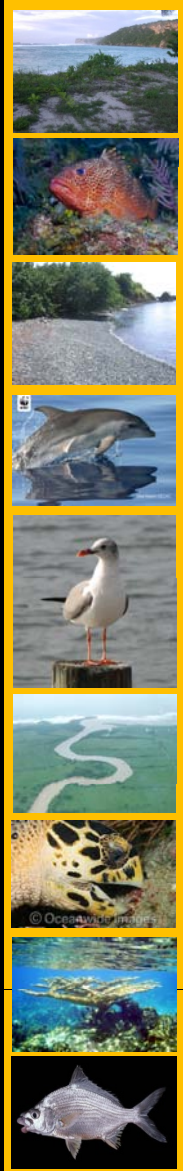




IITF GIS and Remote Sensing Laboratory
Center for Tropical Landscape Analyses



Integrated Gap Analysis Project

Recent progress

Gap Team:

María Isabel Herrera-M.

Mariano Solórzano

Suhey Ortíz-Rosa

Gary Potts

Jessica Castro

Patricia Rincón-Díaz

Maya Quiñones

Benjamin Crain

Nilda Jiménez

William Gould, USDA Forest Service-Research Ecologist

Objective

To develop databases on Puerto Rico and the US Virgin Islands' freshwater, estuarine, and marine resources including habitat description and mapping, species distributions and conservation status, and protected areas and conservation priorities combined with existing Puerto Rico and USVI terrestrial GAP databases to conduct integrated analyses of gaps in conservation protection for the U.S. Territories in the Caribbean.

Aquatic Gap Collaborators Meetings

Announcement the project



1. DRNA December 2010
2. Joyuda March 2011
3. Jobos Bay May 2011

Next meetings: UPR Humacao, USVI



Meeting attendance

**PLANIFICACIÓN Y MANEJO
DE LOS TERRENOS SUMERGIDOS**



**18 DE
AGOSTO
DE 2010**

LUGAR: Edificio DRNA, Dr. Cruz A. Matos, auditorio piso 4,
Sector El Cinco, Río Piedras.
Información y reservaciones - teléfono: 787-999-2200 ext. 2729 ó 2677

2010 Gulf and Caribbean
Fisheries Institute
MEETING



San Juan, Puerto Rico

INTERNATIONAL SEA TURTLE SOCIETY



**SAN DIEGO
2011**

**31st Annual Symposium on
Sea Turtle Biology & Conservation**
San Diego, California, USA April 10-16,
The Next Generation of Research & Conservation

ASLO 2011

AQUATIC SCIENCES MEETING

13-18 FEBRUARY 2011 @ PUERTO RICO CONVENTION CENTER
SAN JUAN, PUERTO RICO



EL SEGUNDO CICLO DE CONFERENCIAS SOBRE
**PLANIFICACIÓN Y MANEJO
DE LOS ESPACIOS MARINOS**

5 AGOSTO 2011



Sheraton Old San Juan
Hotel & Casino

Components: Six data gathering tasks....

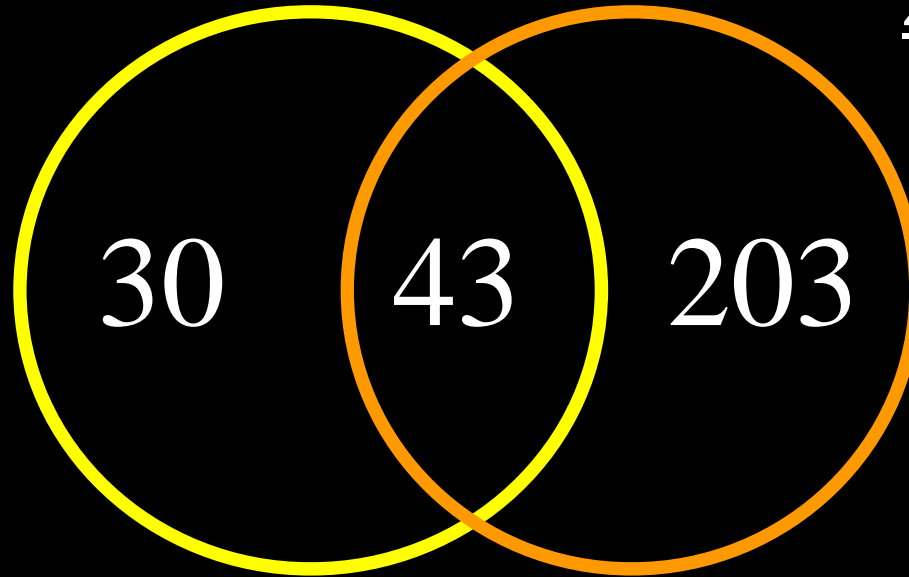
1. Species list and prioritization.
2. Compile information on the natural history of selected species.
3. Compile information on species occurrences.
4. Develop geospatial layers of habitat characteristics.
5. Species habitat modeling.
6. Compile information on protected areas.

30% Completed

Species List Summary

246 species

Freshwater
Species



Marine
Species

Species Prioritization

- ✓ Endangered or vulnerable species
- ✓ Species with commercial and/or recreational use
- ✓ Key species according CFMC (1998)
- ✓ Residence status

PRIORITY 1: 66 SPECIES

PRIORITY 2: 72 SPECIES

PRIORITY 3: 108 SPECIES

**THE PUERTO RICO AND U.S. VIRGIN ISLANDS AQUATIC GAP ANALYSIS PROJECT
SPECIES LIST**

		Common Names		
	Family	SciName	English	Spanish
1	Balistidae	Balistes vetula	Queen Triggerfish	Pejepuerco
2	Carangidae	Seriola rivoliana	Almaco Jack	Medregal, Escolar
3	Chaetodontidae	Chaetodon striatus	Banded Butterflyfish	
4	Haemulidae	Haemulon macrostomum	Spanish Grunt	Colombiana
5		Haemulon plumierii	White Grunt	Boquicolorao, Cachicata
6	Holocentridae	Holocentrus adscensionis	Squirrelfish	Gallo, Candil, Candilero
7	Labridae	Lachnolaimus maximus	Hogfish	Capitán
8	Lobotidae	Lobotes surinamensis	Tripletail	Pargo sargo, Macuri
9	Lutjanidae	Lutjanus analis	Mutton Snapper	Sama
10		Lutjanus apodus	Schoolmaster	Pargo amarillo, Cají
11		Lutjanus synagris	Lane Snapper	Arrayado, Manchego
12		Lutjanus vivanus	Silk Snapper	Chillo
13		Ocyurus chrysurus	Yellowtail Snapper	Colirrubia
14	Malacanthidae	Malacanthus plumieri	Sand Tilefish	Jolocho
15	Muraenidae	Gymnothorax miliaris	Goldentail Moray	
16	Ostraciidae	Acanthostracion polygonius	Honeycomb Cowfish	Chapín
17		Acanthostracion quadricornis	Scrawled Cowfish	Chapín
18		Lactophrys bicaudalis	Spotted Trunkfish	Chapín
19	Scaridae	Scarus taeniopterus	Princess Parrotfish	
20		Scarus vetula	Queen Parrotfish	
21		Sparisoma atomarium	Greenblotch Parrotfish	
22		Sparisoma aurofrenatum	Redband Parrotfish	
23		Sparisoma chrysopterus	Redtail Parrotfish	

PRIORITY 1

2. Compile information on the natural history of selected species.

30% marine and freshwater species

Vertebrate Species Accounts Database SELECTED? PRGAP: N USVI GAP: N Aquatic-Gap: Y

Species Identification | Expert Reviewers | Occurrence Status | Conservation Status | Geographic Distribution | Macro and Micro Habitat Associations | Life History

SPECIES ID: GAP0478 Select Species *Epinephelus guttatus*

SCIENTIFIC NAME: *Epinephelus guttatus* Find Citation Add Citation Citation Help

Marine or Freshwater Bottom Association: Red Hind is a species associated with reefs (Sadovy et al. 2008). Depth range of this species: Species can be found between 2 to 100 m. The spawning depth range is between 18 to 90 m [Sadovy 1994]. Common Distance to River Mouth in meters:

PRGAP Species ID: GAP0478 Old Gap ID: 167700 English Name: Red Hind

PRGAP Sci. Name: *Epinephelus guttatus* Spanish Name: Mero Cabrilla

Tax. Class: Actinopterygii Other English Names: Hind, Lucky grouper

Tax. Order: Perciformes Other Spanish Names: Cabrilla, Mero Cherna, Arigua

Tax. Author: Linnaeus, 1758 Tax. Synonym: *Perca guttata*, *Holocentrus punctatus*, *Epinephelus*

DRNA Element Code: IIS Scientific Name: *Epinephelus guttatus*

DRNA Scientific Name: *Epinephelus guttatus*

Staff Reviewer's Name: Review Completion Date: Puerto Rico Species List:

Staff Reporter's Name: Maria Isabel Herrera-M. Report Completion Date: USVI Species List:

Review Completed: DNER Component List: Priority Level: **1**

Report Completed: DNER Recreational List: What is this?

Habitat Use During Species Life Stages (Type "Y" for Yes or "N" for No)

strPRGAI	Association Category	Habitat	Eggs
GAP0478	Coral Reef	Linear Reef	
GAP0478	Coral Reef	Reef Rubble	
GAP0478	Coral Reef	Scattered Coral/Rock in Unconsolidated Sedim	
GAP0478	Coral Reef	Spur and Groove	
GAP0478	Coral Reef Zone	Back Slope/Back Reef	
GAP0478	Coral Reef Zone	Foreslope	
GAP0478	Coral Reef Zone	Inter-Reef Rubble Substrate	
GAP0478	Coral Reef Zone	Inter-Reef Soft substrate	
GAP0478	Coral Reef Zone	Lagoon	

Record: No Filter Search

General or Broad Habitat Associations

Reefs Sandy bottoms Rivers Lakes

Seagrass Beds Rocky shores Estuary Brackish

Mix Coral rubble/sand/rock Mangrove Pelagic or open water

Species Life Cycle

Potamodromous Oceanodromous

Diadromous

Amphidromous Catadromous Anadromous

Migration: The Red Hind make annual spawning migrations to specific areas. Aggregation areas are generally located in the vicinity of the edge of the insular

Reproduction: Red Hind are usually solitary and territorial, but seasonally aggregate to spawn during few days, between December and April in different

Demography: Adults inhabit shallow reefs and rocky bottoms. Eggs and larvae are pelagic (Sadovy et al. 2010).

Foraging Ecology:

Other Habitat Use:

Activity Pattern:

Summary of Species Natural History:

Red Hind are usually solitary and territorial, but seasonally aggregate to spawn during few days, between December and April in different Caribbean areas. Spawning areas have been reported in Puerto Rico and US Virgin Islands (Nemeth 2005). These areas typically occur on the top of deep coral reef ridges which are located on or near the shelf edge (Nemeth et al. 2007). This species has gender-specific migratory patterns. After spawning, females migrate to shallower inshore areas while the larger males remain on the deeper offshore reefs (Sadovy et al. 1994). Homing behavior, site fidelity, and return migrations to aggregations have been noted in Bermuda and Puerto Rico (Luckhurst 1992; Rosario and Figuerola 2001; Sabaf 2001). Feeds mainly on crabs and other crustaceans, fishes, and octopus (Sadovy et al. 2008)

The Red Hind make annual spawning migrations to specific areas. Aggregation areas are generally located in the vicinity of the edge of the insular platform but may also extend some kilometers shoreward. Individuals do not necessarily move to the nearest aggregation area from a given resident reef (Sadovy et al. 1994). The Red hind can migrated from 6 to 33 km to a ca. 500 km² area (Nemeth 2005).

Database

Natural History Reports

20% marine and freshwater species

Please take one
for review!!!

Taxonomic information

Natural history
summary

Geographic distribution
information


Habitat affinity data

Life history synopsis

Important literature

Eretmochelys imbricata Hawksbill Turtle Tortuga Carey

Taxonomy



Class:	Reptilia
Order:	Testudines
Family:	Cheloniidae
FUSESA Status:	Endangered
IUCN Category:	Critically Endangered
DNER Category:	Endangered
Residence Status in PR:	Migrant
Residence Status in USVI:	Resident

Summary
Hawksbills are the most abundant sea turtles in Puerto Rican and U.S. Virgin Islands coasts. Individuals of this species are highly migratory, and use a wide range of broadly separated localities and habitats during their lifetime. In water, the hawksbill occur in hard-bottomed and reef areas, and it is also found in mangrove bordered areas, shallow inlets, remote oceanic islands, offshore cays, and mainland shores...

Geographic Distribution:
Hawksbills sea turtles have are distributed throughout tropical and, to a lesser extent, subtropical waters of the Atlantic Ocean, Indian Ocean, and Pacific Ocean (Mortimer and Donnelly 2008). Hawksbills are the most abundant sea turtles in Puerto Rican coasts. The main aggregation is located at the coral reefs areas and sea cliffs around Mona and Monito Islands, in the west side of Puerto Rico, where important reproduction and feeding sites exists (Diez and van Dam 2002)...

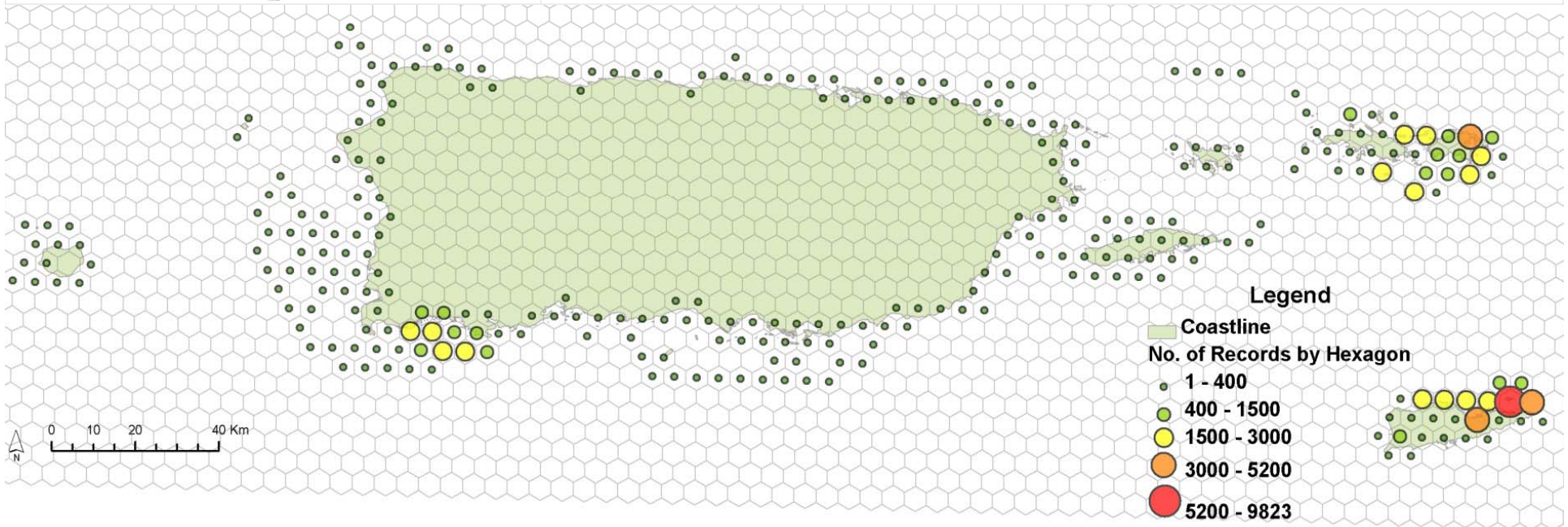
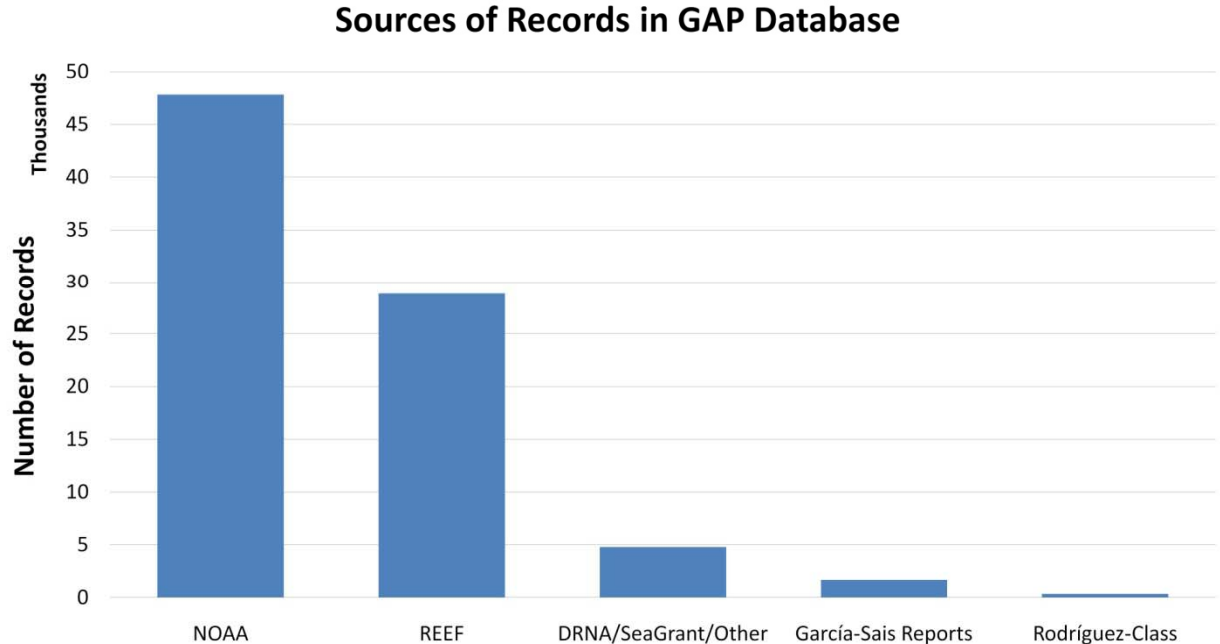
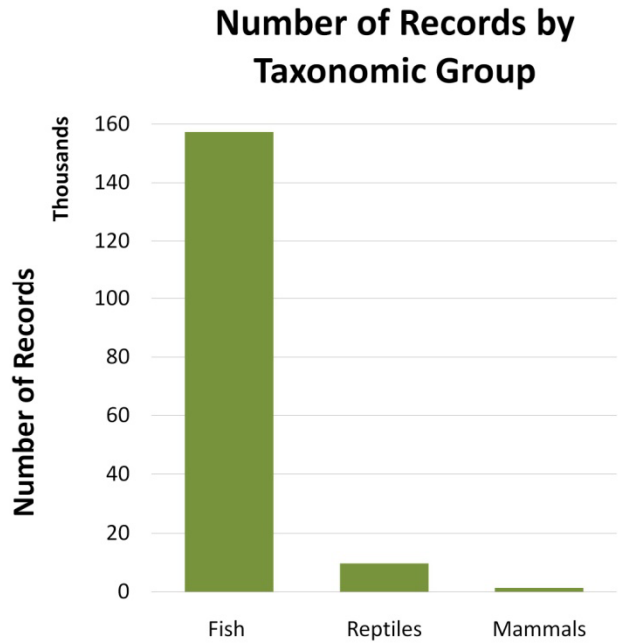
Habitat Associations
Females of hawksbill sea turtles select nesting sites located above high tide levels, in exposed marine beaches, with relatively eroded sand, free of buried debris, with abundant coastal vegetation and sand, and close to coral reefs areas (Mortimer and Donnelly 2008, Diez pers. Comm.).

Life History:
This species is highly migratory, and uses a wide range of broadly separated localities and habitats during its lifetimes. Hawksbills have breeding migrations between foraging grounds and breeding areas. In the Caribbean, the displacement distances reported are of up to 1930 km (Meylan 1999). Nesting females from Mona Island can disperse approximately 85 to 451 km from their nesting sites (van Dam et al. 2007).

References Cited:
Beggs, J.A.; Horrocks, J.A.; Krueger, B.H. 2007. Increase in hawksbill sea turtle *Eretmochelys imbricata* nesting in Barbados, West Indies. *Endangered Species Research* 3:159-168.
van Dam, R.P.; Diez, C.E.; Balazs, G.H.; Colón Colón, L.A.; McMillan, W.O.; Schroeder, B. 2008. Sex-specific migration patterns of hawksbill turtles breeding at Mona Island, Puerto Rico. *Endangered Species Research*. 4:85-94.

We will publish the natural history reports

3. Compile information on species occurrences.



Hawksbill Sea Turtle - *Eretmochelys imbricata* - Carey

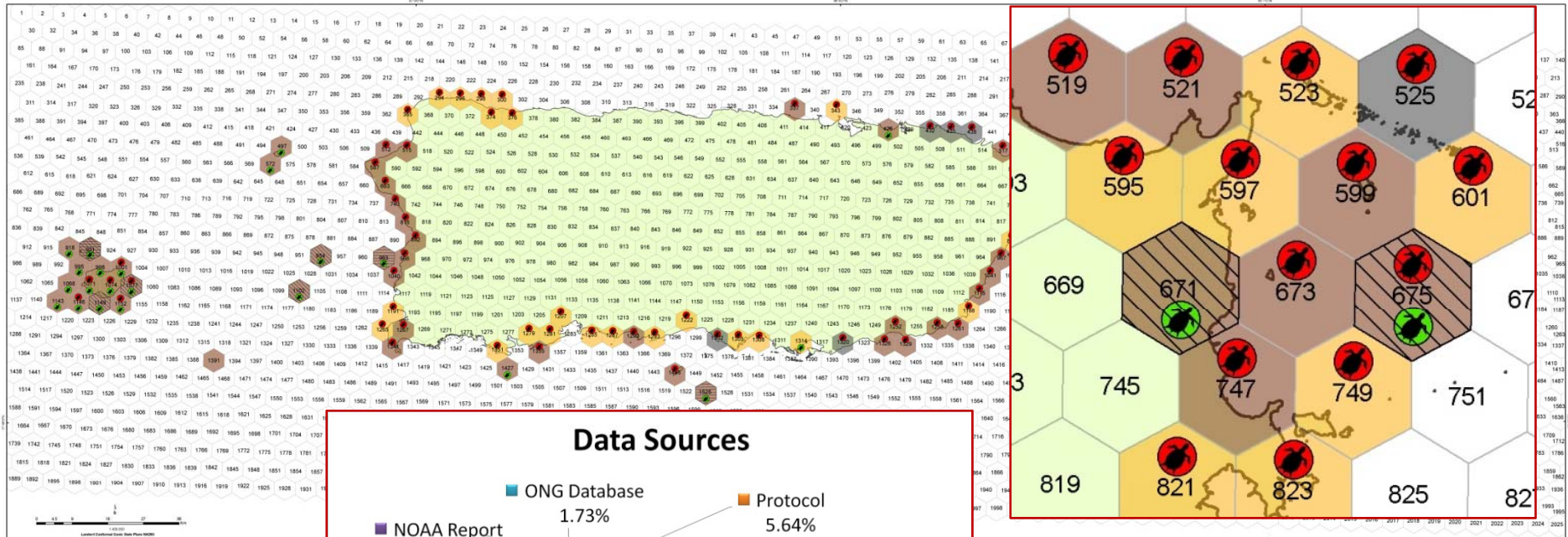
DRAFT July 20, 2011

Confirmed Probable Historical



Occurrence Map Activity

The map shows hawksbill presence based in our database, not yearly or seasonally represented. It is a summary of crawls, nests, seaturtles sight in water and beaches; including nesting and feeding areas.



Occurrence status in hexagons which you visit:

Please provide the name of the area: _____

- Very Common 4 You see turtles or nests always or most of the time you visit the area.
- Common 3 You can see turtles or nests frequently (7 out of 10 times you visit the area)
- Rare 2 You see turtles or nests rarely (4 out of 10 times you visit the area)
- Very Rare 1 You see turtles or nests sporadically (1 out of 10 times you visit the area)
- Absent 0 The species is not actually observed when you visit the area



Feeding Area



Nesting Area



Adult



Juvenile

Hawksbill - *Eretmochelys imbricata* - Carey

DRAFT July 20, 2011

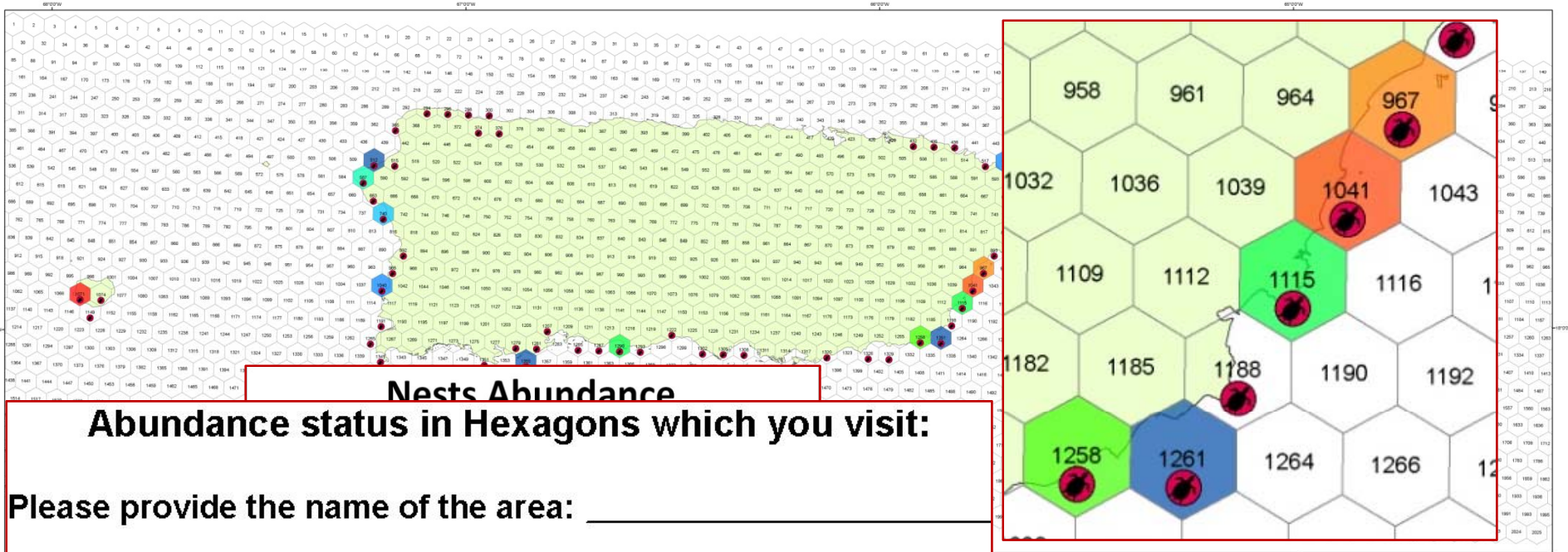
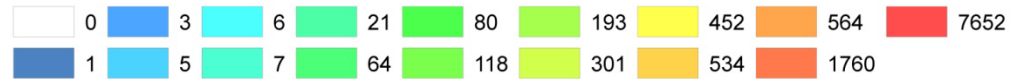
Nests Abundance Map

The map shows hawksbill nests abundance not yearly or seasonally represented. It is a summary of nests in our database. You can use the information below the map to attribute an abundance number and write it in the hexagon.

nesting area



Nests Abundance



Abundance status in Hexagons which you visit:

Please provide the name of the area: _____

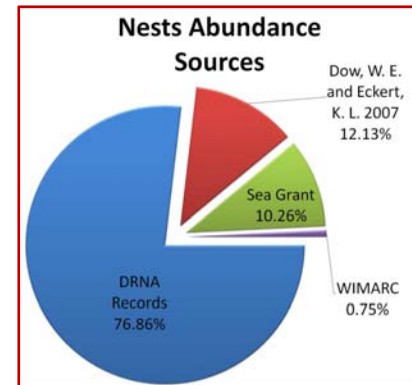
Highly Abundant 4 51 or more nests per year

Abundant 3 26 to 50 nests per year

Low Abundance 2 11 to 25 nests per year

Very Low Abundance 1 1 to 10 nests per year

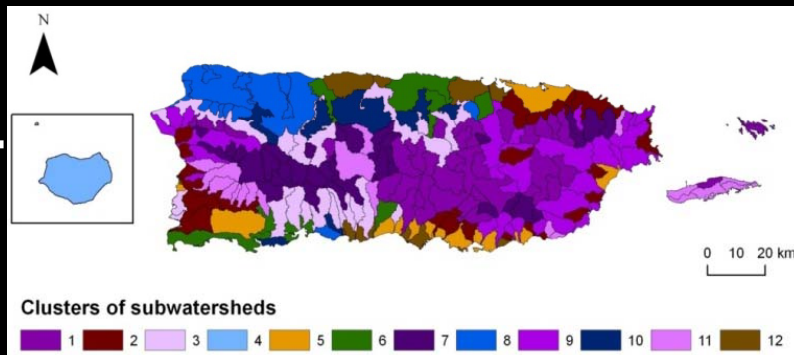
Absent 0 No nests in the area



4. Develop geospatial layers of habitat characteristics.

Identification and classification of freshwater habitats

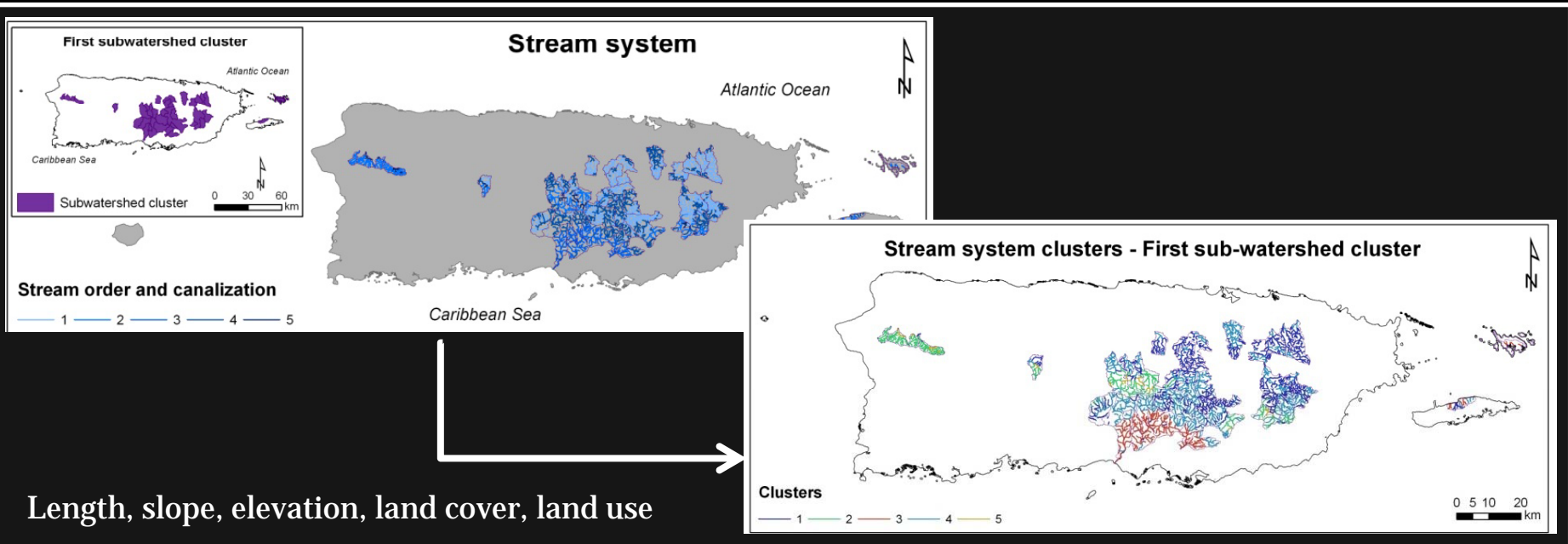
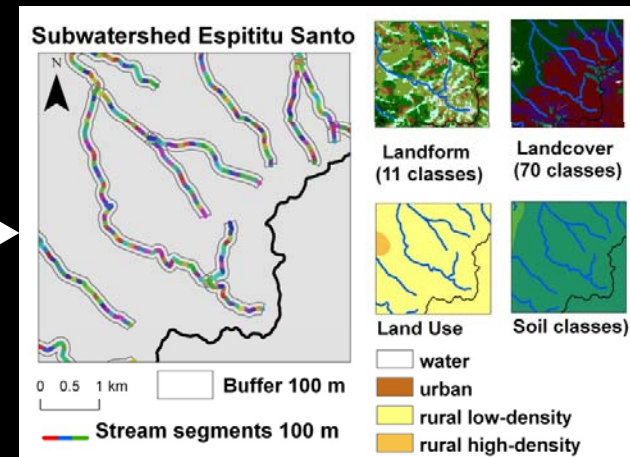
Subwatershed level (100 % completed)



Climatic, geology and land cover features

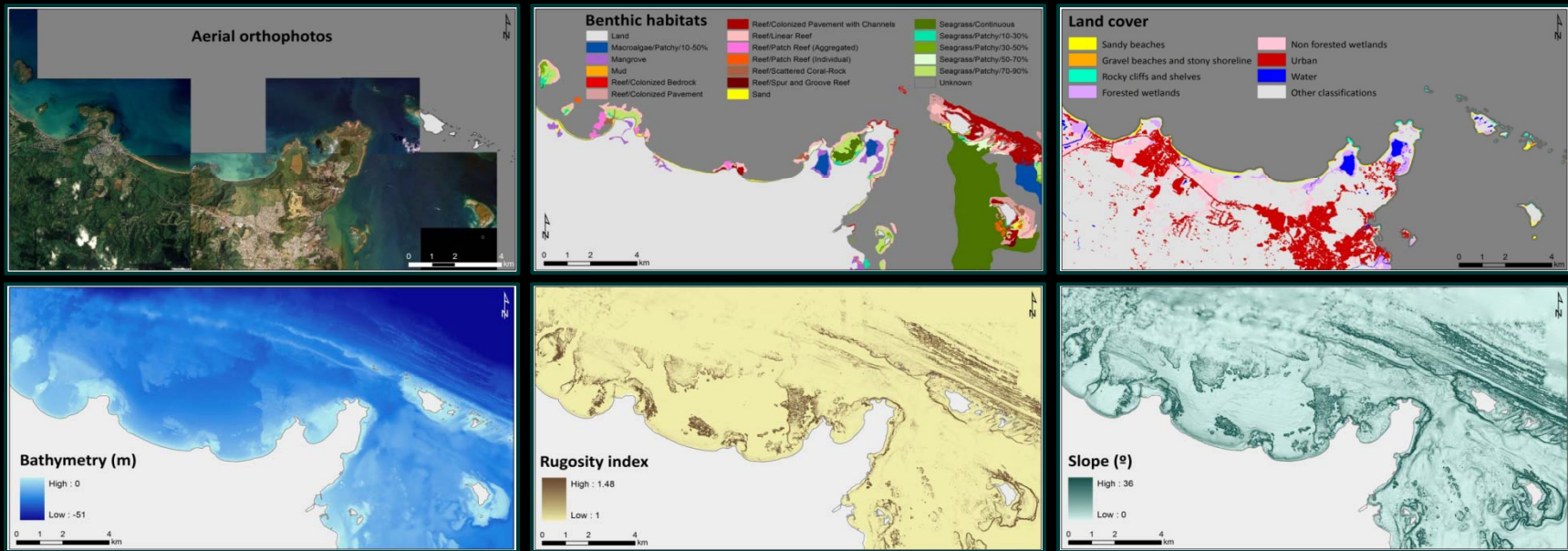
Stream system level (31 % Completed)

Stream segment level (1.5% completed)

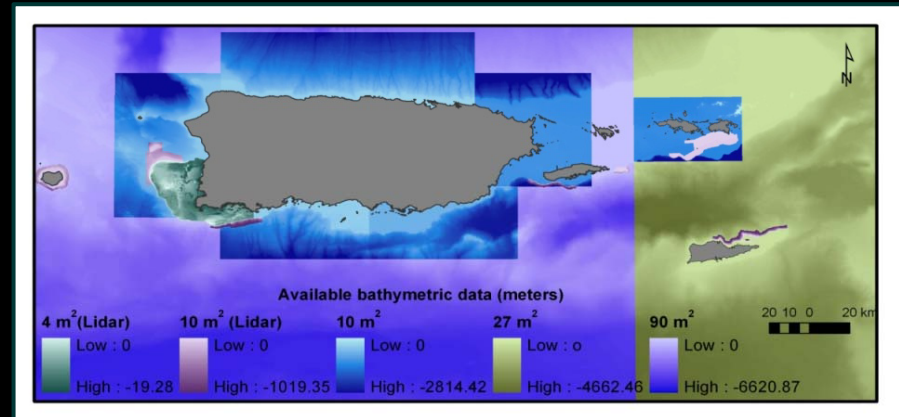


Length, slope, elevation, land cover, land use

Habitat: Land and seascape features compiled to map potential species habitats



- Compilation of information about coastal and benthic habitats along with bathymetric data and derivate products.
- Geospatial information, e.g. bathymetry, varied in extend and in resolution (from coarse to fine) in pelagic areas covering up 35 miles from the coast line.



The Aquatic-GAP analysis project for Puerto Rico and the USVI invites to:



Workshop:

Benthic habitat mapping to improve modeling of marine species distribution in the U.S. Caribbean.

Entry by invitation or prior registration. Limited availability

Place: Pending

Date: October 18th, 2011

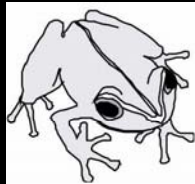
Hour: 9:00 am - 4:00 pm

Contact: Patricia Rincon

mrincondiaz@fs.fed.us

(787)766-5335 Ext: 303

Sponsored by:



gap



KEEPING COMMON SPECIES COMMON

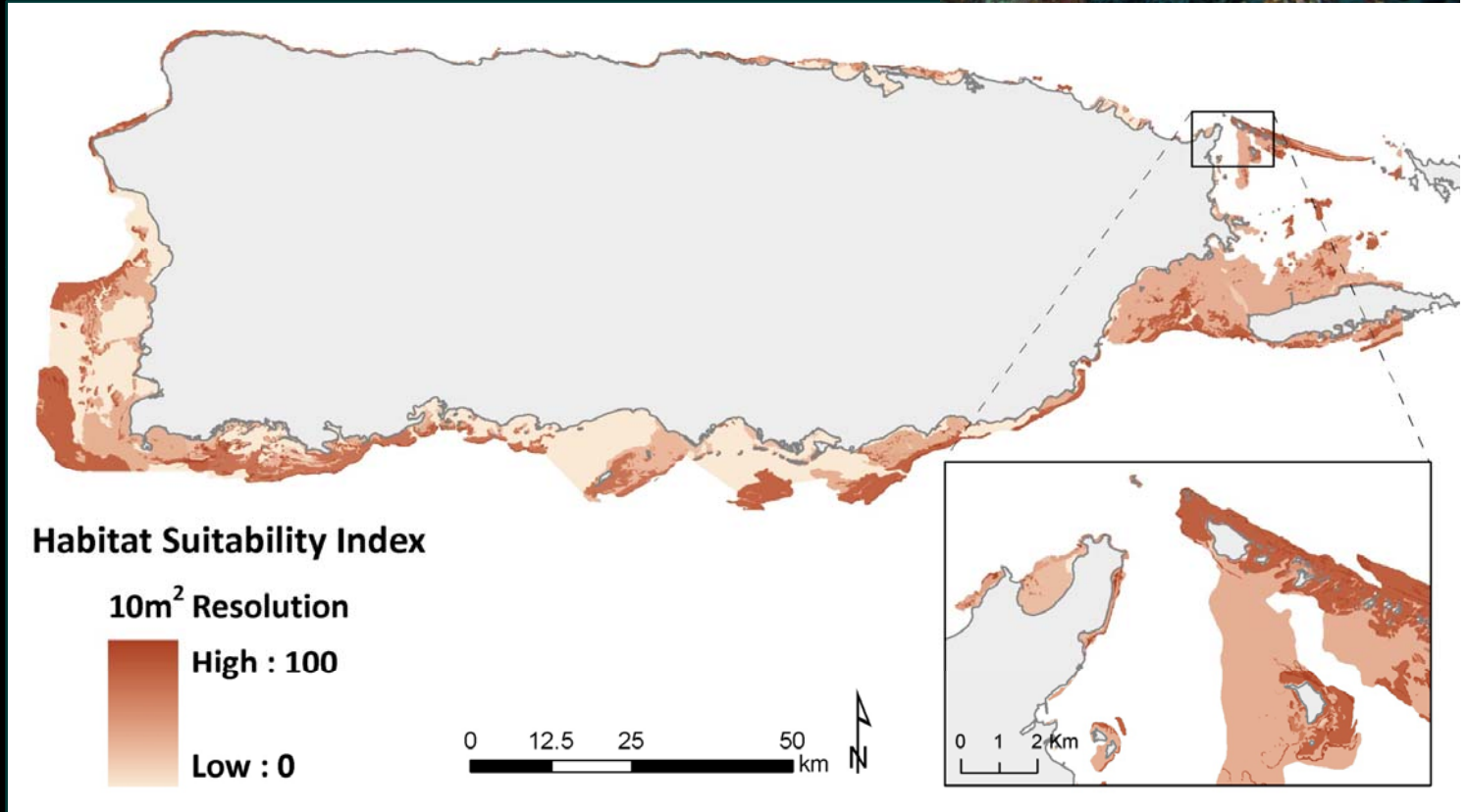
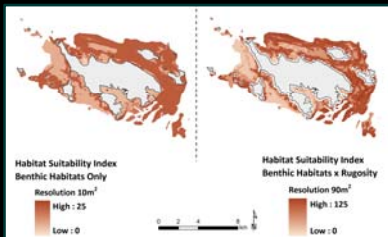
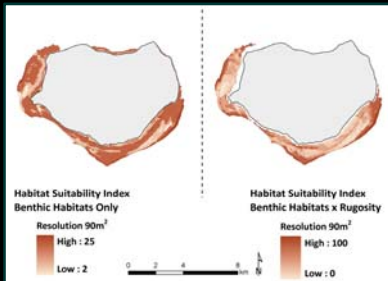
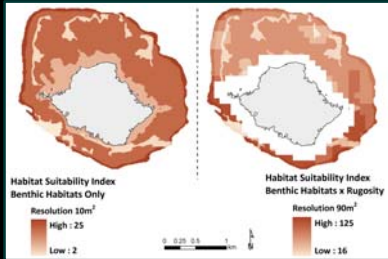


INTERNATIONAL INSTITUTE OF TROPICAL FORESTRY

Puerto Rico and US Virgin Islands Integrated Terrestrial-Aquatic Gap Analysis Project

5. Species habitat modeling.

Juveniles hawksbill sea turtle



$[Structure (value)] \times [Zone (value)] \times [Rugosity (value)] = Suitability\ of\ habitat$

$[Linear\ reef (5)] \times [Back\ reef (5)] \times [Rugosity (5)] = 125$ i.e. suitable habitat;
 $[Mud (0)] \times [Dredged (1)] \times [Rugosity (1)] = 0$ i.e. unsuitable habitat.

6. Compile information on protected areas.

Protected Natural Areas of Puerto Rico (Gould et al. 2011)



Now:

A systematic assessment of the effectiveness of existing protected areas in the Caribbean is necessary to evaluate their current role for meeting biodiversity targets.

By using the Puerto Rico Gap Analysis database, we will assess the extent and management effectiveness of terrestrial protected areas in order to address their role for biodiversity conservation in the island.

Thank you!



TETRA TECH



Fideicomiso de Conservación de Puerto Rico
Conservation Trust of Puerto Rico



Arrecifes Pro Ciudad

We are looking and need more collaborators and reviewers!

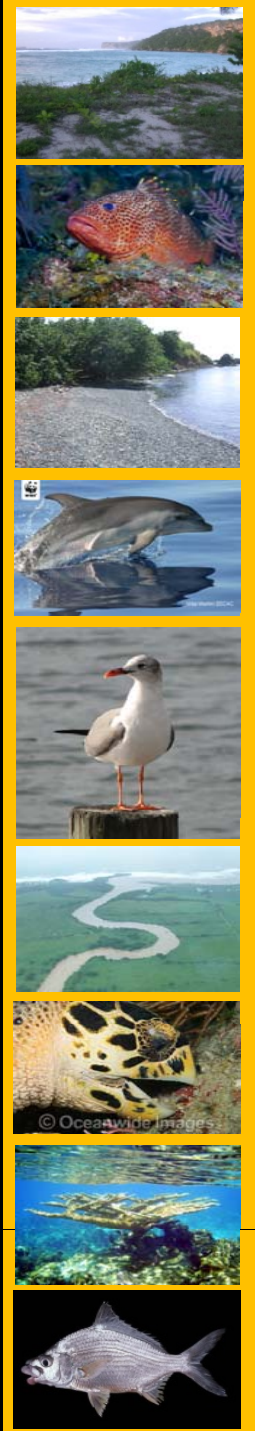
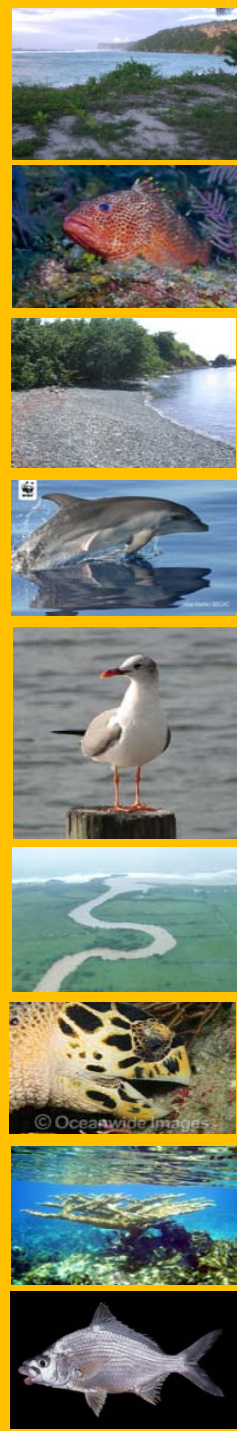


Integrated Gap Analysis Project

¿PREGUNTAS?

IITF GIS and Remote Sensing Laboratory

Center for Tropical Landscape Analyses



Areas for collaboration

- Habitat characterization:
 - Benthic habitats: extent, accuracy, live cover
 - Improving terrestrial/marine interface
- Species natural history reports – author and review
- Occurrence data
- Review occurrence maps, habitat models, habitat distributions
- Related projects, data analyses
- Information on management areas, regulation affecting conservation



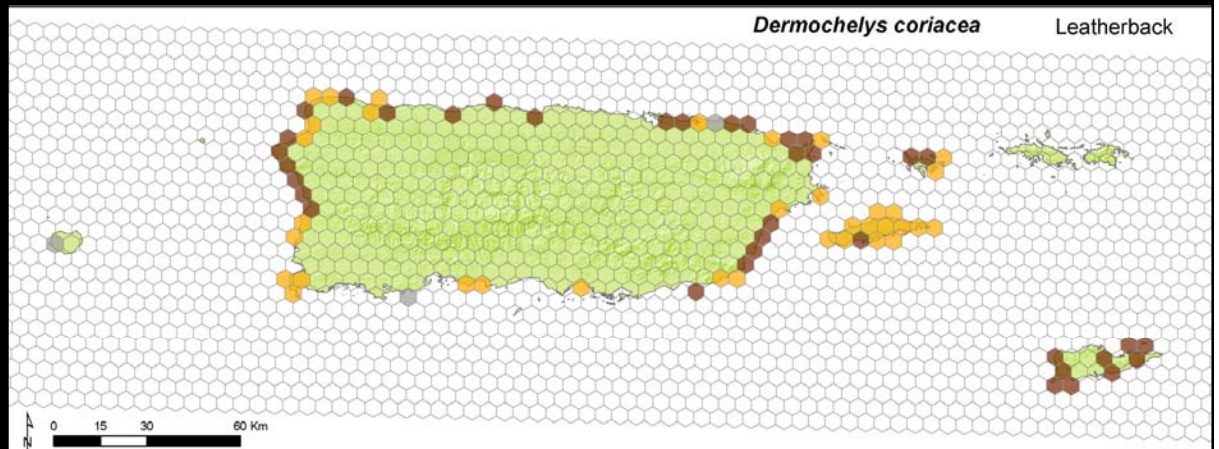
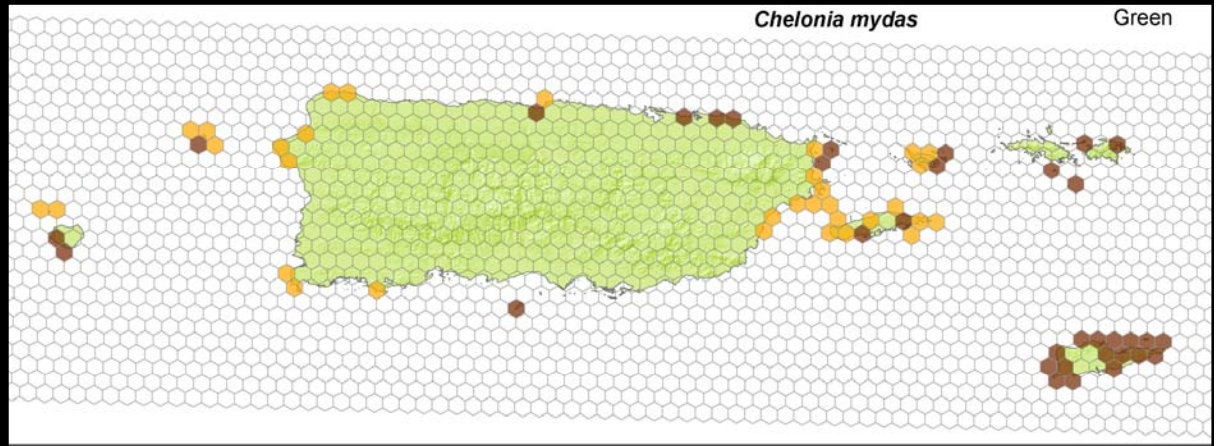
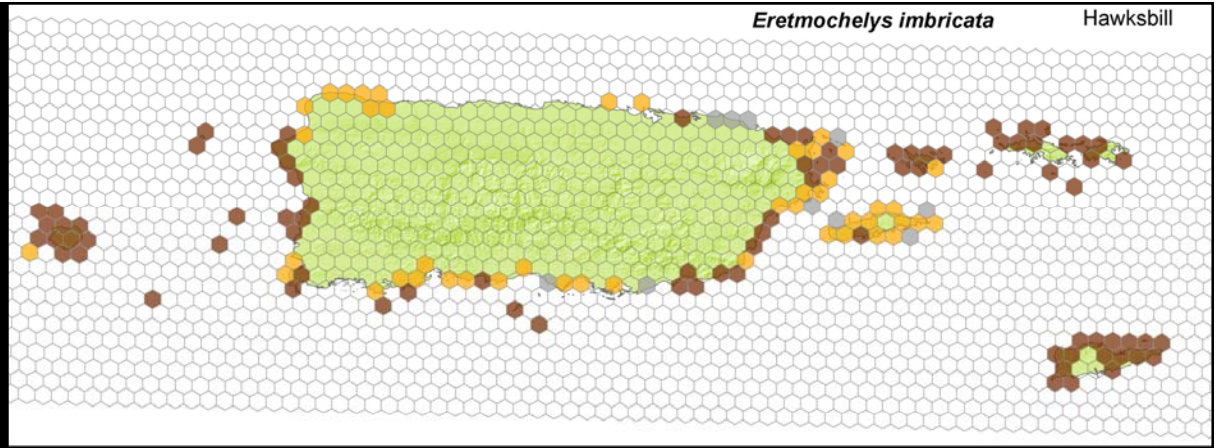
© MaryLKayoe



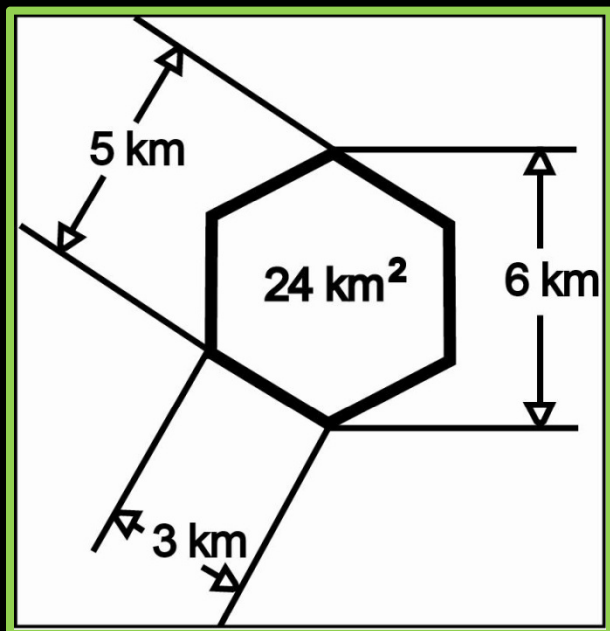
© Pril Fish



© crazycreatures.org



<p>Confirmed: Confidently assumed or known to occur in the hexagon. Sources include species locality records and expert opinion.</p>	<p>Probable: Probable occurrence based on a strong likelihood. Sources include expert opinion and/or published range maps or range descriptions.</p>	<p>Historical: Confidently assumed or known to have occurred in the hexagon prior to 1989 and considered as valid for recent distribution. Source include species locality records and expert opinion.</p>	<p>No Data: Considered absent from hexagon based on no documented records of occurrence and expert opinion. Sources include locality records and expert opinion.</p>
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Leatherback Sea Turtle

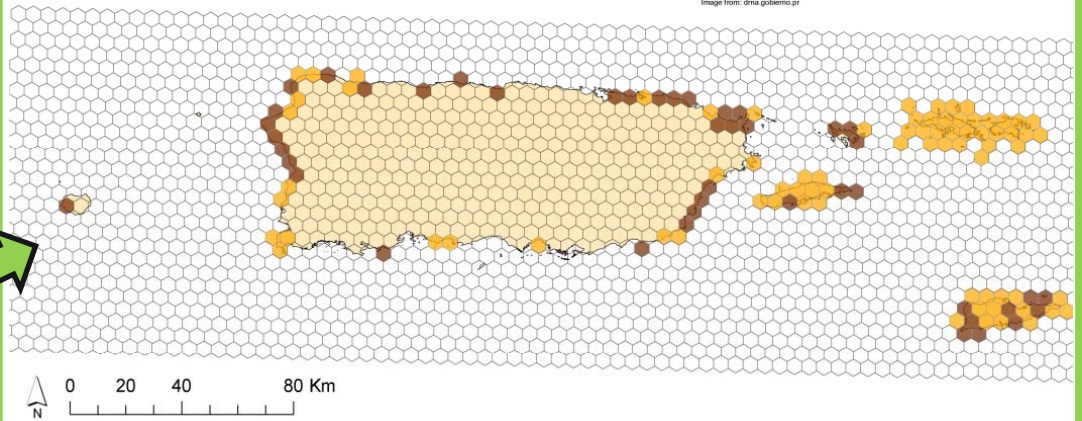
Dermochelys coriacea
Family Dermochelyidae

Tinglar



Legend

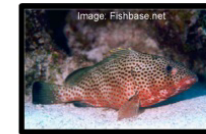
- Probable
- Confirmed
- No Data



Red Hind

Mero cabrilla

Epinephelus guttatus
Family Serranidae



Legend

- Probable
- Confirmed
- No Data

