

# The Diamondback Terrapin in Alabama: Conservation Status and Strategy for Recovery



DCNR

# Collaborators and Funding



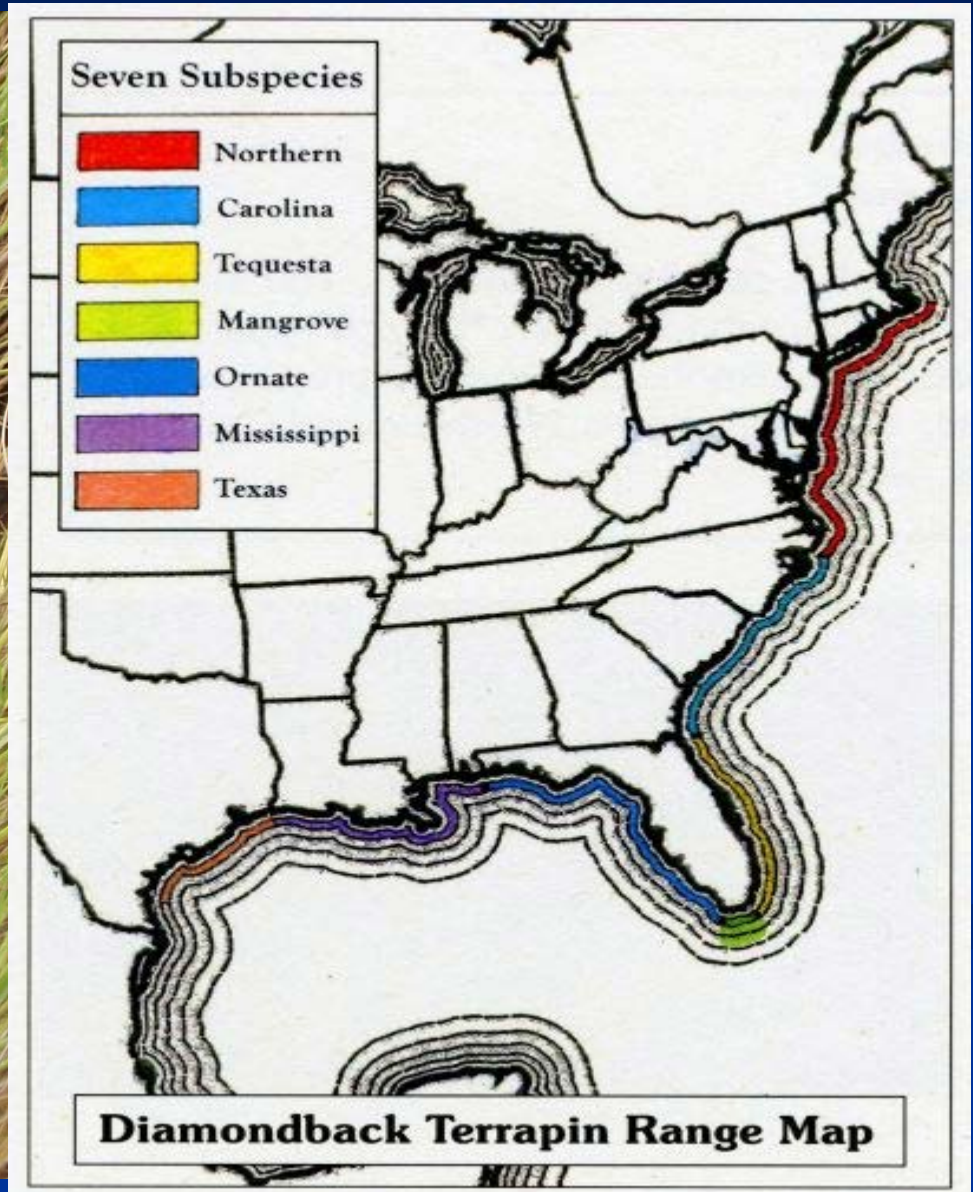
- Alabama Department of Conservation and Natural Resources
- The Nature Conservancy
- Alabama Center for Estuarine Studies

DCNR





# Diamondback Terrapin Range and Subspecies





# Diamondback Terrapin

## *Biologically Unique*

- Only turtle in North America that exclusively inhabits estuarine waters and salt marshes

Regional Importance: Occurs in Salt Marshes in the Northern Gulf of Mexico





# Diamondback Terrapin

## *Biologically Important*

- Potential Keystone Species That Helps Stabilize The Salt Marsh Habitat
  - Higher Trophic Level Predator
  - Decrease in terrapins can result in overabundance of certain invertebrates can cause a shift in the plant and invertebrate balance in the salt marsh (Silliman and Zieman, 2001; Silliman et al., 2005; Gustafson et al 2006, Tucker et al., 1995)



# General Biology and Ecology

- Nest several times in Spring and Summer: Start of May Through the July
- Digs an egg chamber
- Lays approximately 5 to 14 eggs
- Incubation lasts 40-60 days depending on temperature
- (TSD)
- Hatchlings enter marsh





# Historically They Have a Rich Cultural Heritage as a Valuable Marine Resource

## Diamondback Terrapin Stew, Chesapeake Bay Style

Recipe #283841

Turtle soup or stew is no longer a popular item on today's menus, but it once graced the tables of the rich and powerful. From the Southern chapter of the United States Regional Cookbook, Culinary Arts Institute of Chicago, 1947. Cooking time is approximate.

by Molly53

2½ hours | 20 min prep

SERVES 6 -8

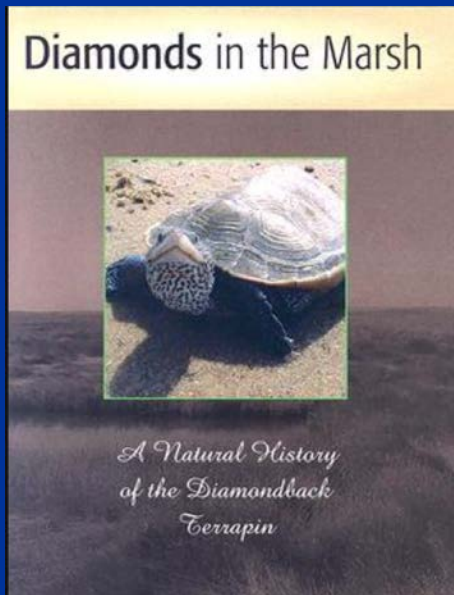
3 large terrapins (turtles)  
6 eggs, hard-cooked  
3 tablespoons flour  
1/2 teaspoon ground nutmeg  
3 tablespoons lemon juice (fresh is best)  
1 tablespoon lemon rind, grated  
1 onion, peeled and sliced  
2 stalks celery, diced  
1 tablespoon worcestershire sauce  
1/2 cup cream  
2 cups sherry wine  
salt and pepper, to taste  
3 cups chicken stock or vegetable stock  
hot milk, if necessary

Terrapin have been utilized for several centuries for making terrapin stew

1. Drop live terrapin into boiling water and let stand for 5 minutes.
2. Remove from water; rub skin off feet, tail and head with a towel, drawing the head out with a skewer.
3. Clip off claws.
4. Scrub shell with boiling water; break apart with a cleaver or axe.
5. Remove meat and liver.
6. Discard heart, sandbag, entrails and gall bladder (taking caution not to break it as it's bitter).
7. Cut the liver in thin slices.
8. Take out eggs, remove film and set aside in cold water.
9. Mash yolks of eggs; add flour, nutmeg, lemon juice and rind.
10. Stir in 1 cup of soup stock.
11. Add onion, celery, terrapin and terrapin eggs and enough more stock to cover meat.
12. Cook in double boiler until meat falls from bones.
13. Remove bones, add worcestershire sauce, salt, pepper, chopped egg whites, cream, sherry and milk (if necessary).
14. Heat thoroughly and serve with toast.

# Historically They Have a Rich Cultural Heritage as a Valuable Marine Resource

“ [The terrapin] gets its name from Native American sources. In the 1600’s, it was called “torope” by Virginia Algonquians, “turepe” by the Abenakis, and “turpen” by the Delawares. Roughly translated, the name means edible or good tasting turtle.<sup>[2]</sup>



Historically, the name terrapin may have referred to “good tasting turtle”

Also see Dodd et al., 2016



## TERRAPIN CULTURE.

A Maryland Expert Talks Entertainingly About It—A Profitable Industry.  
From The Baltimore Sun.

Mr. James C. Tawas, the State Fish Commissioner for the Eastern Shore, lives in Crisfield. He is an active and progressive business man, and unusually bright and intelligent. He has spent his life as a dealer in marine productions, such as fish, crabs, oysters, and terrapin, and is alert to note anything affecting that industry. He has many testimonials from people all over the State engaged in its fisheries to the great increase in the supply of shad and other fish through the efforts of the Fish Commission. Mr. Tawas purposes to devote the efforts of the commission particularly to mountain trout and black bass, not relaxing, however, the previous efforts that he and others have made to increase the supply of perch in Maryland waters.

**Diamond Backs.**

Example: Maryland Terrapin Farm  
1897: Over 10,000 Terrapins



Example: Federal Fisheries Laboratory, Beaufort, NC  
Raised and Released Terrapins 1909-1940

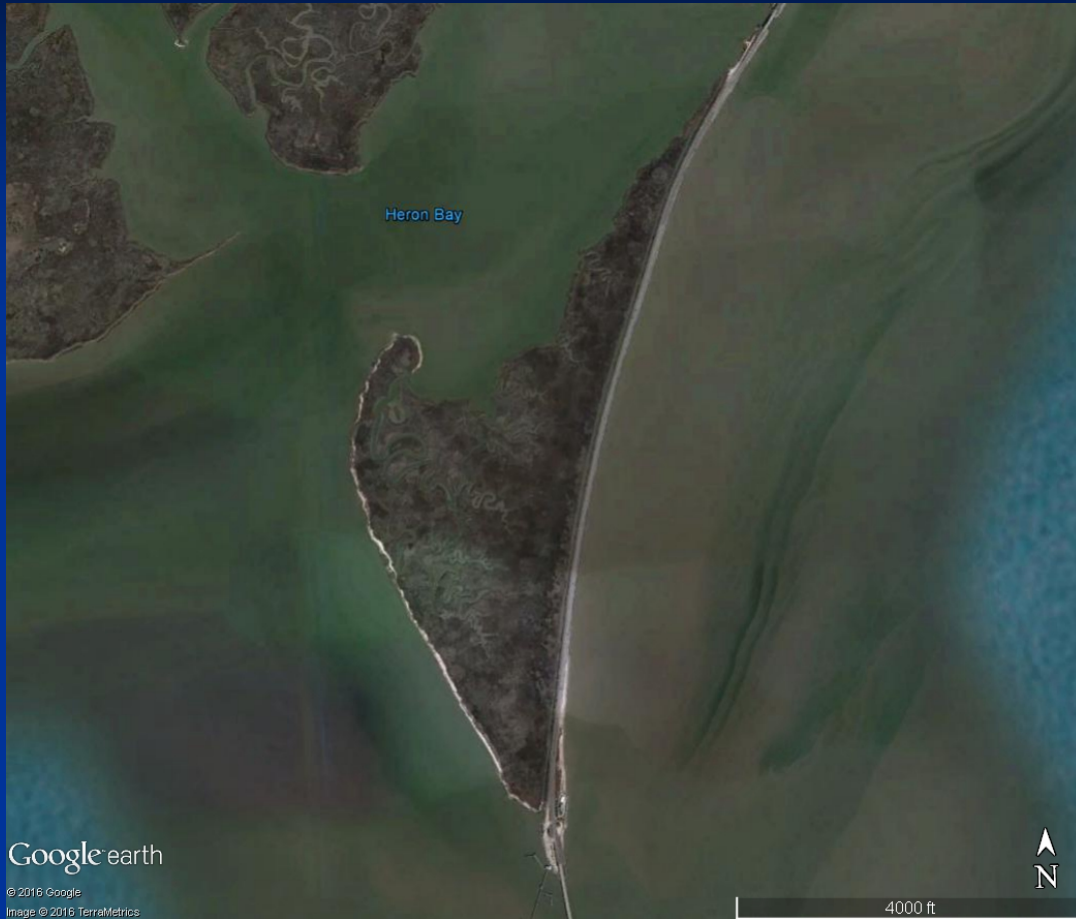
Valuable Marine Resource  
Historically, Terrapin Farms Existed from  
the Northeast U.S. to  
to the Northern Gulf of Mexico  
(i.e. Alabama)



Barbee's Pavilion and Diamond Back Terrapin Farm was founded by Alexander Barbee as an experiment in 1893. The farm was a covered building, 150 feet by 60 feet, divided into 18 pens. The turtles were separated by age and size. An advertisement for the business claims Barbee was the first person to successfully hatch a terrapin. He converted a suitcase into a portable incubator with which he traveled in order to demonstrate his discoveries and promote his business. A trained terrapin, Toby, often traveled with him. Barbee died in 1929.

Example: Barbee Terrapin Farm,  
Founded in 1893, Isle of Hope, GA

# Cedar Point Marsh



Nathan Mulford Dorlan and Wife  
Founder of Turtle Farm at  
Cedar Point, Alabama  
Late 1800's





## A MOBILE TERRAPIN FARM.

HOW THE DIAMOND BACKS ARE RAISED AND SHIPPED—A BIG COLLECTION OF THEM.

*From the Mobile (Ala.) Register, Jan. 30.*

A few days ago an article clipped from a Washington paper appeared in the *Register*, giving a description of Senator Dennis's terrapin farm in Maryland. As we have something of the sort to boast of in the neighborhood of Mobile, it may not be amiss to give our readers a description of Mr. Mulford Dorlon's great terrapin farm at Cedar Point. This projection of land is on the western shore of Mobile Bay, about 30 miles below this city, and is inhabited principally by oystermen who reap golden harvests from the many beds which furnish nearly every oyster brought to the port of Mobile. Mr. Dorlon, who keeps a store at this point, has about three acres fenced in with strong pillings. Leading to this inclosure are two canals, one on the bay side and the other on the gulf side, which supply with salt water a number of ditches 10 feet wide and 100 feet long. The sand accumulating from the excavation of these ditches is thrown on each side, and used by the terrapins to sun themselves and lay their eggs in, which, if counted, would go up in the millions, and can be raked up by the bushel. In the Winter season the terrapins remain imbedded in the mud of the ditches where they stay until Spring time, never touching a morsel of food. A system of sluices enables Mr. Dorlon to keep the ditches full of salt water, or drain them at pleasure, and he is not at all dependent on the tide for that purpose.

New York Time Article in 1881  
reprinted from the Mobile Register

20,000 to 25,000 Terrapins on the Farm  
Collected 8,000 Terrapins Locally Per Year  
Shipped 12,000 Terrapins Per Year to the Northeast

The number of terrapins on the farm, as far as can be ascertained and by the closest calculation, is between 20,000 and 25,000, and in the course of the next three or four years will be something hard to calculate. About May 1, Mr. Dorlon makes his purchase of terrapins from the country people on the Mississippi Sound, and takes all he can secure at \$3 a dozen, and that generally averages about 8,000 a year added to his farm, outside of those bred therein. The inhabitants of Mississippi and Alabama hunt the terrapins with dogs trained for that purpose. The dog barks when he finds one, and the hunter immediately secures it by going to the spot where the dog points.

The cost of feeding the terrapins, which, as we have said, is only done in the Summer, is about \$1 per dozen for the season, and the price per dozen in New-York has varied from \$18 to \$8. The food, which consists of crabs and fish, is caught with a seine, in front of the farm, and really very little expense is attached to the raising of these valuable land tortoises. Mr. Dorlon begins to ship about Oct. 1, and then on to about May 10. He generally sends his to Savannah by rail, and thence to New-York by steamer, averaging about 12,000 a season; and, had it not been for a disastrous hurricane, which some time ago washed out Mr. Dorlon's farm, it would be to-day the greatest terrapin farm in the world. He can always ship all he can get, for there is a ready market for these delicacies.

The New York Times

Published: February 4, 1881

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## Historic Terrapin Farmer Mulford Dorland

a few miles east of the Bosarge land. Uncle Bud himself came of age near the end of the nineteenth century, and he said his father-in-law had once killed a pirate.

“Killed a pirate?” said Rayford.

“He killed him dead,” declared Uncle Bud. “Sure did! Killed him in a fist fight.”

Uncle Bud went on to explain that back in 1837, give or take a couple of years, the pirate Spud Thompson had come ashore in Coden, spoiling for a fight. He found some local men at a dance, and beat up several before he met Mulford Dorlon. Dorlon was not a man to be trifled with, and he ended the fighting spree with one punch.

“Hit him under the jaw and broke his neck,” reported Uncle Bud, who would eventually become Dorlon’s son-in-law.

ALABAMA HERITAGE: WINTER 2011 27

## Mulford Dorland’s Boats for transporting Fish and Terrapins



**About the *Governor Stone***

National Historic Landmark

Built: Pascagoula, Mississippi, 1877  
Length: 63'; 39' at waterline  
Beam: 13'2"  
Weight: 14GRT, 12NRT  
Draft: 3'; loaded 5'; with centerboard down 9'  
Hull & Deck: Yellow Cypress, Juniper  
Spars, boom & gaffs: Heart Pine

Mulford Dorland is also famous for a fight he had  
with the last pirate in the Gulf of Mexico



# Based on Historic Information

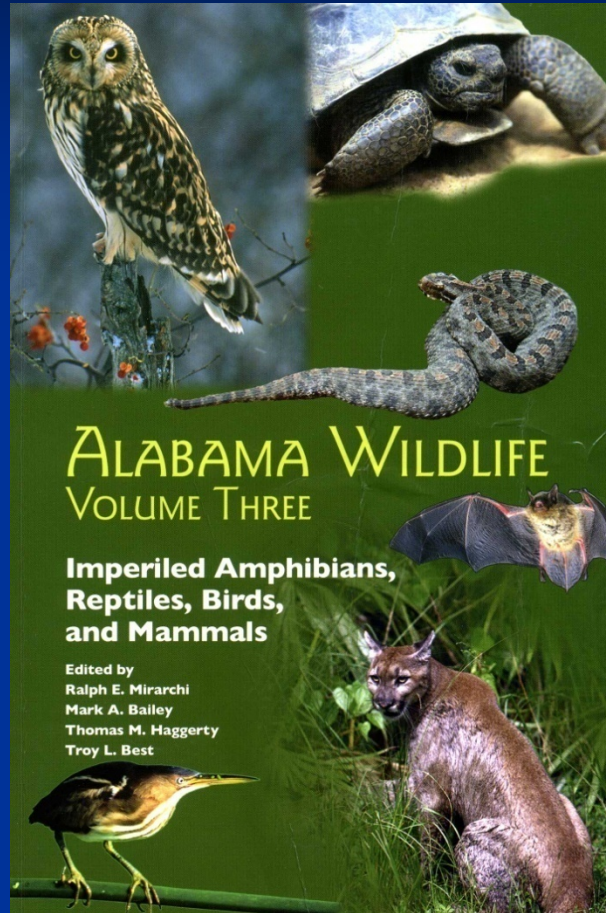
**1) Terrapin used to be a valuable economic resource in Alabama**

**2) Terrapin used to be very abundant in the salt marshes of Alabama**

**3) There is a rich cultural heritage in Alabama in regards to the diamondback terrapin**



# 2004: Terrapin are “A Species of Highest Conservation Concern in Alabama”



52 ALABAMA WILDLIFE ~VOLUME 3~

## MISSISSIPPI DIAMONDBACK TERRAPIN

*Malaclemys terrapin pileata* (Wied)

**OTHER NAMES.** None.

**DESCRIPTION.** A medium-sized (max. length females, 230 mm [9 in.]; males 140 mm [5.5 in.]) brackish-water turtle known to frequent saline habitats. Toes webbed. Adult carapace oval, gray to nearly black, and unmarked; larger carapacial scutes with deep and obvious concentric growth rings. Midline of carapace with row of knobs or bumps, more prominent in females than males. Plastron creamy yellow with some dark spots or blotches. Head and neck smoky gray or light greenish-gray with round black spots. Top of head and limbs usually dark. Mouth consists of a sharp cutting edge and a wide grinding plate on the inner, upper surface. Females bulkier than males, with larger heads, more rounded snouts, deeper shells and shorter tails. Carapace of juveniles rounder and lighter in color, but concentric carapacial ring darker in outline. Seven subspecies currently recognized (Ernst and Bury 1982).



Photo—Ken Maran

**DISTRIBUTION.** The diamondback terrapin is distributed along coastal North America from Massachusetts to southern Texas. The Mississippi diamondback terrapin is found from the Florida Panhandle to eastern Louisiana. In Alabama, confined to the estuaries, salt marshes, and nearby shallow waters of coastal Mobile and Baldwin Counties, including Dauphin Island (Marion 1986). Size of populations and precise distribution in Alabama very poorly known.

**HABITAT.** A resident of coastal salt marshes, estuaries, and tidal creeks, so it is restricted to the Gulf Barrier Islands and Coastal Marshes ecoregion. Although particularly associated with cord grass marshes, it does venture from these confines, occasionally being found on offshore sandy islands or on extensive tidal mudflats. Seems to prefer marshes having open channels with moving water nearby. May bask on mud flats or float in channels; not easily captured. Will venture into brackish streams, but will not tolerate fresh water for extended periods of time. May bury in mud. Juveniles may spend first few years under mats of flotsam or vegetation (Ernst et al. 1994).

**LIFE HISTORY AND ECOLOGY.** Very tolerant of high temperatures, and bask frequently on mud flats or floating debris. Spend the night buried in soft mud in shallow water. Also overwinter in mud but may emerge during periods of warm weather. Copulation takes place in the water in early spring soon after emergence. Details of reproduction of this particular subspecies not well known, but presumably similar to those of other subspecies (Seigel 1979). From two to five clutches laid by each female per season, beginning in April or early May. From five to 12 oblong, pinkish-white and thin-shelled eggs deposited each time in nests dug on beaches or sand dunes above the high-tide mark. Incubation takes 10 to 12 weeks, and young may overwinter in nest. Many nests destroyed by raccoons, fish crows, gulls, and other predators. Hatchlings often fall prey to large wading birds. Sexual maturity probably reached in three to four years in males, six or seven years in females. Maximum egg production occur at about 25 years. Upper age limit may exceed 40 years. Large muscular jaws are well adapted to crush and eat hard-shelled prey such as molluscs and crustaceans. Primary food items include snails, clams,

Terrapin stocks appear to be depleted.  
Need for comprehensive surveys



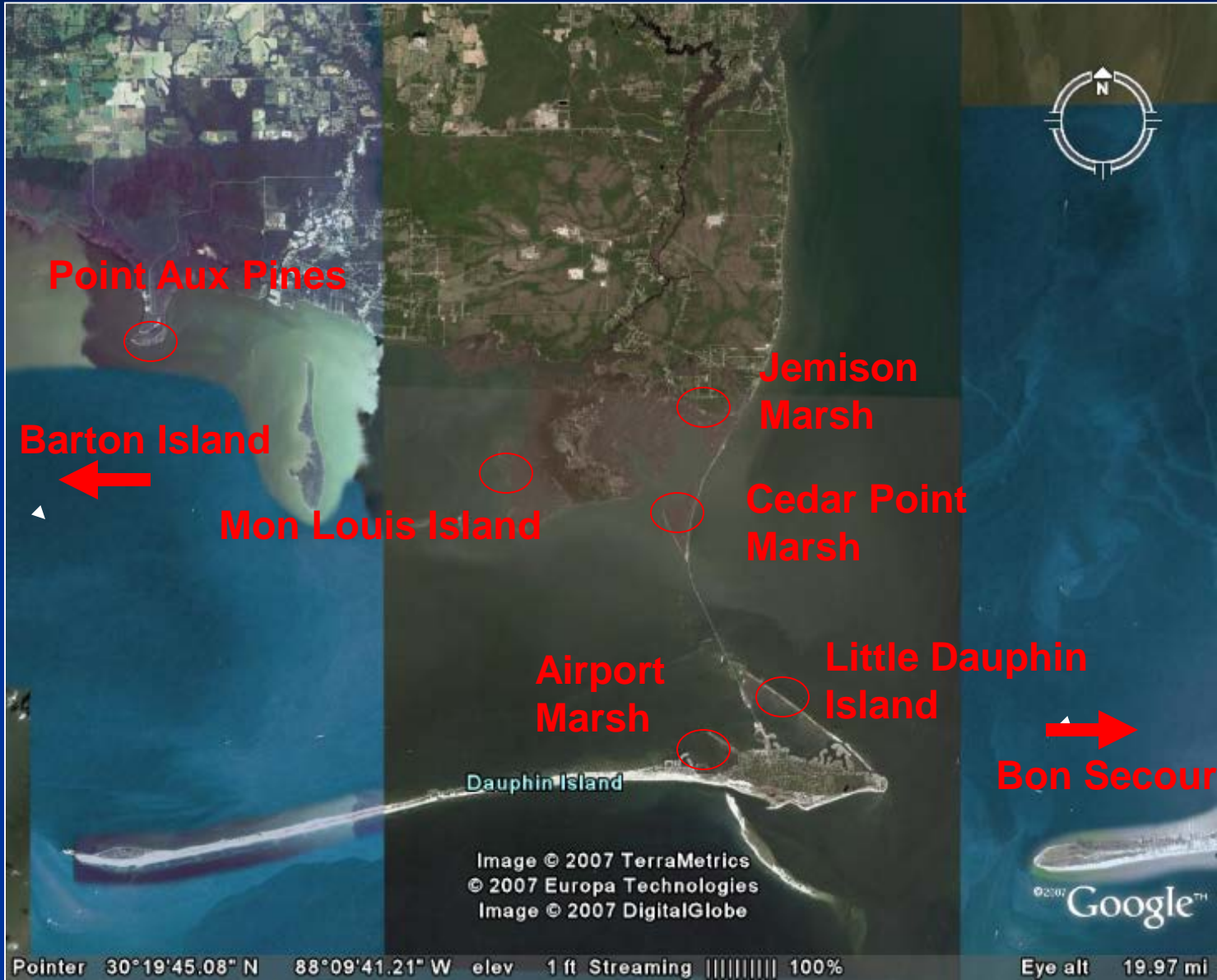
# 2006- Present: Multiple Survey Methods Have Periodically Been Utilized

Cedar Point Marsh and Other Areas

- 1) Head Counts
- 2) Crab Traps
- 3) Trawling
- 4) Nesting Beach Traps/Drift Fences
- 5) Depredated Nest Surveys
- 6) Drone Surveys of Channel



# Surveys Were Conducted in a Wide Variety of Locations in Alabama







## Summary of Findings from the Surveys

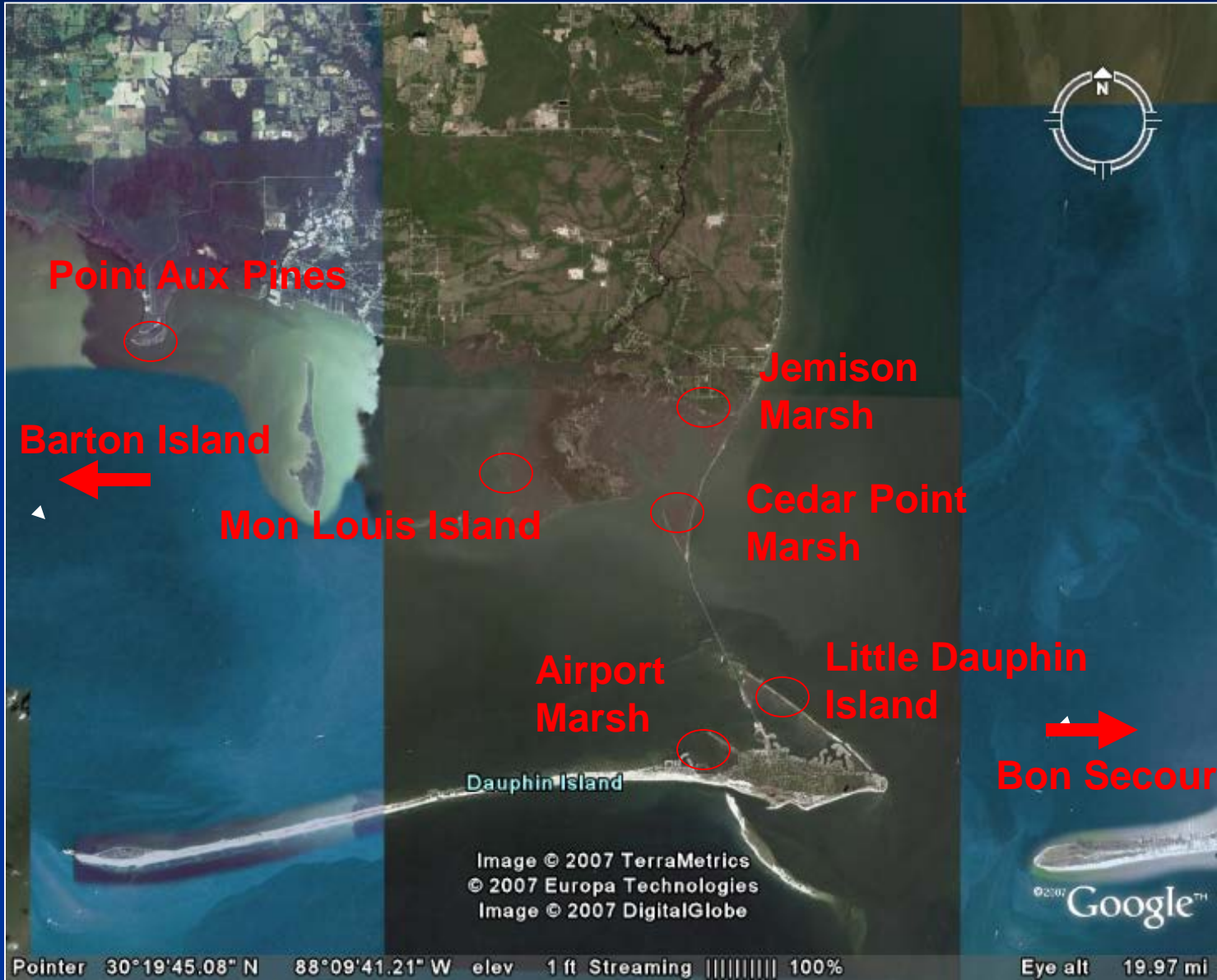
- There are specific locations where you can predictably find terrapin, but they appear to be in low numbers:

**Terrapin population in AL is represented by relatively small groups in specific locations.**

- **Cedar Point Marsh** appears to have the largest aggregation we have identified. (including in the marsh channels and the largest number of nests.

- **Smaller aggregations identified at Barton Island, Point Aux Pines, Mon Luis, Airport Marsh Dauphin Island Jemison's Marsh, Little Dauphin Island, Isles Aux Herbes,**

# Cedar Point Marsh



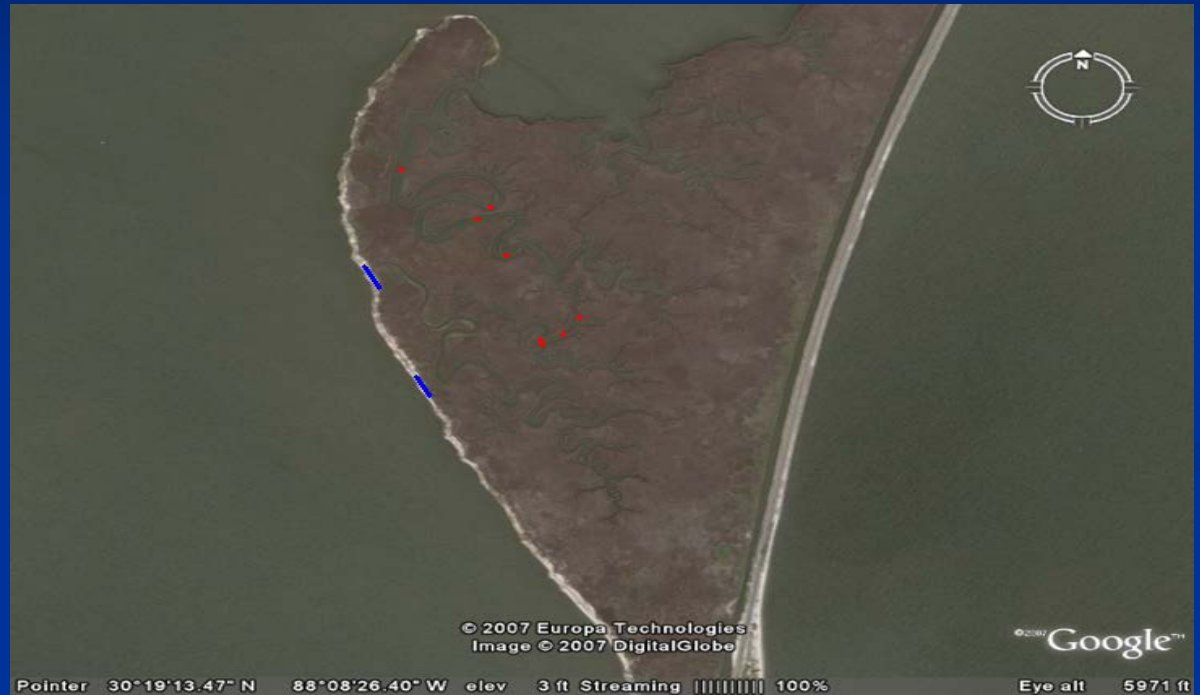


# Cedar Point Marsh

Over a Kilometer of  
One of the Most Elevated  
Nesting Beaches in the Area

Extensive Tidal Channel  
Within the Marsh

Located Adjacent to Several  
Nearby Marshes



# Ratio Tracking Studies Of Adult Females Nesting at Cedar Point Marsh





# 2011 Nesting Season

Example of a tagged female that nested at Cedar Point Marsh and moved across Heron Bay to a marsh on Mon Louis Island and was consistently located there.



# DISL Marine Turtles Course

Cedar Point Nesting Beach  
Drift Fence For Terrapin





# Drift Fence/Pitfall Trap Surveys Over a Decade of Studies



Surveys at Barton Island,  
Point Aux Pines, Mon Louis,  
and Cedar Point.





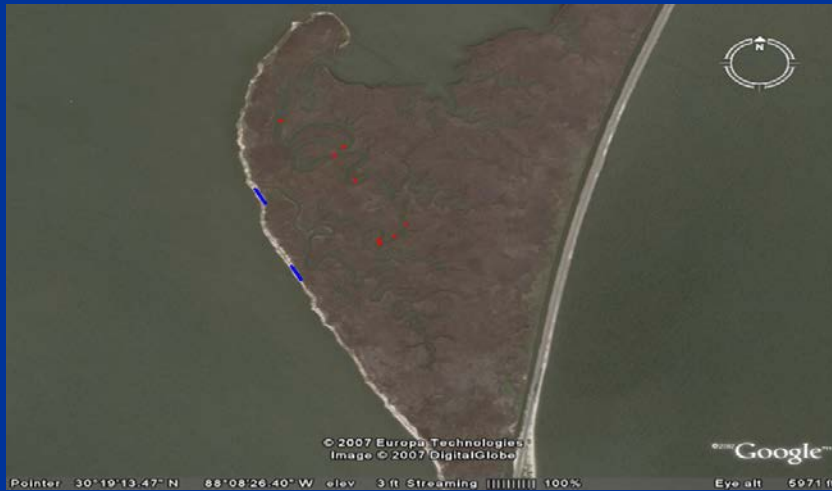
# Terrapin Population Size Estimates

## Cedar Point Marsh

### Largest Nesting Aggregation Identified in AL

Nesting Female Estimate = *Approximately 150 to 300 Adult Females Utilize The Cedar Point Marsh Nesting Area*

Based on Schnabel Model using Recapture Logistic Model  
Roberge, 2017





# Evaluation of Crab Trap TEDs/BRDs

- 5x15cm (2 “ X 6”) BRDs
- Side by side comparison of modified crab traps
- 8 trapping locations in Cedar Point Marsh
- 2007 - 2009 Mid May- Mid July



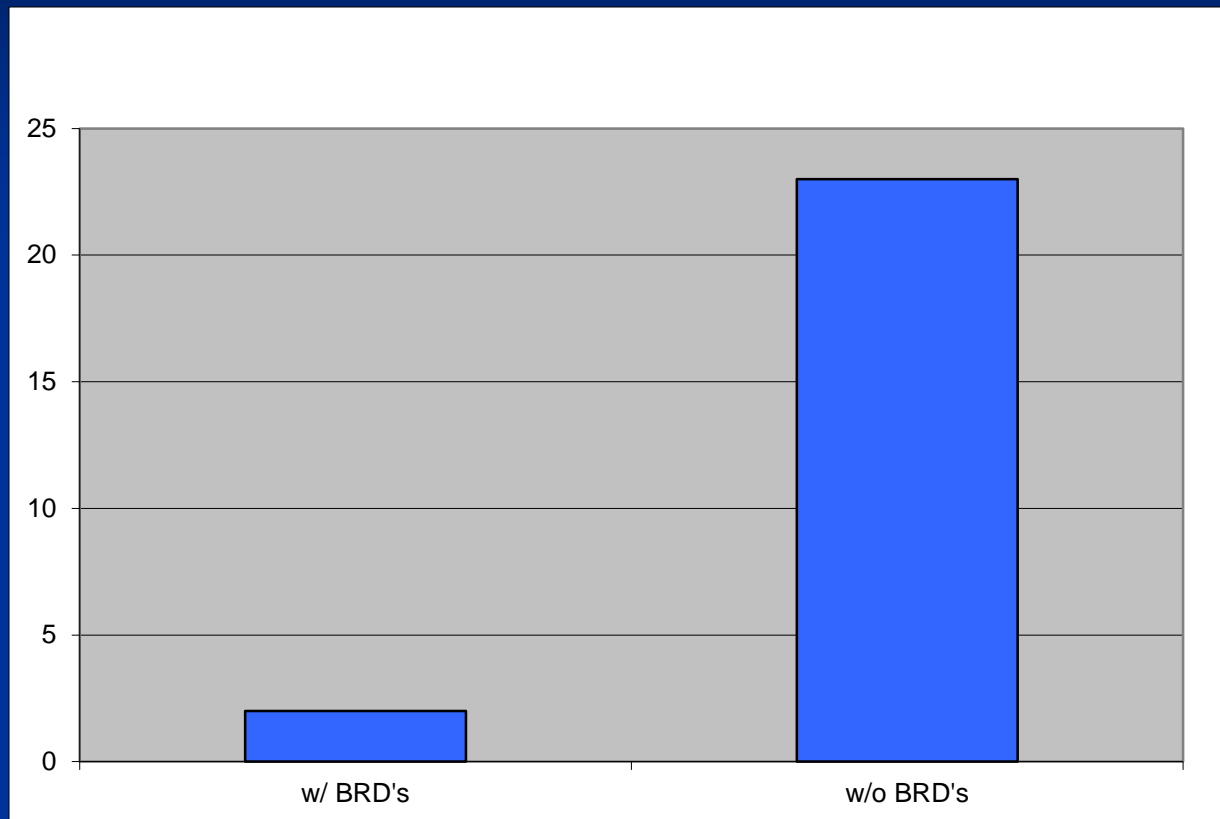
- Number of terrapins and number of crabs recorded
- Estimation of crab size

# Terrapin Crab Trap Captures BRD Versus No BRD



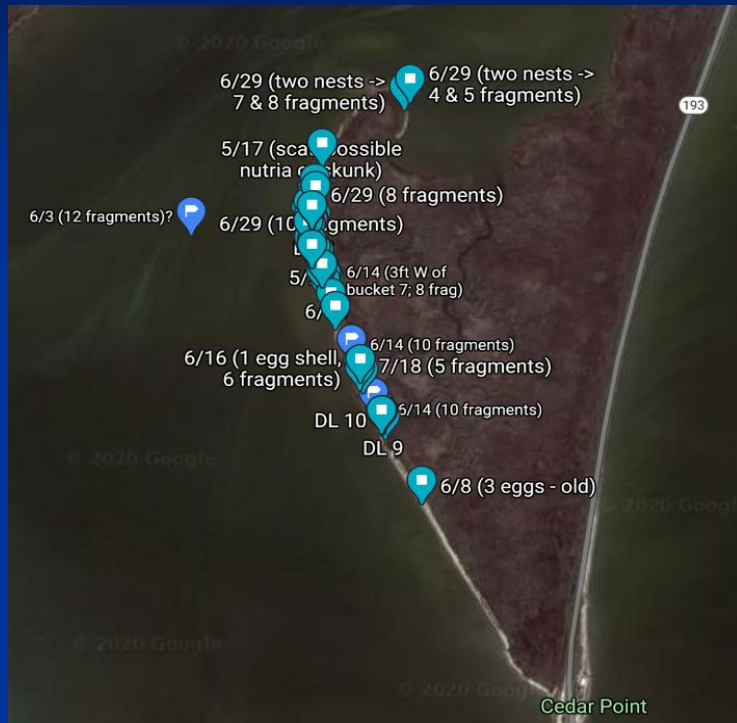
Terrapin TED (i.e. BRD)

Coleman et al., 2011, 2014

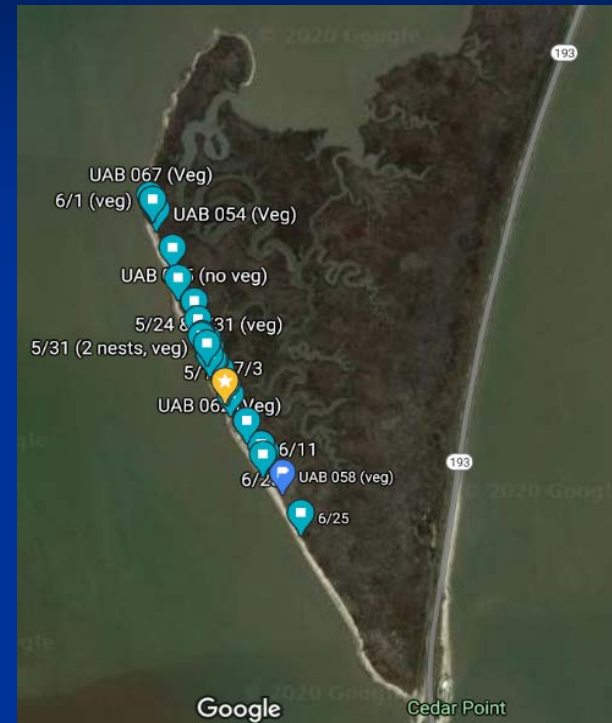




# Examples of Depredated Nest Locations at Cedar Point Marsh



2018



2019

Yearly Observation of Depredated Nests Have Rangee from  
Approximately 30 to over 100

# Raccoons Represent a Major Nest Predator at Cedar Point Marsh

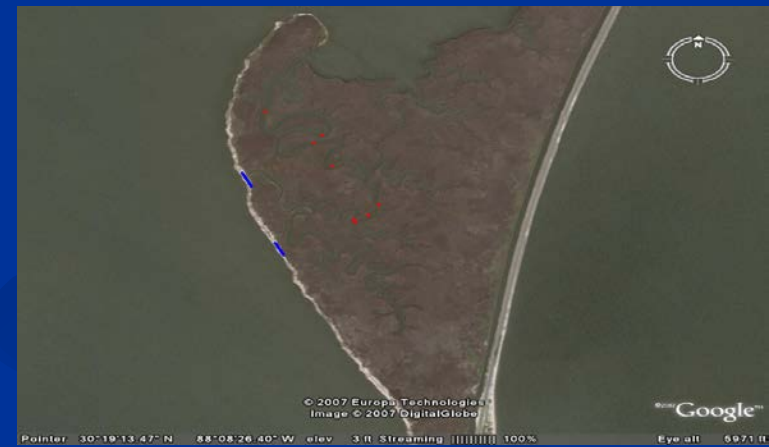
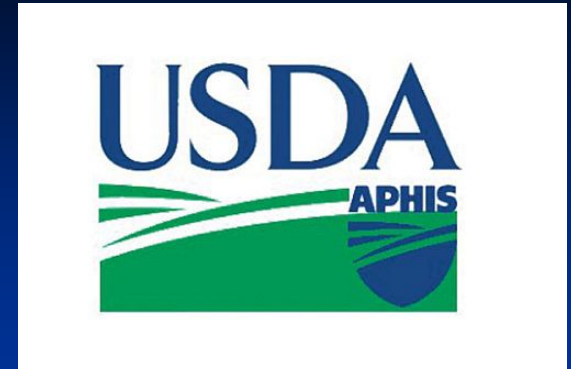


Infrared Wildlife  
Cameras at  
Cedar Point  
Marsh

Potential Increased Predator Access to the Salt Marsh Over Time  
Due to Increased Coastal Development



During 2020 USDA APHIS  
Began Removing Raccoons from  
The Cedar Point Marsh Area



# Drift Fence/Pitfall Trap Surveys Over a Decade of Studies



Surveys at Barton Island,  
Point Aux Pines, Mon Louis,  
and Cedar Point.





# Decrease Predation: Experimental Headstart Using Eggs From High Predation Areas

- Approximately 10 clutches each year  
Using probable depredated nests
- Incubated at either 31°C or 26°C
- Approximately 50 to 70 hatchlings per year
- Release after 2 years  
of captive rearing



## Headstart and Release of Terrapins Using Eggs from High Predation Areas



Over 600 terrapins released into  
Cedar Point Marsh Area





# AL DCNR Heron Bay Wetlands Conservation

## *Heron Bay Wetlands*

*Final Proposal for:*

*The National Coastal Wetlands Conservation Grant Program*

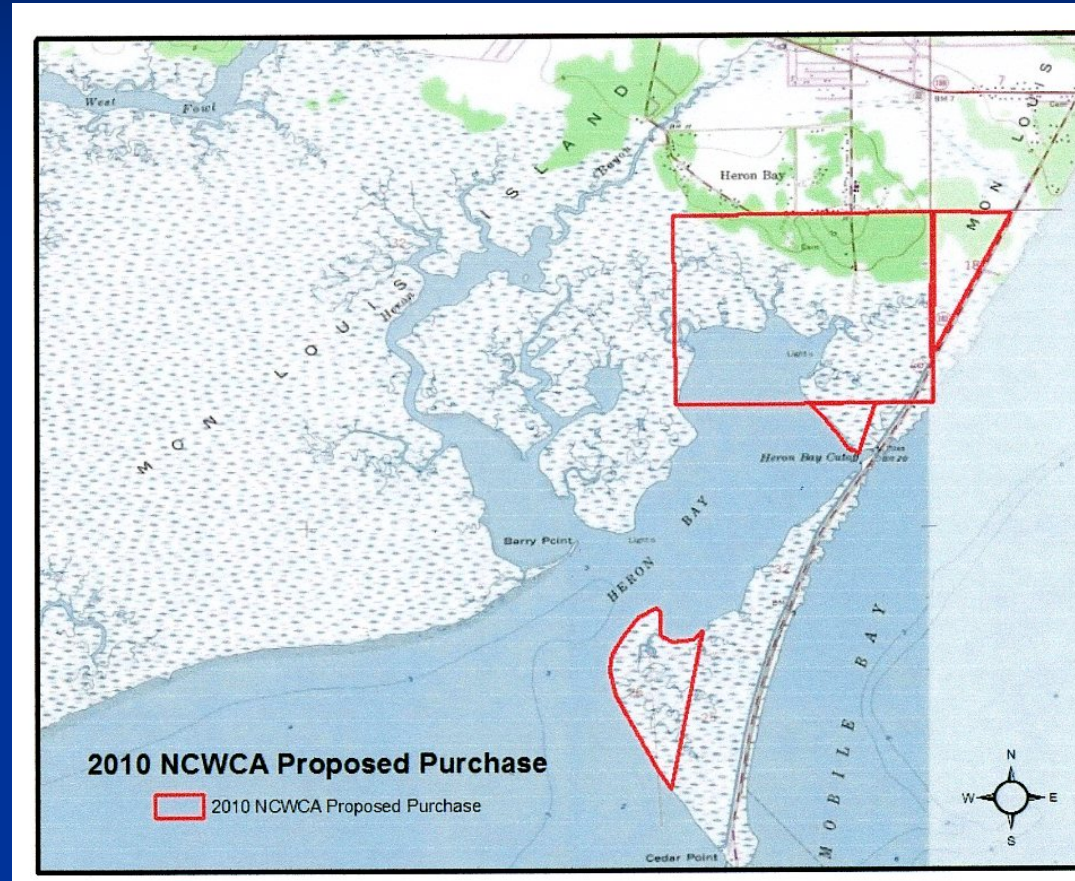
*June 23, 2009*

*Submitted to:*

*U.S. Fish and Wildlife Service  
Chief, Division of Federal Assistance  
1875 Century Boulevard, Suite 240  
Atlanta, GA 30345*

*Submitted by:*

*Chris E. Smith  
State Lands Division  
Alabama Department of Conservation and Natural Resources  
64 North Union St.  
Montgomery, AL 36130  
e-mail: [chris.smith@dcnr.alabama.gov](mailto:chris.smith@dcnr.alabama.gov)  
P 334/242-3409 F 334/242-0999*



# Conservation grant to make terrapin habitat Forever Wild

Published: Friday, December 24, 2010, 8:16 AM



By **Guy Busby** Press-Register

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A baby diamondback terrapin found during a 2008 study in south Mobile County is held by a researcher. A \$1 million federal grant announced this week will allow the state to buy a 520-acre tract that includes the last known habitat of the turtle in Alabama, according to conservation officials. The species is listed as being of "highest conservation concern" by the Alabama Department of Conservation and Natural Resources. (Press-Register/Bill Starling)

A \$1 million federal grant will allow the last known Alabama habitat of the diamondback terrapin turtle to be added to the state Forever Wild program, conservation officials said Thursday.

The grant was part of a \$19 million appropriation for 24 coastal wetland protection projects announced this week by U.S. Secretary of the Interior Kenneth Salazar.

The local grant will allow the Alabama Department of Conservation and Natural Resources to buy a 595-acre wetland tract on Heron Bay and 520 acres on Portersville Bay in south Mobile County, Interior Department spokeswoman Roya Mogadam said. The tracts will be added to 5,151 acres of wetlands being managed by state

officials in the area, she said.

The property will be added to the state Forever Wild program, Chris Smith, state lands manager for

## *Heron Bay Wetlands*

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### *The National Coastal Wetlands Conservation Grant Program*

*June 23, 2009*

*Submitted to:*

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# Example of Major Threats to Terrapins in Alabama

- 1) Crab trap-induced mortality
- 2) Nest and hatchling predation
- 3) Habitat Loss





# Potential Conservation Strategies for Diamondback Terrapin Recovery in Alabama

## 1) Decrease Crab Trap-Induced Mortality



- a) Protect specific areas from crab fishery
- b) Potentially Implement TEDs on Crab Traps  
Selected areas? Work with Crab Industry?  
Etc.
- c) Derelict Crab Trap Removal Program

## 2) Decrease nest predation



- a) Predator Control
- b) Experimental Headstart

## 3) Protection of Habitat



# The Diamondback Terrapin in Alabama: Conservation Status and Strategy for Recovery



DCNR



# Lightning Point, AL



