.pdf (Accessed 10/13/2010).

Frederick, P. C., and J. C. Ogden. 2001. Pulsed breeding of long-legged wading birds and the importance of infrequent severe drought conditions in the Florida Everglades. Wetlands 21: 484-491.

Frederick, P. C., J. A. Heath, R. Bennetts, and H. Hafner. 2006. Estimating nests not present at the time of breeding surveys: an important consideration in assessing nesting populations. Journal of Field Ornithology 77: 212-219.

Gawlik, D.E. (Editor). 1999. South Florida Wading Bird Report, Volume 5, Issue 1. South Florida Water Management District, Everglades System Research Division. West Palm Beach, Florida.

Gawlik, D. E. 2002. The effects of prey availability on the numerical response of wading birds. Ecological Monographs 72: 329-346.

Green, M. C., M. C. Luent, T. C. Michot, C. W. Jeske, and P. L. LeBerg. 2008. Comparison and assessment of aerial and ground estimates of waterbird colonies. Journal of Wildlife Management 72: 697-706.

Hoyer, M. V., S. K. Notestein, T. K. Frazer, and D. E. Canfield, Jr. 2005. A comparison between aquatic birds of lakes and coastal rivers in Florida. Hydrobiologia 567: 5–18.

Hunter, W. C., W. Golder, S. L. Melvin, and J. A. Wheeler. 2006. Southeast United States regional waterbird conservation plan. U.S. Fish and Wildlife Service, Atlanta, Georgia.

IUCN. 2010. International Union for Conservation of Nature and Natural Resources. The IUCN Red List of Threatened Species. http://www.iucnredlist.org/apps/redlist/details/144666/0 (Accessed 10/13/2010).

Kale, H. W., II, B. Pranty, B. M. Stith, and C. W. Biggs. 1992. The atlas of the breeding birds of Florida. Final Report. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.

Kushlan, J. A., M. J. Steinkamp, K. C. Parsons, J. Capp, M. A. Cruz, M. Coulter, I. Davidson, L. Dickson, N. Edelson, R. Elliot, R. M. Erwin, S. Hatch, S. Kress, R. Milko, S. Miller, K. Mills, R. Paul, R. Phillips, J. E. Saliva, B. Syderman, J. Trapp, J. Wheeler, and K. Wohl. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1. Waterbird Conservation for the Americas. Washington, D.C.

Master, T. L., J. K. Leiser, K. A. Bennett, J. K. Bretsch, and H. J. Wolfe. 2005. Patch selection by snowy egrets. Waterbirds 28: 220-224.

Mikuska, T., J. A. Kushlan, and S. Hartley. 1998. Key areas for wintering North American herons. Colonial Waterbirds 21: 125-134.

Parsons, K. C., and T. L. Master. 2000. Snowy Egret (*Egretta thula*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/489 (Accessed 10/13/2010).

Rodgers, J. A., Jr., P. S. Kubilis, S. A. Nesbitt, M. F. Delany, R. K. Felix, Jr., J. Swain, K. T. Bowman, and J. B. Dodge. 1999. Atlas of breeding sites for colonial waterbirds in Florida during 1999. Final report. Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida.

Rodgers, J. A., Jr., H. W. Kale, II, and H. T. Smith, editors. 1996. Snowy Egret. Pages 420-431 *in* Rare and Endangered Biota of Florida, Volume V. Birds. University Press of Florida, Gainesville, Florida.

Rodgers, J.A., Jr. 1997. Pesticide and heavy metal levels of waterbirds in the Everglades agricultural area of south Florida. Florida Field Naturalist 25: 33-41.

Rodgers, J. A., Jr., P. S. Kubilis, and S. A. Nesbitt. 2005. Accuracy of aerial surveys of waterbird colonies. Waterbirds 28: 230-237.

Runde, D.E. 1991. Trends in wading bird nesting populations in Florida 1976–1978 and 1986–1989. Final performance report, Nongame Wildlife Program. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.

Smith, J. P. 1997. Nesting season food habits of 4 species of herons and egrets at Lake Okeechobee, Florida. Colonial Waterbirds 20: 198-220.

Spalding, M. G., C. K. Steible, S. F. Sundlof, and D. J. Forrester. 1997. Metal and organochlorine contaminants in tissues of nestling wading birds (Ciconiiformes) from southern Florida. Florida Field Naturalist 25: 42-50.

Stolen, E. D. 2003. The effects of vehicle passage on foraging behavior of wading birds. Waterbirds 26: 429-436.

| Biological Status Review Information<br>Findings | Species/taxon: | Snowy Egret |
|---|---|---|
| | Date: | 11/04/10 |
| | Assessors: | Rodgers, Cook, Frederick |
| | Generation length: | 12 years |

| Criterion/Listing Measure | Data/Information | Data Type* | Criterion Met? | References |
|---|---|---|---|---|
| *Data Types - observed (O), estimated (E), inferred (I), suspected (S), or projected (P). Criterion met - yes (Y) or no (N). | | | | |
| **(A) Population Size Reduction**, ANY of | | | | |
| (a)1. An observed, estimated, inferred or suspected population size reduction of at least 50% over the last 10 years or 3 generations, whichever is longer, where the causes of the reduction are clearly reversible and understood and ceased[1] | Since 1974, numbers have fluctuated. Numbers range from 1,500 nests (3,000 individuals) in early 1990s to about 3,000 nests (6,000 individuals) during the 2000s in ENP/Everglades. Probably a minimum of 20,000 individuals in Florida. | O | N | Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis. |
| (a)2. An observed, estimated, inferred or suspected population size reduction of at least 30% over the last 10 years or 3 generations, whichever is longer, where the reduction or its causes may not have ceased or may not be understood or may not be reversible[1] | 1988-89 surveys suggest decreases from previous survey in 1970s but was categorical survey and the decline probably has occurred but not as much as 30%. | O | N | Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis. |
| (a)3. A population size reduction of at least 30% projected or suspected to be met within the next 10 years or 3 generations, whichever is longer (up to a maximum of 100 years) [1] | 2010 to 2046 time period: two major possible threats to the species are sea level rise (=reduction in freshwater marsh habitat along coasts) and reduced freshwater discharge into coastal estuaries that will reduce primary estuarine foraging habitat. Less rainfall will have impacts on freshwater habitats through Florida and discharge to estuarine habitats, both which will increase salinity and probably result in reduced quality of foraging sites. The degree of impact of these variables probably will negative but the amount is difficult to predict at this time. | I | N | No modeling or sources to support these threats or suspicions. While sea level rise may reduce the available freshwater foraging habitat the percent change on the species can't be determined at this time. |
| (a)4. An observed, estimated, inferred, projected or suspected population size reduction of at least 30% over any 10 | See A3 above. | I | N | Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend |

| | | | | |
|---|---|---|---|---|
| year or 3 generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased or may not be understood or may not be reversible.[1] | | | | analysis. |
| [1] based on (and specifying) any of the following: (a) direct observation; (b) an index of abundance appropriate to the taxon; (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat; (d) actual or potential levels of exploitation; (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites. | | | | |
| **(B) Geographic Range**, EITHER | | | | |
| (b)1. Extent of occurrence < 20,000 $km^2$ (7,722 $mi^2$ ) OR | Probably >45,000 $miles^2$. | S | N | See EOO on notes tab. |
| (b)2. Area of occupancy < 2,000 $km^2$ (772 $mi^2$ ) | Probably >10,000 $miles^2$. | S | N | See AOO on notes tab. |
| AND at least 2 of the following: | | | | |
| a. Severely fragmented or exist in ≤ 10 locations | | | | |
| b. Continuing decline, observed, inferred or projected in any of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent, and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals | | | | |
| c. Extreme fluctuations in any of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals | | | | |
| **(C) Population Size and Trend** | | | | |
| Population size estimate to number fewer than 10,000 mature individuals AND EITHER | Probably a minimum of 20,000 individuals in Florida. | E | N | Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis. |
| (c)1. An estimated continuing decline of at least 10% in 10 years or 3 generations, whichever is longer (up to a maximum of 100 years in the future) OR | | | | |

| | | | | |
|---|---|---|---|---|
| (c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following: | | | | |
| a. Population structure in the form of EITHER | | | | |
| (i) No subpopulation estimated to contain more than 1000 mature individuals; OR | | | | |
| (ii) All mature individuals are in one subpopulation | | | | |
| b. Extreme fluctuations in number of mature individuals | | | | |
| **(D) Population Very Small or Restricted**, EITHER | | | | |
| (d)1. Population estimated to number fewer than 1,000 mature individuals; OR | Probably a minimum of 20,000 individuals in Florida. | E | N | Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis. |
| (d)2. Population with a very restricted area of occupancy (typically less than 20 $km^2$ [8 $mi^2$]) or number of locations (typically 5 or fewer) such that it is prone to the effects of human activities or stochastic events within a short time period in an uncertain future | See A1, B1, and B2 above. | E | N | Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis. |
| **(E) Quantitative Analyses** | | | | |
| e1. Showing the probability of extinction in the wild is at least 10% within 100 years | Not available. | | N | |

| Initial Finding (Meets at least one of the criteria OR Does not meet any of the criteria) | Reason (which criteria are met) |
|---|---|
| Does not meet any criteria. | |
| | |
| Is species/taxon endemic to Florida? (Y/N) | N |
| If Yes, your initial finding is your final finding. Copy the initial finding and reason to the final finding space below. If No, complete the regional assessment sheet and copy the final finding from that sheet to the space below. | |

| | |
|---|---|
| Final Finding (Meets at least one of the criteria OR Does not meet any of the criteria) | Reason (which criteria are met) |
| Does not meet any criteria. | |

| | | |
|---|---|---|
| 1 | Species/taxon: | Snowy Egret |
| 2 | Biological Status Review Information<br>Date: | 11/4/10 |
| 3 | Regional Assessment<br>Assessors: | Rodgers, Cook, Frederick |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | Initial finding | Supporting Information |
| 9 | | |
| 10 | 2a. Is the species/taxon a non-breeding visitor? (Y/N/DK). If 2a is YES, go to line 18. If 2a is NO or DO NOT KNOW, go to line 11. | No, breeds in Florida. |
| 11 | 2b. Does the Florida population experience any significant immigration of propagules capable of reproducing in Florida? (Y/N/DK). If 2b is YES, go to line 12. If 2b is NO or DO NOT KNOW, go to line 17. | Do not know. |
| 12 | 2c. Is the immigration expected to decrease? (Y/N/DK). If 2c is YES or DO NOT KNOW, go to line 13. If 2c is NO go to line 16. | |
| 13 | 2d. Is the Florida population a sink? (Y/N/DK). If 2d is YES, go to line 14. If 2d is NO or DO NOT KNOW, go to line 15. | |
| 14 | If 2d is YES - Upgrade from initial finding (more imperiled) | |
| 15 | If 2d is NO or DO NOT KNOW - No change from initial finding | |
| 16 | If 2c is NO or DO NOT KNOW- Downgrade from initial finding (less imperiled) | |
| 17 | If 2b is NO or DO NOT KNOW - No change from initial finding | No change. |
| 18 | 2e. Are the conditions outside Florida deteriorating? (Y/N/DK). If 2e is YES or DO NOT KNOW, go to line 24. If 2e is NO go to line 19. | |
| 19 | 2f. Are the conditions within Florida deteriorating? (Y/N/DK). If 2f is YES or DO NOT KNOW, go to line 23. If 2f is NO, go to line 20. | |
| 20 | 2g. Can the breeding population rescue the Florida population should it decline? (Y/N/DK). If 2g is YES, go to line 21. If 2g is NO or DO NOT KNOW, go to line 22. | |
| 21 | If 2g is YES - Downgrade from initial finding (less imperiled) | |
| 22 | If 2g is NO or DO NOT KNOW - No change from initial finding | |
| 23 | If 2f is YES or DO NOT KNOW - No change from initial finding | |
| 24 | If 2e is YES or DO NOT KNOW - No change from initial finding | |
| 25 | | |
| 26 | Final finding | |

**Additional notes**

**Generation time**: Most birds breed at 2 years of age. Maximum known age of recovered banded bird was 14 years. Maximum age probably is about 25 years of age. Calculation of generation time based on the mid-point of breeding to maximum age at death: 22-2=20/2=10, generation time is 10+2=12 years of age. Therefore, time period for evaluation of change/trend analysis is 3x12=36 years or begin the period at 1974.

**Extent of occurrence**: Mostly the entire state of Florida (total 59,000 miles2) except for western panhandle and extreme NC region of state (i.e., Columbia, Clay counties region) where few colonies are known/located. In summary, the EOO is still larger than the 20,000 km2 delination.

**Area of occupancy**: Using the general presence of wetlands typically makes up about 1/3 the total area, the AOO is at least 10,000 miles2.

**Quality and status of wading bird survey data**: While a white-plumaged species, snowy egrets tend to nest under the tree canopy making them difficult to detect during aerial surveys using fixed wing aircraft, which is the primary method to survey wading birds over a large area such as the entire state. There also is the potential to not to be able to separate snowy and cattle egrets when both species nest in the same colony. Rodgers et. al (2006) found the probability of detecting any of the intermediate-sized day herons within a colony was <50%. Only ground counts (typical of surveys in the Everglades and Florida Bay) will result in accurate nest counts. Breeding Bird Survey (BBS) surveys may not accurately detect wading birds if the routes do not occur in wetlands to sufficiently detect these species. These short comings may result in undercount of actual species presence.

**APPENDIX 1: Biological sketches for the Biological Review Group.**

**Mark I. Cook** has a M.S. in Ecology from the University of Durham, UK and Ph.D. in Ecology from Glasgow University, UK. He is a senior environmental scientist with the South Florida Water Management District. His expertise is in the behavioral ecology, conservation biology, habitat quality and reproductive success, and restoration ecology related to wading bird foraging and reproductive performance especially applied to hydrologic management and restoration issues in the Everglades. He has published numerous papers on the foraging ecology of wading birds.

**Peter C. Frederick** received a Ph.D. in Zoology from the University of North Carolina. He is Research Professor at the University of Florida. His expertise is in the areas of wetland ecology, ecotoxicology, and avian ecology of wading birds, especially with the wood stork, great egrets, and white ibis and the Everglades. He has published numerous papers on waterbird ecology, pesticide contamination, population biology, and habitat requirements of wading birds in Florida.

**James A. Rodgers** received a M.S. from Louisiana State University and a Ph.D. from the University of South Florida. Since joining the FWC in 1980, he has worked on snail kites, double-crested cormorants, several species of wading birds including little blue herons and wood storks, development of buffer distances for waterbirds, pesticide contamination, and population genetics of birds. He was elected a Fellow of the American Ornithologist Union in 2009 and has published numerous papers on the breeding and nesting ecology of waterbirds.

**APPENDIX 2: Summary of letters and emails received during the solicitation of information from the public period of September 17, 2010 through November 1, 2010.**

Most information received by FWC staff was anecdotal and consisted of general observations of presence or absence. Information from Ann Hodgson (Tampa Bay Sanctuaries, NAS) for the status of the species in the Tampa Bay region was used in the review of the species by the BSR panel on November 3-4, 2010.

**APPENDIX 3. Information and comments received from independent reviewers.**

To be added later.