Sunia Internship 2015
Caribbean Area (PR and USVI)

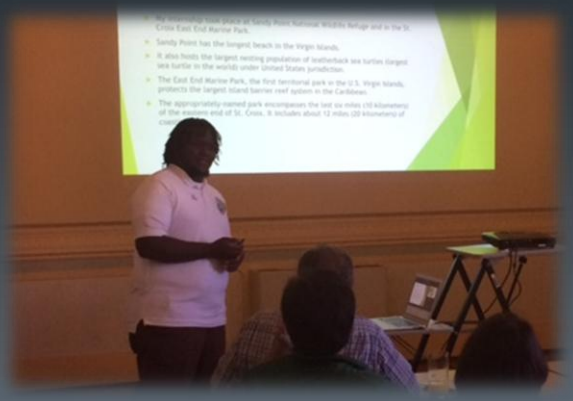
Silmarie Padron, DOI-USFWS
Elizabeth Padilla, Para la Naturaleza
Suhey Ortiz, Sunia 2015
Carlos M. Zayas, Sunia 2015

2015 Update

- Partners:
  - DOI-OIA, DOI-FWS, NOAA, USDA-NRCS, Para la Naturaleza, PRDNER, USVI-DPNR
- Budget:
  - DOI (OIA and FWS) to cover summer 2014 and 2015
- Area covered:
  - Puerto Rico
  - USVI-St. Croix
- Number of interns:
  - 4 students
- Mentors:
  - USFWS, NOAA, PRDNER, USVI-DPNR

Sunia Internship 2015

- **Total of applications:** **49**
- **Students selected:** **4**
  - 3 in Puerto Rico: Carlos M. Zayas, Suhey Ortiz and Isabel Sanchez
  - 1 in St. Croix, USVI: Antonio Watts



Where are the former interns?

- **Jeselyn Calderon:** USDA Forest Service Quarantine Laboratory Facility and the Volcano weather - Hawaii
- **Jeiger Medina:** Coordinator of Environmental Initiatives, Protectores Cuencas
- **Maria Crisitina Lopez:** Environmental Educator at Para la Naturaleza. Applying for graduate school next year.
- **Mariana Lopez:** Master degree in Biological Oceanography from the University of Puerto Rico, Mayagüez campus (December 2015).
  - **Selected as the new NOAA Fellow for Puerto Rico**
- **Alexandra Galindo:** FWS-Pathways Student November 13 she will be defended her thesis project
- **Yasiel Figueroa:** UPR- Environmental Science Graduate School. Working with the HICE PR (NASA) and his project is focused on agricultural hydrology (coffee farms in Yauco)
- **Nancy Cardona:** Working in her PhD in UPR-Rio Piedras (Environmental Health).

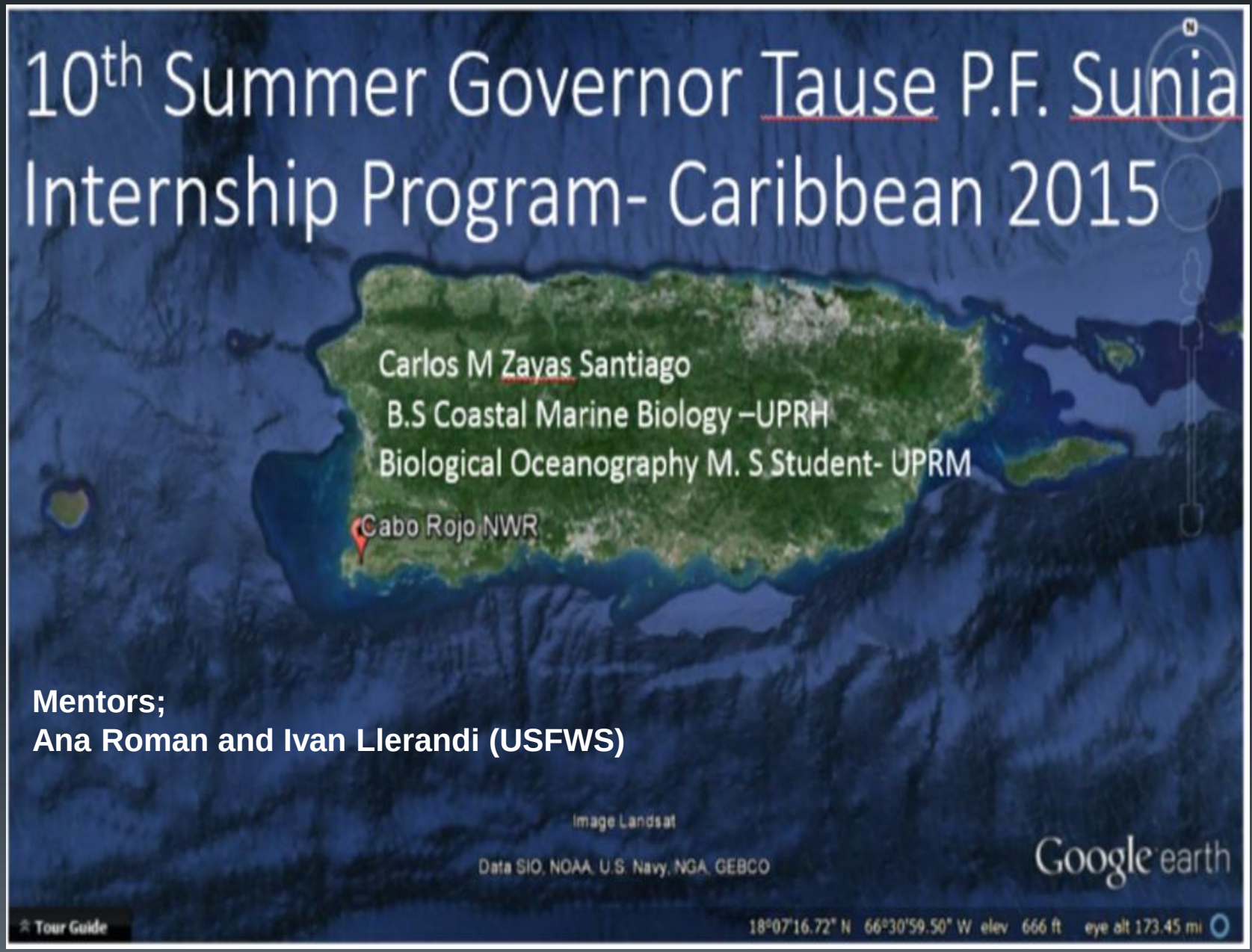
Sunia Intern 2015
Isabel Sanchez-PRNDER

- Project:
  - Evaluation of coral bleaching and disease in Natural Reserves Puntas Guaniquilla and Belvedere

- **Activities:**
  - Out-planting corals, Monitoring of previously planted corals, Monitoring of fish populations, and Monitoring of health of corals
- **Mentor:**
  - Idelfonso Ruiz, PR-DNER

Sunia Intern 2015
Antonio Watts

- **Project:** Revitalizing the Friends Group and building/ establishing a citizen science program (or framework) in the Friends Group for the St. Croix East End Marine Park through participation in specific management actions and assist in monitoring activities in Sandy Point National Refuge
- **Activities:**
  - Engage public in the Park and awareness about watershed management through park outreach activities, Assistance to Park Staff, Help with ecocamps (students learning about habitats in St. Croix and connect them to coral reefs).
  - Developing a citizen science program, that may include, seagrass mapping and monitoring, beach profiling, turtle nesting monitoring and management, coral restoration. The deliverable would be a document within each park science need, an engagement strategy, and a training and implementation plan.
  - Participate in monitoring and management activities at Sandy Point and Green Cay National Wildlife Refuges. These activities may include sea turtle research and monitoring, habitat restoration, invasive species control, and bird and herpetological surveys. Coordinate at least one meeting with the Friends Group.
  - Coordinate with Friends groups to participate at least one activity within Sandy Point Refuge and St. Croix East Marine Park.
- **Mentors:**
  - Marlon Hibbert (NOAA), Claudia Lombard (USFWS) and Jean-Pierre Oriol (USVI-DPNR)


10th Summer Governor Tause P.F. Sunia
Internship Program- Caribbean 2015
Carlos M Zayas Santiago
B.S Coastal Marine Biology –UPRH
Biological Oceanography M. S Student- UPRM
Cabo Rojo NWR
Mentors;
Ana Roman and Ivan Llerandi (USFWS)
Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google earth
Tour Guide
18°07'16.72" N 66°30'59.50" W elev 666 ft eye alt 173.45 mi

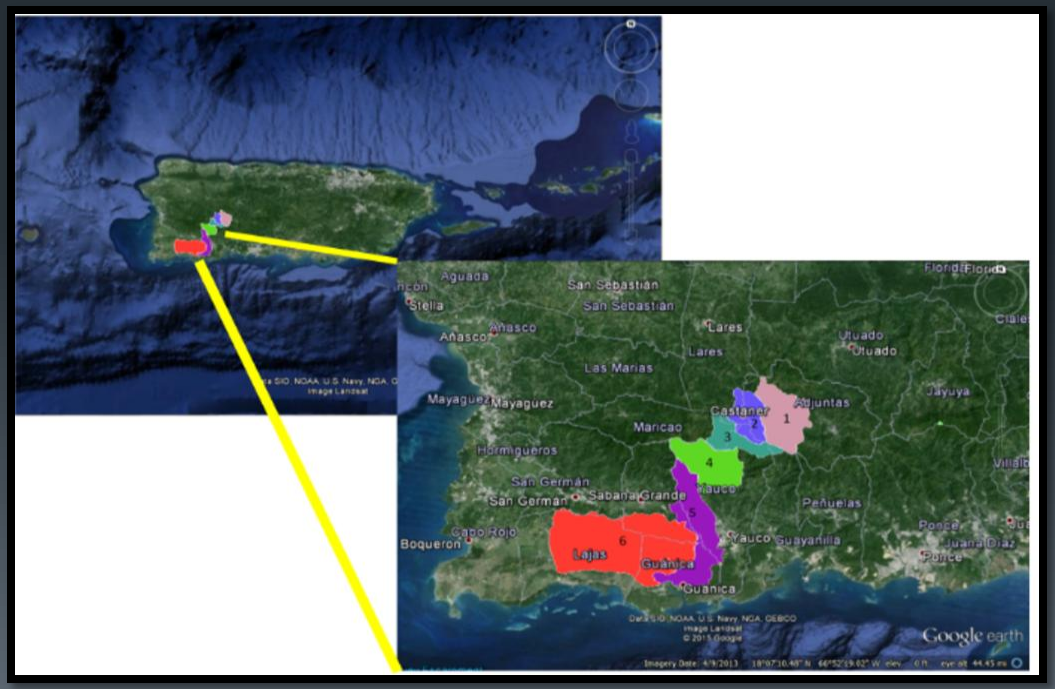
Tasks and Objectives

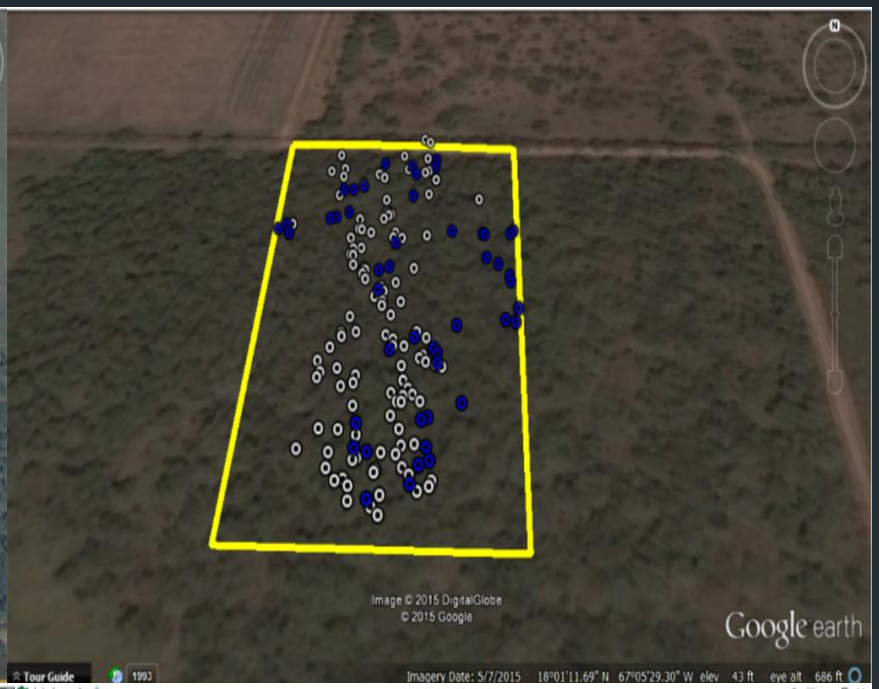
Main Objective

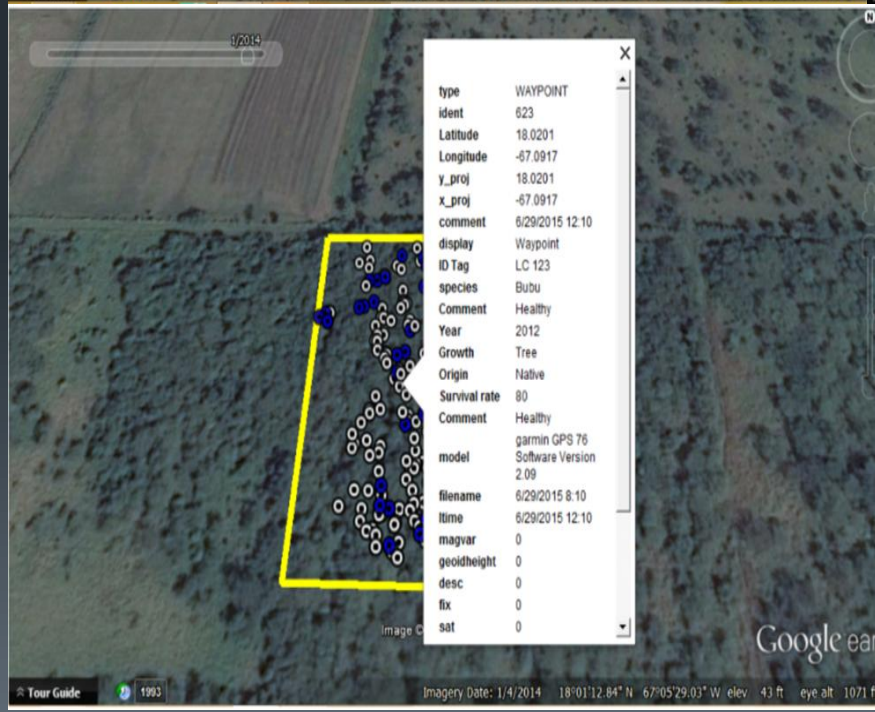
- **Assessment of Demonstrative planting sites developed by previous Sunia Interns throughout Guanica Bay Rio Loco Watershed**

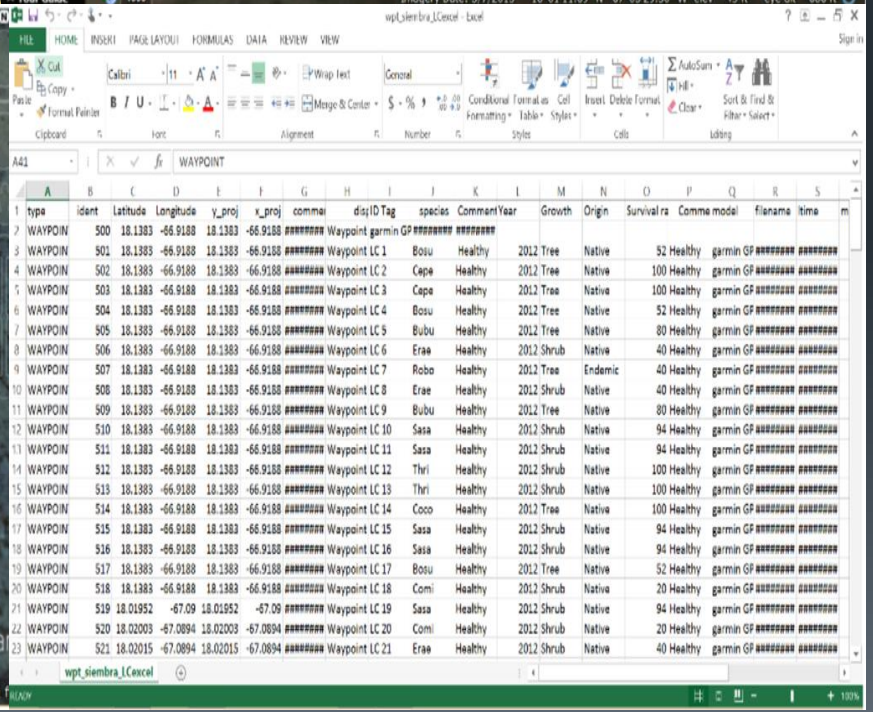
Collaborations

- Elfin-wood Warbler Habitat Restoration management plan.
- Laguna Providencia Avian Habitat Restoration Program.
- Outreach

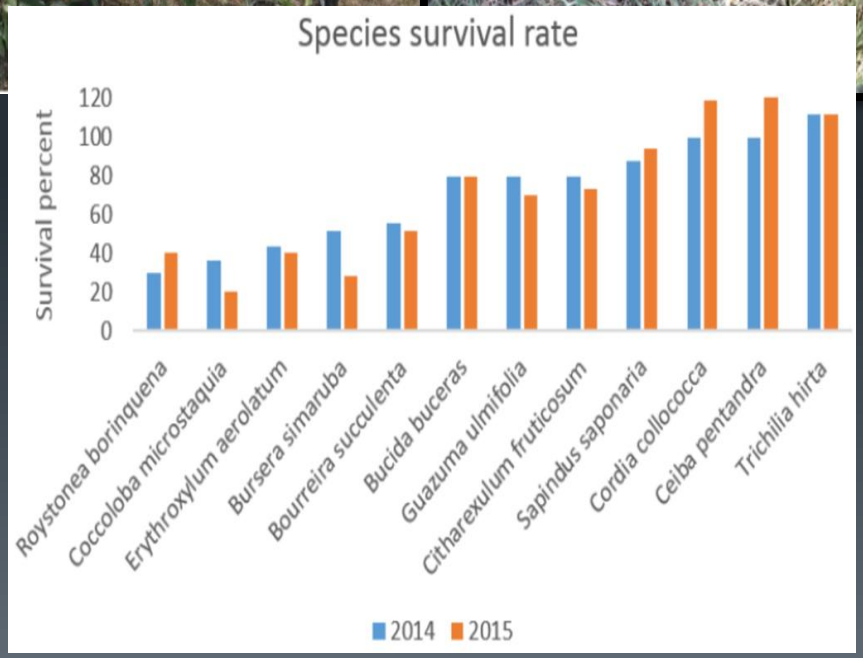




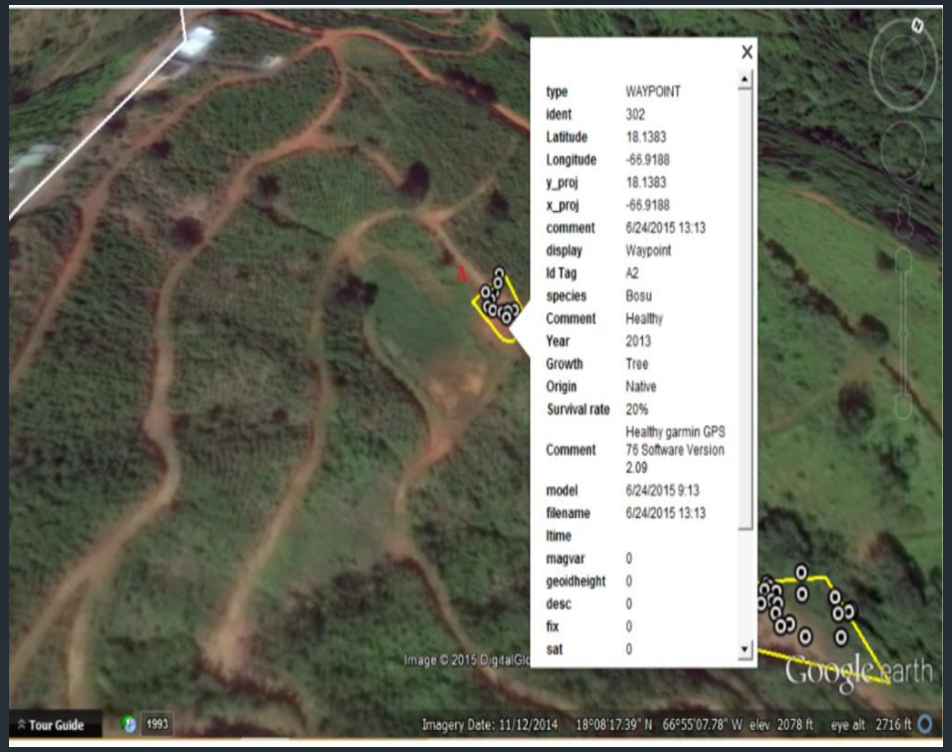


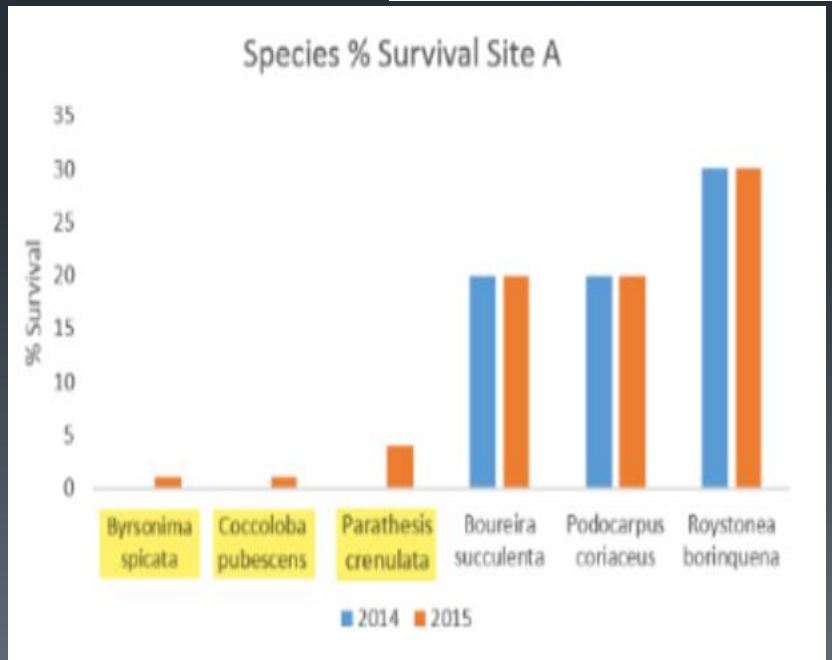


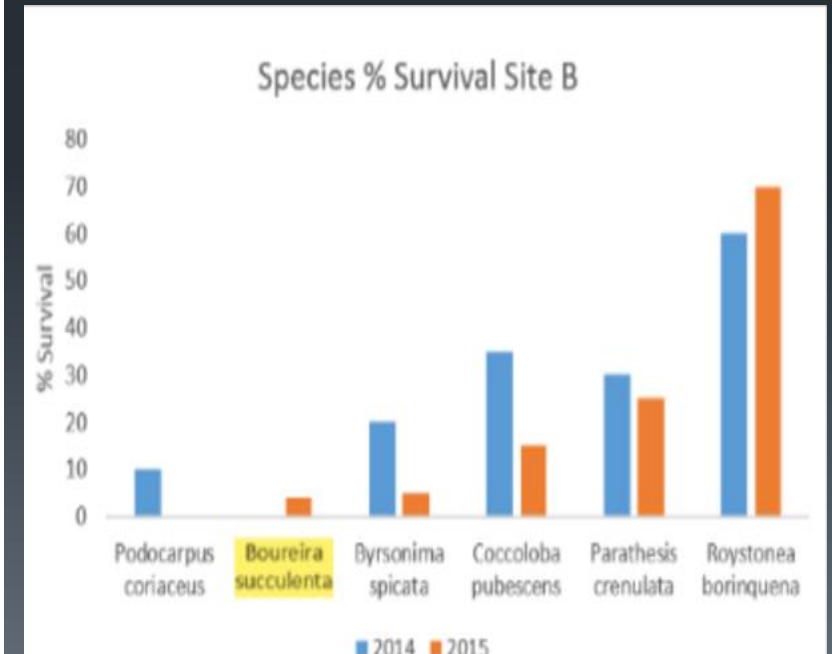
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	type	ident	Latitude	Longitude	y_proj	x_proj	comme	disp	ID Tag	species	Comment	Year	Growth	Origin	Survival ra	Comme	model	filename	ltime
2	WAYPOIN	500	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	garmin GP	########	########								
3	WAYPOIN	501	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 1	Bosu	Healthy	2012	Tree	Native	52	Healthy	garmin GF	########	########
4	WAYPOIN	502	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 2	Cepa	Healthy	2012	Tree	Native	100	Healthy	garmin GF	########	########
5	WAYPOIN	503	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 3	Cepa	Healthy	2012	Tree	Native	100	Healthy	garmin GF	########	########
6	WAYPOIN	504	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 4	Bosu	Healthy	2012	Tree	Native	52	Healthy	garmin GF	########	########
7	WAYPOIN	505	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 5	Bubu	Healthy	2012	Tree	Native	80	Healthy	garmin GF	########	########
8	WAYPOIN	506	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 6	Erae	Healthy	2012	Shrub	Native	40	Healthy	garmin GF	########	########
9	WAYPOIN	507	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 7	Robo	Healthy	2012	Tree	Endemic	40	Healthy	garmin GF	########	########
10	WAYPOIN	508	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 8	Erae	Healthy	2012	Shrub	Native	40	Healthy	garmin GF	########	########
11	WAYPOIN	509	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 9	Bubu	Healthy	2012	Tree	Native	80	Healthy	garmin GF	########	########
12	WAYPOIN	510	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 10	Sasa	Healthy	2012	Shrub	Native	94	Healthy	garmin GF	########	########
13	WAYPOIN	511	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 11	Sasa	Healthy	2012	Shrub	Native	94	Healthy	garmin GF	########	########
14	WAYPOIN	512	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 12	Thri	Healthy	2012	Shrub	Native	100	Healthy	garmin GF	########	########
15	WAYPOIN	513	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 13	Thri	Healthy	2012	Shrub	Native	100	Healthy	garmin GF	########	########
16	WAYPOIN	514	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 14	Coco	Healthy	2012	Tree	Native	100	Healthy	garmin GF	########	########
17	WAYPOIN	515	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 15	Sasa	Healthy	2012	Shrub	Native	94	Healthy	garmin GF	########	########
18	WAYPOIN	516	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 16	Sasa	Healthy	2012	Shrub	Native	94	Healthy	garmin GF	########	########
19	WAYPOIN	517	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 17	Bosu	Healthy	2012	Tree	Native	52	Healthy	garmin GF	########	########
20	WAYPOIN	518	18.1383	-66.9188	18.1383	-66.9188	########	Waypoint	LC 18	Comi	Healthy	2012	Shrub	Native	20	Healthy	garmin GF	########	########
21	WAYPOIN	519	18.01952	-67.09	18.01952	-67.09	########	Waypoint	LC 19	Sasa	Healthy	2012	Shrub	Native	94	Healthy	garmin GF	########	########
22	WAYPOIN	520	18.02003	-67.0894	18.02003	-67.0894	########	Waypoint	LC 20	Comi	Healthy	2012	Shrub	Native	20	Healthy	garmin GF	########	########
23	WAYPOIN	521	18.02015	-67.0894	18.02015	-67.0894	########	Waypoint	LC 21	Erae	Healthy	2012	Shrub	Native	40	Healthy	garmin GF	########	########


Species survival rate
Survival percent
120
100
80
60
40
20
0
Roystonea borinquena
Coccoloba microstaquia
Erythroxylum aerolatum
Bursera simaruba
Bourreira succulenta
Bucida buceras
Guazuma ulmifolia
Citharexulum fruticosum
Sapindus saponaria
Cordia collococca
Ceiba pentandra
Trichilia hirta
2014
2015

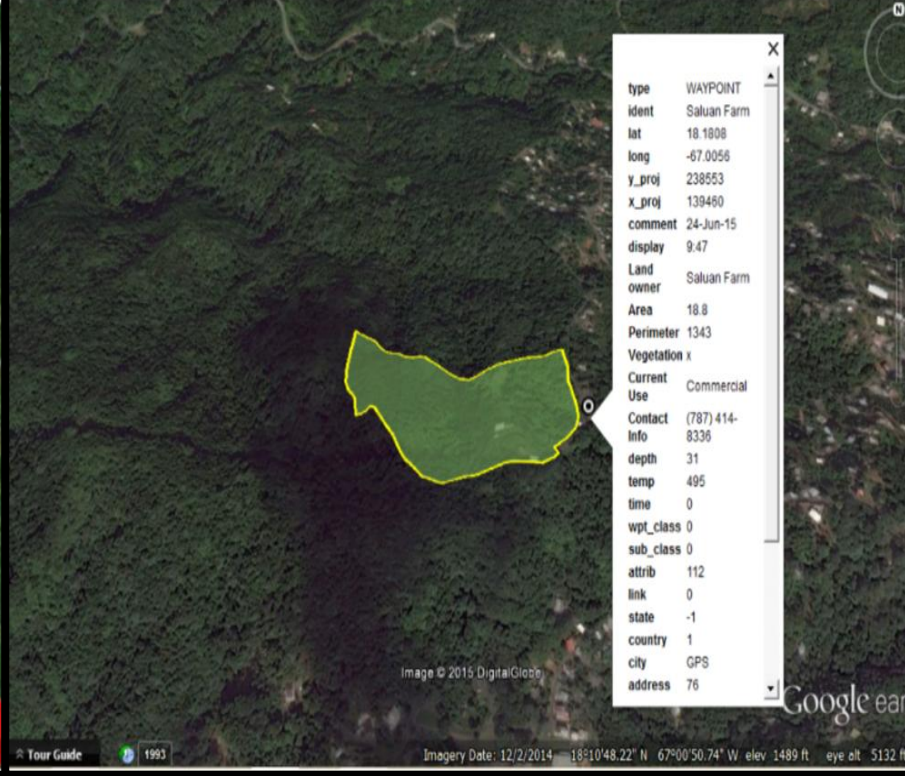

A
B
Image © 2015 DigitalGlobe
Google earth
Tour Guide
1993
Imagery Date: 11/12/2014 18°08'20.86" N 66°55'10.27" W elev 2134 ft eye alt 3001 ft

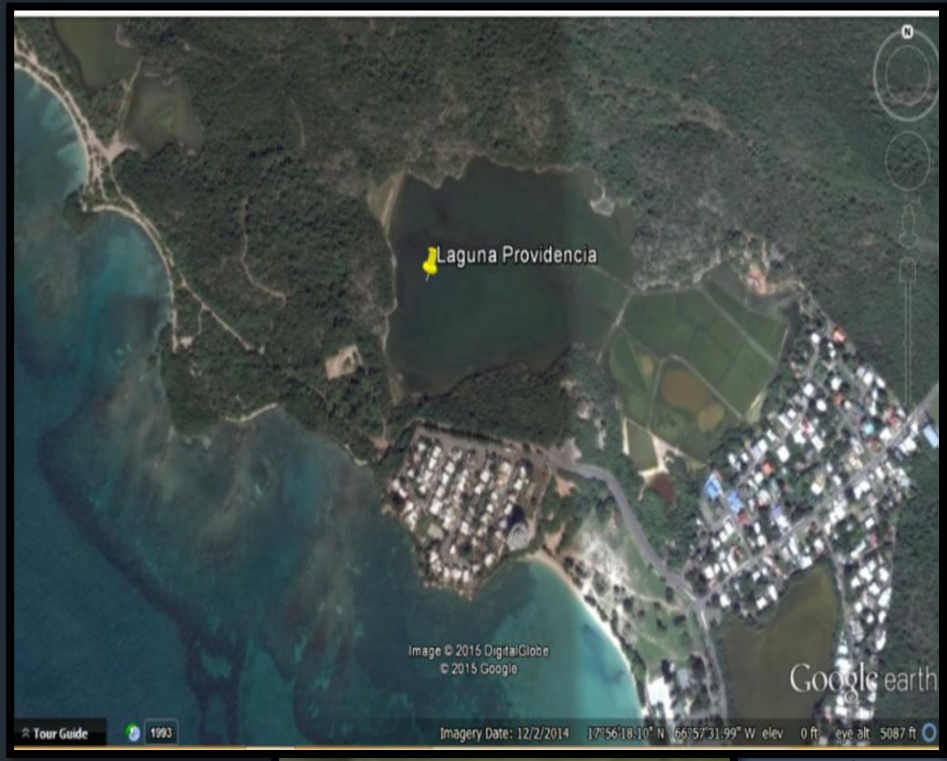

type WAYPOINT
ident 302
Latitude 18.1383
Longitude -66.9188
y_proj 18.1383
x_proj -66.9188
comment 6/24/2015 13:13
display Waypoint
Id Tag A2
species Bosu
Comment Healthy
Year 2013
Growth Tree
Origin Native
Survival rate 20%
Comment Healthy garmin GPS 76 Software Version 2.09
model 6/24/2015 9:13
filename 6/24/2015 13:13
ltime
magvar 0
geoidheight 0
desc 0
fix 0
sat 0
Image © 2015 DigitalGlo
Google earth
Tour Guide
Imagery Date: 11/12/2014 18°08'17.39" N 66°55'07.78" W elev 2078 ft eye alt 2716 ft


Species % Survival Site A
% Survival
35
30
25
20
15
10
5
0
Byrsonima spicata
Coccoloba pubescens
Parathesis crenulata
Boureira succulenta
Podocarpus coriaceus
Roystonea borinquena
2014
2015


Species % Survival Site B
% Survival
80
70
60
50
40
30
20
10
0
Podocarpus coriaceus
Boureira succulenta
Byrsonima spicata
Coccoloba pubescens
Parathesis crenulata
Roystonea borinquena
2014
2015


Maricao
Maricao
Bosque Estatal Maricao
A
San German
© 2015 Google
Image © 2015 DigitalGlobe
Google earth
Imagery Date: 5/7/2015 18°08'41.30" N 66°59'13.42" W elev 0 ft eye alt 10.53 mi


type WAYPOINT
ident Saluan Farm
lat 18.1808
long -67.0056
y_proj 238553
x_proj 139480
comment 24-Jun-15
display 9:47
Land owner Saluan Farm
Area 18.8
Perimeter 1343
Vegetation x
Current Use Commercial
Contact Info (787) 414-8336
depth 31
temp 495
time 0
wpt_class 0
sub_class 0
attrib 112
link 0
state -1
country 1
city GPS
address 76
Image © 2015 DigitalGlobe
Tour Guide
1993
Imagery Date: 12/2/2014 18°10'48.22" N 67°00'50.74" W elev 1489 ft eye alt 5132 ft


Laguna Providencia
Image © 2015 DigitalGlobe
© 2015 Google
Google earth
Tour Guide
1993
Imagery Date: 12/2/2014 17°56'18.10" N 66°57'31.99" W elev 0 ft eye alt 5087 ft


FREE HUGS


© Joyce Gross

Suhey Ortiz Rosa - PhD Student
University of Puerto Rico at Mayaguez
Department of Marine Sciences - Bio-optical Oceanography Lab

Connecting social behavior and land based pollution in Culebra: Education Outreach and GIS

Sunia Internship Program - Caribbean
Summer 2015

Mentors
Lisa Vandiver – NOAA
Ricardo J. Colón-Merced – FWS
Rob Ferguson - NOAA

Scope of Work

- Education and Outreach
- Reintroduction of new populations of *Leptocereus grantianus* inside the refuge boundaries
- Participate in the Seabird Monitoring Project
- Water Quality Data Analysis
- **Develop an OpenNSPECT model for Culebra Island**

Sooty tern

Background/ Importance

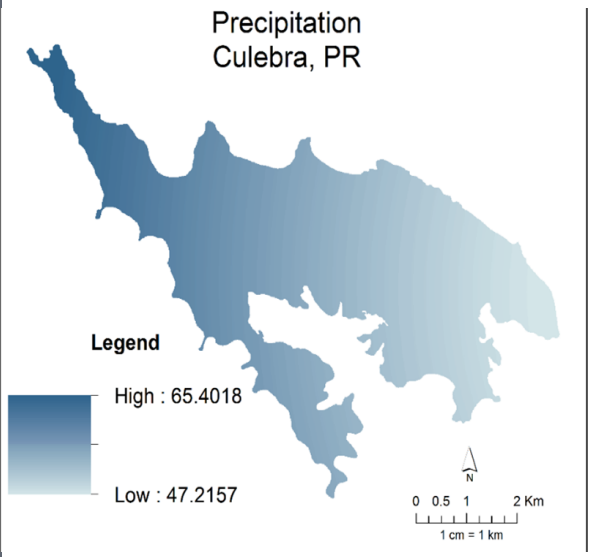
Objective # 1
Develop an OpenNSPECT model for Culebra Island

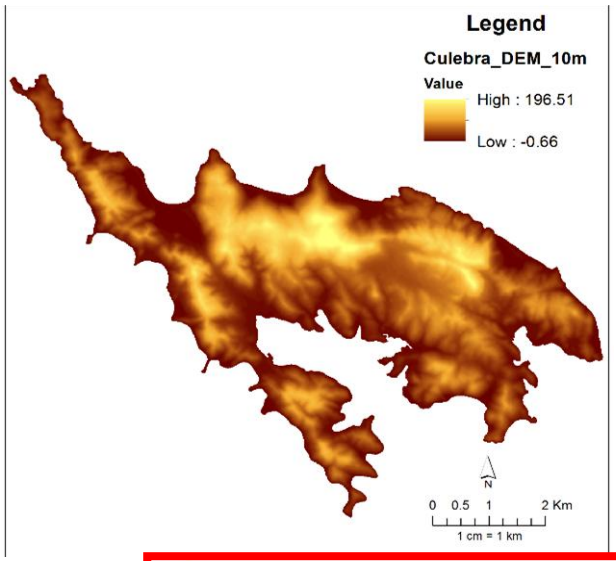
- Open Source Coded Tool developed by NOAA
- Nonpoint Source Pollution and Erosion Comparison Tool
  - Test the effectivity of Erosion Control Projects

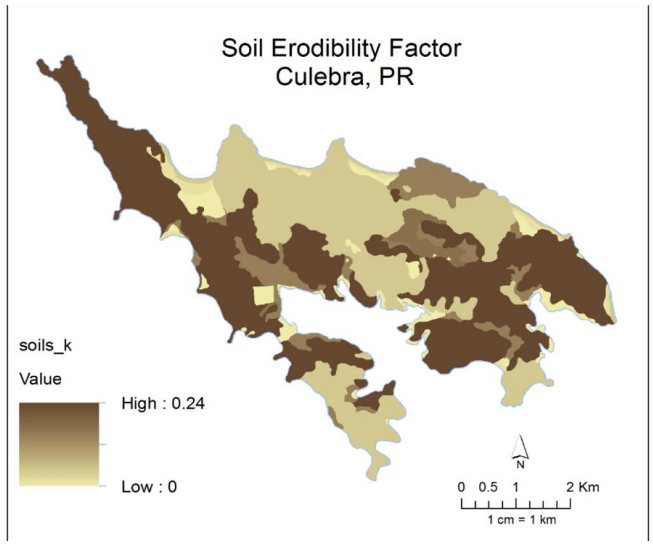
Estimate the sediment load reduction benefits of selected watershed restOration projects on Culebra.

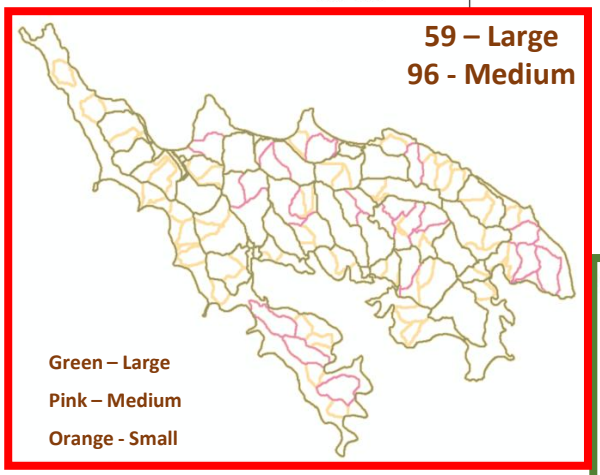
Methodology

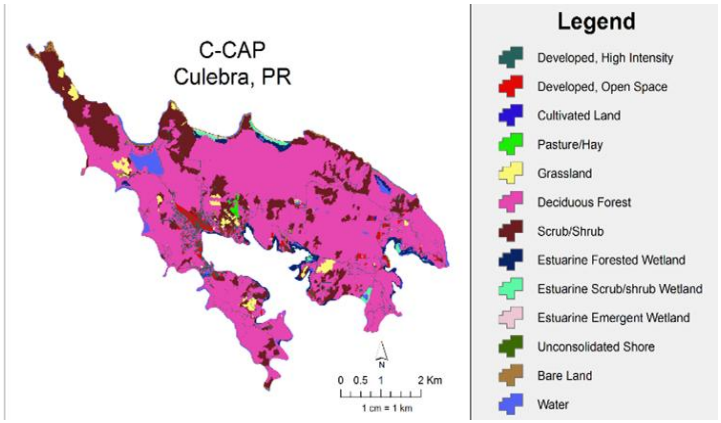
Input Data

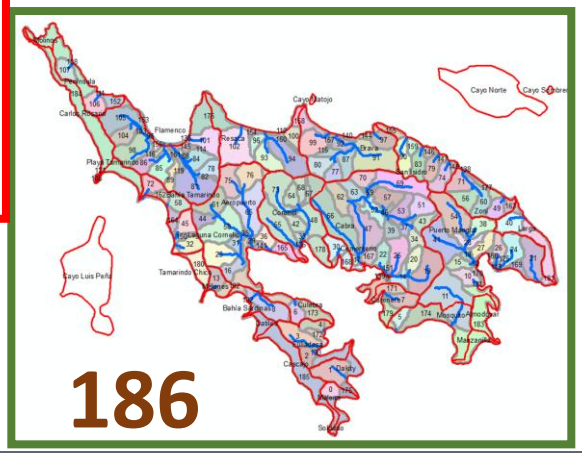










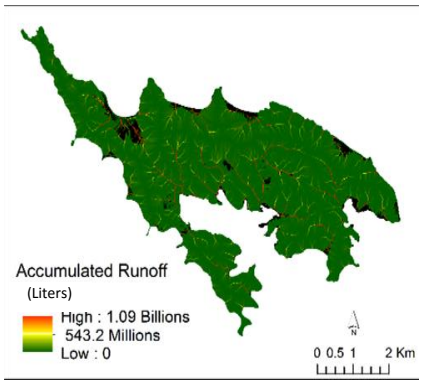


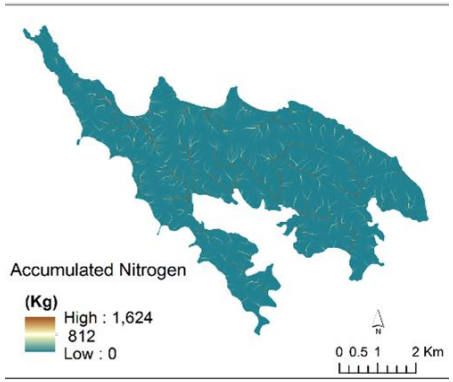
Baseline Scenario

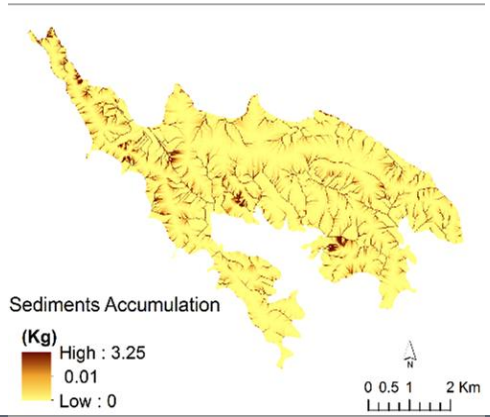
Local Effect Scenario

Accumulated Runoff volume grid (liters)

This grid displays accumulated values of water volume at each cell in the analysis area. These values are used in calculating the pollutant and sediment concentration grid by dividing the pollutant/sediment accumulation grid by the water volume to give a concentration.

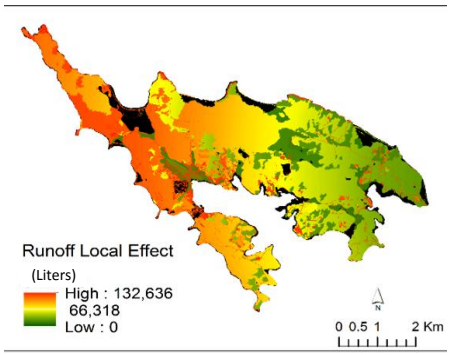


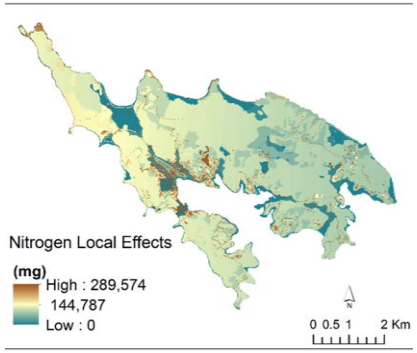


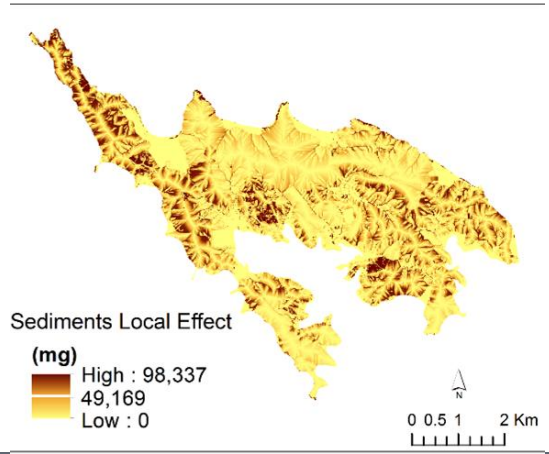


1st Scenario

- **10 m DEM and Small WS**
- **10 m Precipitation Grid and Annual Precipitation= 47 Inches/yr**
- **Nitrogen Set, Type 1**







Results

Restoration Scenario + Comparing Output

Restoration Size = 1,830 m^2 = 0.45 Acres = 0.13 Hectares = 0.0018 Km^2 The delineated area is an estimates of the real scenario.

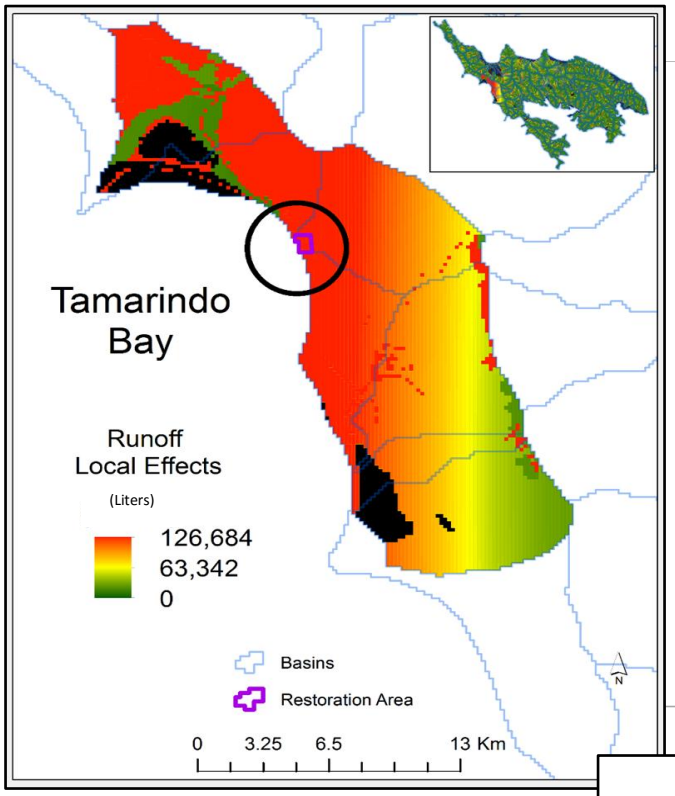
The management scenario included changes on land cover type from developed/high intensity, deciduous forest and bare land into scrub/shrub land.

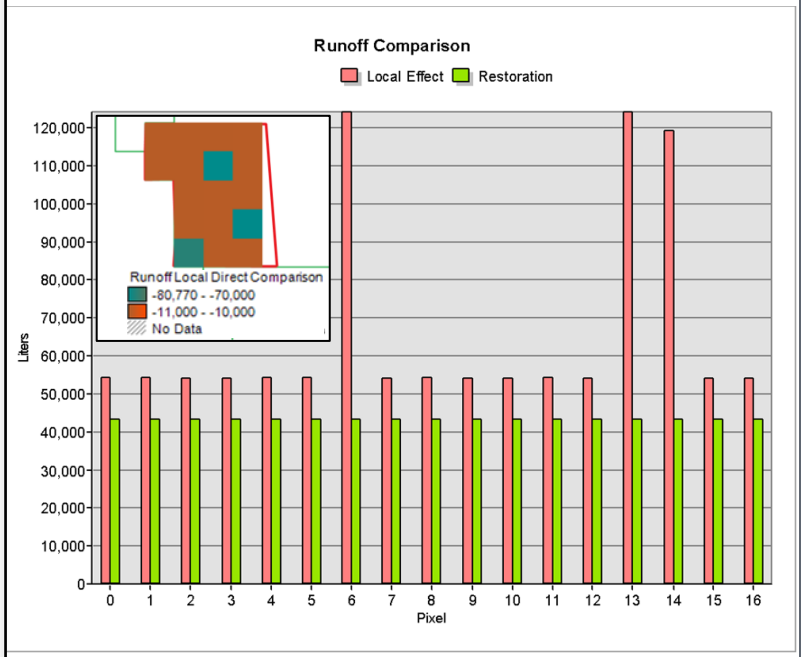
Direct Comparison =

(Management – Baseline)

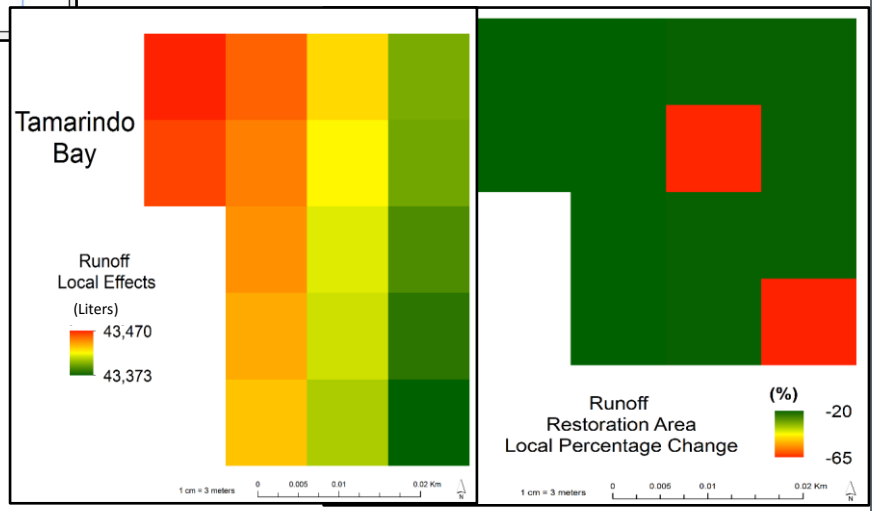
Percent Change = 100 *

(Management – Baseline) / Baseline



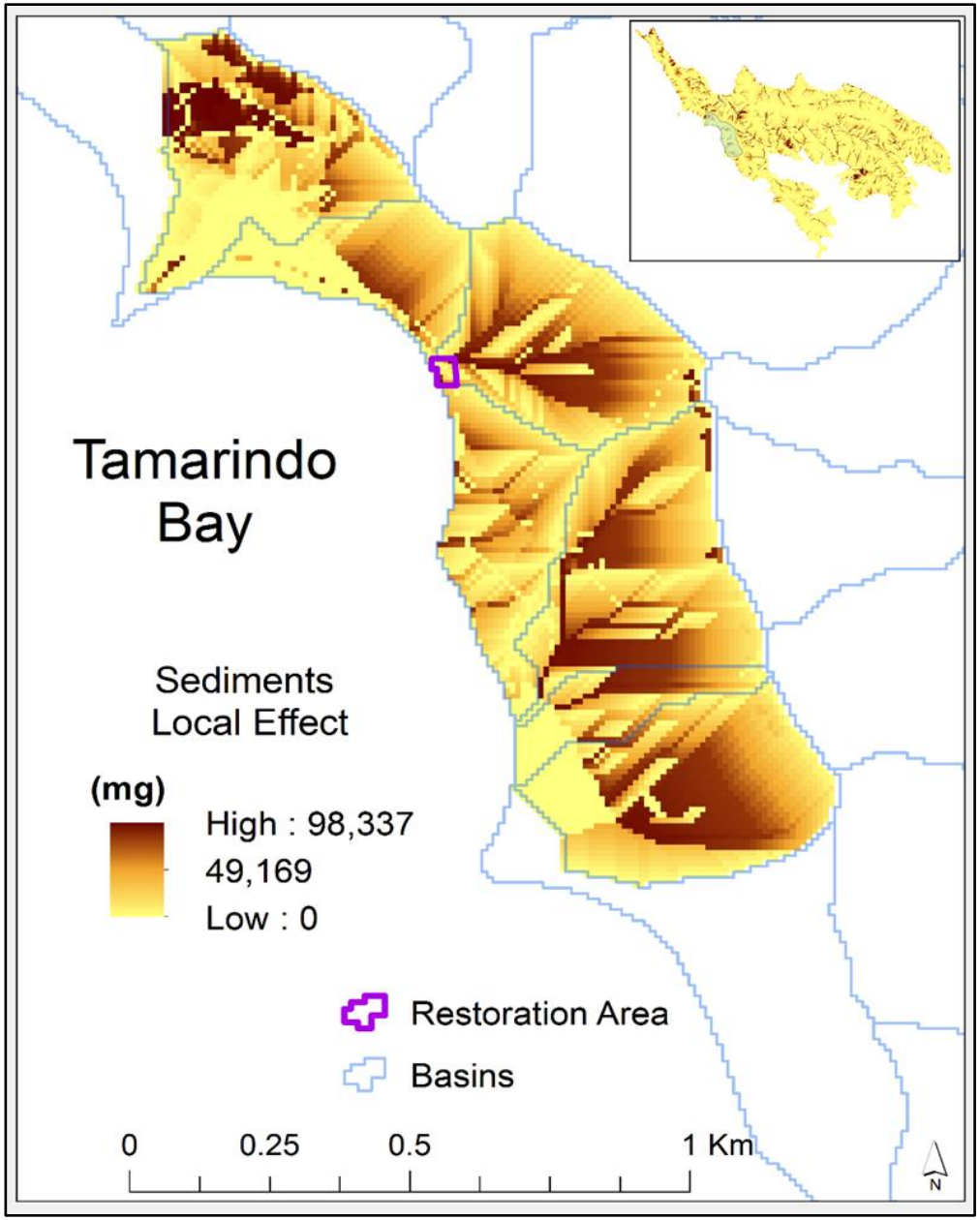


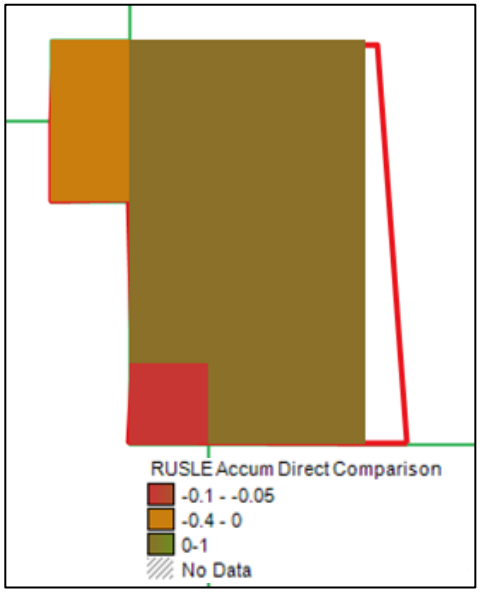
OpenNSPECT estimates the difference in water quality between a baseline landscape and some management scenario. The compare tool delivers a direct comparison and percentage change for each layer within a group. These include local effects, accumulates effects and pollutants concentrations

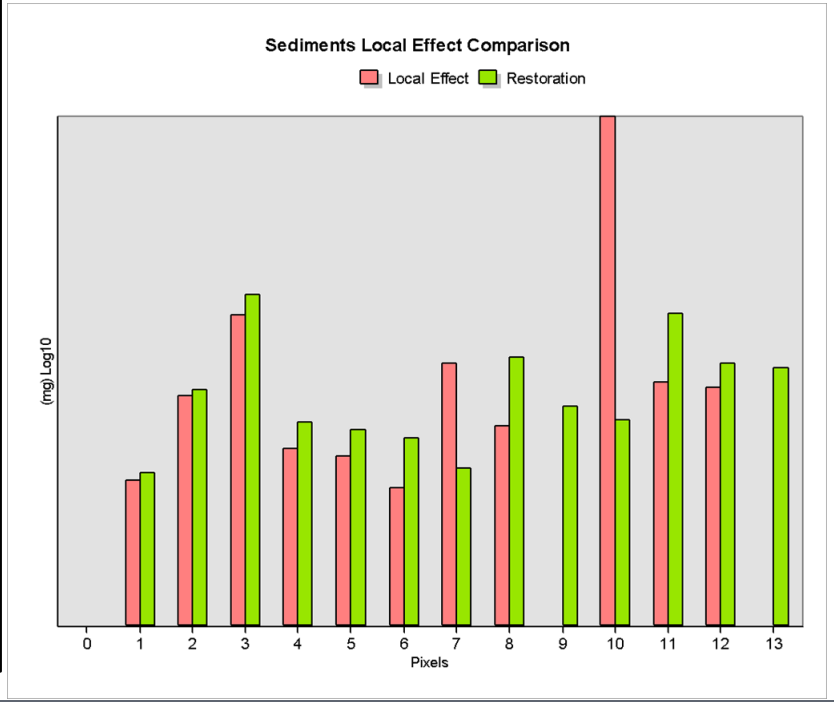


Results

Restoration Scenario + Comparing Output

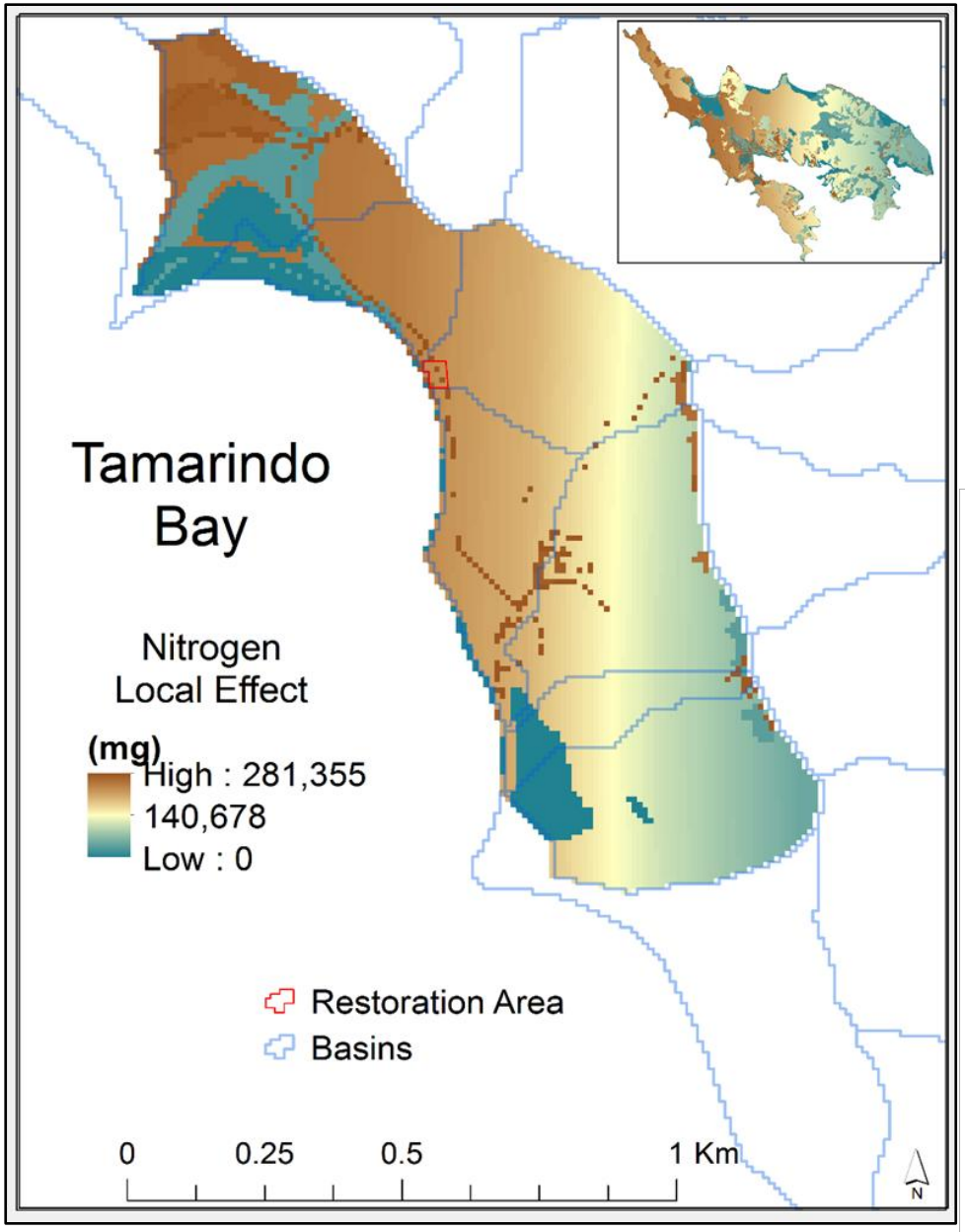


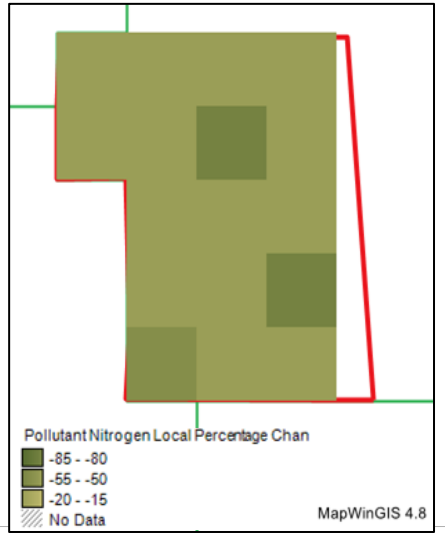


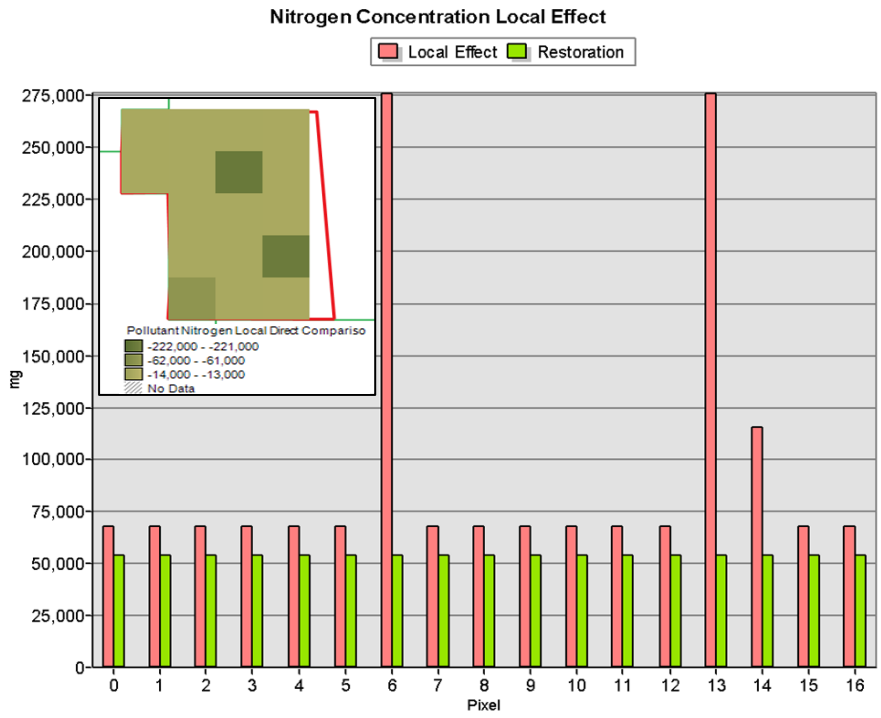


Results

Restoration Scenario + Comparing Output







Summary

- The change on land cover reduced the runoff up to 65 %.
- The sediments accumulation were reduced at nearshore. The scenario creates a buffer zone retaining sediments.
- The nitrogen was reduced up to 85 %.

Conclusion

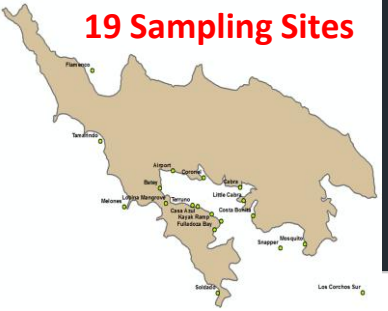
The restoration practice had a positive impact into the coastal zone.

Recommendation

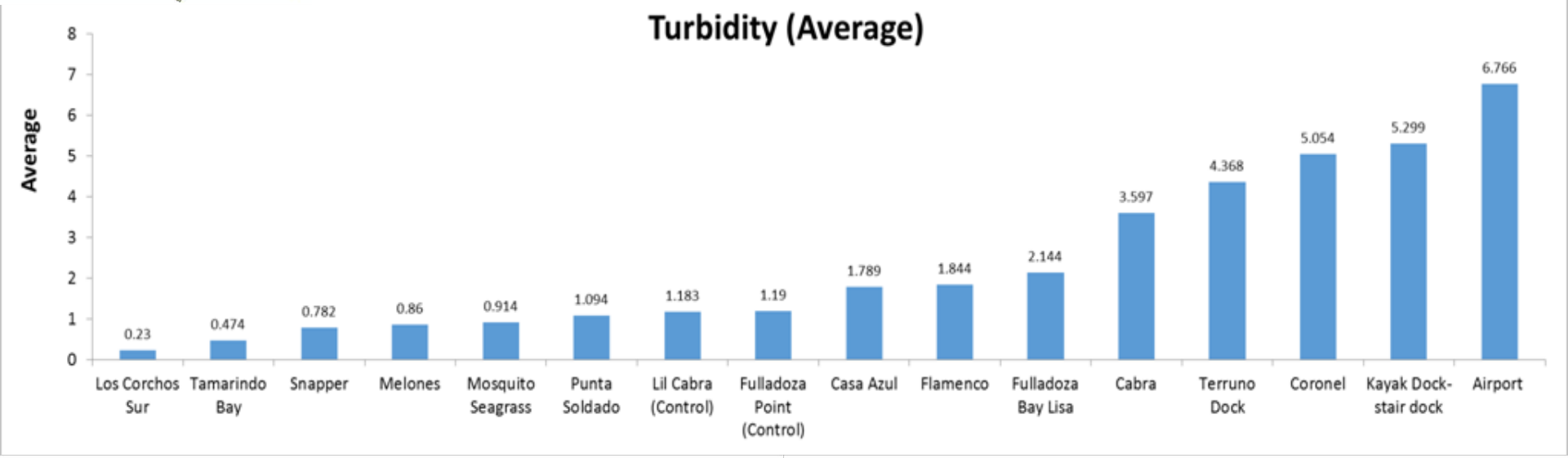
- Water Quality data is needed to understand the impacts of watersheds restoration projects.

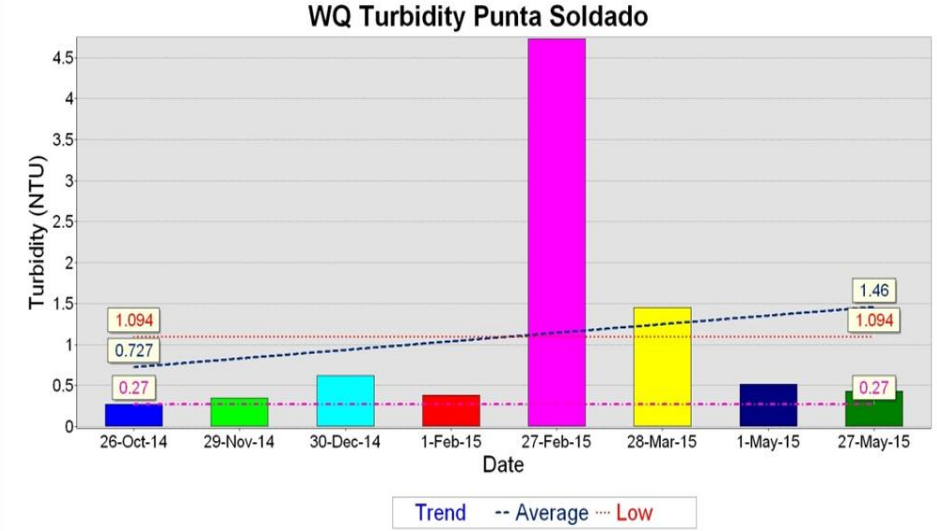
Next Steps

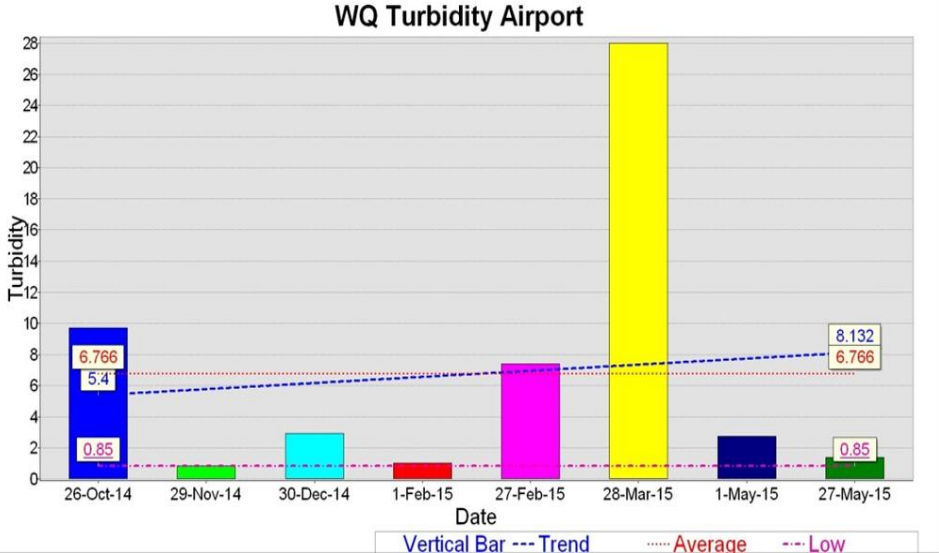
- Execute the model with new delineated areas including restoration projects as Zoni and Punta Soldado
- Quantify the sediments and pollutants at coastal areas
- Estimates and correlates field and model data
- Identify future land changes or management scenarios and the impact on water quality.
- Integrate water quality and underwater data into the model.

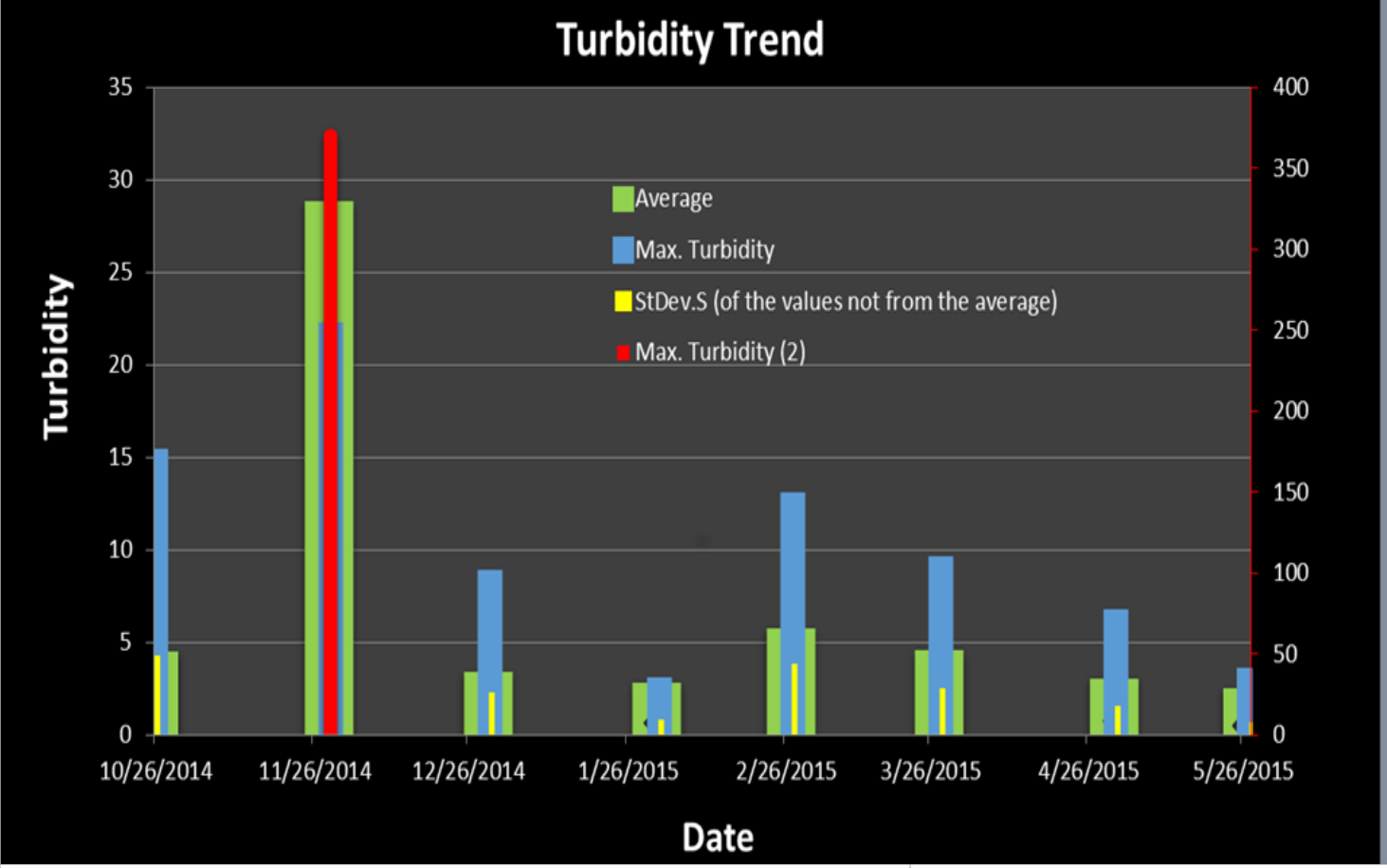


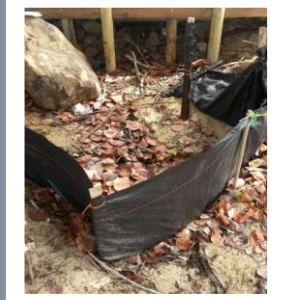
Water Quality

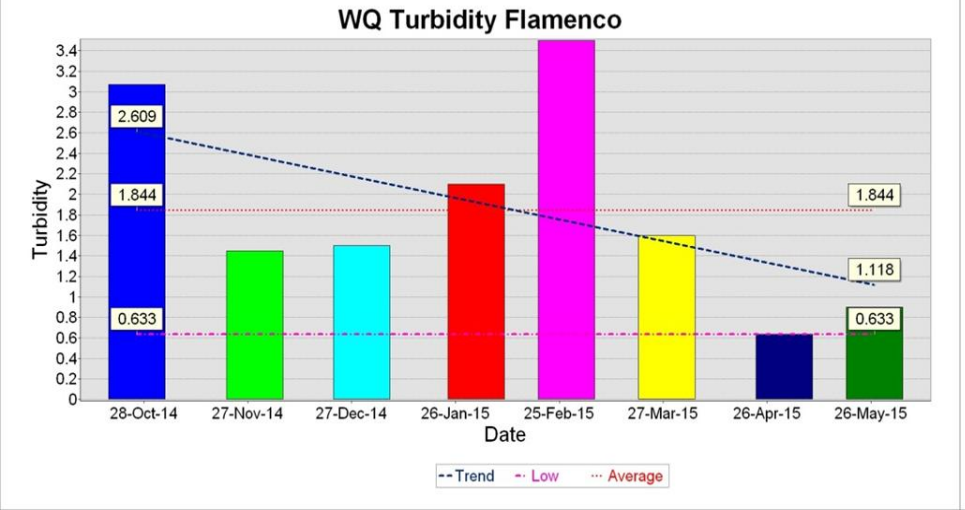


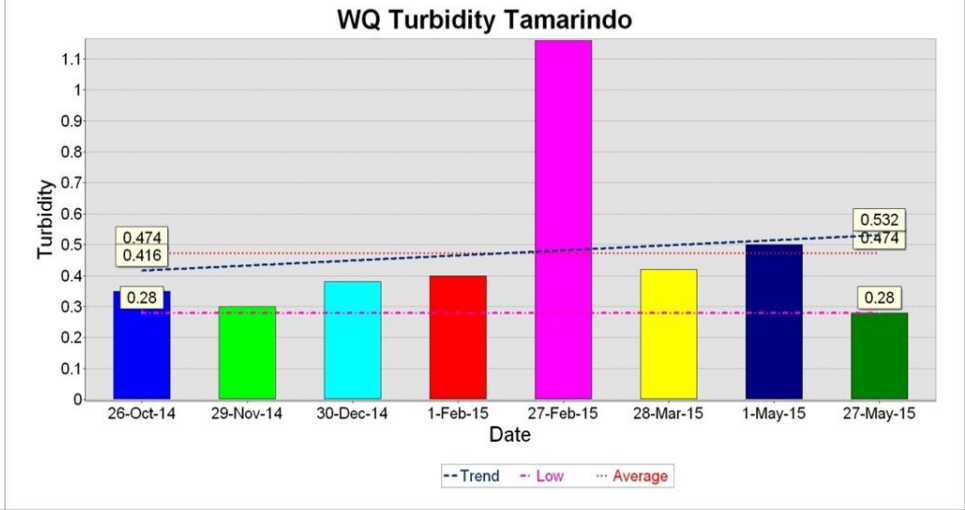





Turbidity Trend
Turbidity
Date
Average
Max. Turbidity
StDev.S (of the values not from the average)
Max. Turbidity (2)
0
5
10
15
20
25
30
35
0
50
100
150
200
250
300
350
400
10/26/2014
11/26/2014
12/26/2014
1/26/2015
2/26/2015
3/26/2015
4/26/2015
5/26/2015




WQ Turbidity Flamenco
Turbidity
Date
2.609
1.844
0.633
1.844
1.118
0.633
28-Oct-14
27-Nov-14
27-Dec-14
26-Jan-15
25-Feb-15
27-Mar-15
26-Apr-15
26-May-15
Trend
Low
Average


WQ Turbidity Tamarindo
Turbidity
Date
0.474
0.416
0.28
0.532
0.474
0.28
26-Oct-14
29-Nov-14
30-Dec-14
1-Feb-15
27-Feb-15
28-Mar-15
1-May-15
27-May-15
Trend
Low
Average

Acknowledgements

Governor Sunia Internship Program – 2015
Protectores de Cuencas Inc.
Shan Burkhalter and Chris Jeffrey
Kayaking PR

U.S. Fish and Wildlife Services
Para La Naturaleza
PR- DRNA
NOAA- Restoration Program

Guanica Bay/Rio Loco Watershed Partnership Initiative – Story Map