

Design Development

- Site investigation datasets
- Existing conditions modeling
- Literature review



Reddish Herons
Egretta rufescens
courting at
Ding Darling NWR

Source: Andy Morffew, [CCBY2.0](https://upload.wikimedia.org/wikipedia/commons/1/11/Reddish_Egret_Courtship._%2825378873176%29.jpg), via Wikimedia Commons https://upload.wikimedia.org/wikipedia/commons/1/11/Reddish_Egret_Courtship._%2825378873176%29.jpg

Egrets in a lagoon at Ding Darling NWR



Source: Chris Morris, [CCBY2.0](https://commons.wikimedia.org/wiki/File:Egrets_(5747467524).jpg), via Wikimedia Commons [https://commons.wikimedia.org/wiki/File:Egrets_\(5747467524\).jpg](https://commons.wikimedia.org/wiki/File:Egrets_(5747467524).jpg)

Design Development

- Protection for nests and juveniles

American crocodile *Crocodylus acutus* basking at Ding Darling NWR



Source: U.S. Fish and Wildlife Service Headquarters, Public domain, via Wikimedia Commons
[https://commons.wikimedia.org/wiki/File:American_crocodile,_J.N._%22Ding%22_Darling_National_Wildlife_Refuge_\(5584758909\).jpg](https://commons.wikimedia.org/wiki/File:American_crocodile,_J.N._%22Ding%22_Darling_National_Wildlife_Refuge_(5584758909).jpg)

Juvenile white ibis *Eudocimus albus*
foraging in the shallows at Ding Darling NWR



Source: Mke's Birds from Riverside, CA US, [CC BY-SA 2.0](https://commons.wikimedia.org/wiki/File:Juvenile_ibis_from_Ding_Darling_%284204952929%29.jpg), via Wikimedia Commons
https://upload.wikimedia.org/wikipedia/commons/f/f9/Juvenile_ibis_from_Ding_Darling_%284204952929%29.jpg

Design Development

- Variety of nesting scenarios and vegetation types

Green Heron *Butorides virescens* among the mangrove roots at Sanibel Island



Source: Hans Stieglitz, [CCBY-SA3.0](https://commons.wikimedia.org/wiki/File:Florida-222.jpg), via Wikimedia Commons <https://commons.wikimedia.org/wiki/File:Florida-222.jpg>

Mangroves at Sanibel Island



Source: James St. John, [CCBY2.0](https://commons.wikimedia.org/wiki/File:Rhizophora_mangle_(red_mangroves)_\u0028Sanibel_Island,_Florida,_US_A\u0026_2_(24335562742).jpg), via Wikimedia Commons [https://commons.wikimedia.org/wiki/File:Rhizophora_mangle_\(red_mangroves\)_\u0028Sanibel_Island,_Florida,_US A\u0026_2_\(24335562742\).jpg](https://commons.wikimedia.org/wiki/File:Rhizophora_mangle_(red_mangroves)_\u0028Sanibel_Island,_Florida,_US_A\u0026_2_(24335562742).jpg)

Design Development

- Water levels during nesting season and access to food sources

Tricolored Heron *Egretta tricolor* at Ding Darling NWR



Source: U.S. Fish and Wildlife Service Headquarters, Public domain, via Wikimedia Commons [https://commons.wikimedia.org/wiki/File:Tricolored_Heron_\(7345195950\).jpg](https://commons.wikimedia.org/wiki/File:Tricolored_Heron_(7345195950).jpg)

American White Ibis *Eudocimus albus* foraging at Sanibel Island



Source: James St. John, [CCBY2.0](https://creativecommons.org/licenses/by/2.0/), via Wikimedia Commons [https://commons.wikimedia.org/wiki/File:Eudocimus_albus_\(American_white_ibis\)_\u0028Sanibel_Island,_Florida,_USA\u0029_3.jpg](https://commons.wikimedia.org/wiki/File:Eudocimus_albus_(American_white_ibis)_\u0028Sanibel_Island,_Florida,_USA\u0029_3.jpg)

Alternative Concepts

Little Blue Heron *Egretta caerulea* foraging at Sanibel Island



Source: James St. John, [CCBY2.0](https://commons.wikimedia.org/wiki/File:Egretta_caerulea_(little_blue_heron)_\(\Sanibel_Island,_Florida,_USA)_2.jpg) via Wikimedia Commons
[https://commons.wikimedia.org/wiki/File:Egretta_caerulea_\(little_blue_heron\)_\\(\Sanibel_Island,_Florida,_USA\)_2.jpg](https://commons.wikimedia.org/wiki/File:Egretta_caerulea_(little_blue_heron)_\(\Sanibel_Island,_Florida,_USA)_2.jpg)

Design Criteria

1. **Bird Nesting Islands** with sinuous shape. Distanced >350' from humans. Vegetative visual barrier where setback isn't feasible.
2. **Foraging shallows** to give foraging habitat for juvenile birds 2"-8" water depth. Areas 15 to 90 feet wide. Emergent vegetation.
3. **Crocodile basking beaches** and sandbars around the edges.
4. **Moats** with depth of >1.5' deep during dry season (October - May) for protection from mammalian predators.



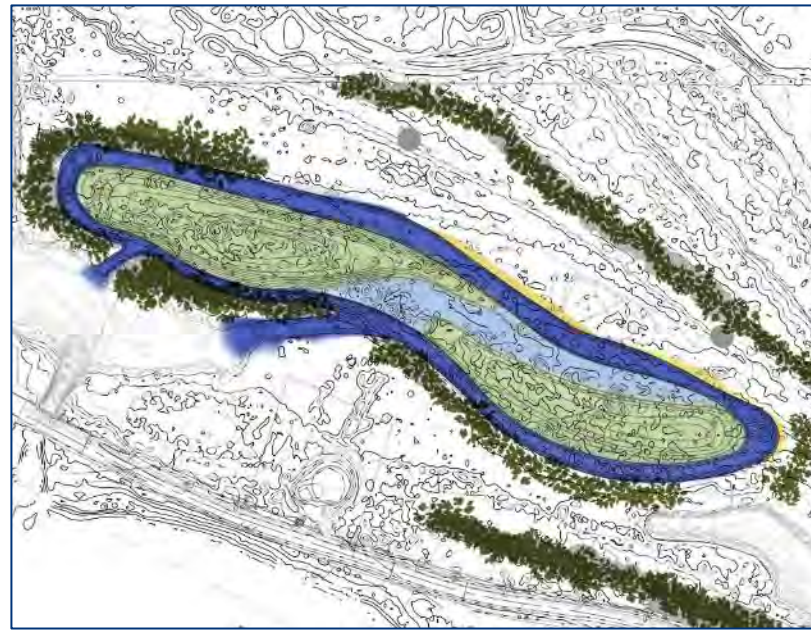
Features	Design Criteria	Concept 1 Island Lagoons	Concept 2 Central Shallows	Concept 3 Snake Island
Nesting Islands	2.2 - 25 ac	4.5 acres	6.5 acres	4.5 acres
Moats	>1.5' deep	1.5' deep	3.5' deep	3.5' deep
Shallows	Min. 1.3 acres	1.5 acres	1.8 acres	2.2 acres
Crocodile Basking	>0.3 acres	0.7 acres	0.4 acres	0.4 acres
Mangrove Impacts		1.2 acres	1.3 acres	1.3 acres

Alternative Concepts



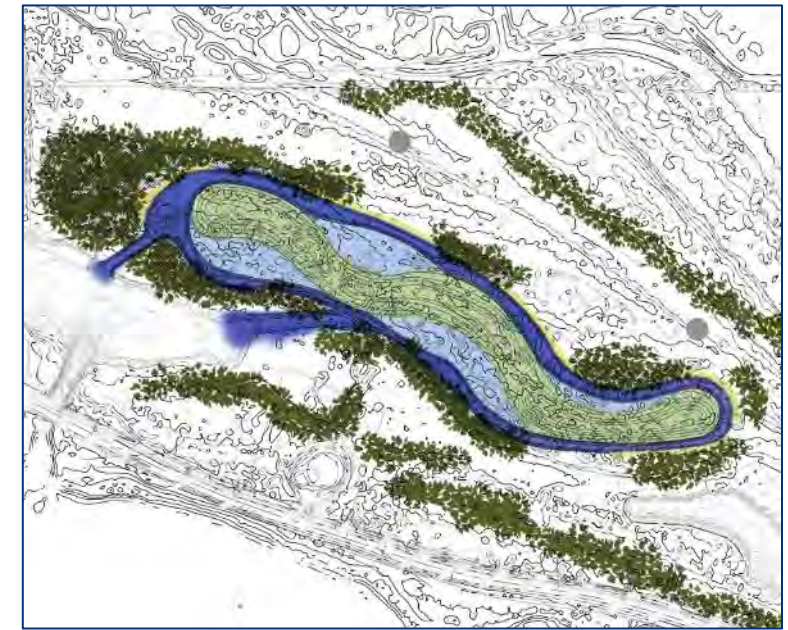
CONCEPT 1 “Island Lagoons”

- Lagoon within nesting island
- Interior foraging areas
- Varied topography on series of nesting islands
- Basking beaches along upland shores and on islands



CONCEPT 2 “Central Shallows”

- Foraging shallows between islands
- Two large islands with sloped elevations
- Crocodile basking on upland shores



CONCEPT 3 “Snake Island”

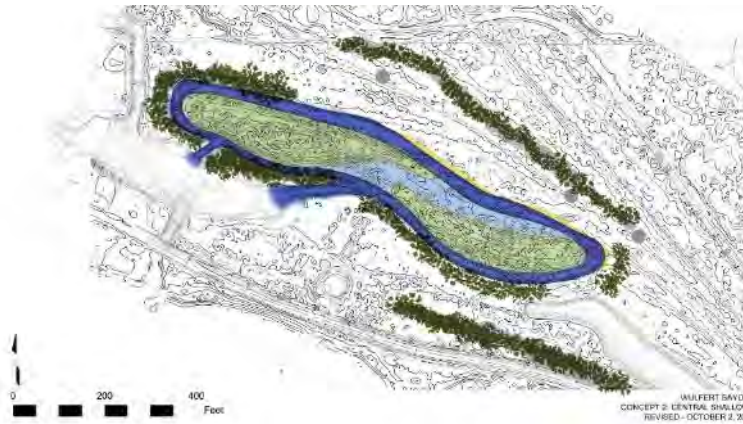
- Island shape allows for better visibility of predators
- Varied topography on nesting sites
- Edge foraging areas
- Crocodile basking on perimeter

Evaluating the Concepts

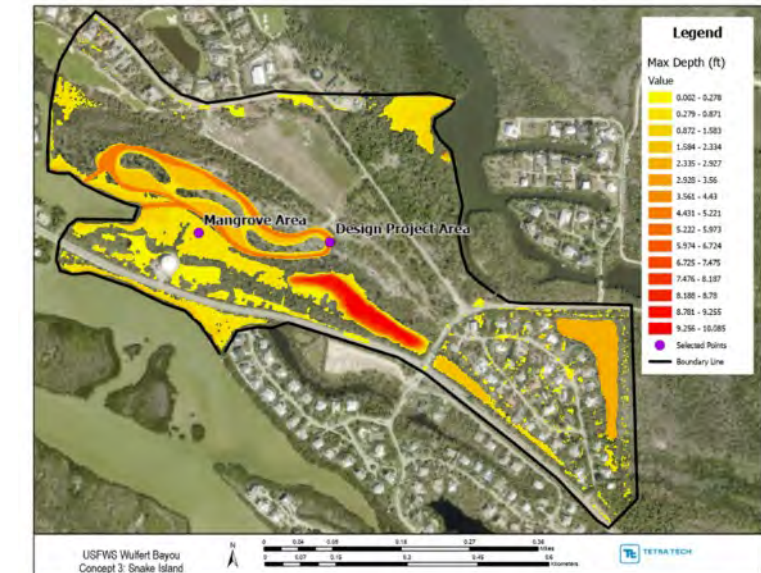
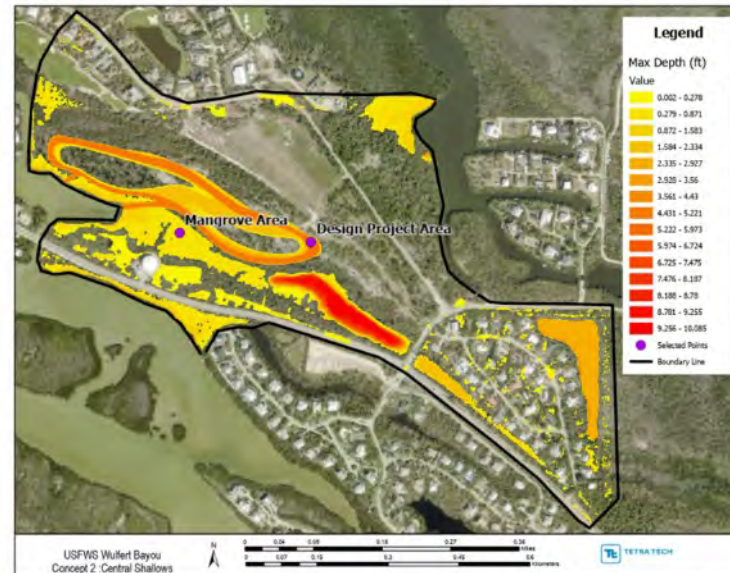
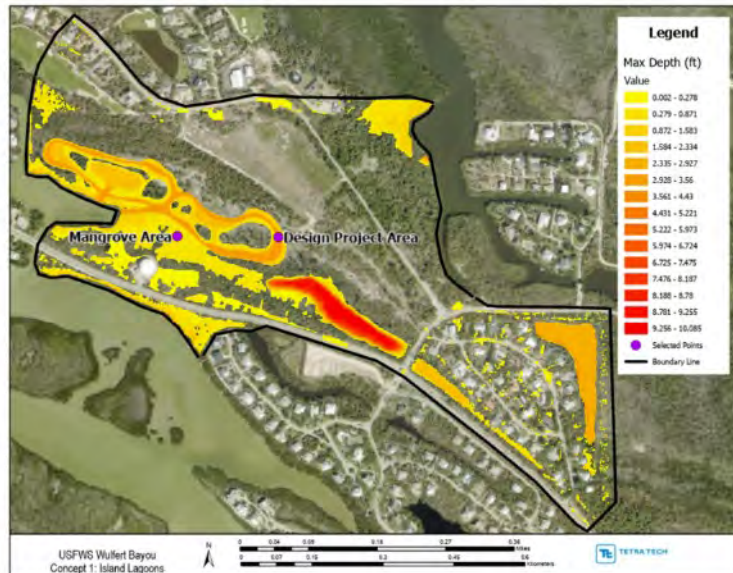
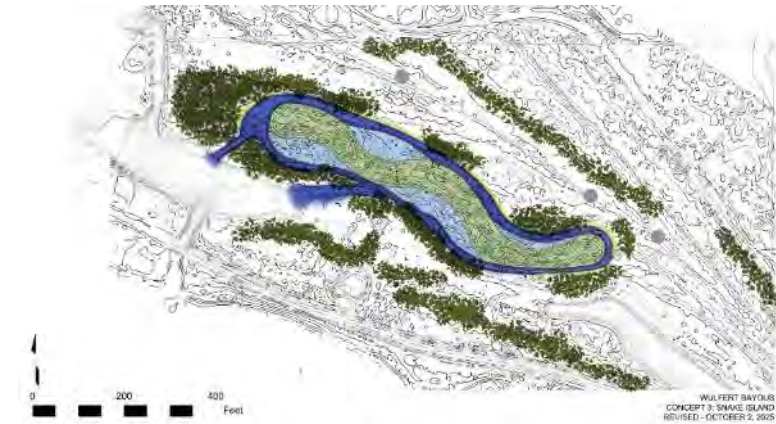
“ISLAND LAGOONS”



“CENTRAL SHALLOWS”



“SNAKE ISLAND”



Selected Design “Island Lagoons”

- Varied topography on islands provides **variety of nesting conditions and materials**:
 - high ground for woody vegetation
 - low ground for dense cover and finer plants
- Interior lagoon and edge shallows provide **juvenile foraging** areas
- **Moat** surrounding the islands with water exchange through two inlets
- Crocodile **basking beaches** line moat to discourage predators
- **Screening** trees where 350-foot setback from human activity is not feasible
- **Upland Tropical Hardwood** habitat is protected
- Surrounding **mangrove wetlands** enhanced, invasives removed

