

Understanding the abundance and distribution of hawksbill sea turtles through seascape features in Caribbean coral reefs



Patricia Rincon

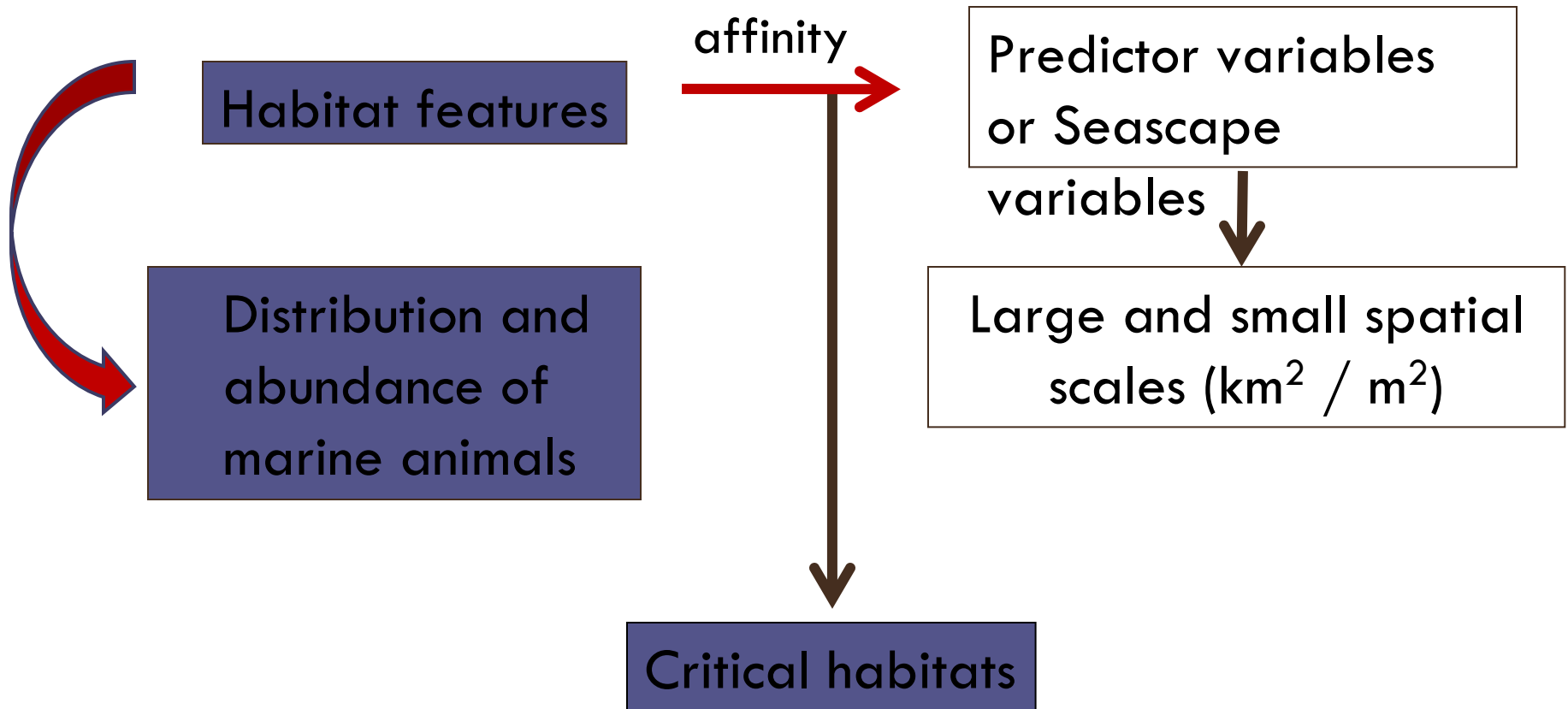
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Introduction



Habitat preference by hawksbill turtles by using manual capture techniques and sonic tags

- Residents in coral reef areas
- Home range $< 2 \text{ Km}^2$
- Rugose areas
- Distribution responds to habitats nutritionally more favorable



Research needs



- Little research on foraging behavior and habitat preferences in juvenile stage:
 - ▣ Lack knowledge of the effect of quantity and quality of food on abundance of juvenile hawksbill sea turtles.
 - ▣ Poor understanding of habitat affinities using seascape variables.

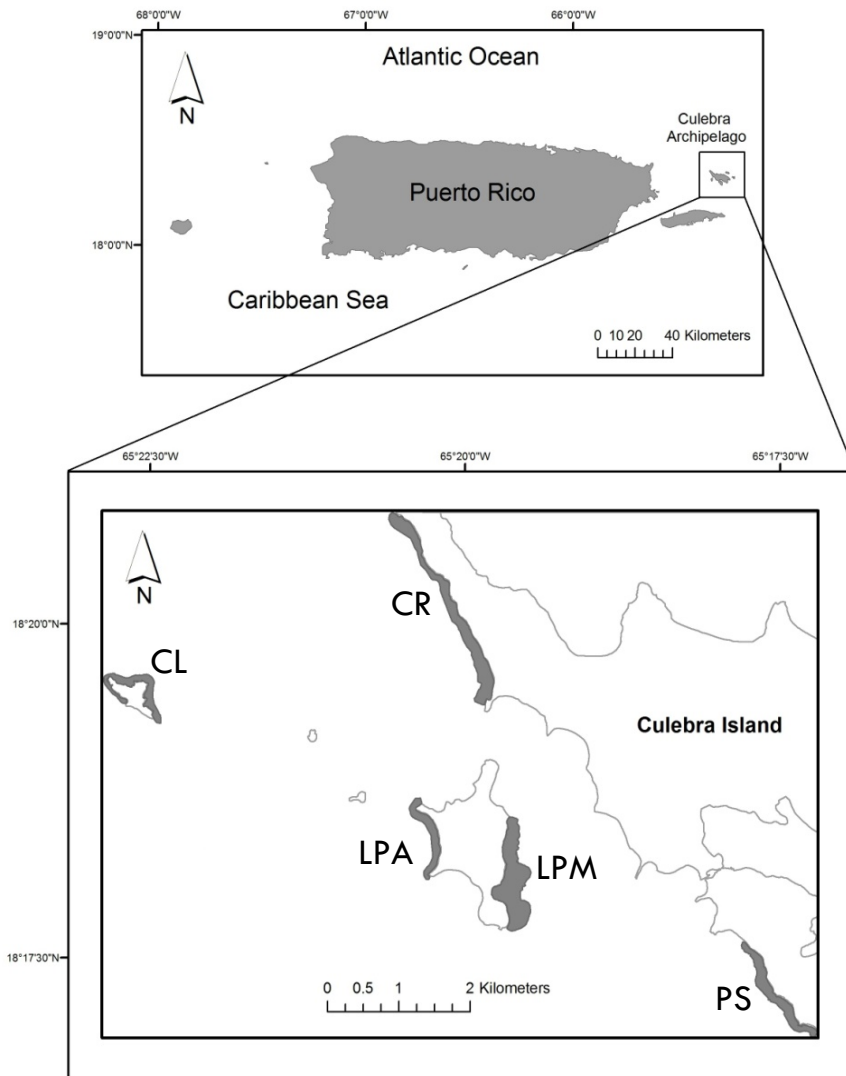
Objectives and Hypothesis



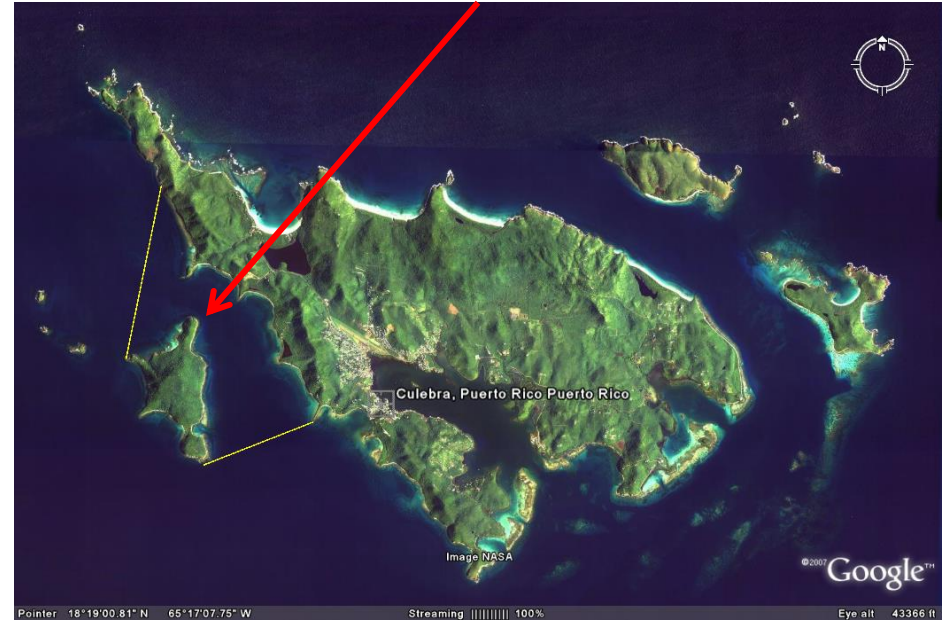
O1: To relate the availability of food items with abundance of juvenile hawksbill turtles in five localities of Culebra.

H1: Turtle abundance will be positively related with high availability of preferred prey items.

Study Areas



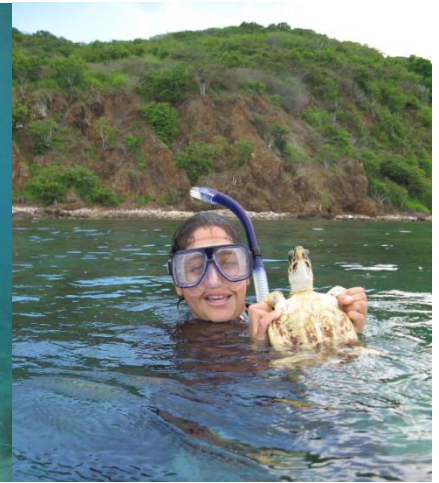
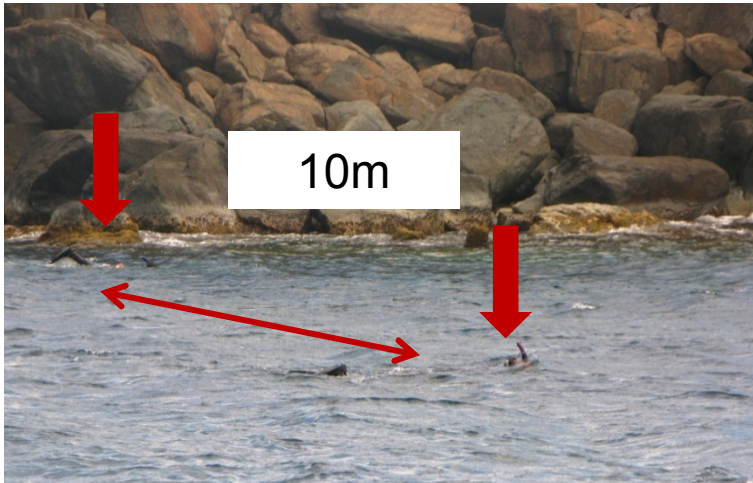
Marine Reserve: Luis Peña Channel



(Objective 1)

Methods: Turtle surveys and esophageal lavages

April 2008 to June 2009 – 15 hours per site



Location of capture (GPS) = 80



Measure of maximum straight carapace length (SCLmax)



Diet composition – Prey item with more than 1% in diet

Chondrilla nucula

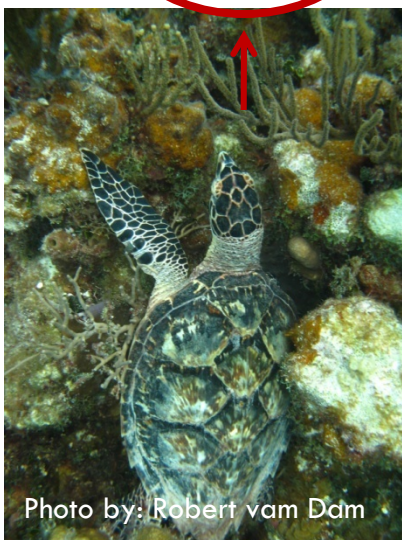
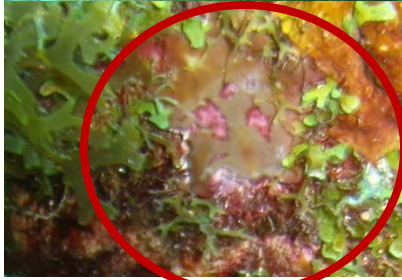
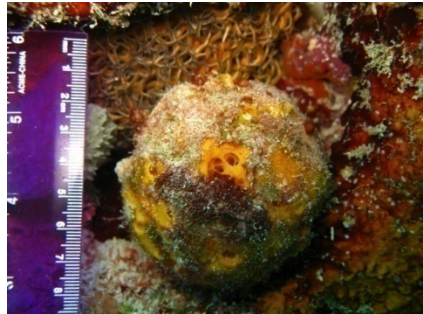
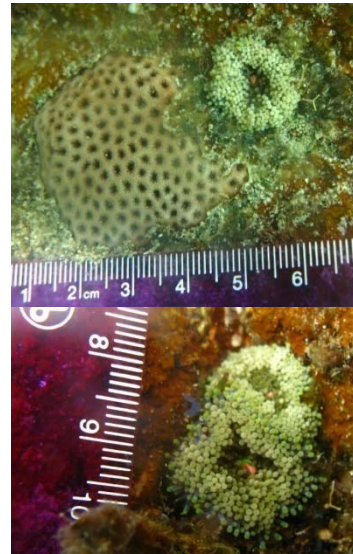


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Cinachyrella sp.



Ricordea florida



Lobophora variegata



Lebrunia danae



Methods: Quantification of food availability

Benthic surveys: 166 Phototransects 10 m²



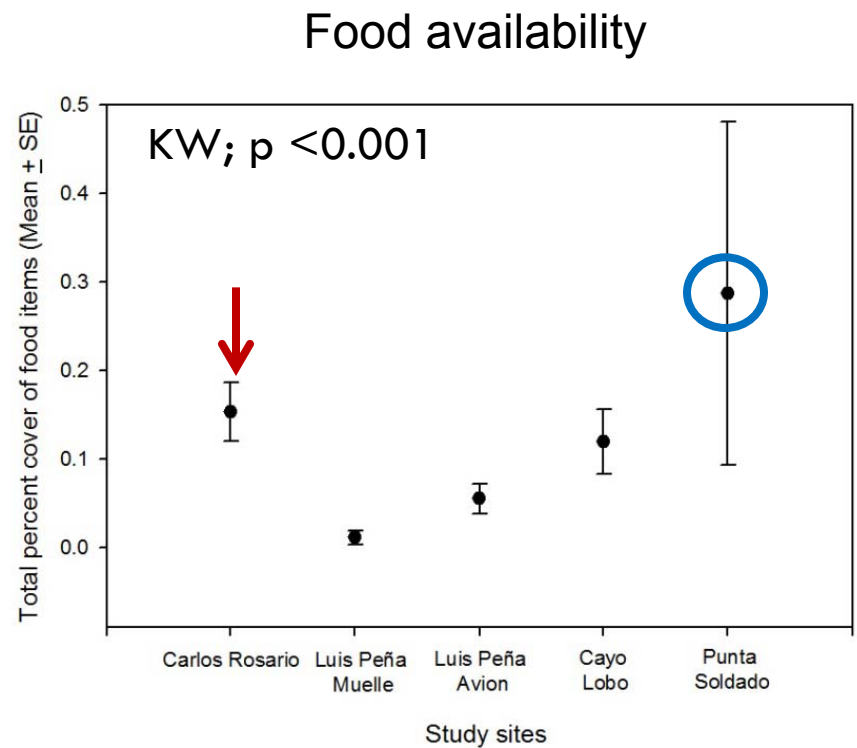
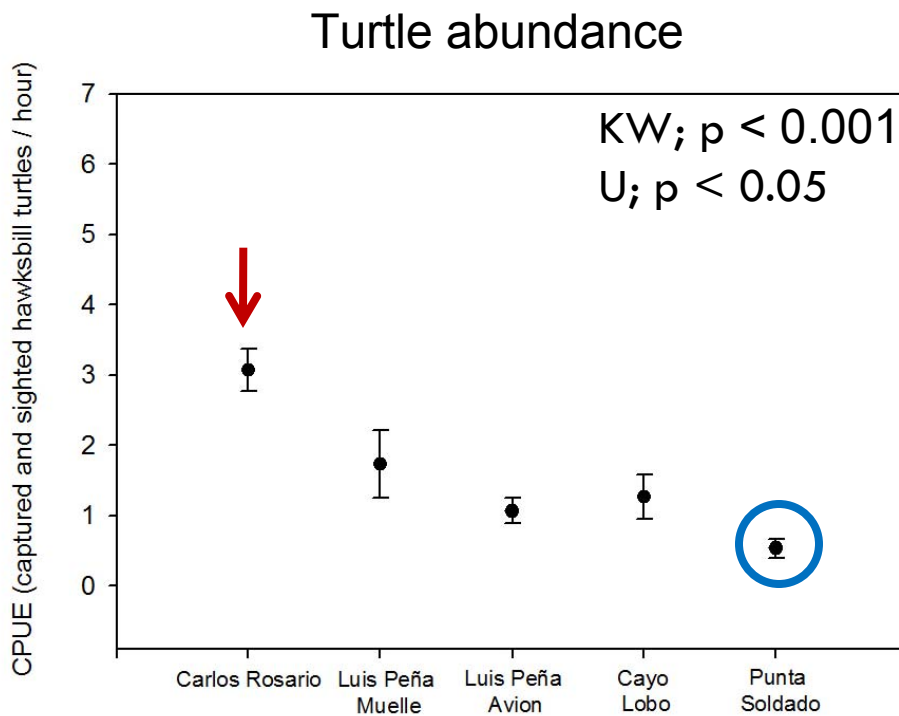
Percentage cover of prey items from the planar area
Coral Point Count with Excel Extensions Program (CPCe-NCRI)

(Objective 1)



Results and Discussion

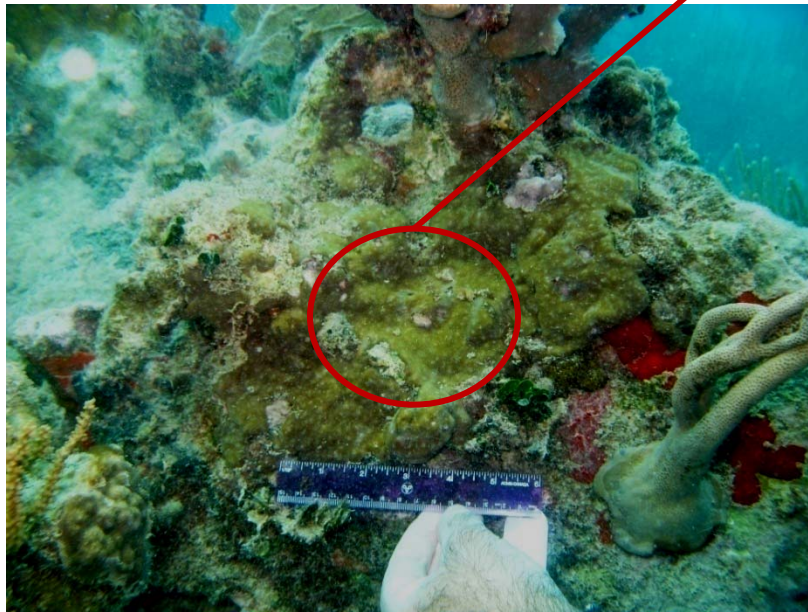
Is the availability of food items affecting the abundance of juvenile hawksbill turtles?



No as individual factor
Should be as a combined effect

C. nucula is a non limiting resource facilitating its consumption by Hawksbill turtles and appearing as an item with low preference

- High abundance of the sponge
- High regeneration from bite wounds healing rate around $\geq 1 \text{ mm d}^{-1}$



Objectives and Hypothesis



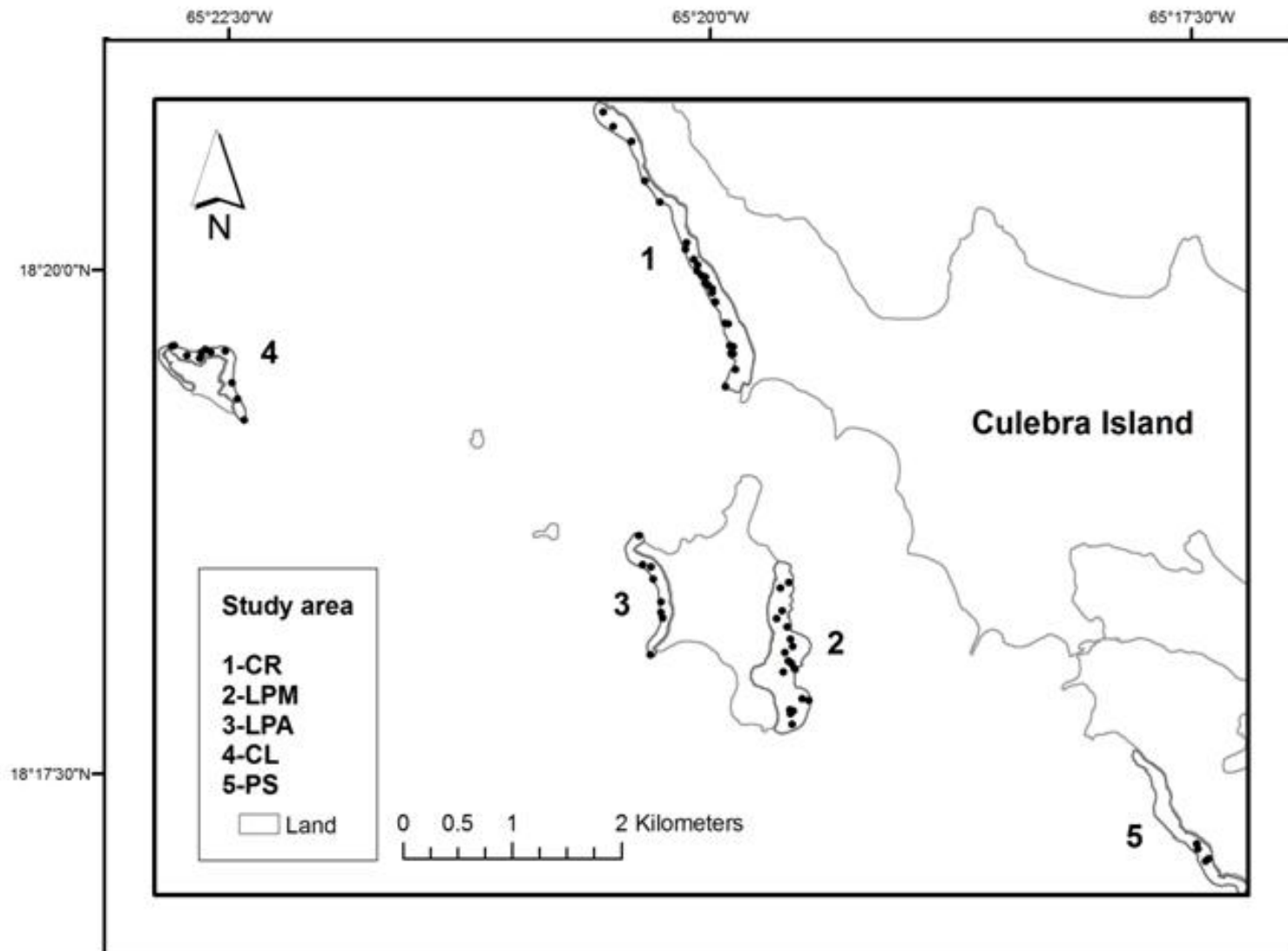
O2: To relate the presence of juvenile hawksbill sea turtles by using habitat affinities to seascape variables such as number and cover of benthic bottom types, rugosity and water depth column.

H2: Turtle presence will be positively related to coral reef areas with high availability of shelter areas.

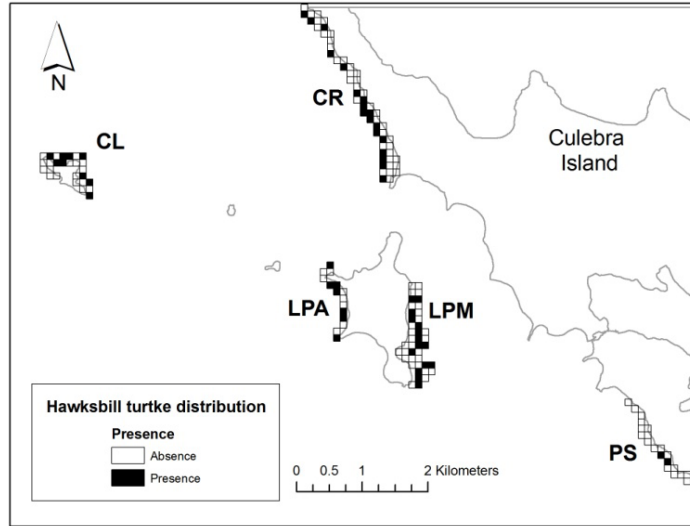
Methods

(Objective 2)

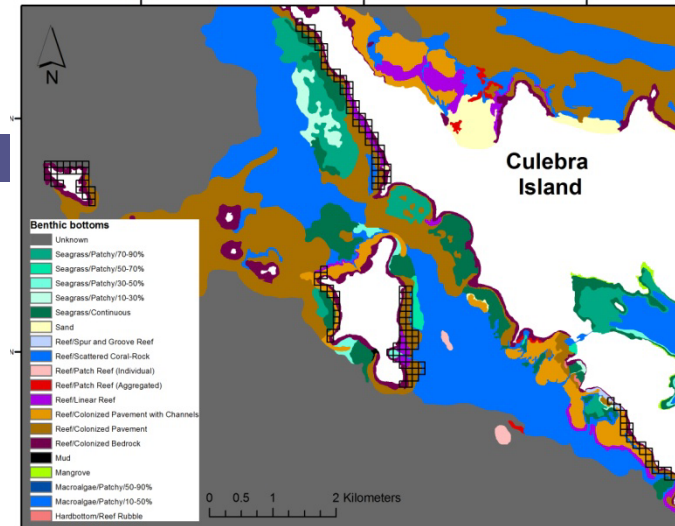
Location of capture hawksbill turtles in study areas



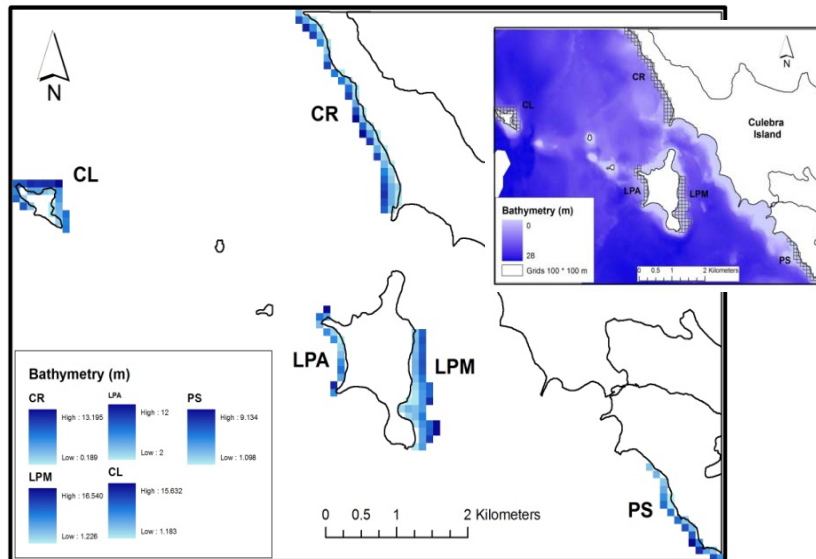
Presence of turtles



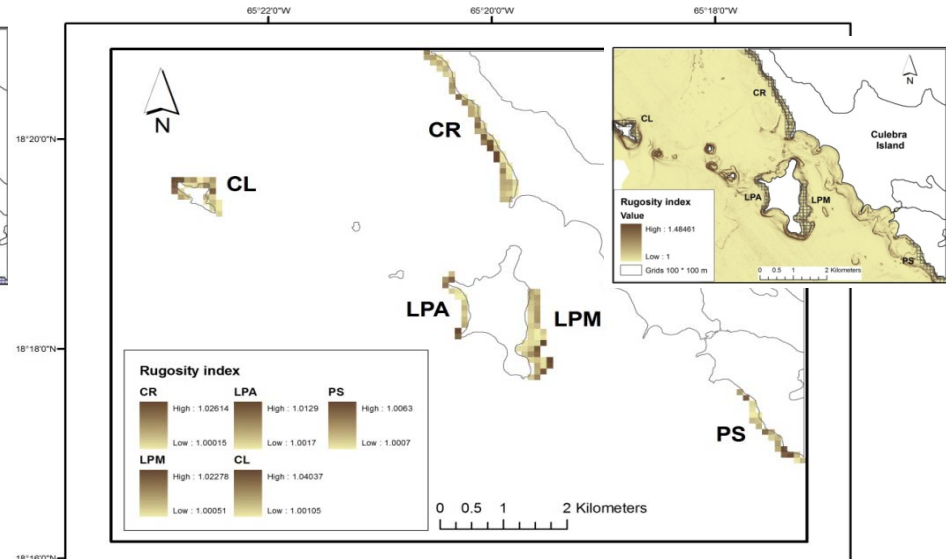
% Benthic bottoms (NOAA, 2001)



Mean depth (m)



Mean rugosity (Index)



GLM: Presence = benthic bottoms (number and cover) + mean depth + mean rugosity

(Objective 2)



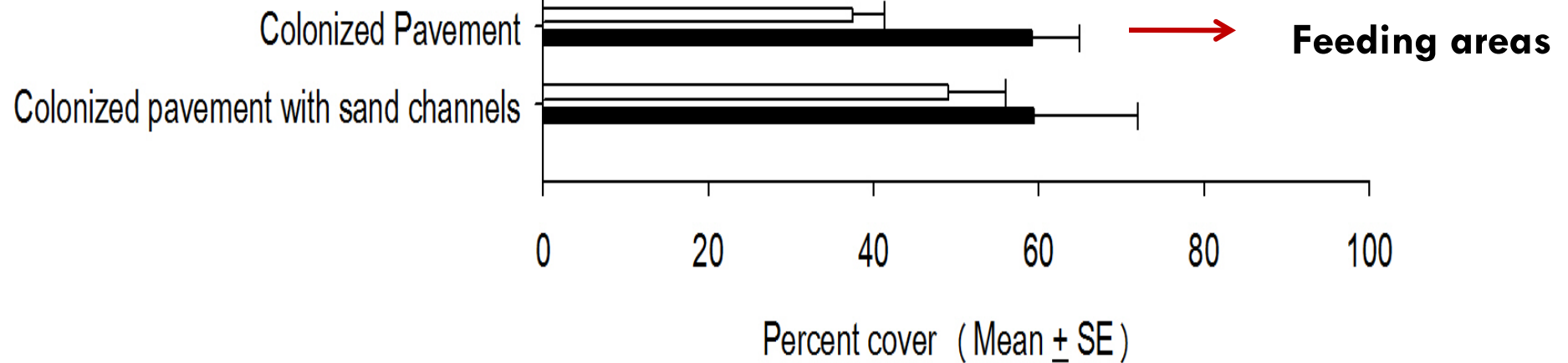
Results and Discussion

Best GLM between turtle presence and seascape variables

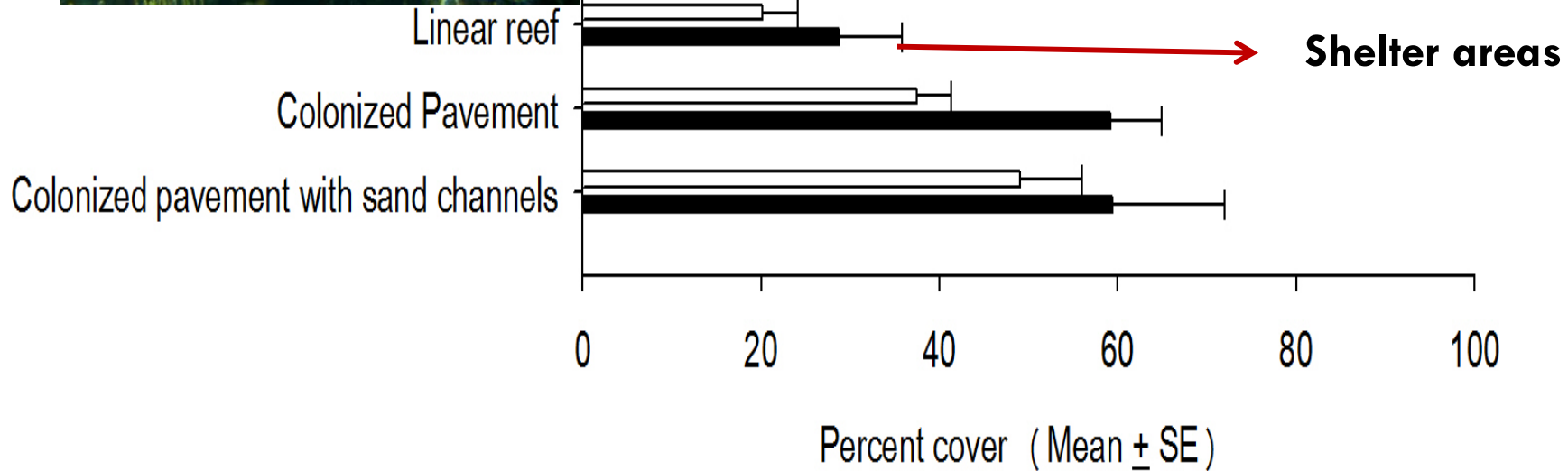
Seascape (predictor) variables	Regression coefficient
Colonized pavement with sand channels	0.432
Colonized pavement	1.155
Linear reef	0.514
Number of benthic bottoms	-2.111
Mean depth (associated with rugosity)	1.808

Statistical significance $p < 0.05$, AIC = 174.92

Hawksbills' behaviors are associated to specific bottom types



Hawksbills' behaviors are associated to specific bottom types



Conclusions

This study identified as habitat affinities for juvenile hawksbill turtles:

- Mean depth 2 to 15 m.
- Continuous and intermediate mean rugosity (1.008).
- Colonized pavements > 60%.
- Linear reef cover > 15%.



Critical area: Carlos Rosario


Continuous rugosity (food and shelter)



The main recommendation is to extend the boundaries of the Marine Protected Area to the north area of Carlos Rosario



Habitat affinity model as a tool for conservation



- This is the first approach to understand distribution of juvenile hawksbill sea turtles in the Caribbean by using predictor variables.
- This model could be used to identify critical habitats to protect this species including other life stages of turtles.
- This model needs to be completed with a distribution model and confirmation of presence of turtles around the Archipelago.

Acknowledgements

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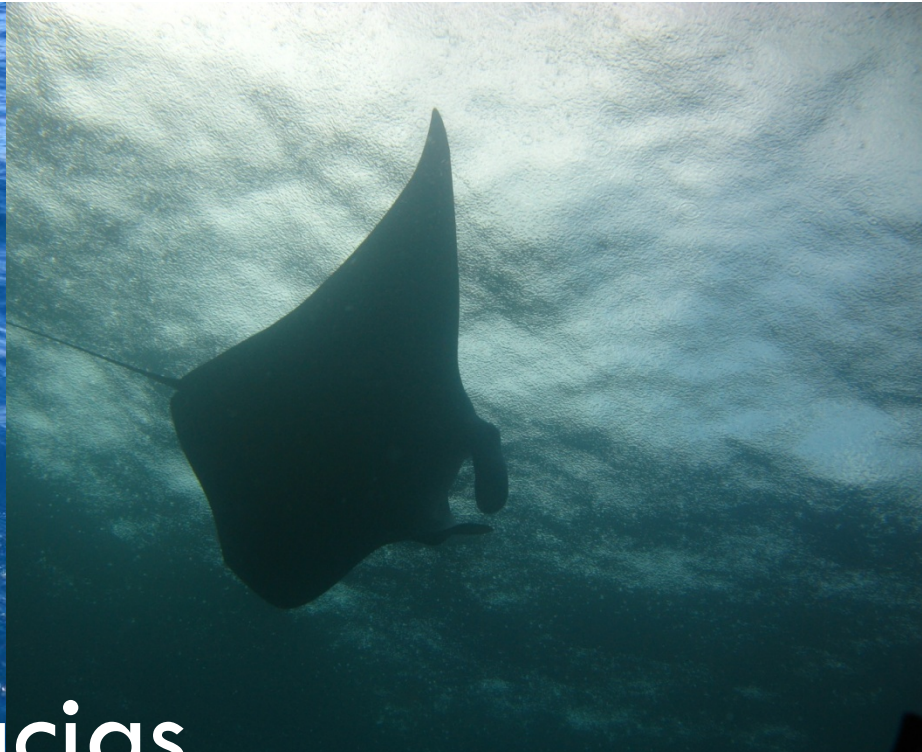
Identification of prey items: A. Zuluaga and A. Mercado (University of Puerto Rico), N. Santodomingo (National Museum of Natural History of Netherlands), Y. Leon (Jaguara Group, Dominican Republic).

Bathymetric data: C. Restrepo PhD. (University of Puerto Rico).

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Photo by: Robert van Dam



Gracias



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