

Supplemental Information for the Little Blue Heron

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

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Peer review #1 from Dr. Dale Gawlick

From: Dale E. Gawlik
To: Imperiled
Subject: Status Review LBHE
Date: Thursday, January 27, 2011 4:47:54 PM

Dear Jim,

I have finished reviewing the Biological Status Review for the Little Blue Heron (*Egretta caerulea*). I agree with the findings of the document. The authors rightly note that nesting data are pretty sparse for this species; however, the document includes all the relevant sources for which I am familiar. The reasoning behind the recommendation also seems justified given the data. The only other comment I have, which I also raised in the Snowy Egret status review, is to try to find a better estimate of the wetland area for the state.

Best regards.
Dale Gawlik

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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

**Peer review #2 from Jaime Collazo**

**From:** Jaime A. Collazo  
**To:** Imperiled  
**Subject:** Little Blue Heron Review  
**Date:** Monday, January 17, 2011 9:20:25 PM

Dear Pam:

Many thanks for the opportunity to review the biological status packet for the Little Blue Heron. After reading the species' review, I concur with the assessment and recommendation by panel of experts. There is evidence to list the LBH as a State Threatened Species.

I have two comments/recommendations. First, evidence for listing is tenuous, based mostly on survey data. Detection issues are of greater concern for this species than for white-plumaged species. In view of the recommended status and sensitivity to detection probability biases, the FWC should 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, and as with egrets in general, 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 about 3-5 years. A state-wide habitat threat/risk analysis might be an appropriate proxy to assess species vulnerability.

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

### Peer review #3 from Michael Cheek

**From:** Cheek, Michael

**To:** Imperiled

**Cc:** Rodgers, James

**Date:** Thursday, January 06, 2011 2:47:14 PM

**Attachments:** TRHE and LBHE status review comments Cheek.docx

Please find my attached comments regarding the species status reviews for both tricolored heron and little blue heron. I had initially only received the tricolored heron for review, but then in a second e-mail I received little blue heron as well, but they appeared very similar so I reviewed them both.

Please let me know if you have any questions.

Mike

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**Michael Cheek**

Staff Environmental Scientist

Lake and River Science Division

Restoration Sciences Department

South Florida Water Management District

3301 Gun Club Road

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Overall, both species (LBHE and TRHE) status reviews appear to have defensible logic and solid reasoning for their respective proposed listing recommendations.

Although data from the Kissimmee Division of the South Florida Water Management District is not suitable for statewide trend analysis of either species, the authors may want to consider the following abundance data from the Kissimmee River floodplain in central Florida to assist in estimating statewide numbers. Data collected from aerial surveys along the Kissimmee River show that small dark herons (LBHE and TRHE combined, excluding juv. little blue herons) averaged approximately 1.66 ( $\pm 0.19$  SE) birds/km<sup>2</sup> within the *restored* area (55 km<sup>2</sup> total) from 2001-2008 (SMDH densities were 1.12 ( $\pm 0.19$  SE) in the control area prior to restoration during the baseline period (1996-1998)).

If you extrapolate the restored value out to wetland habitat statewide (approximately 1/3 of 90,000 km<sup>2</sup>, or 29,997 km<sup>2</sup>) it is a rather large number, around 49,750 birds statewide. Roughly estimating that TRHE are at least 2x the population size of LBHE based on nesting numbers and spp. proportions in foraging flocks in south Florida, that would equal roughly 33,000 TRHE and 16,500 LBHE, assuming they were equally distributed throughout the state, which we know they are not.

It is unclear in the Area Occupied (AOO) under the Status Review sections at the bottom of both reviews where the 16,000 km<sup>2</sup> (25,000 km<sup>2</sup> for LBHE) area of occupied habitat came from for

TRHE, is this supposed to be 1/3 of total state area of 95,000 km<sup>2</sup> *minus* the western panhandle and north central counties? May need to clarify.

**Little blue heron status review comments**

-Change Mark Cook's name from "Mike" back to Mark in the first paragraph.

Also, under "Status Review", total land area of Florida is stated as 94,000 km<sup>2</sup> under TRHE, but 95,000 km<sup>2</sup> under LBHE.

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

**Email from Mark Rachal**

**From:** RACHAL, Mark

**To:** Imperiled

**Cc:** HODGSON, Ann

**Subject:** Little Blue Heron trends

**Date:** Tuesday, November 02, 2010 11:06:16 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 2003 of 522 nesting pairs and a general decrease in the number of birds going forward. Preliminary results from the 2010 surveys show a much lower total number of nesting pairs.

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

## **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 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 several 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. They are gone now.

**Email from Neil Langenberg**

**From:** Langenberg, Neil  
**To:** Imperiled  
**Subject:** Imperiled Species Report  
**Date:** Wednesday, October 20, 2010 7:43:47 AM  
**Attachments:** Report.doc  
FWC DATA1.xls

Please find two attachments pertaining to requested information about Florida's Imperiled Species/Biological Status Review.

Neil Langenberg  
Environmental Specialist  
Florida Department of Environmental Protection  
Charlotte Harbor Aquatic Preserves  
12301 Burnt Store Road  
Punta Gorda, Fl. 33955

## **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 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](mailto: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](mailto: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 peleciform 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<sup>th</sup> 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              | City of Pasadena                |                  | 0.00                    | N                         | 27.7431  | -82.7299  |
| 30            | Sunset Beach                   | BCB         | L         |             |           |                      | 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              | 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              | 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              | USFWS NWR                       | Y                | 0.00                    | Y                         | 27.6619  | -82.7178  |
| 42            | Listen Key NWR                 | BCB         | P, Ci     |             |           |                      | X              | USFWS NWR                       | Y                | 0.00                    | N                         | 27.6596  | -82.7179  |
| 43            | Sister Key                     | BCB         | P, Ci     |             |           |                      | X              | Florida / Pinellas County       |                  | 0.00                    | N                         | 27.6503  | -82.7312  |
| 44            | Ft. DeSoto Park                | LTB         | L, Ch     |             |           |                      | 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  |

*Populations of Colonial Waterbirds*

| 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/Fernan Bird Colony                      | HC          | P, Ci        | 8           | 74        |                      | X              | Private                                 | Y                | 0.13                    | Y                         | 27.9448  | -82.3417  |

*Populations of Colonial Waterbirds*

| 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); poss. 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.

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**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.

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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  |

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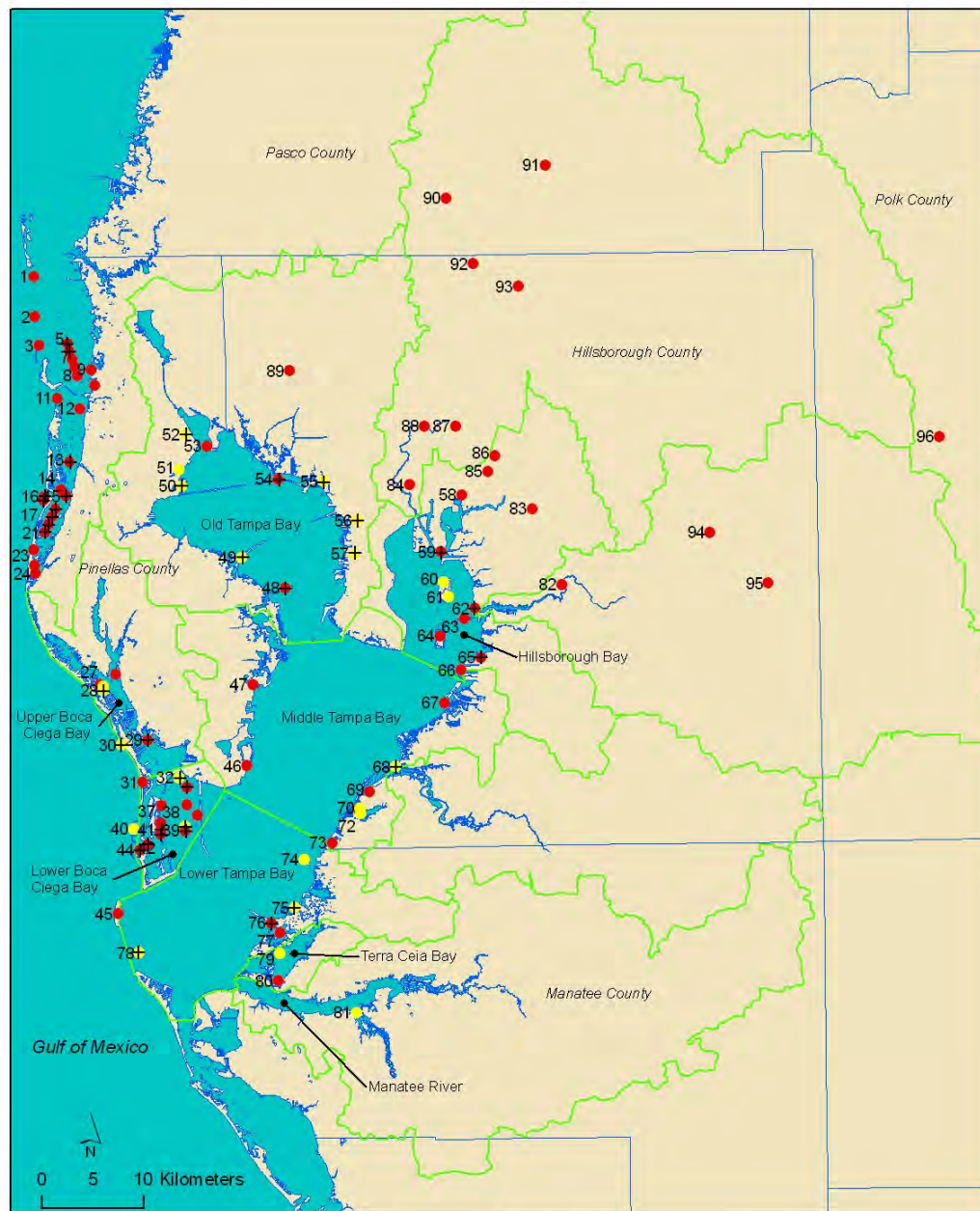
| Colony Number | Name                                 | Bay Segment | Taxa      | Species (n) | Pairs (n) | Abandoned after 1984 | New since 1984 | Ownership / Management                  | Protected status | Regional population (%) | Active within last 5 yrs? | Latitude | Longitude |
|---------------|--------------------------------------|-------------|-----------|-------------|-----------|----------------------|----------------|-----------------------------------------|------------------|-------------------------|---------------------------|----------|-----------|
| 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  |
| 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  |

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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 |
|---------------|--------------------------------------------|-------------|--------------|-------------|-----------|----------------------|----------------|-------------------------------------|------------------|-------------------------|---------------------------|----------|-----------|
| 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  |
| 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                 | TCB         | P, Ci        | 14          | 407       |                      | X              | FDEP Terra Ceia Aquatic             | Y                | 0.70                    | Y                         | 27.5285  | -82.6015  |

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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 |
|---------------|----------------------------------------------|-------------|-------|-------------|-----------|----------------------|----------------|----------------------------|------------------|-------------------------|---------------------------|----------|-----------|
|               | Bay Little Bird Key                          |             |       |             |           |                      |                | Preserve / FCIS            |                  |                         |                           |          |           |
| 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                  |                           |          |           |



 **Audubon** OF FLORIDA

**Legend**

- Basis I Colonies
- Post Basis I Colonies
- + Abandoned Colonies
- Tampa Bay Watershed Basins

## Copy of the Little Blue Heron BSR draft report that was sent out for peer review

### Biological Status Review for the Little Blue Heron (*Egretta caerulea*)

#### 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 little blue heron was sought from September 17, 2010 to November 1, 2010. A 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 Little Blue Heron Biological Review Group was charged with evaluating the biological status of the little blue heron using criteria included in definitions in 68A-27.001(3) 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](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 little blue heron met the population size reduction criteria A2, A3, and A4 for listing. Based on the literature review, information received from the public, and the biological review findings, FWC staff recommends listing the little blue heron as state threatened.

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

#### BIOLOGICAL INFORMATION

**Taxonomic Classification** – Little blue herons (*Egretta caerulea*) are members of the Family Ardeidae, along with egrets, bitterns and other herons. Despite the species' large range, no subspecies are formally recognized. Previously the species was placed in the monotypic genus *Florida*.

**Geographic Range and Distribution** – The breeding range of the little blue heron extends along the Atlantic coast from southern Maine to Florida, with larger populations from South Carolina southward (Rodgers and Smith 1995). The species occurs both interior and along the coasts in the Southeast U.S., along the Gulf of Mexico coast from Florida to Texas and into Mexico, and interior throughout the Mississippi River Valley. Breeding also occurs from southern California through Baja California along the Pacific coast, and into the West Indies, Central America and northern South America. The species is widely distributed throughout Florida but generally is less common in colonies compared to other species of herons (Rodgers et al. 1996). Little blue herons tend to be found most frequently in freshwater habitats compared to

other heron species (Rodgers et al. 1996, Smith 1997). There is an influx of migrant little blue herons into Florida during the winter (Kikuska et al. 1998,

**Life History References** –Kale et al. 1992, Rodgers and Smith 1995, Rodgers et al. 1996, Dugger et al. 2005, Hoyer et al. 2006, IUCN 2009, Lantz et al. 2010.

## **BIOLOGICAL STATUS ASSESSMENT**

**Threats** – Similar to other colonial waterbirds, little blue heron populations suffered tremendous losses from egg and plume hunting prior to regulations enacted in the early 1900s (Rodgers et al. 1996). Current threats to the species are not well understood, but coastal development, disturbance at foraging and breeding sites, environmental degradation of foraging habitat and reduced prey availability, and impacts of predators are concerns. Additional threats include exposure to pesticides, heavy metals and other contaminants at the local level, adverse weather events at nesting colony locations, parasitic infection, and alteration to the hydrology of wetland habitats (Rodgers and Smith 1995, Rodgers et al. 1996, Spalding et al. 1997, Spahn and Sherry 1999, Hunter et al. 2006). The impact of climate change (sea level rise and lower rainfall) is uncertain but would result in more marine habitat but less freshwater and estuarine (i.e., less freshwater discharge) habitat along regions of both coasts. Competition for nesting habitat with cattle egrets has also been suggested as a potential contributor to reduced productivity in little blue herons in the past (Rodgers and Smith 1995, Rodgers et al. 1996, Hunter et al. 2006). Despite having a widespread distribution, the little blue heron was one of fourteen species identified as a regional priority species in need of Critical Recovery or Immediate Management in the 2006 Southeast U.S. Waterbird Conservation Plan (Hunter et al. 2006).

**Statewide Population Assessment** – Little blue heron populations gradually increased through the 20<sup>th</sup> century as a result of increased protection measures and hunting prohibitions. Runde (1991) documented a possible decline in the Florida population from >20,000 individuals in the late 1970s to <17,000 birds in the late 1980s while Rodgers et al. (1999) found a decrease in number of breeding colonies and smaller colonies in 1999. However, because of its dark plumage and tendency to nest under the nesting canopy of trees, it is difficult to survey for little blue herons during aerial surveys (Rodgers et al. 2005, Frederick et al. 2006, Conroy et al. 2008). Although there has not been a statewide survey for this species since 1999, wading birds are monitored and surveyed regularly in south Florida and the Everglades region (Cook et al. 2009, Lantz et al. 2010). The largest colonies of little blue herons were identified in Water Conservation Areas 2 and 3 as supporting >2,000 nesting pairs in 2009 (Cook and Kobza 2009). There are indications that the species has exhibited a slow but steady decline since the latter 1990s, especially in south Florida (Florida Fish and Wildlife Conservation Commission 2003). See Table 1 for complete details for the status of the little blue heron.

**Biological Status Review for the little blue heron**—The review group concluded the little blue heron met the population size reduction criteria A2, A3, and A4. See Table 1 for details.

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

## **LISTING RECOMMENDATION**

Staff recommends that the little blue heron be listed as a Threatened species because the subspecies meets criteria for listing as described in 68A-27.001(3), F. A. C.

## **SUMMARY OF THE INDEPENDENT REVIEW**

To be added later.

DRAFT



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**Table 1. Biological status review information findings for the little blue heron in Florida.**

|                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    |                |                                                                                                                       |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------|-----------------------------------------------------------------------------------------------------------------------|--|
| Biological Status Review Information Findings                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Species/taxon:     |                | Little Blue Heron                                                                                                     |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Date:              |                | 11/04/10                                                                                                              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Assessors:         |                | Rodgers, Frederick, Cook                                                                                              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    |                |                                                                                                                       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 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 <sup>1</sup>                                                                                                                                                    | Since 1974, numbers have fluctuated among years. Numbers appear to show a slow decline from 1974 in south Florida but the decline is not as great as 50%.                                                                                                                                                                                                                                                                                                                                                     | 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 <sup>1</sup>                                                                                                                               | Based on the BBS data and trends in the everglades, there has been at least a 30% decline since 1974.                                                                                                                                                                                                                                                                                                                                                                                                         | O                  | Y              | 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) <sup>1</sup>                                                                                                                                                                                                                  | 2010 to 2046 time period: expect continued slow decline referred to in A2 above. In addition, two major threats 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. | I                  | Y              |                                                                                                                       |  |
| (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. <sup>1</sup> | FWC 1999 survey indicated a tendency to nest in smaller and fewer colonies since 1978-79 survey. Analysis indicates about a 37% decline over 3 generations or 1.1%/year decrease and a possibility of 50% reduction in next 3 generation time period.                                                                                                                                                                                                                                                         | I                  | Y              | Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis. |  |
| <sup>1</sup> 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>(B) Geographic Range, EITHER</b>                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                      |   |   |                                                                                                                       |
| (b)1. Extent of occurrence < 20,000 km <sup>2</sup> (7,722 mi <sup>2</sup> )<br>OR                                                                                                                                                                            | Probably >45,000 miles <sup>2</sup> .                                                                                                                                                                                                                                | O | N | See EOO in notes tab.                                                                                                 |
| (b)2. Area of occupancy < 2,000 km <sup>2</sup> (772 mi <sup>2</sup> )<br>AND at least 2 of the following:                                                                                                                                                    | Probably >10,000 miles <sup>2</sup> .                                                                                                                                                                                                                                | O | N | See AOO in notes tab.                                                                                                 |
| 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                                                                             |                                                                                                                                                                                                                                                                      |   |   |                                                                                                                       |
| <b>(C) Population Size and Trend</b>                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                      |   |   |                                                                                                                       |
| Population size estimate to number fewer than 10,000 mature individuals AND EITHER                                                                                                                                                                            | Average 2000-3000 birds in Everglades, but data for 3 generations are lacking elsewhere in state. We don't know what the statewide population currently is but it probably is between 5,000 (all of south Florida, including the everglades) and 15,000 individuals. | I | 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                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                      |   |   |                                                                                                                       |
| <b>(D) Population Very Small or Restricted, EITHER</b>                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                      |   |   |                                                                                                                       |
| (d)1. Population estimated to number fewer than 1,000 mature individuals; OR                                                                                                                                                                                  | Minimum colony numbers and relative sizes indicate at least 5,000 individuals in south Florida.                                                                                                                                                                      | O | 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 <sup>2</sup> [8 mi <sup>2</sup> ]) 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 | Minimum number of nesting colonies in 1999 was about 60 sites widely distributed around state.                 | O | N | FWC 1999 statewide survey data.                                                                                       |
| <b>(E) Quantitative Analyses</b>                                                                                                                                                                                                                                                                      |                                                                                                                |   |   |                                                                                                                       |
| e1. Showing the probability of extinction in the wild is at least 10% within 100 years                                                                                                                                                                                                                | Not available for species on statewide basis. BBS and ENP/Everglades trend analysis indicate a downward trend. |   | N | Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis. |
|                                                                                                                                                                                                                                                                                                       |                                                                                                                |   |   |                                                                                                                       |
| Initial Finding (Meets at least one of the criteria OR Does not meet any of the criteria)                                                                                                                                                                                                             | Reason (which criteria are met)                                                                                |   |   |                                                                                                                       |
| Meets at least one of the criteria.                                                                                                                                                                                                                                                                   | A2, A3, A4                                                                                                     |   |   |                                                                                                                       |
|                                                                                                                                                                                                                                                                                                       |                                                                                                                |   |   |                                                                                                                       |
| Is species/taxon endemic to Florida? (Y/N)                                                                                                                                                                                                                                                            | No                                                                                                             |   |   |                                                                                                                       |
| 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)                                                                                |   |   |                                                                                                                       |
| Meets at least one of the criteria.                                                                                                                                                                                                                                                                   | A2, A3, A4                                                                                                     |   |   |                                                                                                                       |

**Table 2. Biological status review information for the regional assessment for the little blue heron.**

|    |                                                                                                                                                                                                           |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Biological Status Review<br>Information<br>Regional Assessment                                                                                                                                            | <u>Species/taxon:</u> | Little Blue Heron                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 2  |                                                                                                                                                                                                           | <u>Date:</u>          | 11/4/10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 3  |                                                                                                                                                                                                           | <u>Assessors:</u>     | Rodgers, Frederick, Cook                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 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, breeding species 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. Though little information is available for parameters regarding movement into Florida, we suspect it occurs or can occur albeit at some low rate. We also suspect that any rescue effect of the Florida population from outside state regions will not be adequate to offset the decrease currently occurring in Florida (see criterion A2) as indicated by the steady decline in the Florida population. We also infer that the out of state populations may not be adequate to reverse the current decline. |
| 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 | finding       | If 2f is YES or DO NOT KNOW - No change from initial |           |
| 24 | finding       | If 2e is YES or DO NOT KNOW - No change from initial |           |
| 25 |               |                                                      |           |
| 26 | Final finding |                                                      | No change |

**Status Review Notes** - In our review of the status of the little blue heron 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 old. Maximum age probably is about 22-25 years old and birds breed up to maximum age. Generation time is based on the mid-point of beginning breeding to maximum age at death:  $(22-2)/2=10$  years, with generation time as  $10+2=12$  years of age. Therefore, the time period for evaluation of a change/trend analysis is  $3 \times 12=36$  years or the beginning time is 1974.
- Extent of occurrence (EOO): The species mostly occurs throughout the entire state of Florida (total 95,000 km<sup>2</sup> or 59,000 miles<sup>2</sup>) except for extreme western panhandle and north-central region of state (i.e., Columbia, Clay and Union counties and adjacent region) where few colonies are known or located. In summary, the EOO is still larger than the 20,000 km<sup>2</sup> minimum area of concern.
- Area of occupancy (AOO): Using the general presence of wetlands typically makes up about 1/3 the total land area, the AOO is at least 25,000 km<sup>2</sup> or 15,000 miles<sup>2</sup>.
- Quality and status of wading bird survey data: Little blue herons are dark-plumaged species that 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. Rodgers et al. (2006) found the probability of detecting any of the dark-plumaged 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 presence of the species.

## **APPENDIX 1. Biographies of the members of the Little Blue Heron 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 in West Palm Beach. His expertise is 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 egret, 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.

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### **APPENDIX 3. Information and Comments Received from Independent Reviewers.**

To be completed later.

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