



**Caracterización de playa y cambios en
línea de costa a corto (2009) y largo plazo
(1951-2009) en La Reserva Tres Palmas,
Rincón, P.R.**

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Historical Shoreline Changes at Rincón, Puerto Rico 1936-2006

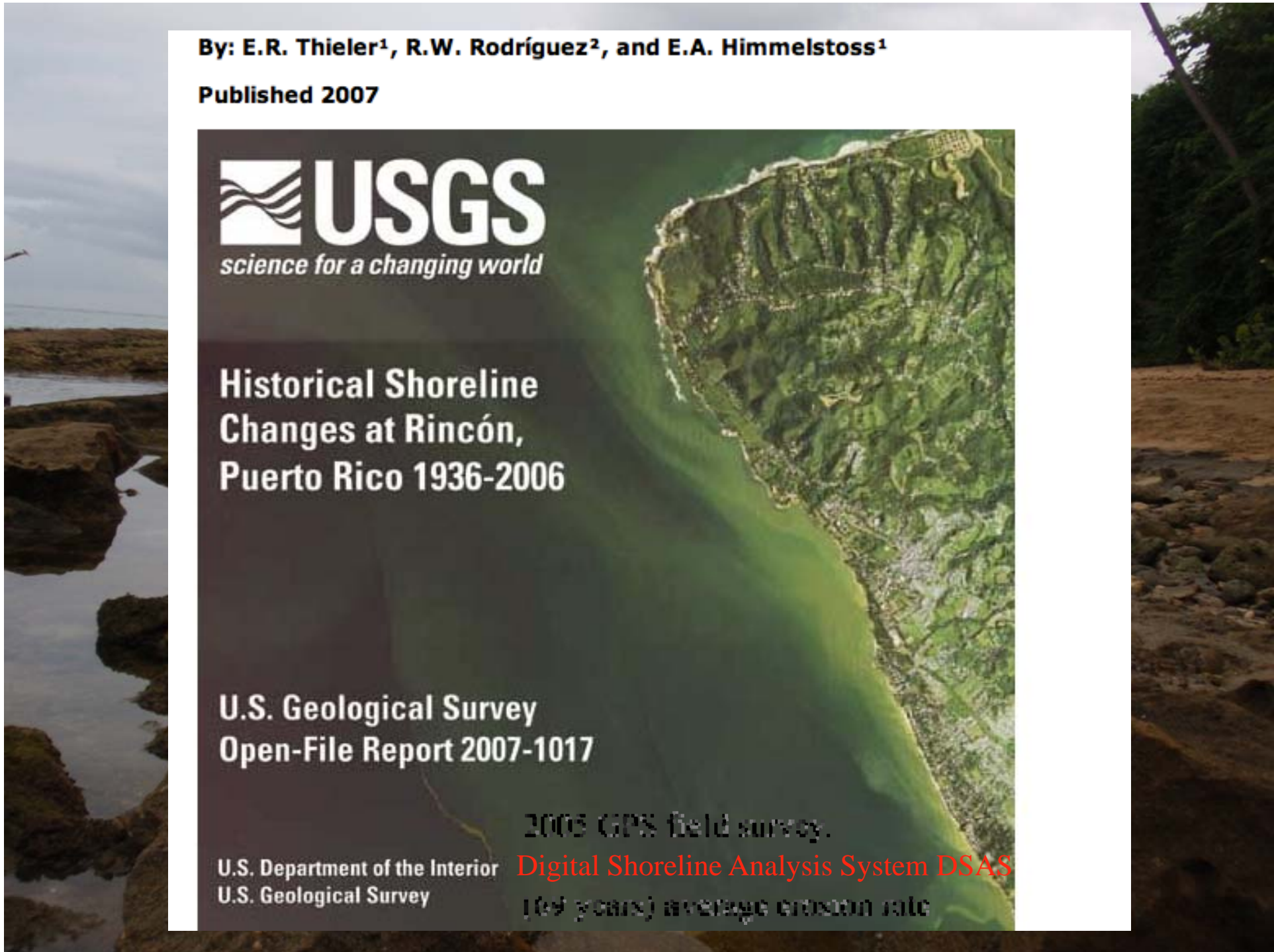
U.S. Geological Survey
Open-File Report 2007-1017

U.S. Department of the Interior
U.S. Geological Survey

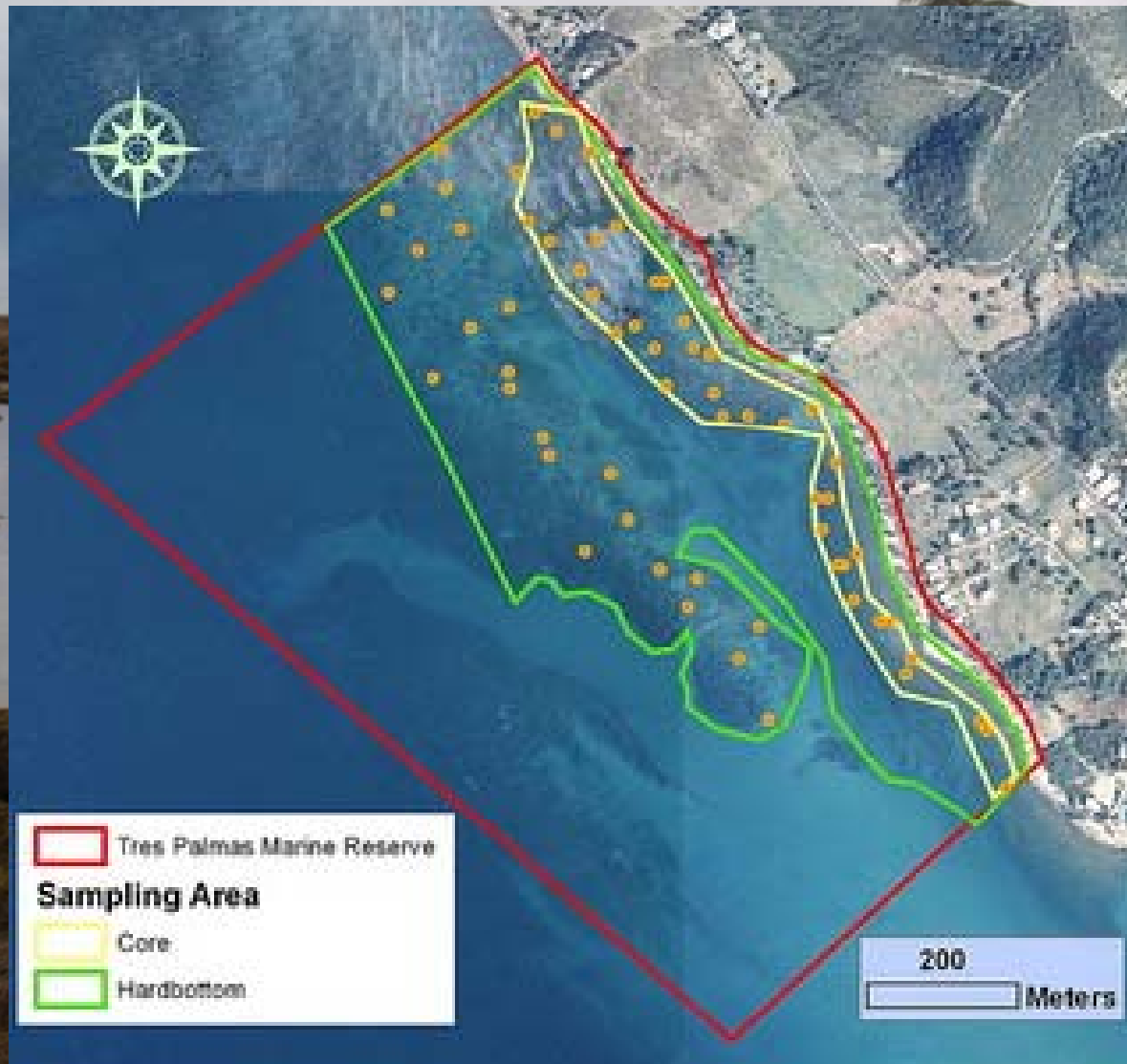
2005 GPS field survey.

Digital Shoreline Analysis System DSAS

(69 years) average erosion rate



El Coral Cuerno de Alce (Acropora palmata) en la Reserva Marina de Tres Palmas de Rincón



Michelle T. Schärer y Michael I. Nemeth
Departamento de Ciencias Marinas UPR-Mayagüez



Surfrider
Foundation®

RTMP Debris Removal

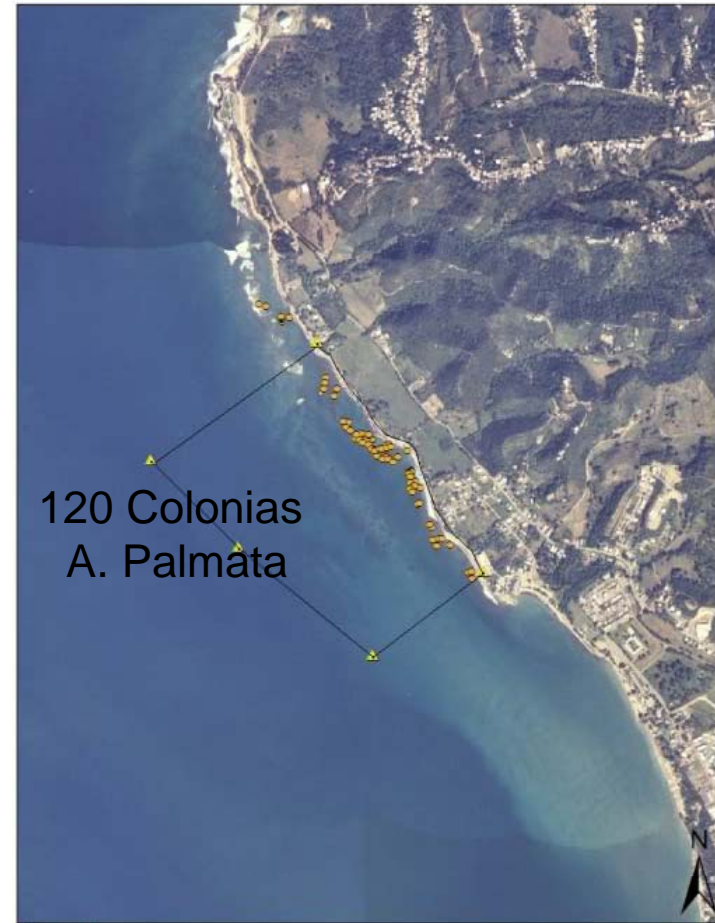
Wesley Merten, Marine Science Department UPRM



Legend

- Cable, rope or chain
- Cinderblocks
- Bottom trash Patch
- Clothing on Corals
- Derelict boat debris
- ▲ Marine Reserve Boundary
- Tires

0 100 200 400 600 800 Meters



120 Colonias
A. Palmata

Legend

- Clothing on Corals
- ▲ Marine Reserve Boundary

0 100 200 400 600 800 Meters

Objetivos

- Establecer un marco de referencia donde los parámetros medidos por percepción remota se verifiquen y combinen con parámetros costeros medidos en el campo complementando así los estudios de erosión costera y procesos en Rincón.
- Determinar nivel base(2009) para medidas futuras en la línea de costa.

RESERVA MARINA TRES PALMAS

Designado bajo la Ley 17 - ocho de enero de 2004
"Ley de la Reserva Marina Tres Palmas de Rincón"

Actividades Permitidas Activities Allowed



Surfear
Surfing



Buceo/Buceo Libre
Scuba/Snorkeling



Pasadia
Picnicking



Caminar
Walking



Observación de la Naturaleza
Nature Watching



Fotografía
Photography

Actividades Prohibidas Prohibited Activities



Pesca
Fishing



Pesca con Figa
Spearfishing



Tirar Basura
Littering



Colección de Cualquier Tipo
Collection of any kind



Recursos Naturales Natural Resources



Comunidades de Coral
"Cuerno de Arce"
Elkhorn Coral Communities
Acropora palmata



Ballenas Jorobadas
Humpback Whale
Megaptera novaengliae



Delfín Hocico De Botella
Bottlenose Dolphin
Tursiops truncatus



Peces Comunes del Arrecife
Common Reef Fishes
Parrot Fish, Blue Tang, Surgefinfish,
Sergeant Major, Yellowtail



Carey de Concha
Hawksbill Turtle
Eretmochelys imbricata



Langosta Espinosa
Spiny Lobster
Panulirus argus

Una reserva marina es una area protegida con recursos excepcionales en la cual no se permite ningún daño ni extracción alguna. Esta reserva marina contiene algunas de las comunidades de coral "Cuerno de Alee" mejor conservadas en el Caribe.

A marine reserve is a protected area with exceptional natural resources that are protected and must not be removed or damaged. This marine reserve contains some of the healthiest Elkhorn Coral communities in the Caribbean.

Los corales se dañan al tocarlos, pararse encima, removerlos, anclarse y son sofocados por la basura y sedimento.

Coral are damaged by touching, standing on them, removing them, anchoring, and can be smothered by trash and sediment.

Recoja su basura y mantenga las playa limpia para ayudar a proteger la vida marina.
Pick up your trash and keep the beach clean to help protect sea life.

Localización



Para información o para reportar actividades ilegales, por favor llame al:
For information or to report unlawful activity, please call:
(787)882-5827 or (787)724-5700

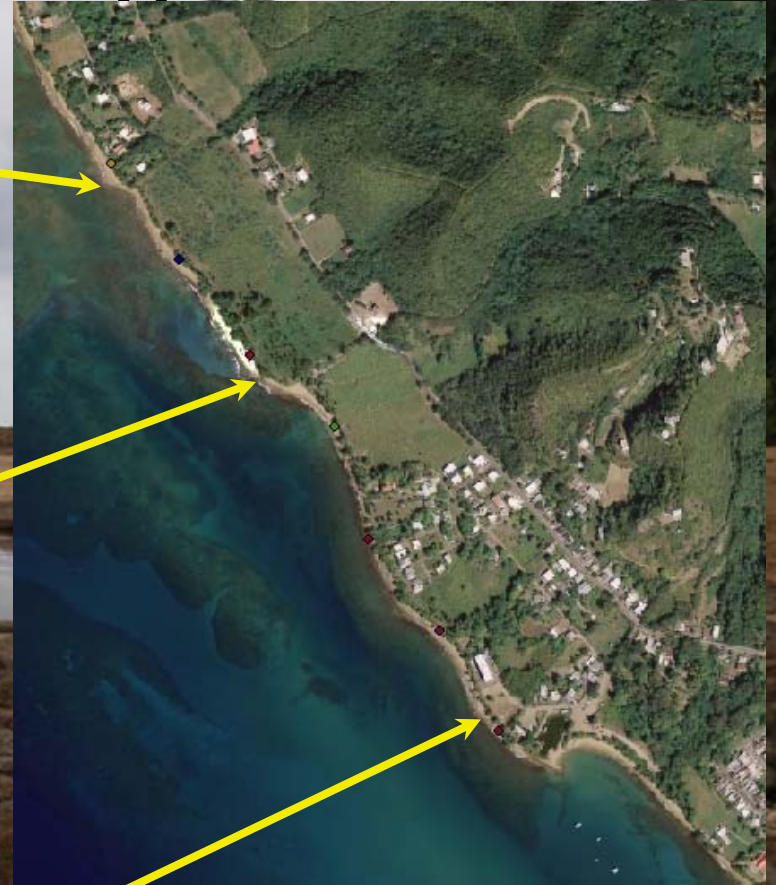


Gracias al patrocinio de
This sign made possible by a grant from:
SUPTRA

Estructuras Geológicas



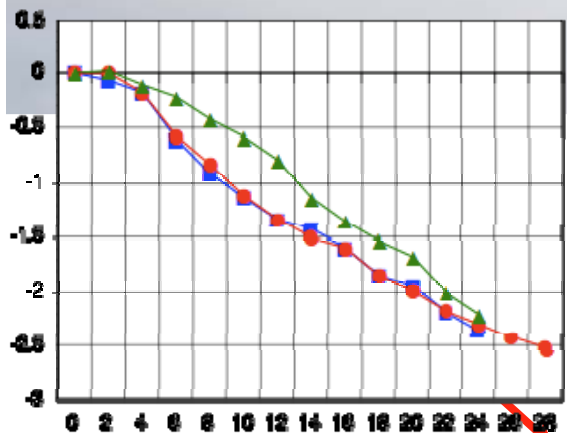
Beach Rock
Cuaternario



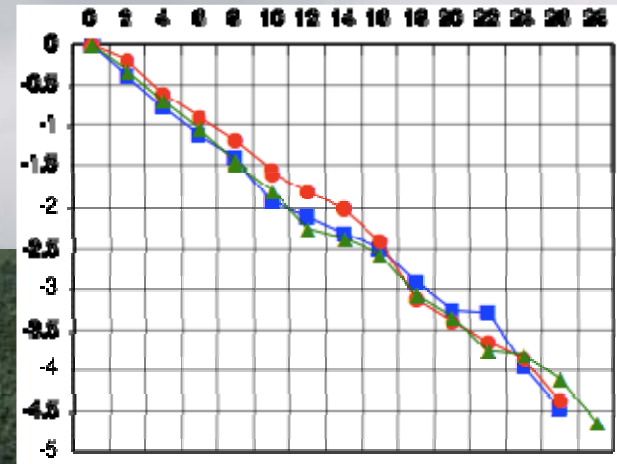
A. Palmata



Reserva Tres Palmas



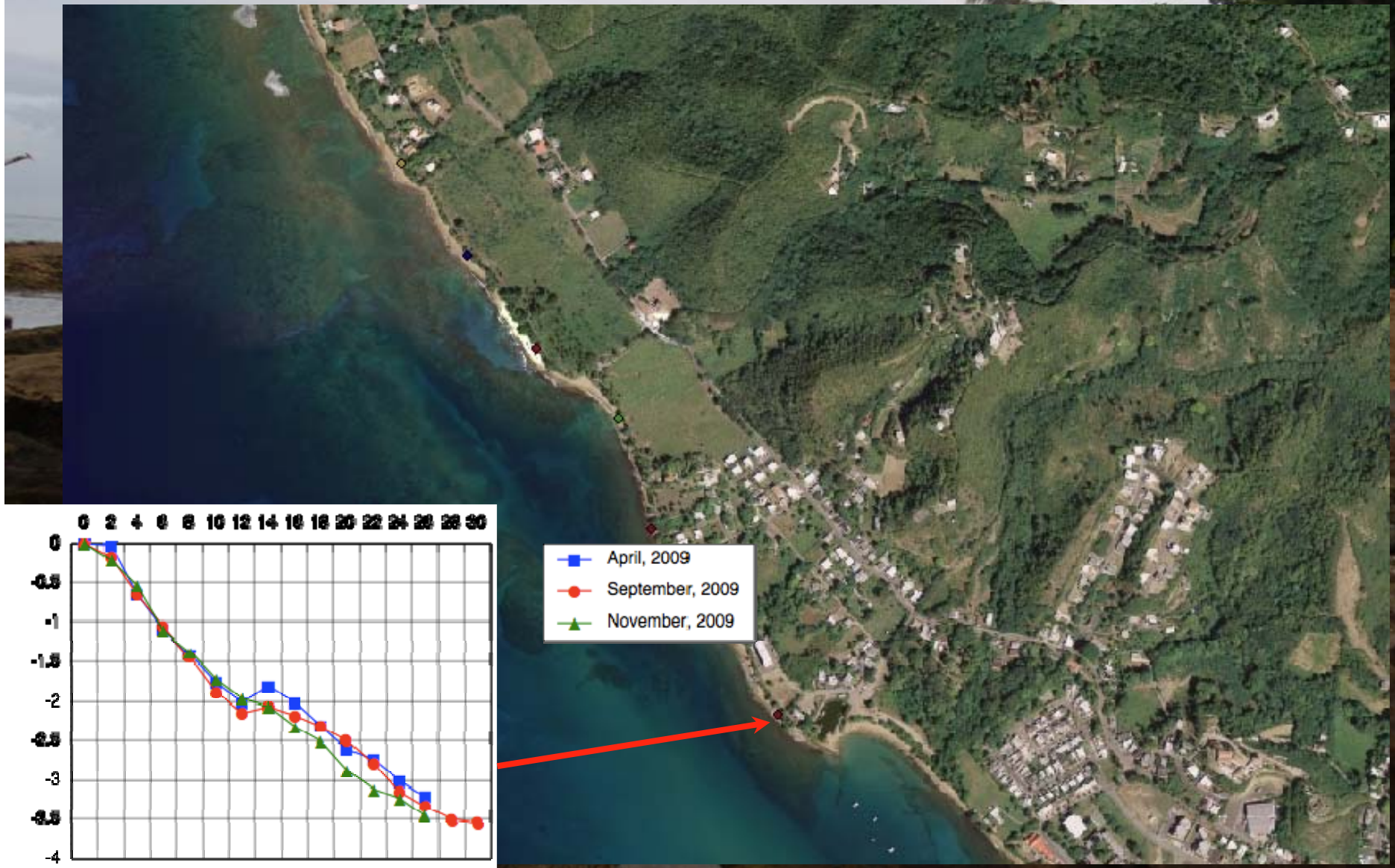
Reserva Tres Palmas



- April, 2009
- September, 2009
- November, 2009



Reserva Tres Palmas

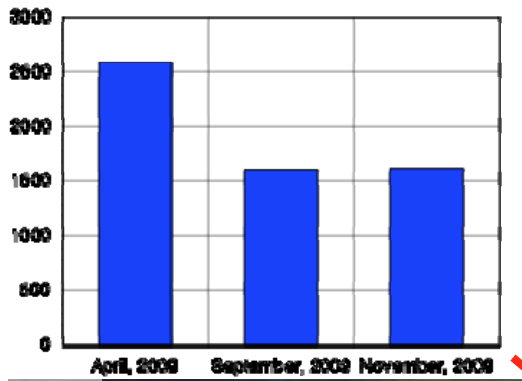


Volumen de Arena

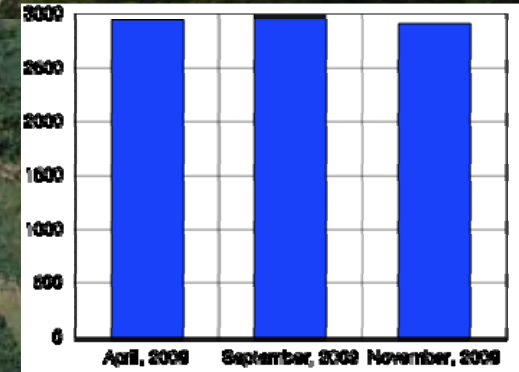


Volumen de Arena

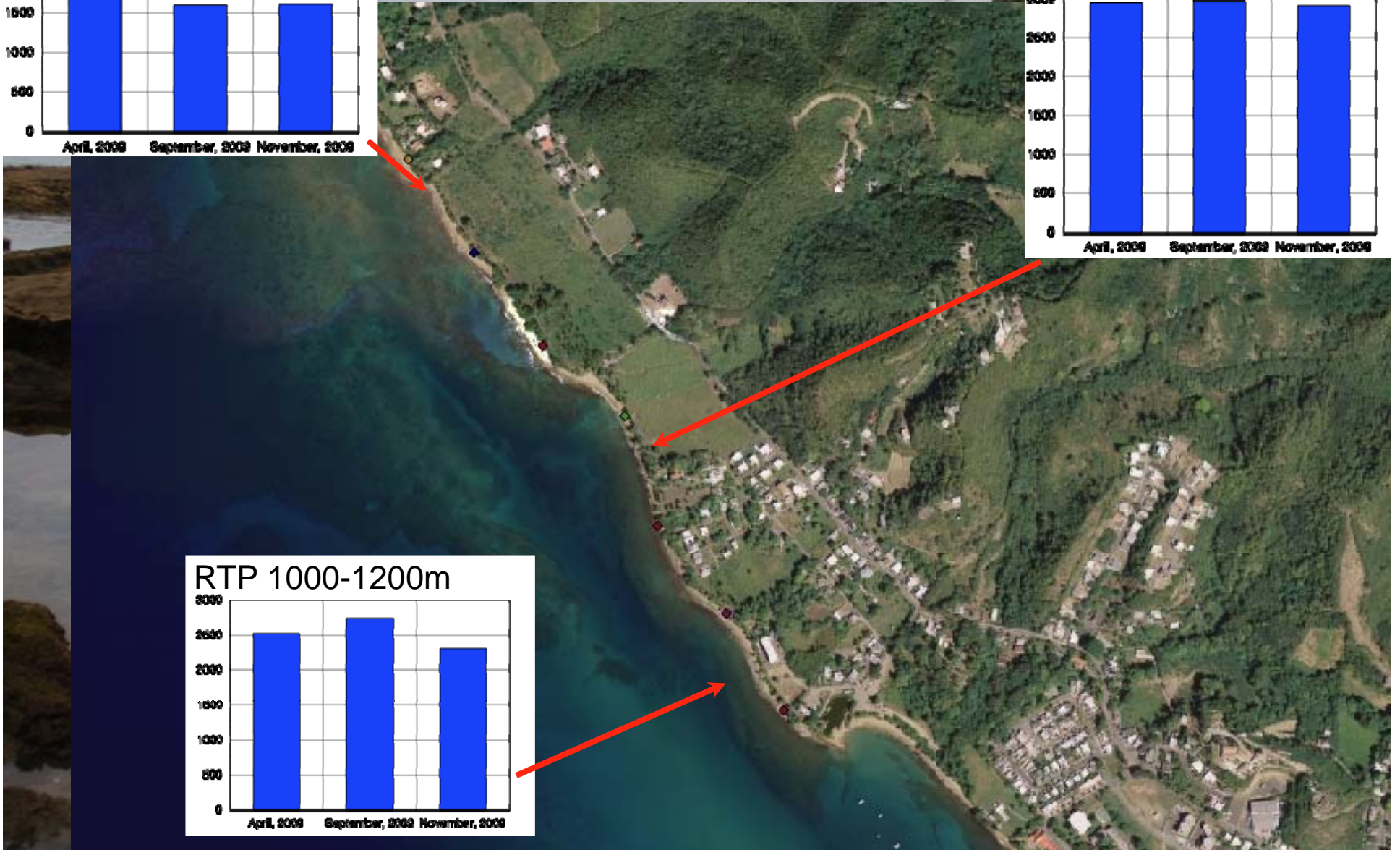
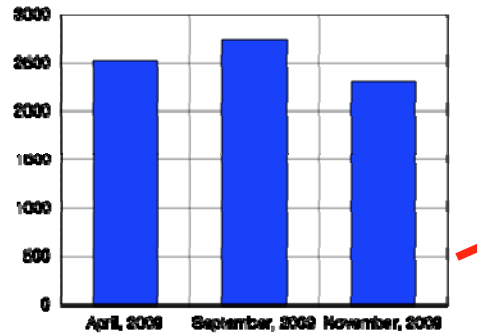
RTP 0-200m



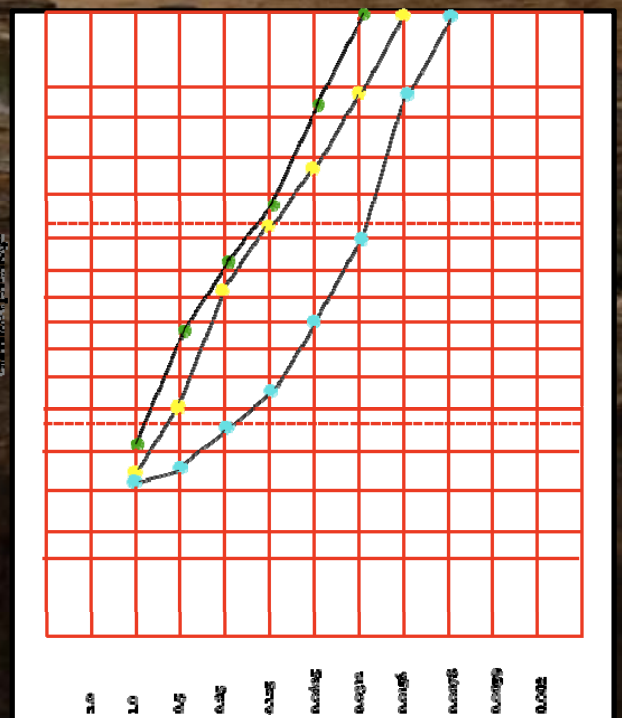
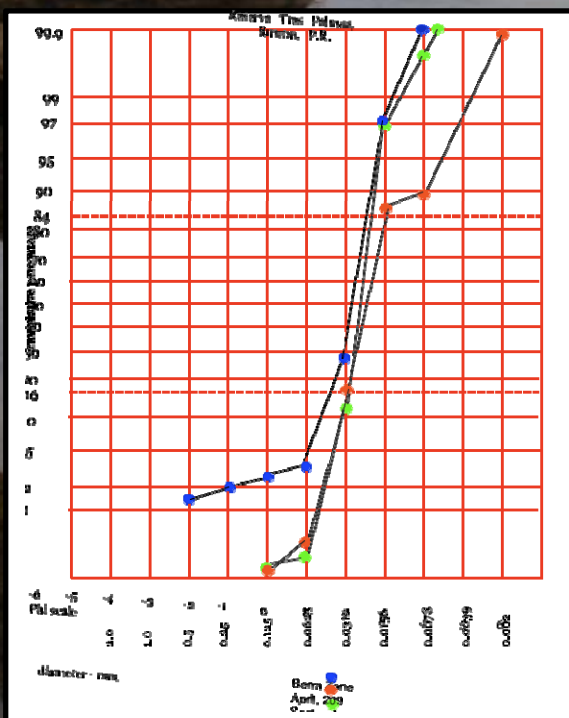
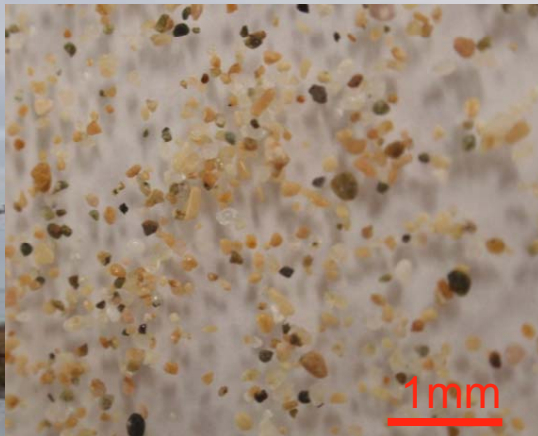
RTP 400-600m



RTP 1000-1200m



Composición de Arena

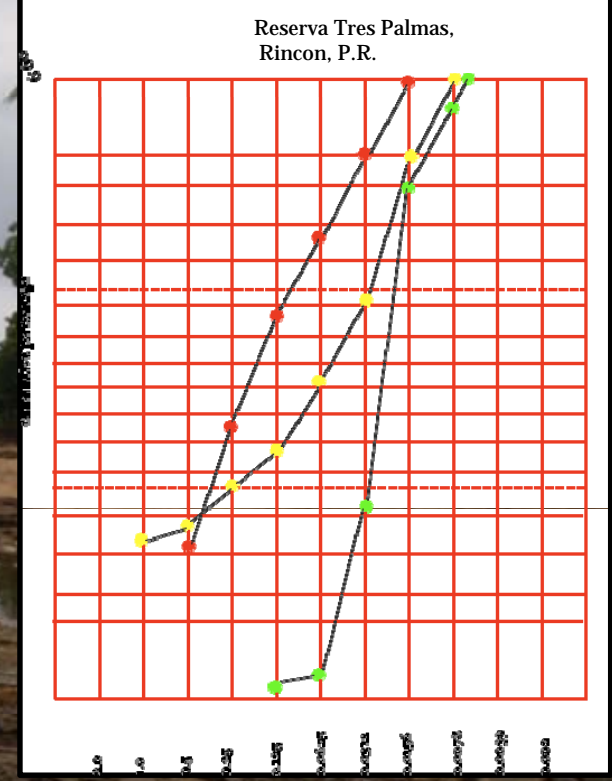
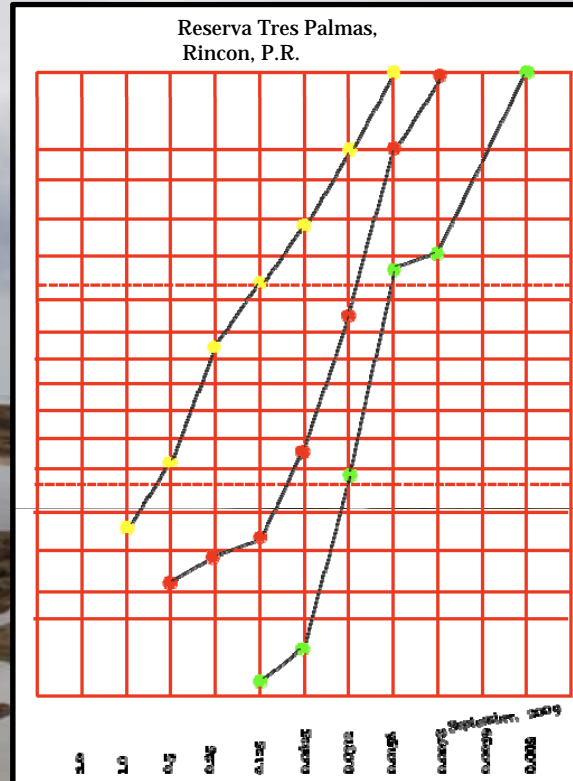
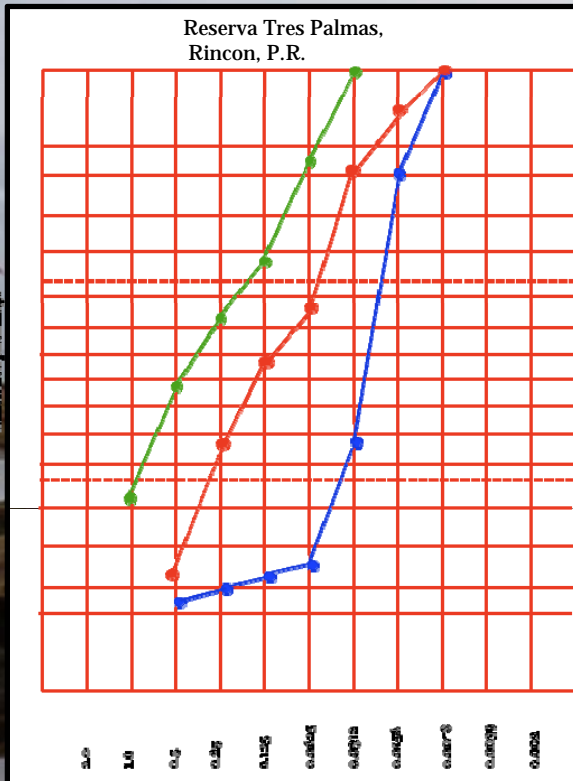


Berm Zone

Swash Zone

Near Shore

Análisis de Arena

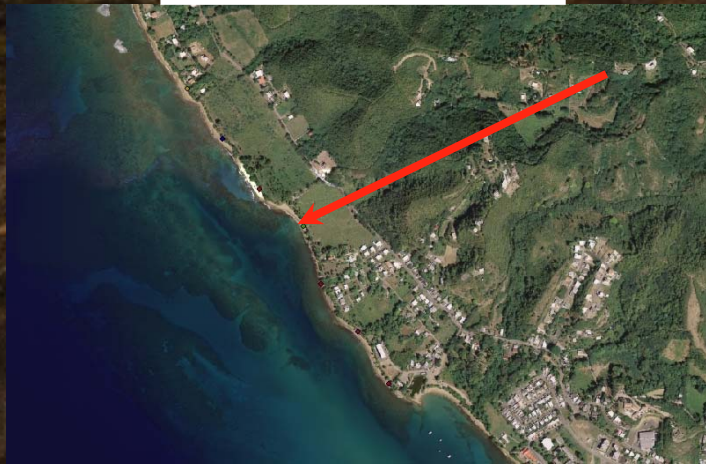


April, 2009
Berm Zone
Swash Zone
Near Shore Zone

Playa Escalera

September, 2009
Berm Zone
Swash Zone
Near Shore Zone

November, 2009
Berm Zone
Swash Zone
Near Shore Zone



CaCO₃



Berm
Inicial: 100g
Final: 82.06g



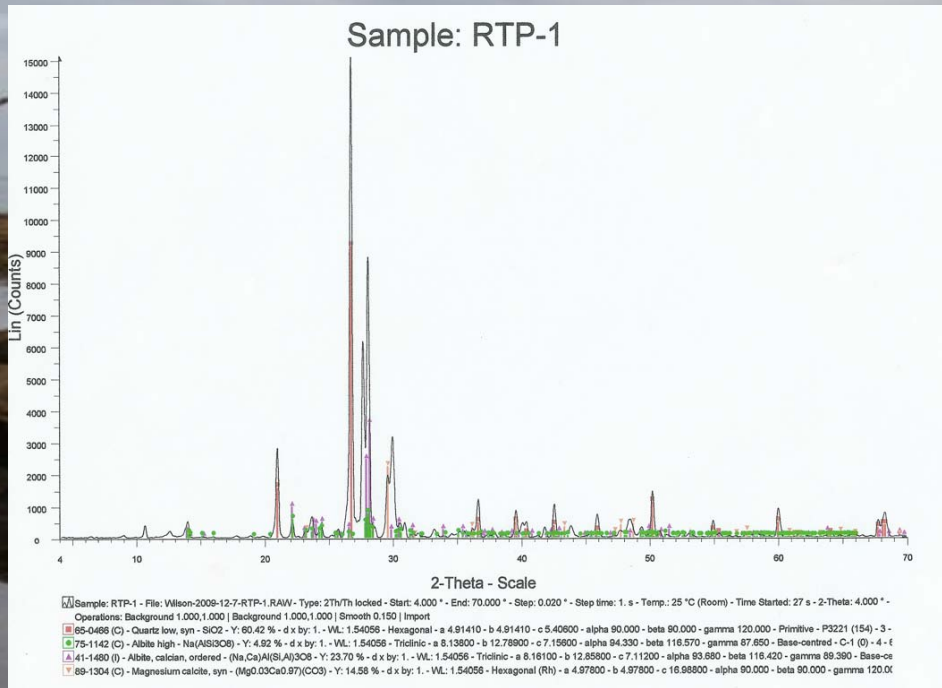
Swash Zone
Inicial: 100g
Final: 83.37g



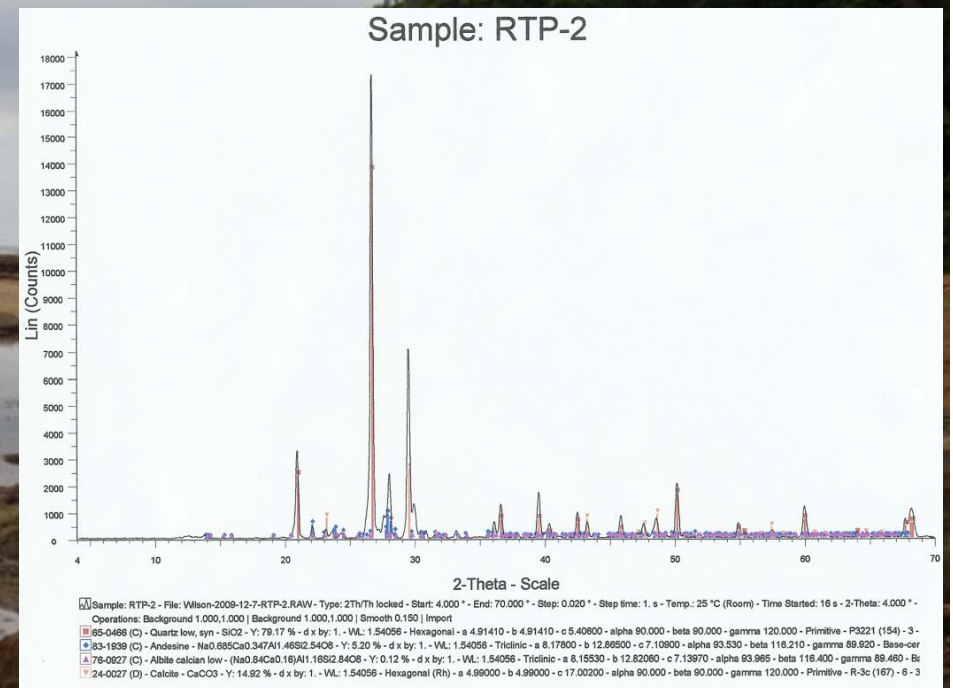
Near Shore Zone
Inicial: 100g
Final: 74g

CALCIUM
CARBONATE 15%-
20%

Mineralogía



Berm Zone
 Quartz
 Magnetite
 Magnesium Calcite



Near Shore Zone
 Quartz
 Magnetite
 Andesine
 Calcite

Cambios en Linea de Costa

Reserva Tres Palmas
1951



0 70 140 280 420 560 Meters

Reserva Tres Palmas
1987



0 70 140 280 420 560 Meters

Cambios en Linea de Costa

Reserva Tres Palmas
2004



0 70 140 280 420 560 Meters

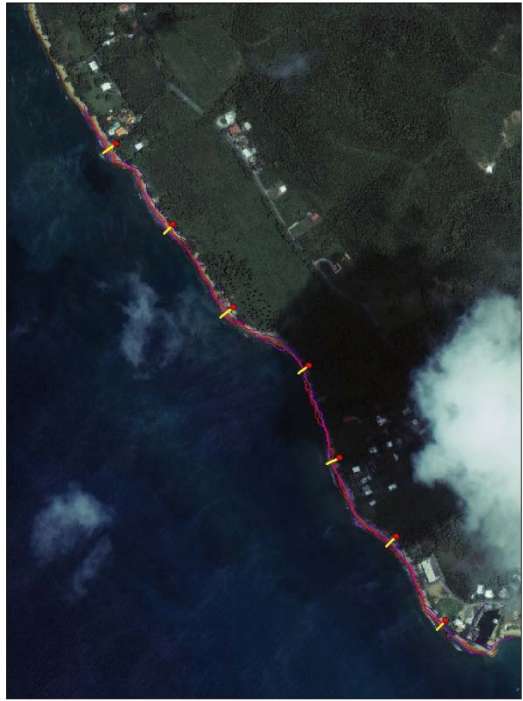
Reserva Tres Palmas
2007



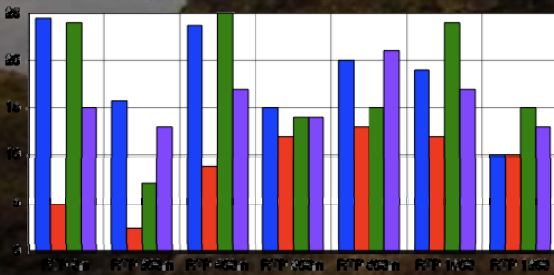
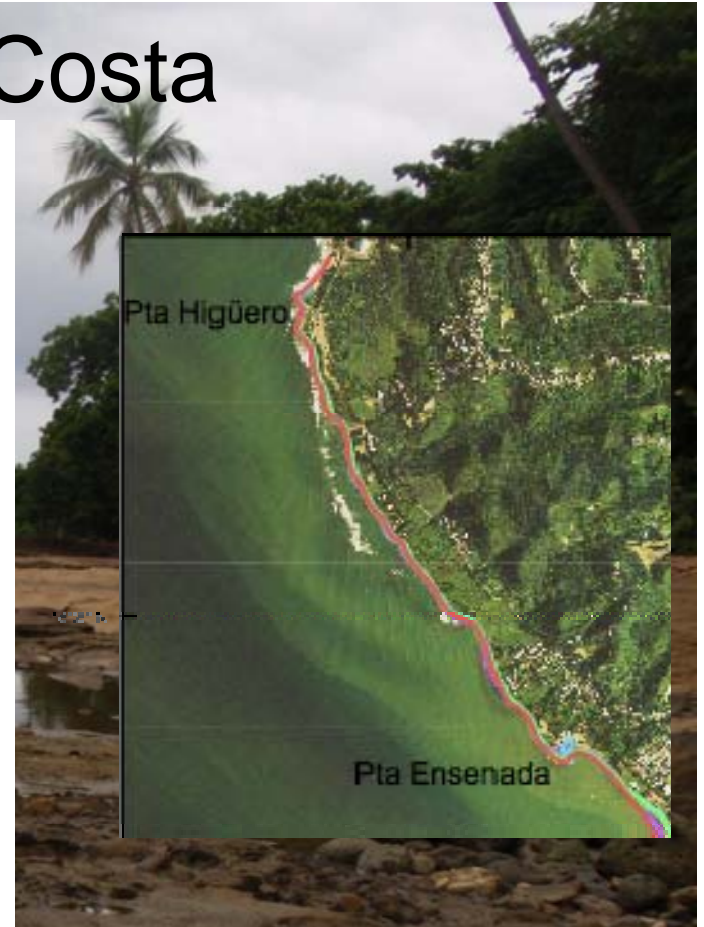
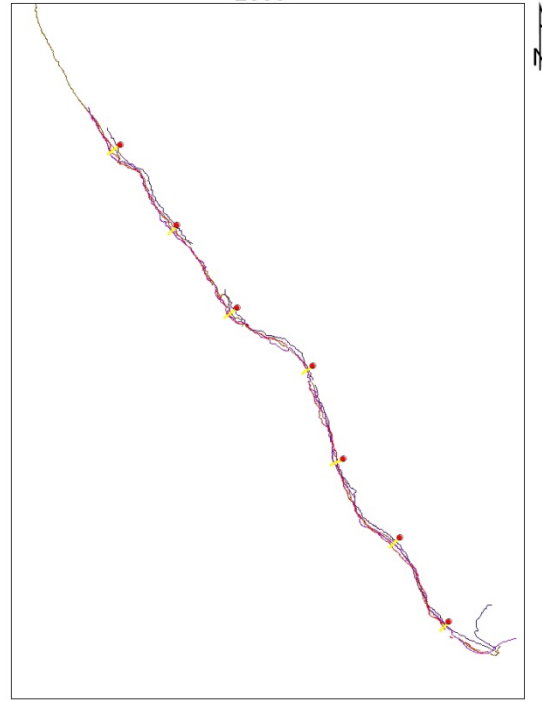
0 40 80 160 240 320 Meters

Cambios en Linea de Costa

Reserva Tres Palmas
2008



Reserva Tres Palmas
2008



Volumen Neto
1951-2007

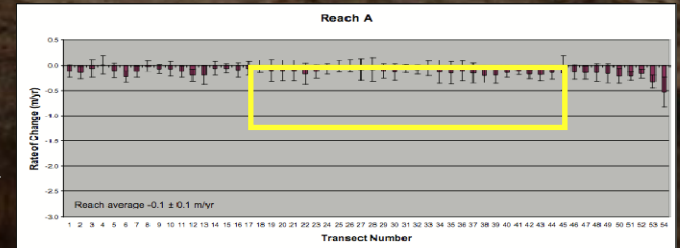
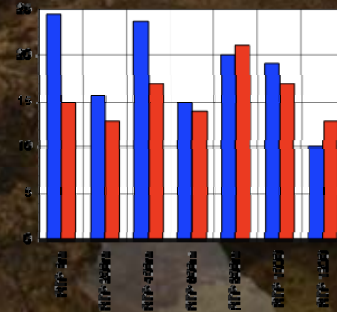
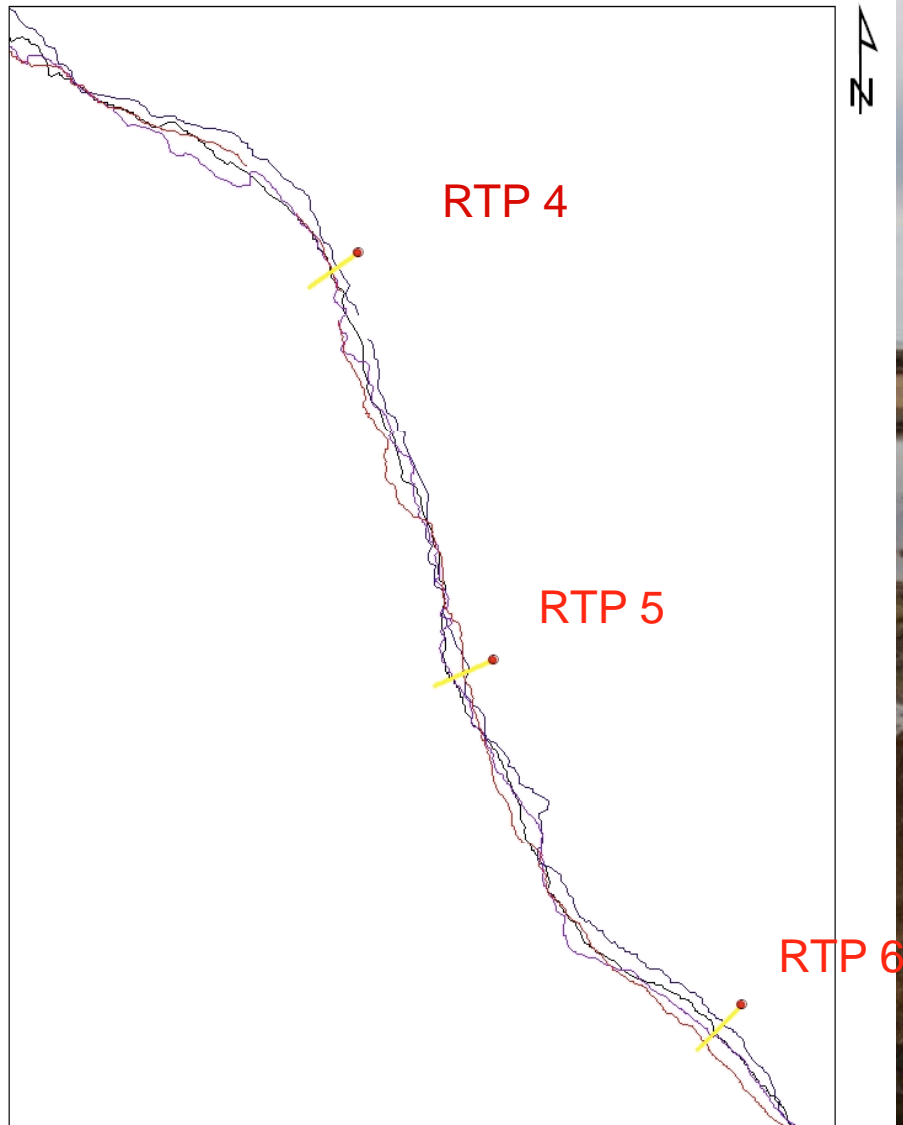


FIGURE 10. COASTAL EROSION RATES AT TRAP LOCATIONS (R1P1-R1P5, R1M1-R1M3) ALONG REACH A.

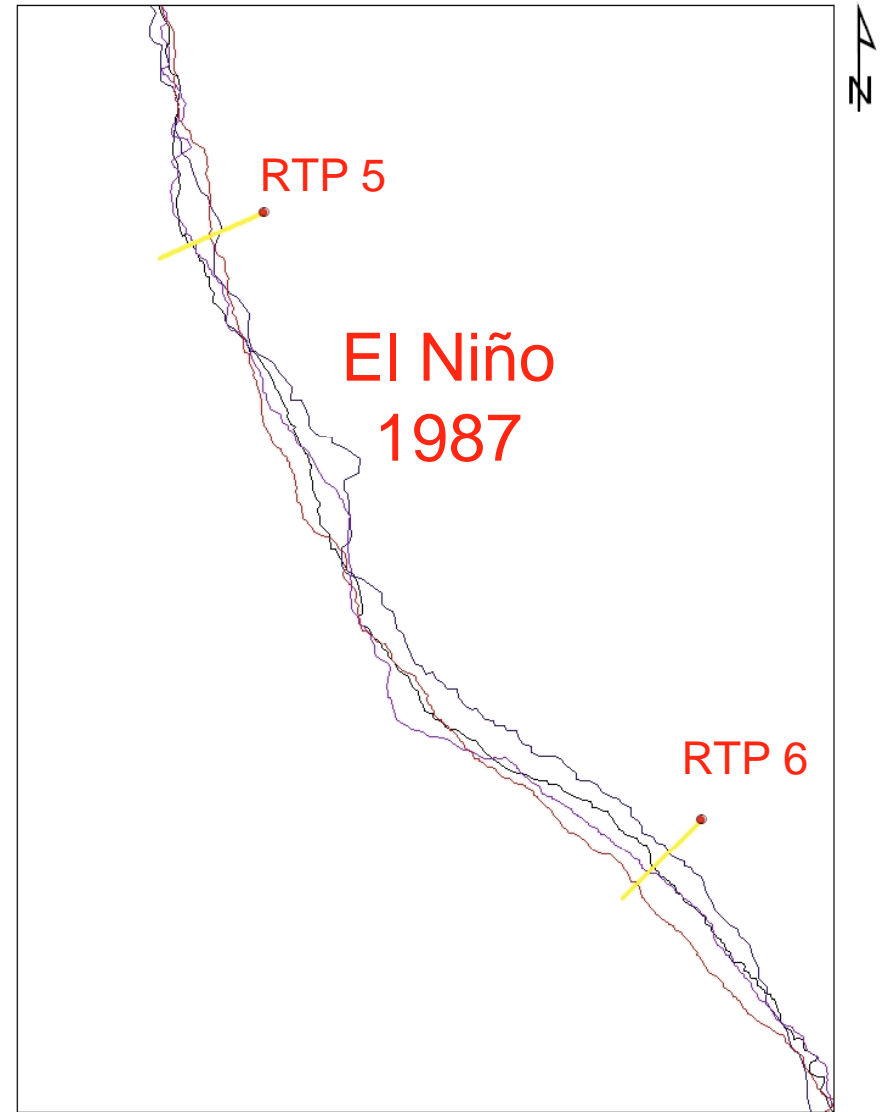
Cambios en Linea de Costa

Marina Tres Palmas
2007



Meters
0 5 10 20 30 40

Marina Tres Palmas
2007



Meters
0 3 6 12 18 24

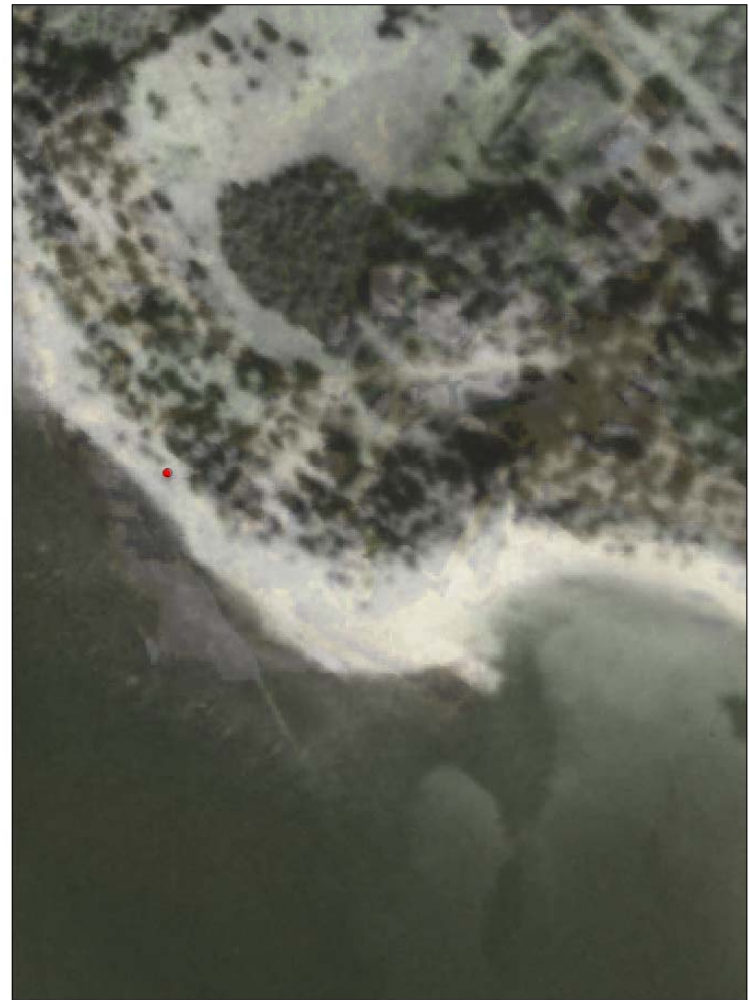
Marina de Rincón

Marina Tres Palmas
1930



0 5 10 20 30 40 Meters

Marina Tres Palmas
1951



0 5 10 20 30 40 Meters

Marina de Rincón

Marina Tres Palmas
1987



4 anos despues de construccion

0 5 10 20 30 40 Meters

N
↑

Marina Tres Palmas
2004



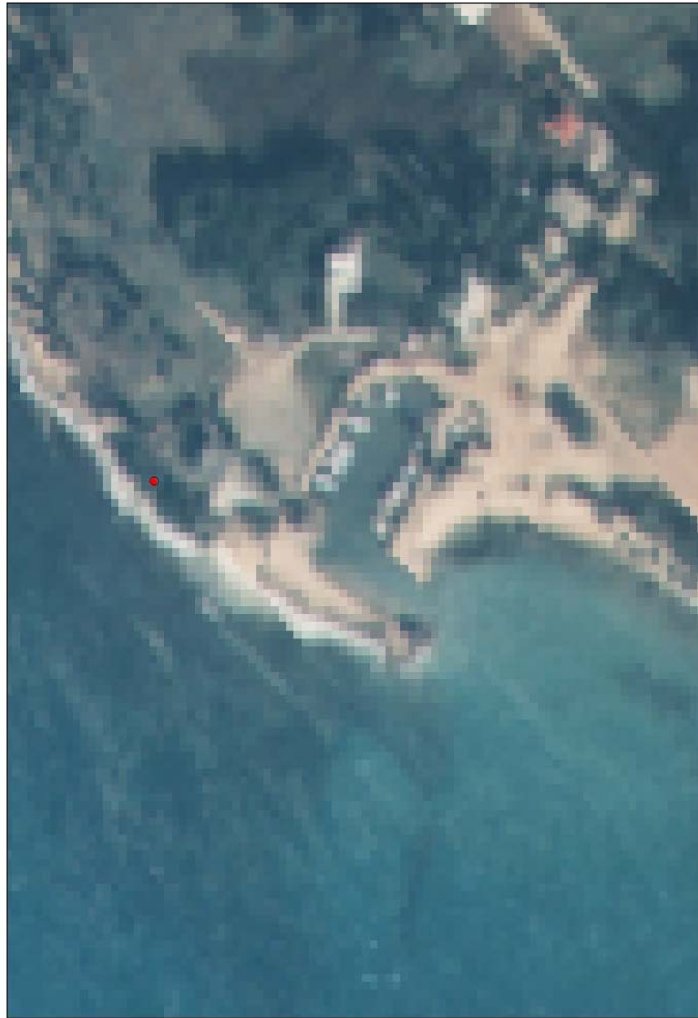
20 anos despues de construccion

0 5 10 20 30 40 Meters

N
↑

Marina de Rincón

Marina Tres Palmas
1987



▲
N

0 5 10 20 30 40 Meters

Marina Tres Palmas
2008



▲
N

0 5 10 20 30 40 Meters

Marina Tres Palmas
2008



0 5 10 20 30 40 Meters

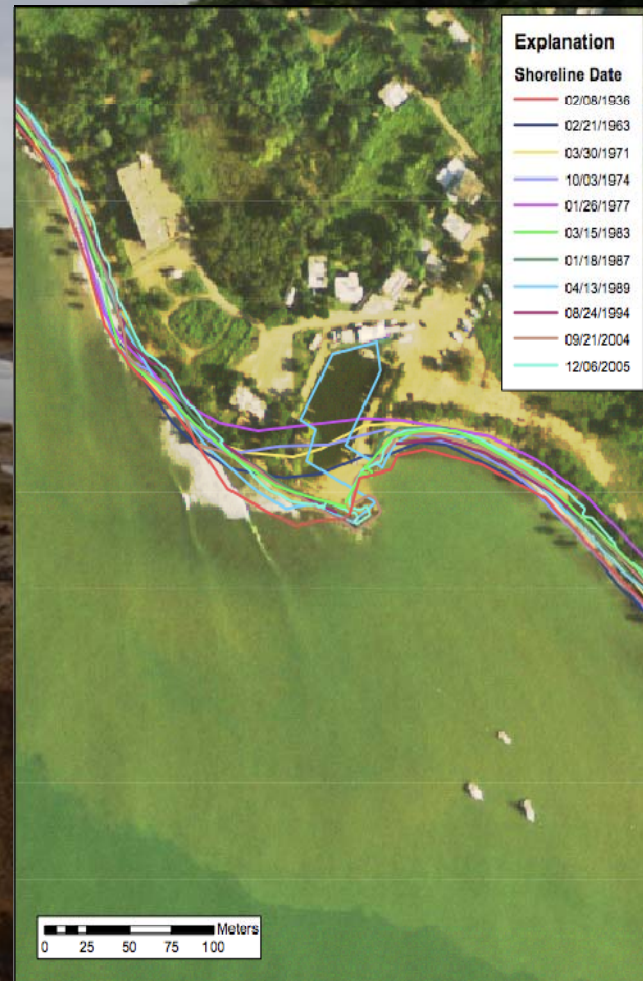


Figure 2-1. Aerial photograph showing the historical shoreline positions of Marina Tres Palmas.

Exposición de Roca de Playa



Marina Tres Palmas
2007



Disolución de Roca
Playera



Conclusiones

- Línea de Costa se ha mantenido relativamente estable durante el año 2009
- 2,500m² de Volumen de Arena Neto transportado en la Reserva
- Composición de las arenas es dominada por granos de cuarzo y minerales pesados
- 20% de producción de CaCO₃ local
- Predominan granos de tamaño fino a grueso en la línea de costa
- Evento El Niño 1987 causa erosión en la línea de costa
- No funcional la entrada de la Marina de Rincon, debido al transporte litoral de arena

Agradecimientos



Fernando Gilbes



Wilson R. Ramirez (Advisor)



Elson Core



Samuel Pacheco



Edgardo Quinones



Omar N. Chabrier

Preguntas??

