Urban Greenspaces enhance ecosystem services for Mobile Bay

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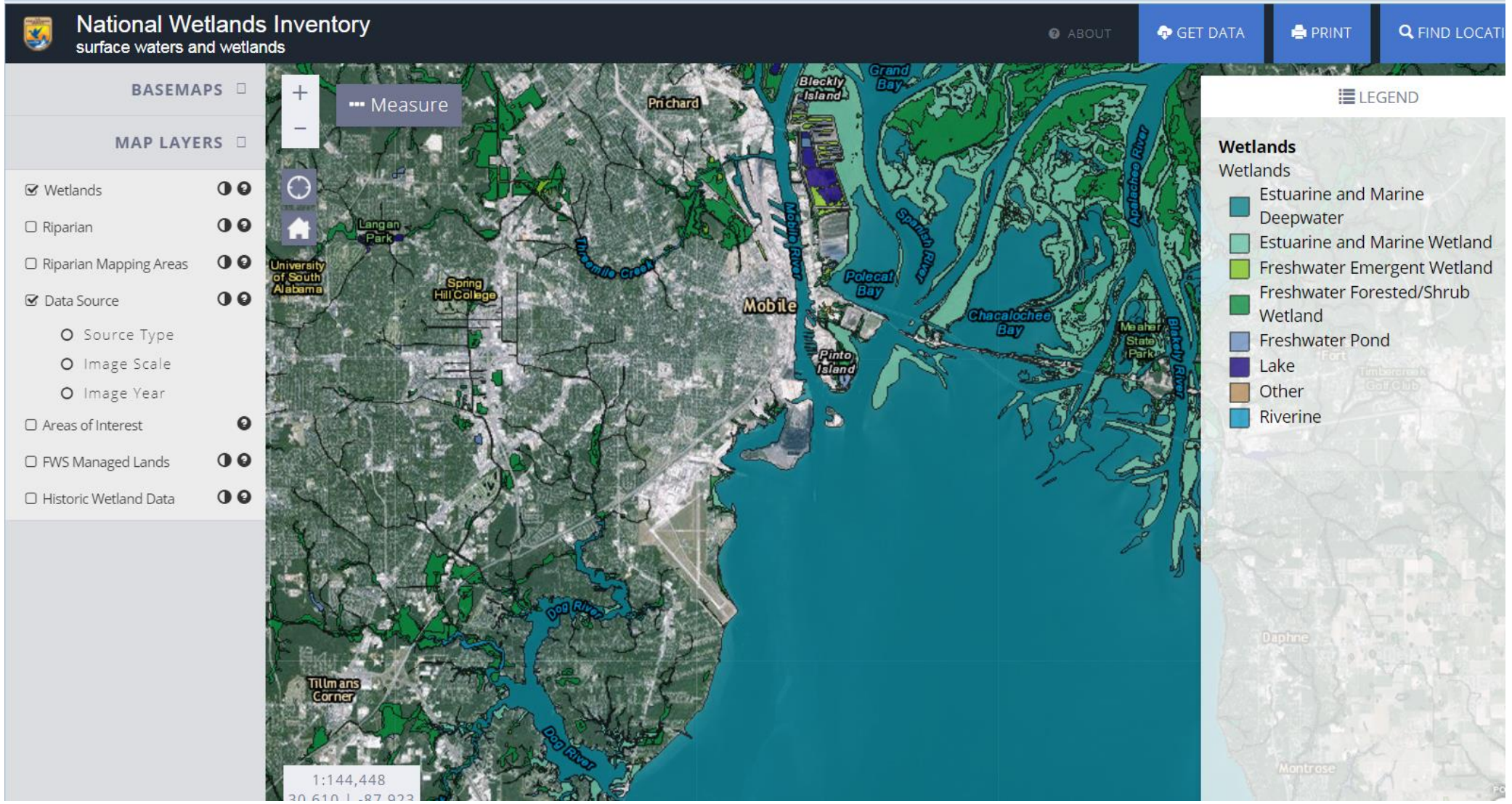
Orange Beach, Alabama

Outline

- Background & Definitions
- Ecosystem Services and Natural Capital
- Valuing Ecosystems Services to Offset DWH Dollars
- Green Infrastructure
- Example: Climate Smart Cities
- Example: of Ecosystem Service Benefits from Restoration Projects
- Example: for a Shoreline Acquisition on Mobile Bay

Arlington Park alongside of Mobile Bay

City of Mobile – Connection to the Bay



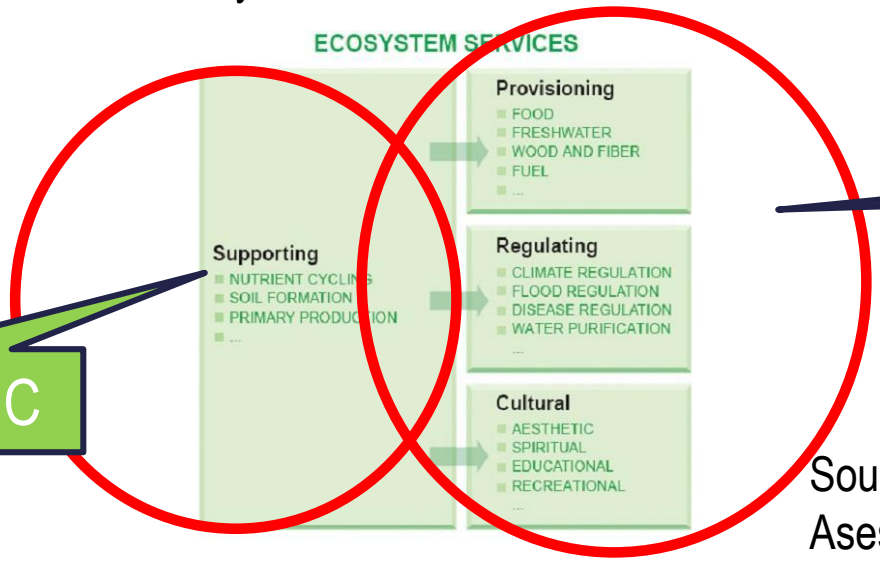
Ecosystem Services & Natural Capital

Energy

Ecosystem

Products & Services

Supporting Services often Ignored because they have no market value



ECOCENTRIC

ANTHROPOCENTRIC

Source: Millenium Ecosystem Asessment

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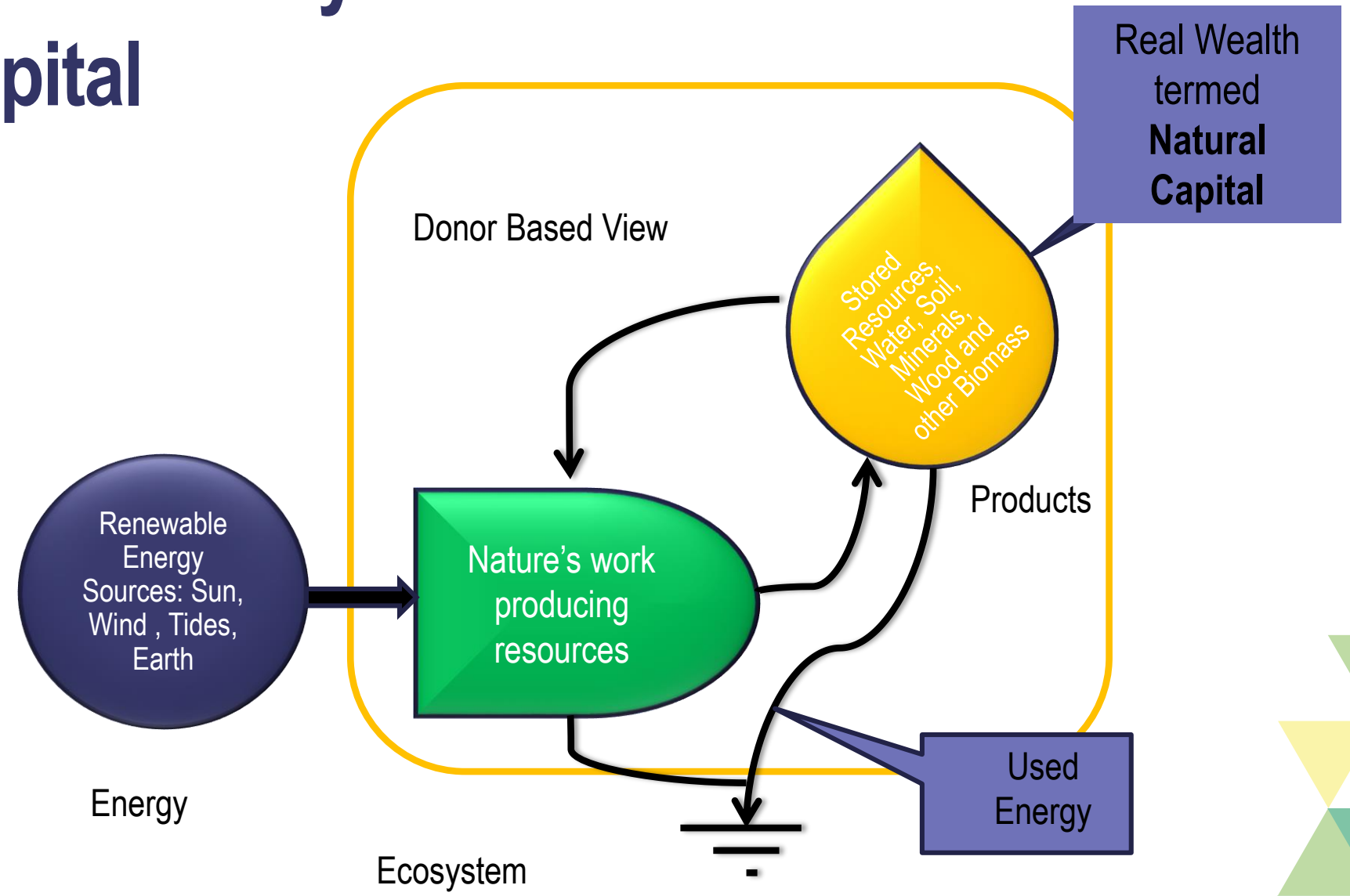
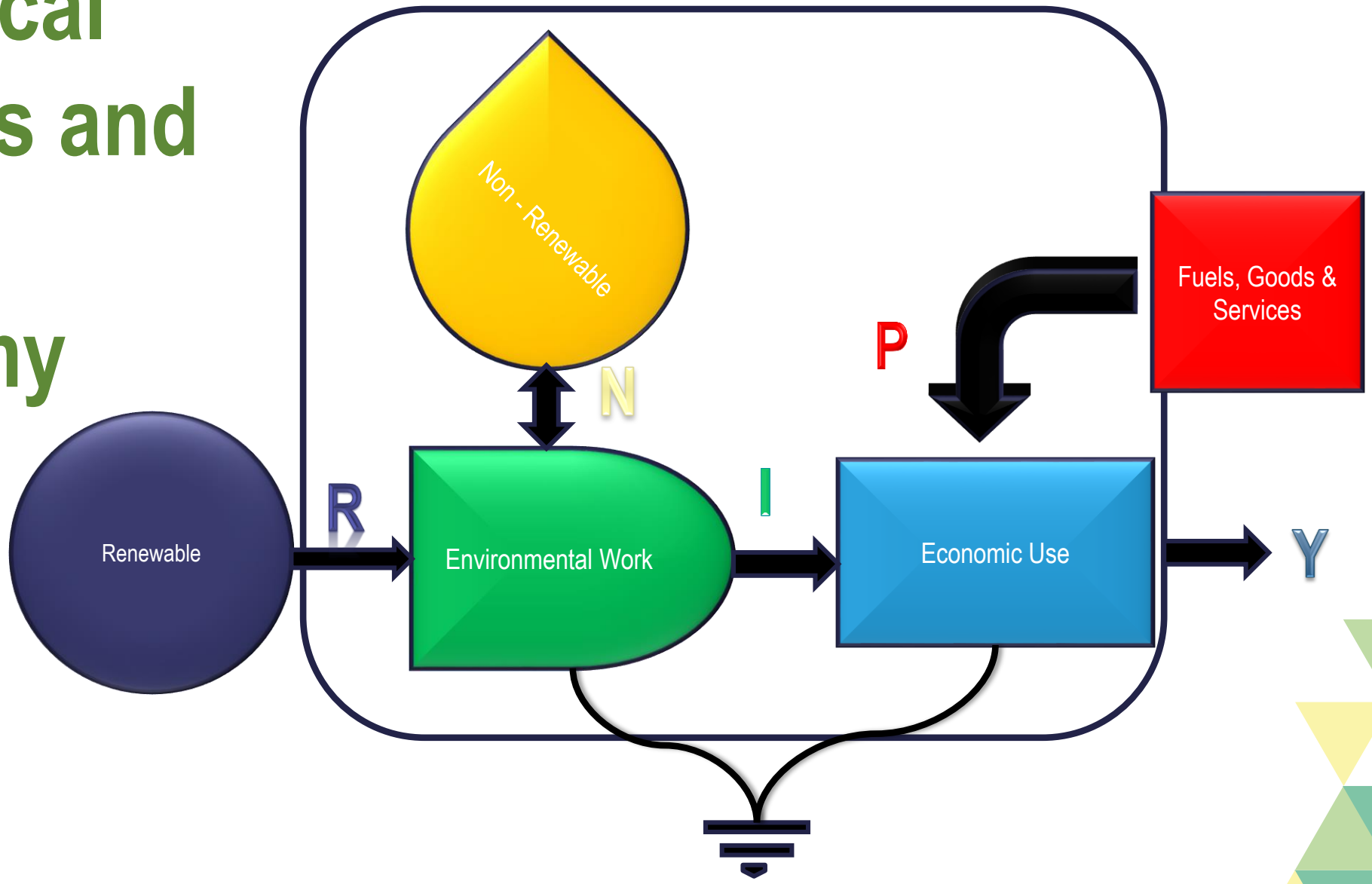
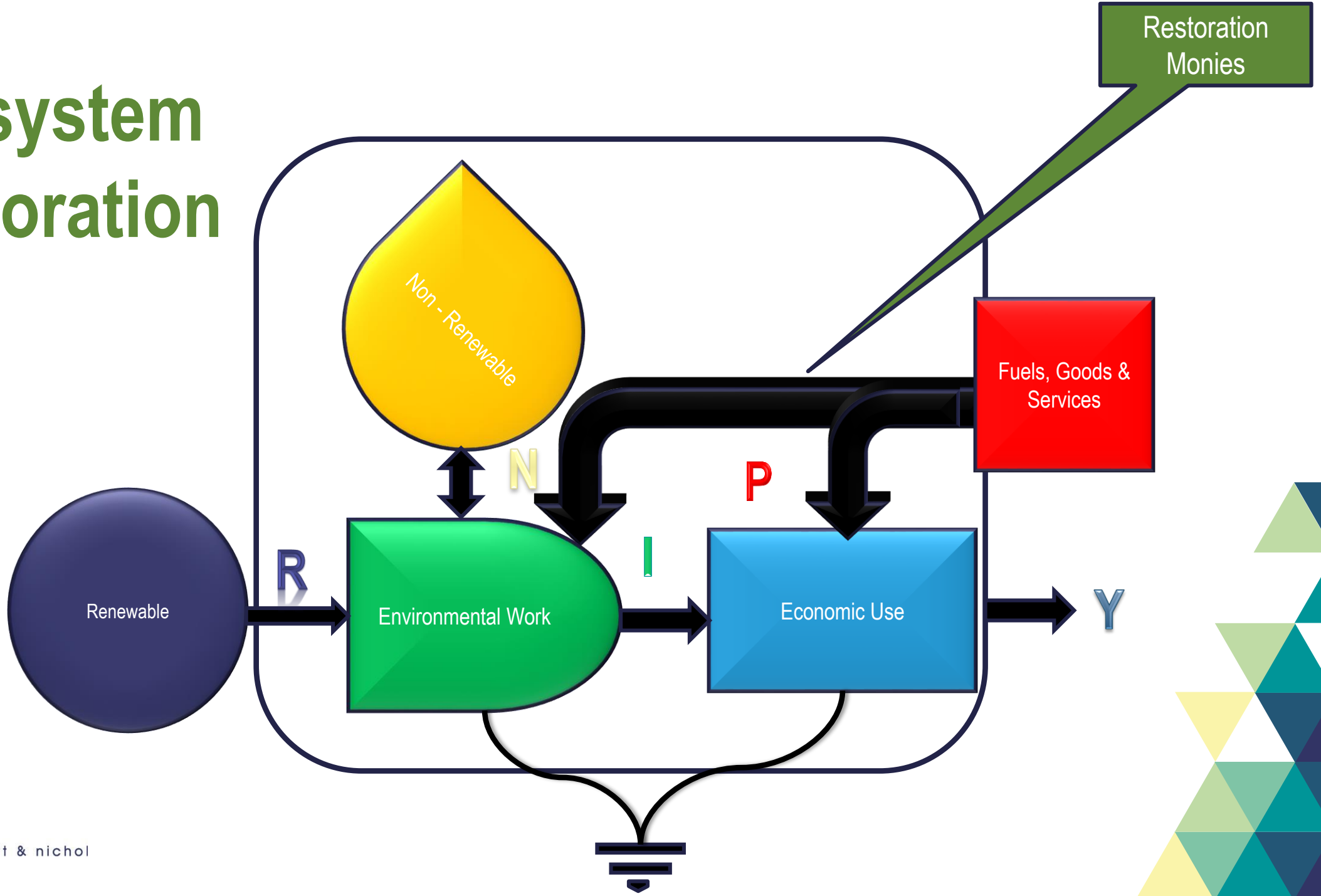
Real Wealth of Ecosystem is Termed Natural Capital



Ecological Systems and Human Economy



Ecosystem Restoration Goal



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DWH Resource and Habitat Injuries

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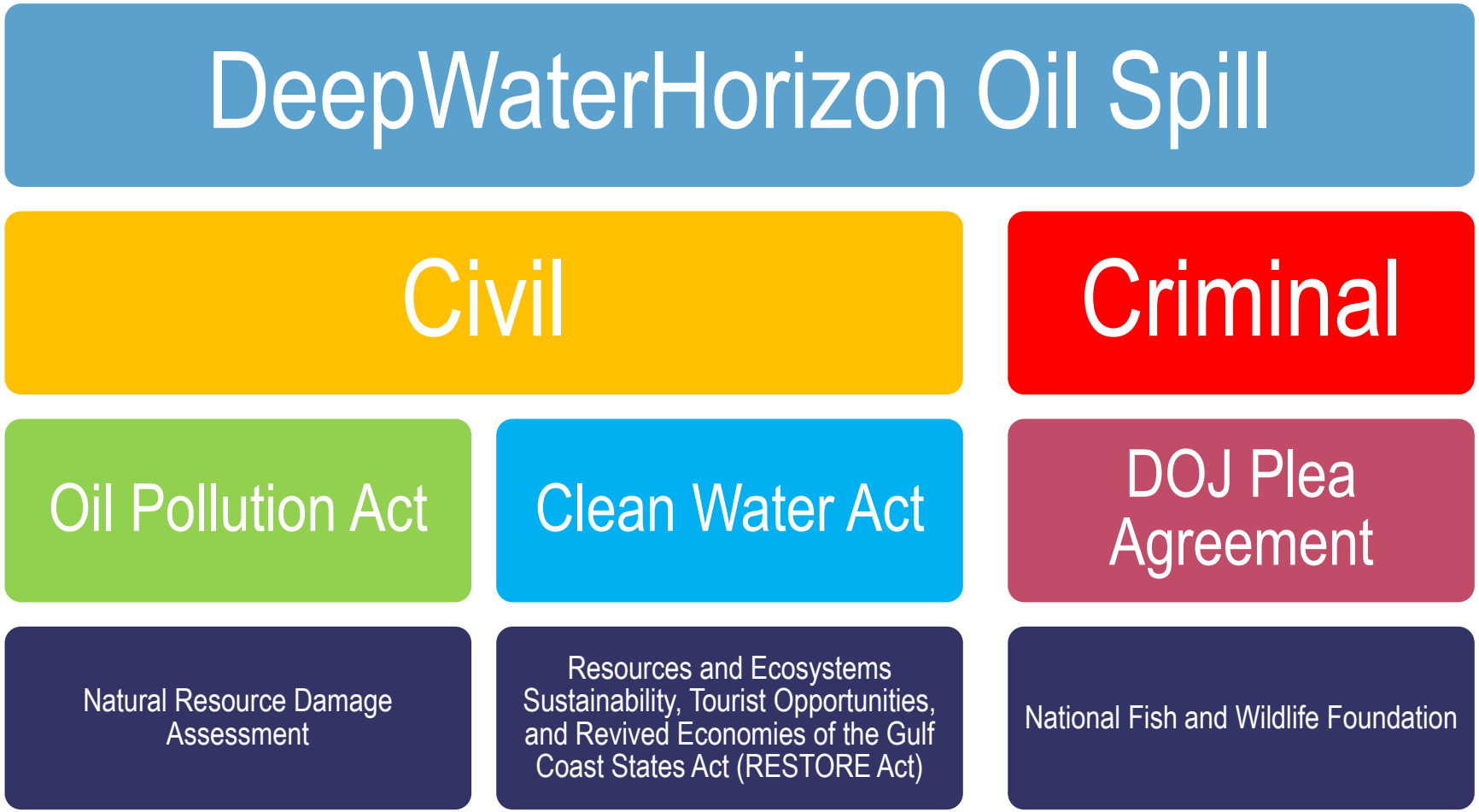
DWH RESTORATION FUNDING



DWH RESTORATION FUNDING

DeepWaterHorizon Oil Spill

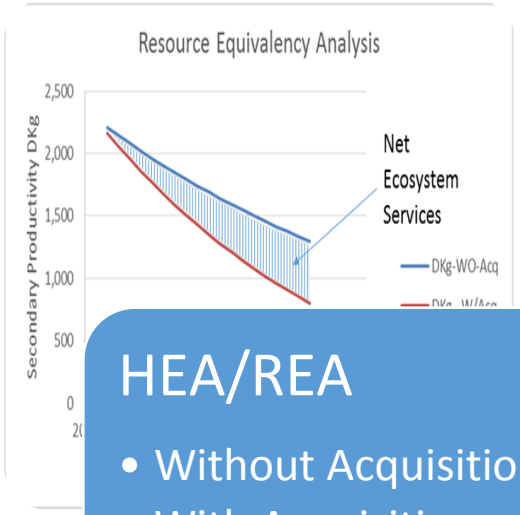
CAVEAT: Much of the Restoration activities funded must Restore Lost Resources

OPA	CWA	Plea
NRDA	RESTORE	NFWF

Net Ecosystem Service Benefit - Process

NRDA

- Baseline
- Early Restoration Values



HEA/REA

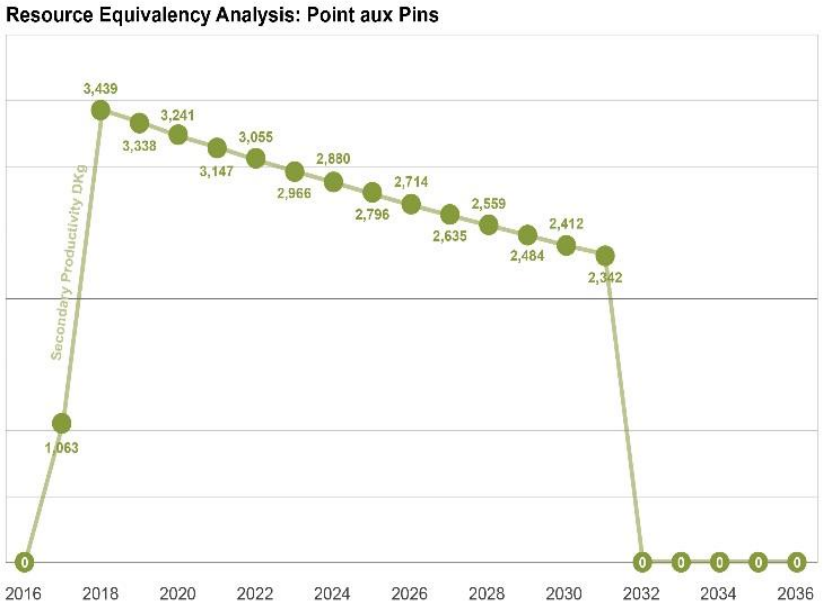
- Without Acquisition
- With Acquisition
- With Acquisition and Restoration

NET Ecosystem Service Values

- DSAY's
- D-Kg productivity (1^{o}, 2^{o},3^{o})
- Monetary Value $$

Living Shoreline Example

- Secondary Productivity-Reef



HABITAT	BENEFIT	QUANTITY	UNIT	VALUE
REEF	Primary	64192	$ 1.25	$ 80,240
	Secondary	41070	$ 12.50	$ 513,375
	Tertiary	8004	$ 125.00	$ 1,000,475
				$ 1,594,090
MARSH	Marsh DSAY's	227	$ 39,000.00	$ 8,853,000
MARSH EDGE	Primary	220887	$ 1.25	$ 276,109
	Secondary	15309	$ 12.50	$ 191,363
	Tertiary	2673	$ 125.00	$ 334,125
				$ 801,596
ESTIMATED COST				**$ 2,300,000**
TOTAL VALUE OF ECOLOGICAL BENEFITS				**$ 11,248,686**

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Net Ecosystem Service Benefits- Oyster reef Example

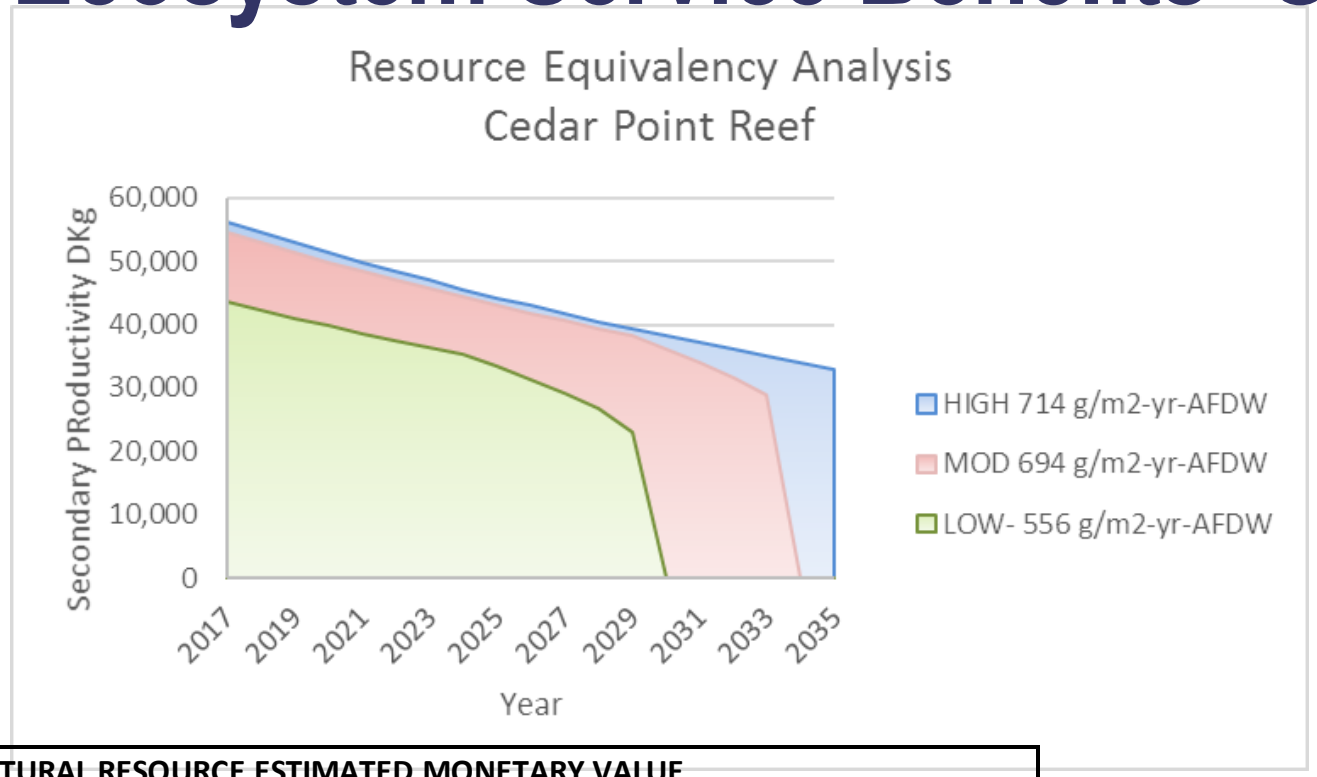


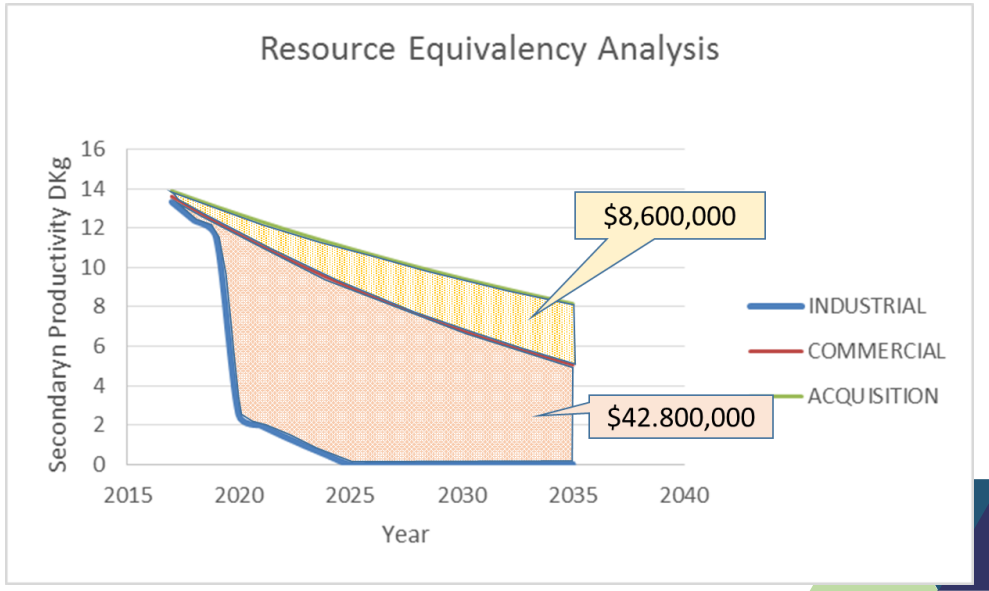
Photo Source: Chesapeake Bay Program

NATURAL RESOURCE ESTIMATED MONETARY VALUE		
Natural Resource Value OYSTER REEF Creation - minimal profile 10 Year Lifespan - Secondary (2^o) and Tertiary Productivity (3^o)	Natural Resource Value OYSTER REEF Creation - minimal profile 15 Year Lifespan - (2^o) and (3^o) Productivity	Natural Resource Value OYSTER REEF Creation - minimal profile 20 Year Lifespan - (2^o) and (3^o) Productivity
$ 5,497,713	$ 8,730,198	$ 10,314,889
$ 7,145,042	$ 10,441,015	$ 12,279,630
$ 12,642,755	$ 19,171,213	$ 22,594,519
INCREASE	$ 6,528,457	$ 9,951,763

Original Graphics: Smithsonian Environmental Research Center-Chesapeake)

Conservation Land Acquisition Example

- The net ecosystem service benefit was analyzed based on three scenarios:
- **Without project (Land is NOT acquired)** – assume commercial development and a 50% degradation rate over 25 years.
- **With project (Land acquired)** – land is protected for conservation and no active restoration occurs. This represents the "baseline" condition and provides the ecosystem services produced over a 25 year period.
- **With project plus implementation of restoration strategies** – assume a 5-20% (varies by habitat and position n the landscape) uplift of habitat ecosystem services (depending on potential restoration opportunities viewed by the project team) with implementation of restoration (e.g. invasive species removal, restore hydrology, replant vegetation or prevent degradation over time). This provides the greatest uplift considered in this analysis.



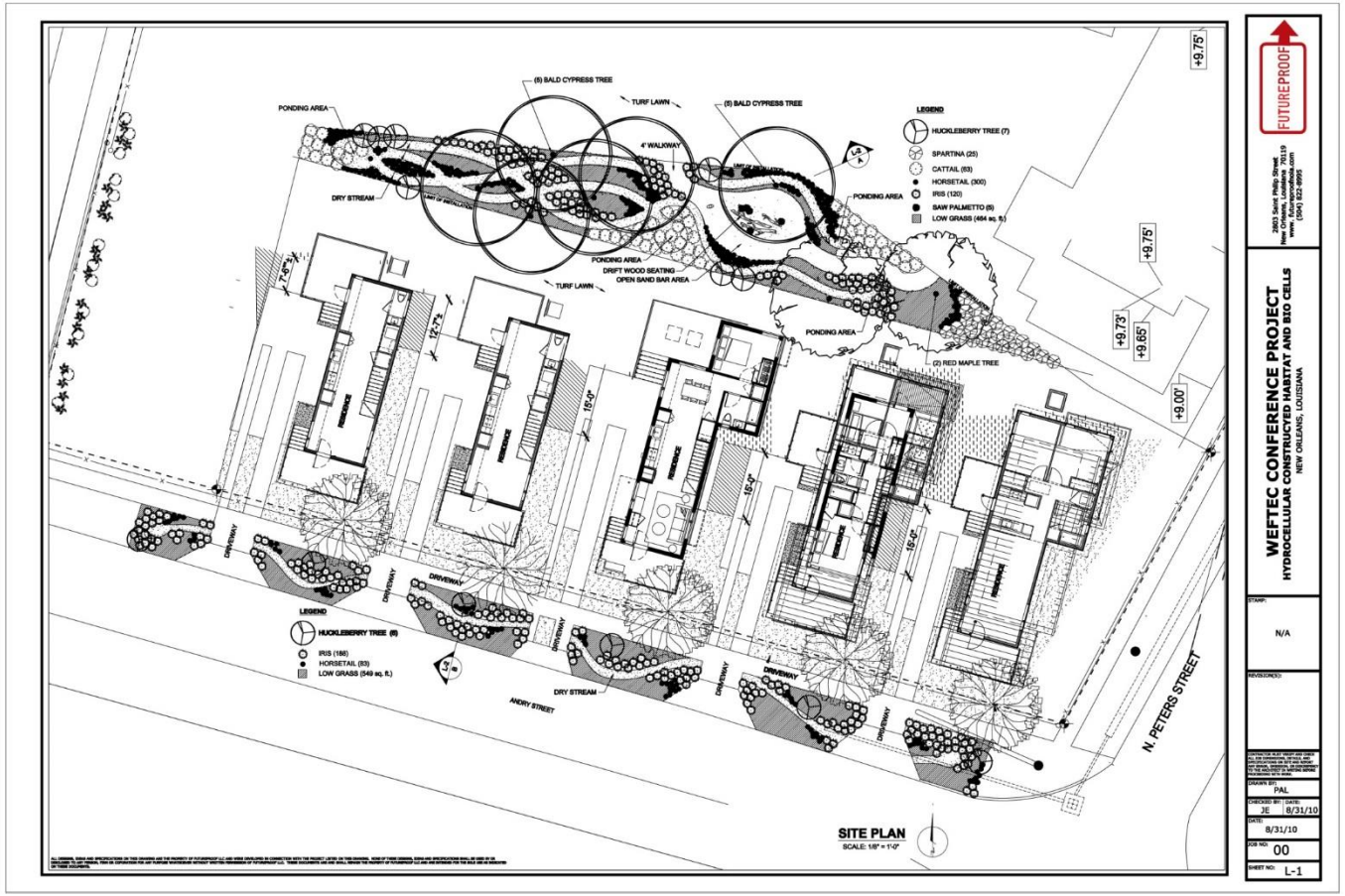
Ecosystem services from Restoration Efforts

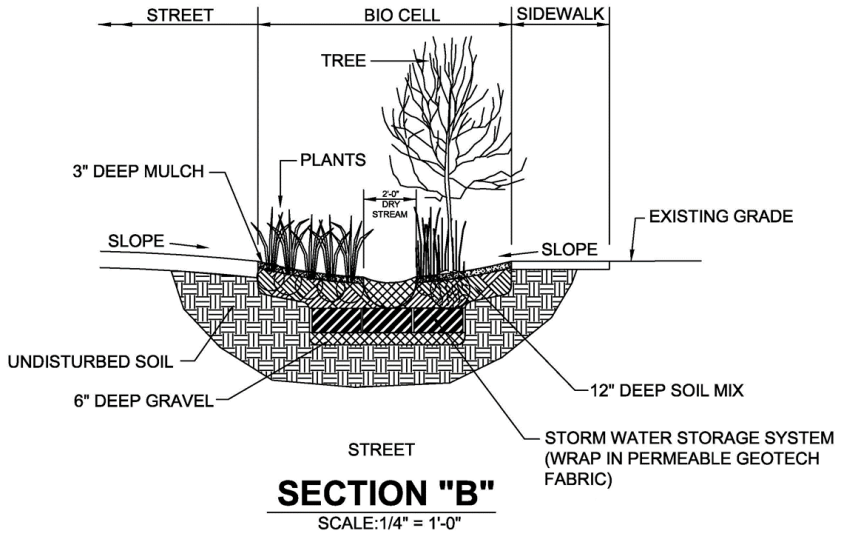
- Enhanced Bay productivity
  - Healthier Bay – Healthier People
  - Provisioning - more fish, shrimp oysters and crabs
- Improved Water Quality
- Improved Aesthetics for citizens
- Cultural Enhancement
  - Coastal citizens have cultural roots in the activities.
  - Enjoy enhanced recreational opportunities
  - Spiritual enhancement

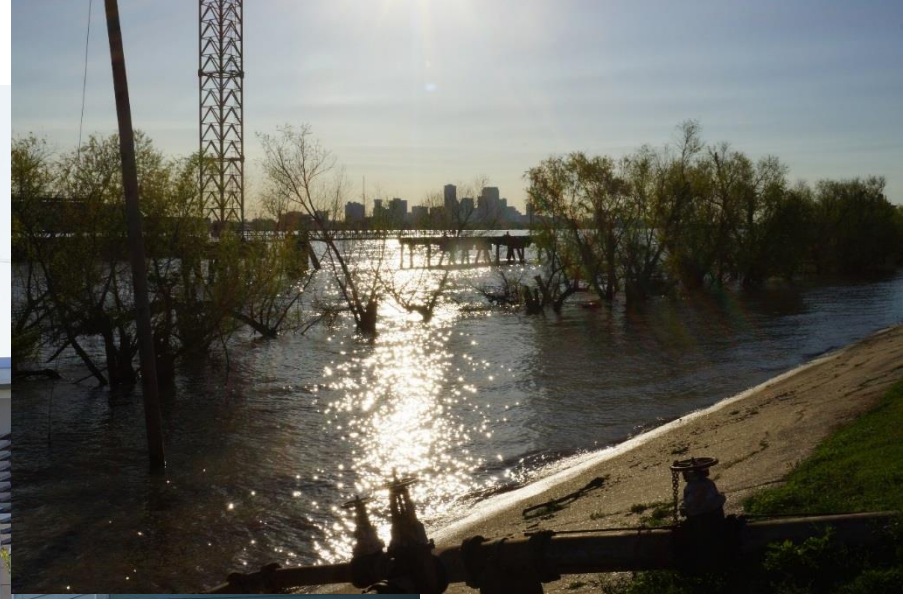
Amenities

Aesthetics – Improve “worth” of Neighborhood
Absorb Water – contribute to flood reduction
Absorb – Nutrients – improve WQ
Cool – reduce heat island effect of City
Connect – Bring people together

Tools: Green Infrastructure Example : Bioswales & Rain Gardens

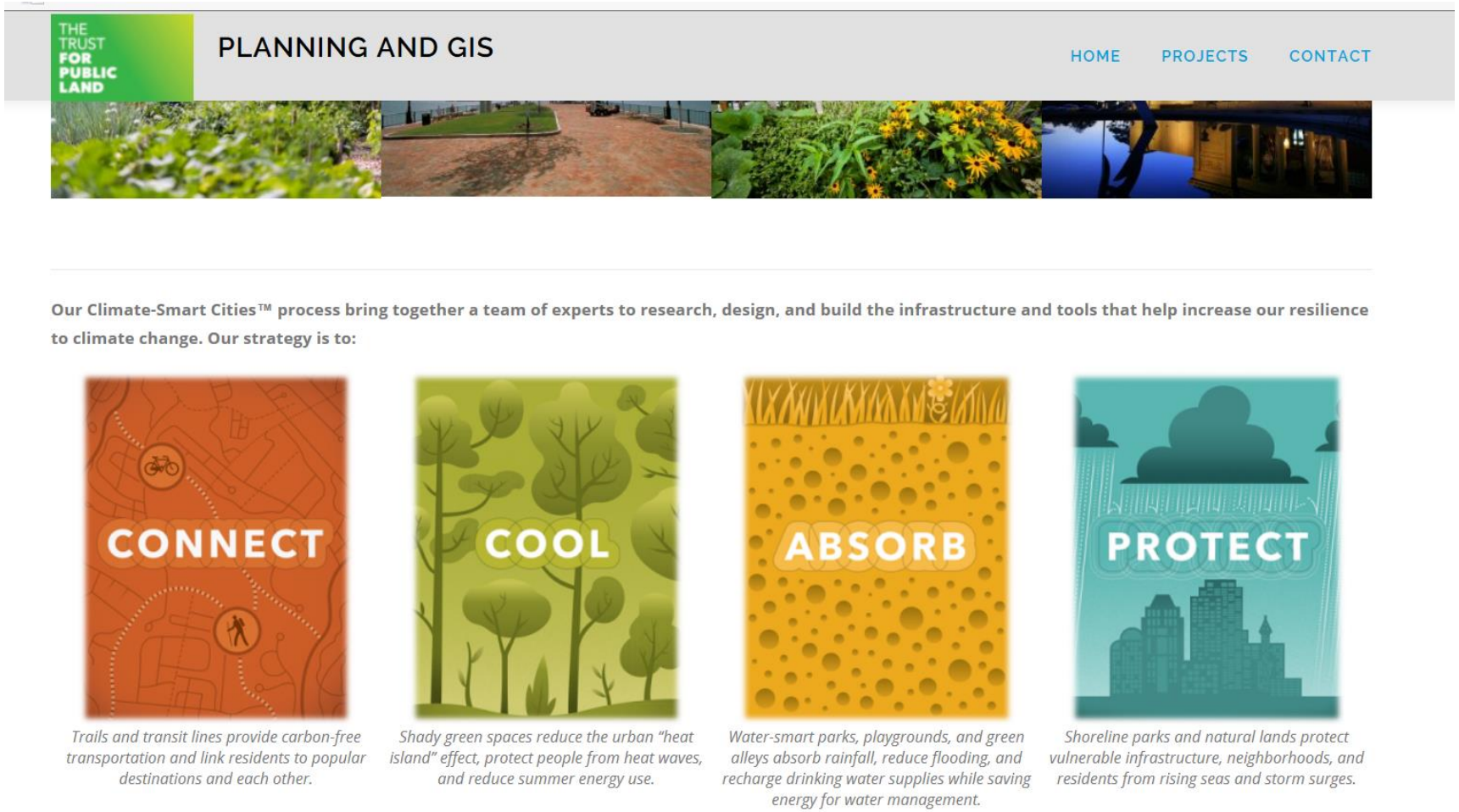




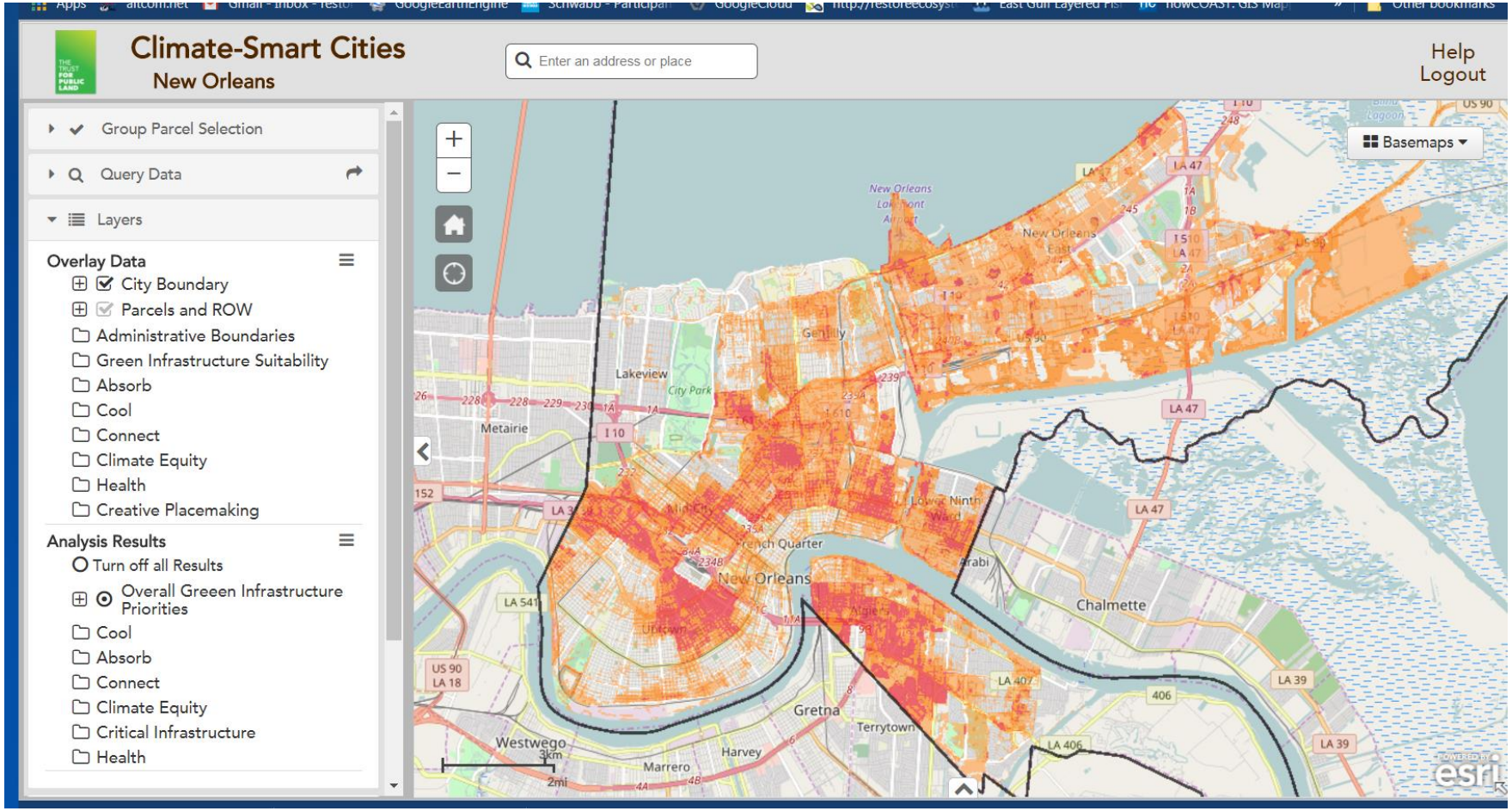


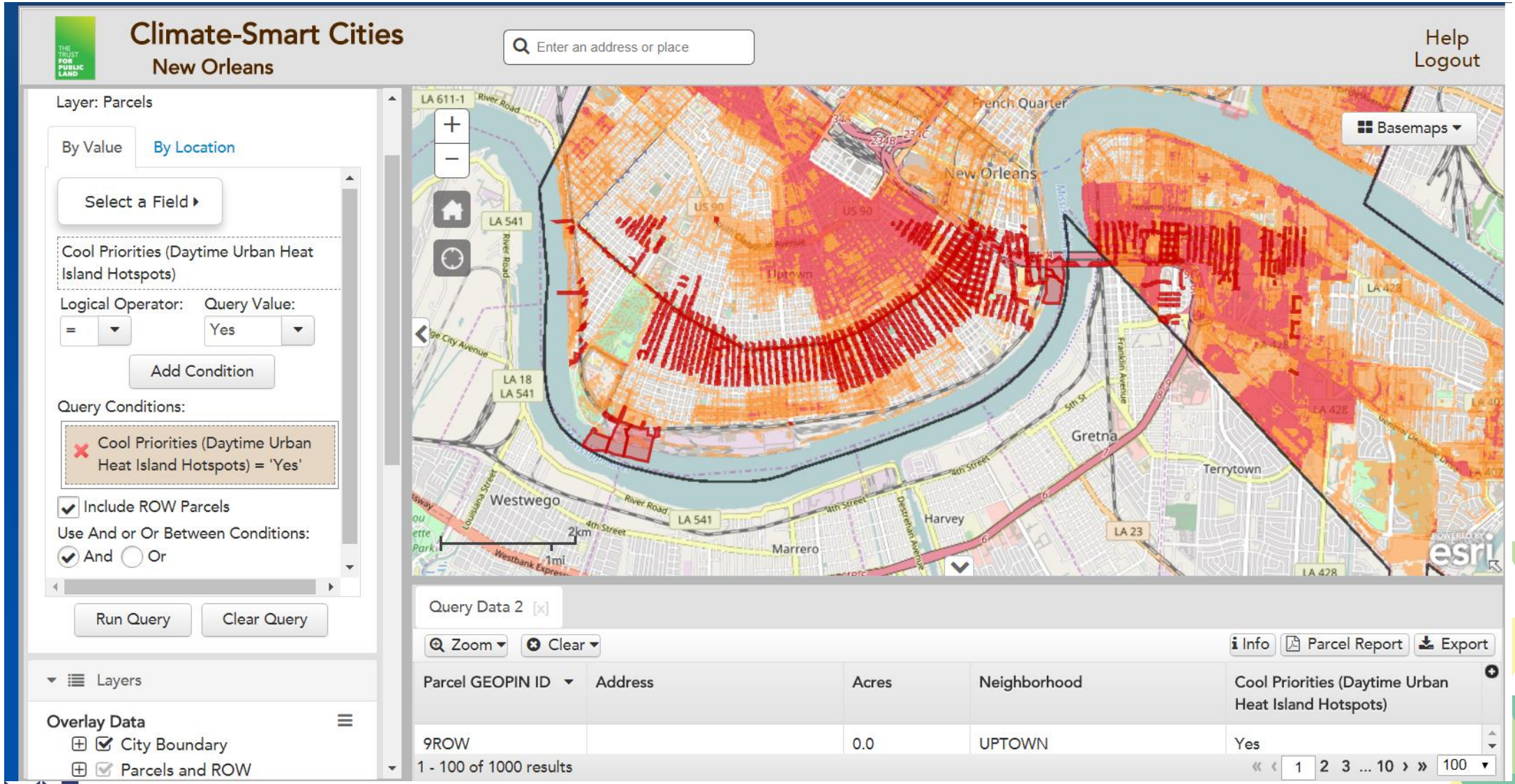
St Roch, New Orleans

Health Example : Climate Smart Cities



Source: Trust for Public Lands


Climate-Smart Cities
New Orleans
Enter an address or place
Help
Logout
Group Parcel Selection
Query Data
Layers
Overlay Data
City Boundary
Parcels and ROW
Administrative Boundaries
Green Infrastructure Suitability
Absorb
Cool
Connect
Climate Equity
Health
Creative Placemaking
Analysis Results
Turn off all Results
Overall Greeen Infrastructure Priorities
Cool
Absorb
Connect
Climate Equity
Critical Infrastructure
Health
Basemaps
Lakeview
Metairie
New Orleans
Chalmette
Gretna
Terrytown
Harvey
Marrero
Westwego
Lower Ninth Ward
French Quarter
LA 47
LA 39
LA 406
US 90
I 10
esri


Climate-Smart Cities
New Orleans
Enter an address or place
Help
Logout
Layer: Parcels
By Value
By Location
Select a Field
Cool Priorities (Daytime Urban Heat Island Hotspots)
Logical Operator:
=
Query Value:
Yes
Add Condition
Query Conditions:
Cool Priorities (Daytime Urban Heat Island Hotspots) = 'Yes'
Include ROW Parcels
Use And or Or Between Conditions:
And
Or
Run Query
Clear Query
Layers
Overlay Data
City Boundary
Parcels and ROW
Basemaps
French Quarter
New Orleans
Uptown
Gretna
Terrytown
Westwego
Harvey
Marrero
Query Data 2
Zoom
Clear
Info
Parcel Report
Export
Parcel GEOPIN ID
Address
Acres
Neighborhood
Cool Priorities (Daytime Urban Heat Island Hotspots)
9ROW
0.0
UPTOWN
Yes
1 - 100 of 1000 results
1
2
3
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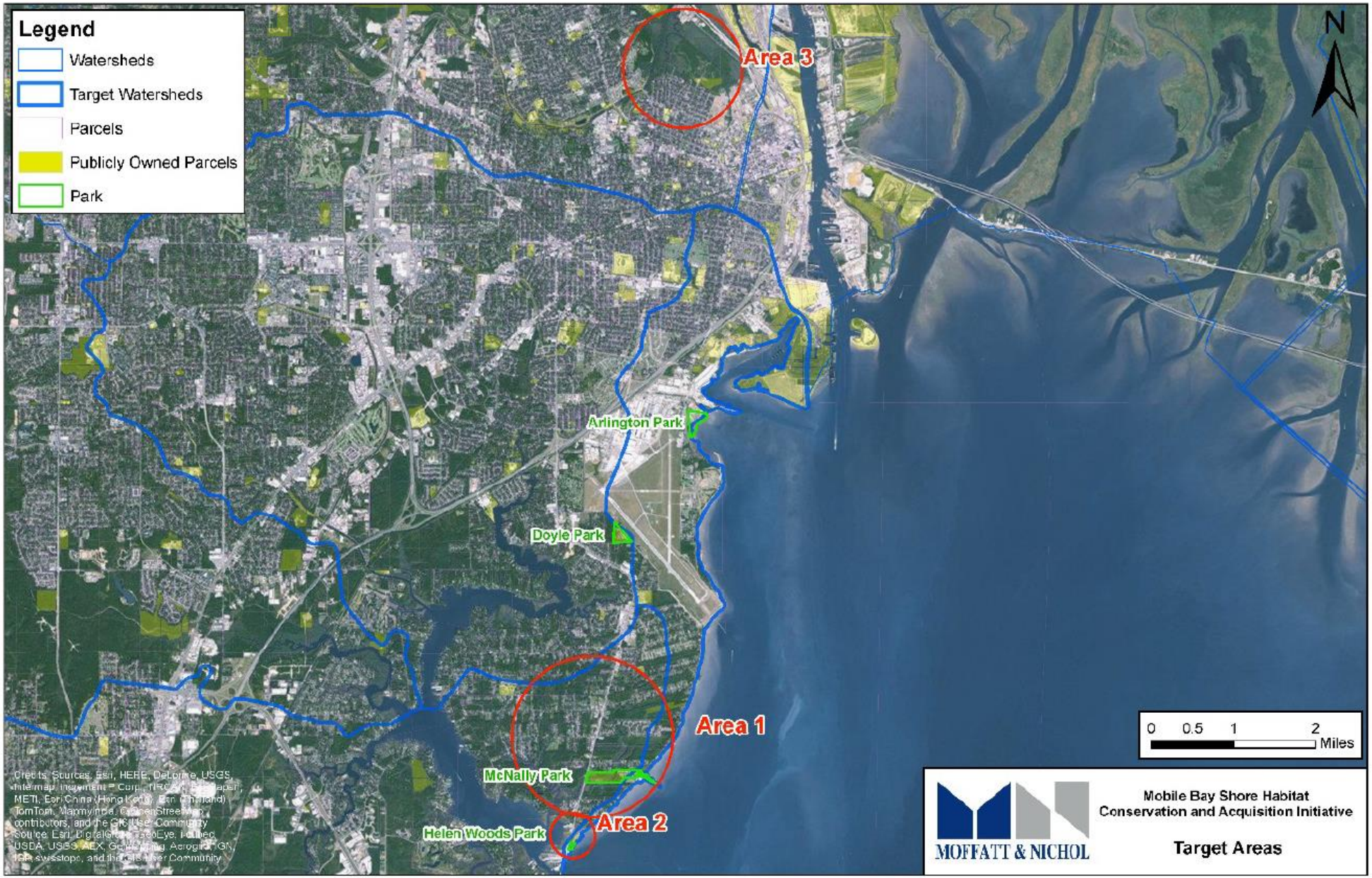
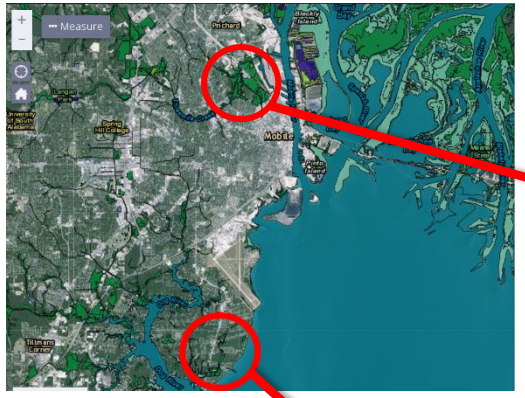
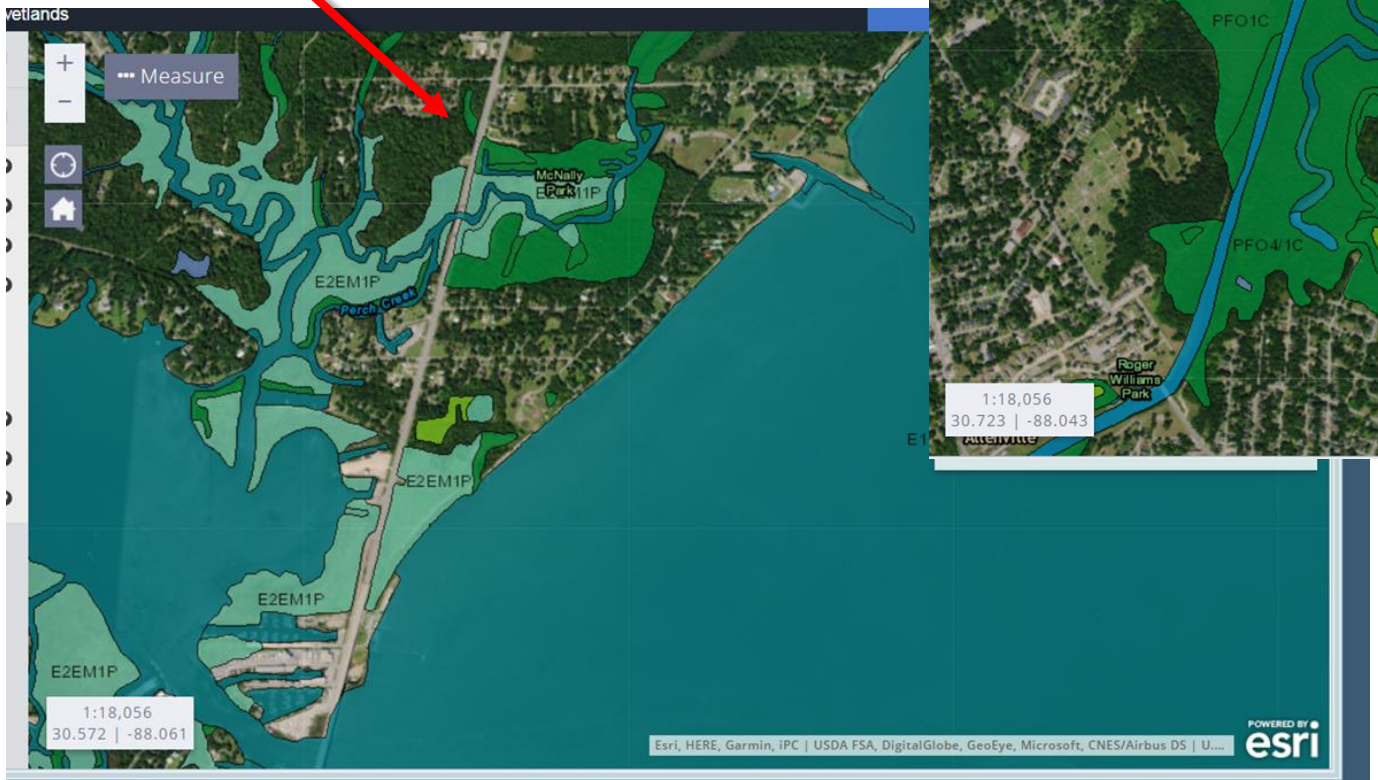
100


Legend
Watersheds
Target Watersheds
Parcels
Publicly Owned Parcels
Park
Area 3
Arlington Park
Doyle Park
Area 1
McNally Park
Area 2
Helen Woods Park
N
0 0.5 1 2
Miles
MOFFATT & NICHOL
Mobile Bay Shore Habitat
Conservation and Acquisition Initiative
Target Areas

City of Mobile – Connection to the Bay





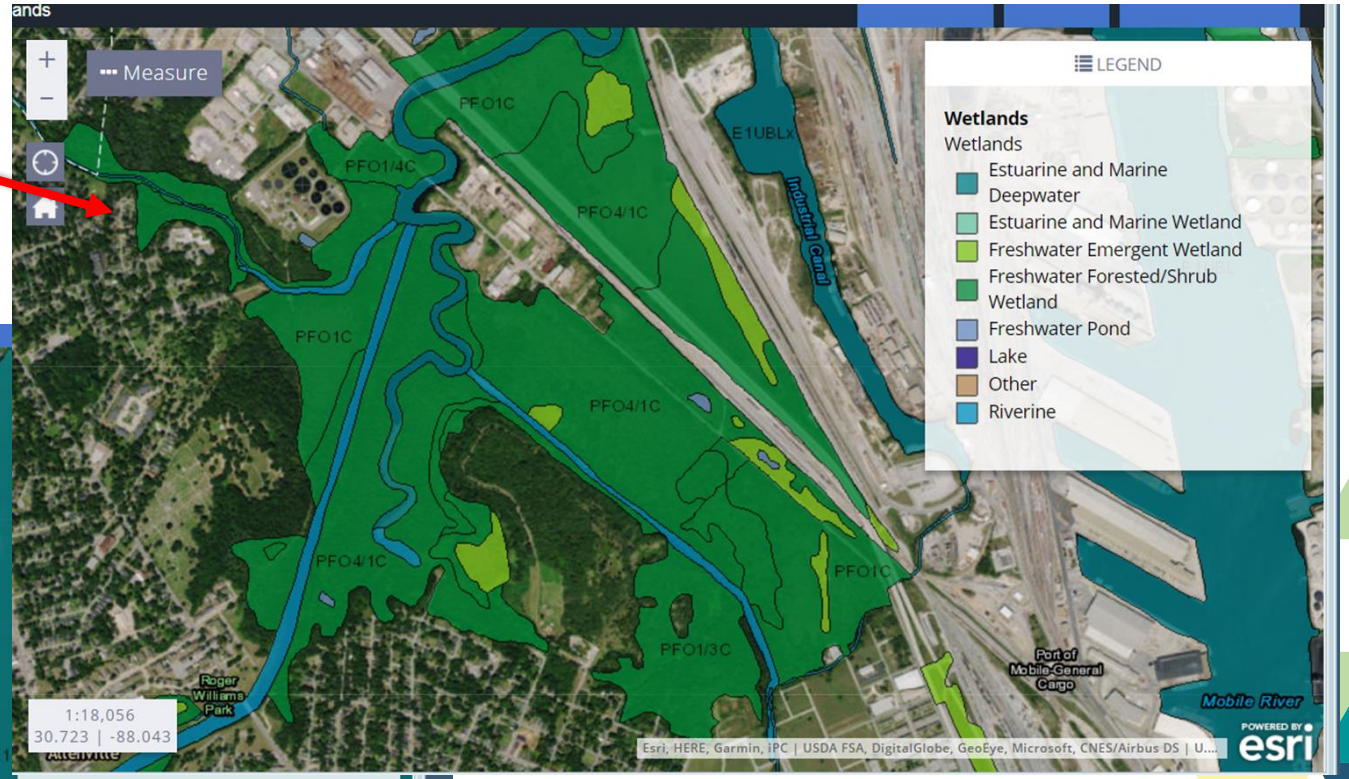


Table 1. Habitat types found in each area.

HABITAT TYPE	AREA 1 – Perch Creek Preserve	AREA 2 – Garrows Bend (Crepe Myrtle Trail Head)	AREA 3 – Three Mile Creek Conservation Area
Palustrine Forested Wetlands	x	x	x – Bottomland Hardwoods
Forested uplands	x	x	x
Scrub-shrub Wetlands	x		
Intertidal Salt Marsh	x		
Emergent Freshwater Marsh			x
Salt/Brackish Marsh		x	
Submerged Aquatic Vegetation (SAV)	x- Associated with Perch Creek, the dominant water feature.	x- Immediately adjacent to focal area. The dominant water feature is Mobile Bay.	x – Associated with Three Mile Creek, the dominant water feature
Sand beach		x	
Disturbed Uplands		x	

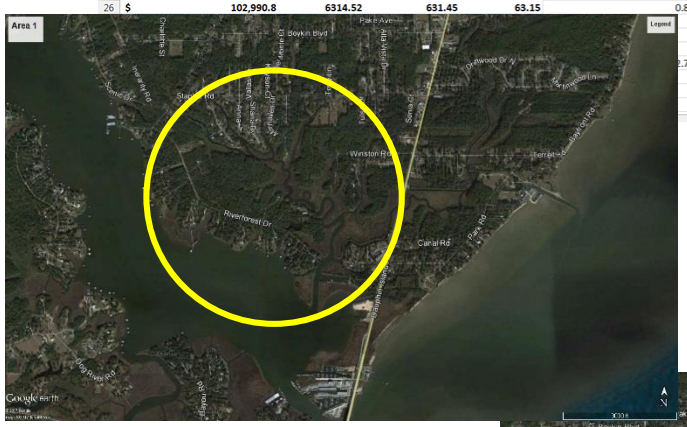
City of Mobile NFWF Conservation Grant

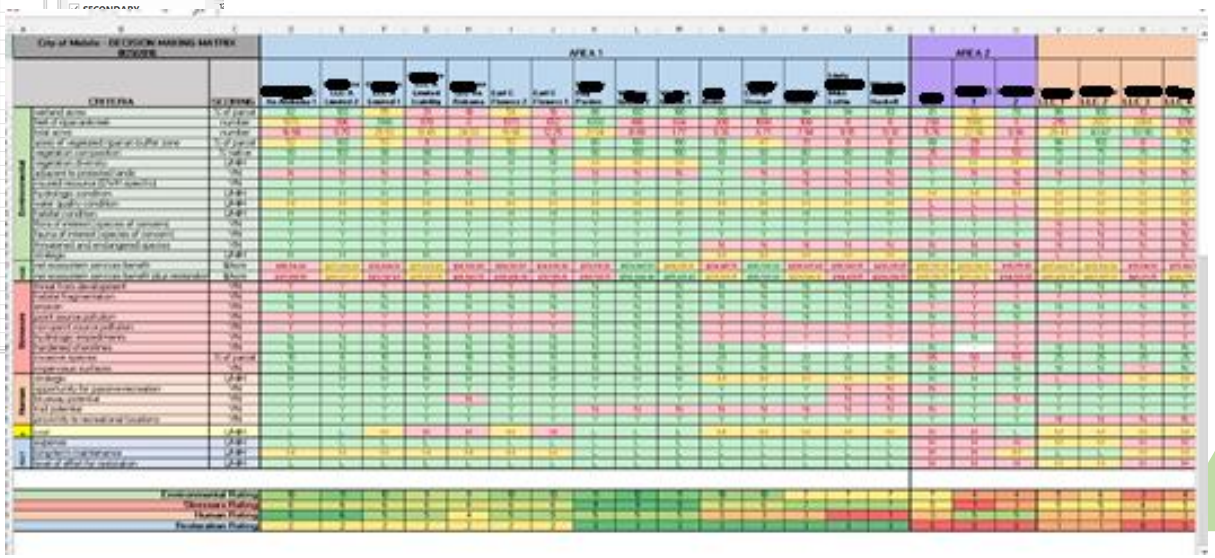
Sum of Baseline EcoServices Value	Sum of PRIMARY	Sum of SECONDARY	Sum of TERTIARY	
$ 1,800,421.2	123607.76	12360.78	1236.08	14.50%
$ -	0.00	0.00	0.00	
$ 1,800,421.2	123607.76	12360.78	1236.08	
$ 522,055.7	35454.77	3592.54	361.45	4.21%
$ -	0.00	0.00	0.00	
$ 512,173.2	35163.21	3516.32	351.63	
$ 9,882.4	291.56	76.22	9.82	
$ 238,340.4	16343.46	1634.35	163.43	1.92%
$ 288.0	0.00	0.00	0.00	
$ 238,052.4	16343.46	1634.35	163.43	
$ 17,325.3	210.57	55.04	7.09	0.14%
$ 10,188.0	0.00	0.00	0.00	
$ -	0.00	0.00	0.00	
$ 7,137.3	210.57	55.04	7.09	
$ 780,436.7	52414.64	5241.46	524.15	6.29%
$ 11,070.0	0.00	0.00	0.00	
$ 763,450.7	52414.64	5241.46	524.15	
$ 5,916.0	0.00	0.00	0.00	
$ 556,032.4	37916.41	3823.01	383.77	4.48%
$ -	0.00	0.00	0.00	
$ 549,444.1	37722.03	3772.20	377.22	
$ 6,588.3	194.37	50.81	6.54	
$ 102,990.8	6314.52	631.45	63.15	0.83%

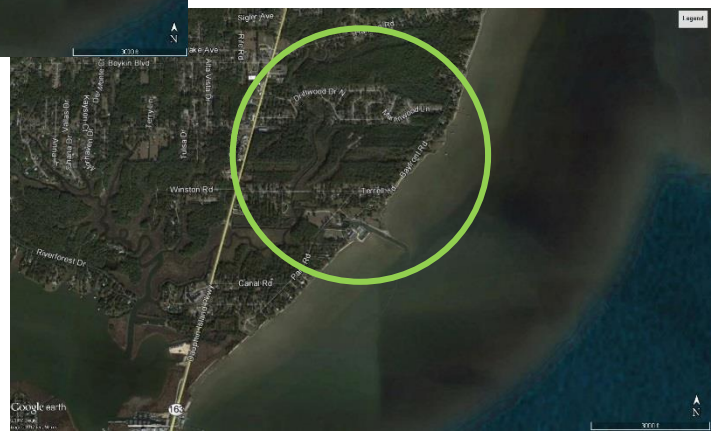
Row Labels	Sum of Habitat Acres	Sum of Baseline EcoServices Value
Forested Upland	60.02	$ 108,036.00
Forested Wetland	154.59	$ 9,293,058.91
Marsh	11.09	$ 432,510.00
Marsh Edge	1.01	$ 27,725.72
Uplands	15.01	$ 18,012.00
Grand Total	241.72	$ 9,879,342.62
Open water	23.12	

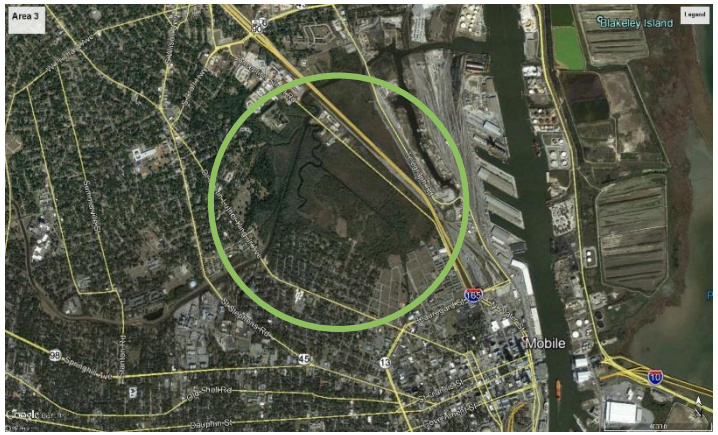
Choose fields to add to report:

- Parcel
- Habitat Type
- Habitat Acres
- PRIMARY









Map 3: Area 2 - Habitats and parcel numbers

Map 4. Project location map

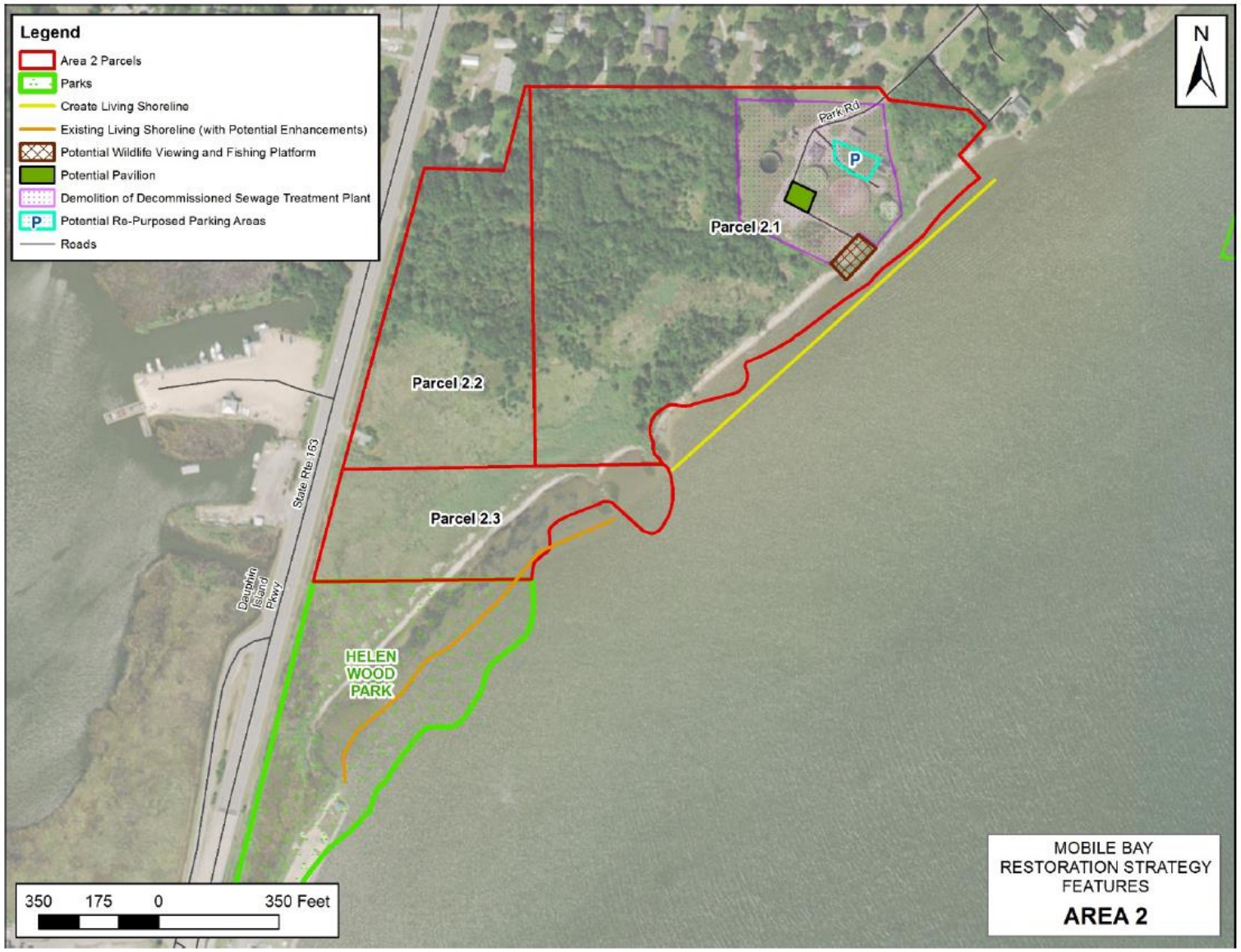


Table 10. Habitat Acreage for the Various Parcels considered for acquisition.

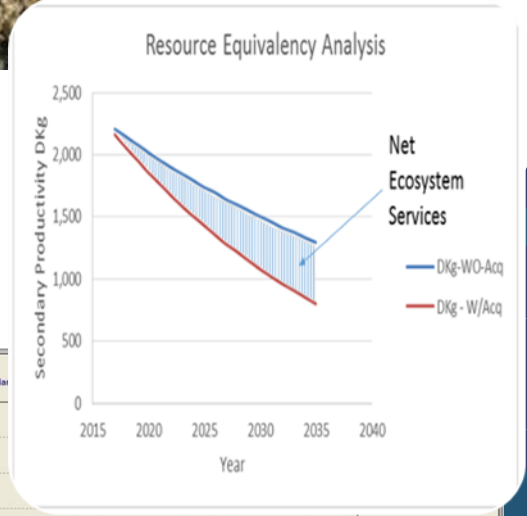
HABITAT	AREA 1 - Perch Creek	AREA 2 - MAWWS/USA	AREA 3 - Hickory Stree
	Acres	*Acres*	*Acres*
Beach Edge	0	14.05	0
Forested Upland	79.61	7.68	60.3
Forested Wetland	33.68	7.41	196.72
Marsh	60.37	14.18	11.09
Marsh Edge	26.09	0.99	22.72
SAV	0	0	0
Soft Estuarine Bottom	0	0	0
Upland	2.52	5.55	15.01
Grand Total	**202.27**	**49.86**	**305.84**

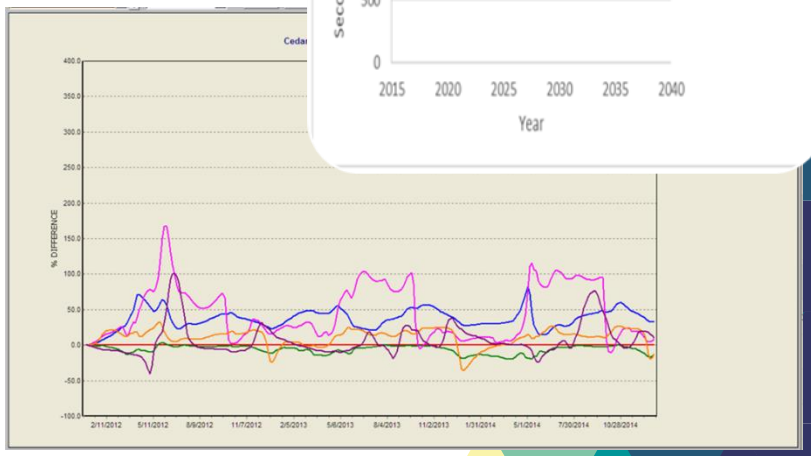
Table 5: Estimated net ecosystem services benefit 'with' and 'without project' as well as 'with project' plus implementation of some potential restoration strategies. Monetary value are based on negotiated prices for other similar NRDA Early Restoration Projects (no credit given for uplands as not negotiated in Early Restoration process).

AREA 1 - Perch Creek Parcels						
Habitats	Resource Credits	Scenarios			Net Ecosystem Services Benefit $ Value – Acquisition	Net Ecosystem Service Benefit $ Value – Acquisition + Restoration
		Without Project	With Project	With Project + Restoration		
Aquatic Habitats (Dkg)	Primary Production	11,587,490	15,039,615	15,384,827	$4,142,550	$4,556,805
	Secondary Production	802,995	1,042,222	1,066,145	$2,870,724	$3,157,796
	Tertiary Production	138,789	180,137	184,272	$4,961,744	$5,457,919
TOTAL					$11,975,018.00	$13,172,520.00
Marsh (DSAY)		810	1,051	1,075	$9,410,504	$10,351,555
Forested Upland(DSAY)		909	1,386	1,418	$859,129	$916,405
Forested Wetland (DSAY)		452	586	600	$8,092,353	$8,901,588
Upland (DSAY)		29	44	45	$18,130	$19,339
TOTAL					$18,380,116.00	$20,188,887.00
					$30,355,135	$33,361,407

Conclusions

- Improving Ecosystem Service benefits promote Ecosystem Sustainability- enhancing economic benefits
- NET ECOSYSTEM SERVICE BENEFIT from restoration projects in the Urban Landscape
  - Healthy Environment – good for Bay; Good for City
  - Water Quality Benefits
  - Enhanced Ecosystem Services increase Mobile Bay productivity, providing for numerous provisioning, regulating and cultural benefits
  - Demonstrates monetary gains from projects, based on DWH values





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National Fish and Wildlife Foundation GEBF Program
and the City of Mobile

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