Bank On It
Mitigation and the Restoration of Ecosystem Services to Urbanizing Watersheds

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June 7, 2012

Brown AND Caldwell

Ecosystem Banking

- One avenue toward restoring and maintaining ecosystem services in urbanizing watersheds is to develop, or encourage the development of, ecosystem banks.
- Many factors must be considered to successfully use such projects for restoring ecosystem services to watersheds.
  1. bank planning *(is there a market with room for a new bank? etc.),*
  2. ecosystem services/natural resource assessment *(are there watershed restoration plans in place or needed to guide bank site selection? etc.),*
  3. ecosystem restoration *(which sites are well placed in the watershed and technically feasible to restore? etc.)*, and
  4. regulatory factors *(what regional regulatory requirements exist and can they be met? etc.)*.

Watersheds are getting a lot of attention

- Watershed Approach
  - Wetlands Mitigation – Sec. 404 Clean Water Act (CWA)
  - Stream Mitigation – Sec. 404 CWA
- Water Quality & Nutrients – Sec. 402 CWA
- Integrated Watershed Approach
  - NPDES Permitting
  - Wastewater Permitting
- Overlaps with watersheds
  - Species – Sec.s 7 & 10 Endangered Species Act
    - Aquatic – watershed-based
    - Non-Aquatic – habitat based (not watershed-specific)

Trends in the world's ecosystem services over past 50 years (WRI)

	Degraded	Mixed	Enhanced
Provisioning	• Capture fisheries • Wild foods • Biomass fuel • Freshwater • Genetic resources • Biochemicals, natural medicines, and pharmaceuticals	• Timber and other wood fiber • Other fibers (e.g., cotton, hemp, silk)	• Crops • Livestock • Aquaculture
Regulating	• Air quality regulation • Regional and local climate regulation • Erosion regulation • Water purification and waste treatment • Pest regulation • Pollination • Natural hazard regulation	• Water regulation • Disease regulation	• Global climate regulation (carbon sequestration)
Cultural	• Ethical values (spiritual, religious) • Aesthetic values	• Recreation and ecotourism	

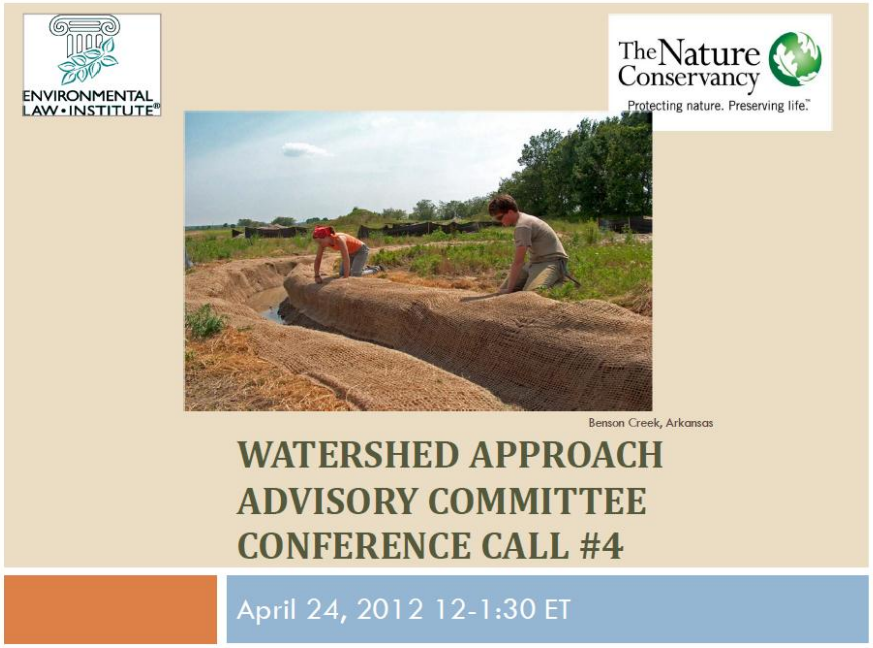
Source: Adapted by WRI in Corporate Ecosystem Services Review from the Millennium Ecosystem Assessment. 2005. *Ecosystems and Human Well-being: Synthesis.* Washington, DC: Island Press.

Ecosystem Services and Watersheds

ES Type	Ecosystem Service (Selected)
Provisioning	• Capture fisheries • Wild foods • Freshwater • Timber and other wood fiber • Other fibers (e.g., cotton, hemp, silk) • Crops • Livestock • Aquaculture
Regulating	• Regional and local climate regulation • Erosion regulation • Water purification and waste treatment • Pollination • Water regulation • Disease regulation • Natural hazard regulation • Global climate regulation (carbon sequestration)
Cultural	• Ethical values (spiritual, religious) • Recreation and ecotourism • Aesthetic values

EPA-funded Watershed Approach Project for Section 404 projects

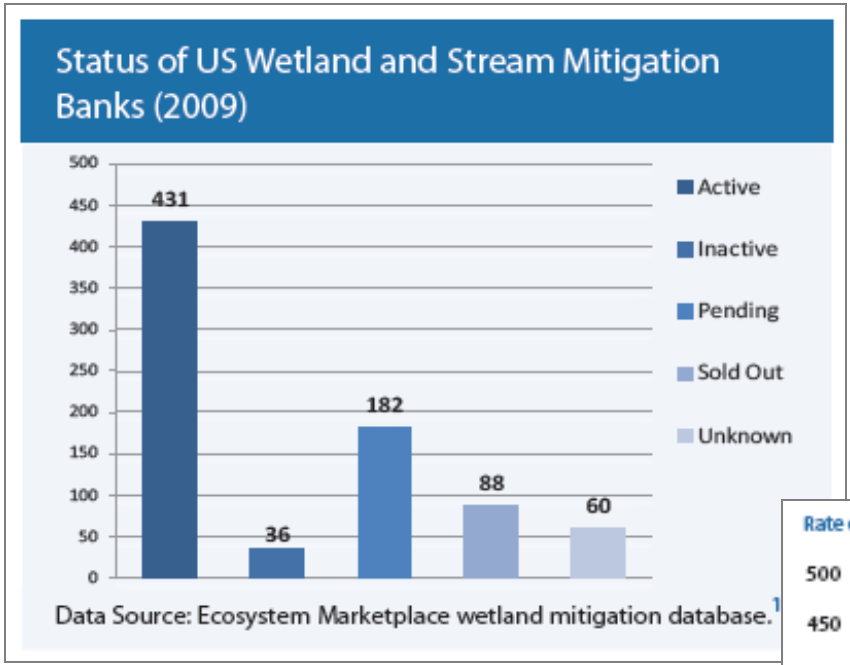
- Watershed needs identified in existing plans, reports, or analyses, such as:
  - CWA 303(d)/305(b) reports and related TMDLs
  - CWA 319 watershed plans
  - USACE Watershed Assessments/Plans
  - CZMA Coastal Zone Management Plans/Measures
  - State Wildlife Action Plans/Comprehensive Wildlife Conservation Strategies
  - State and local flood management and flood hazard mitigation plans

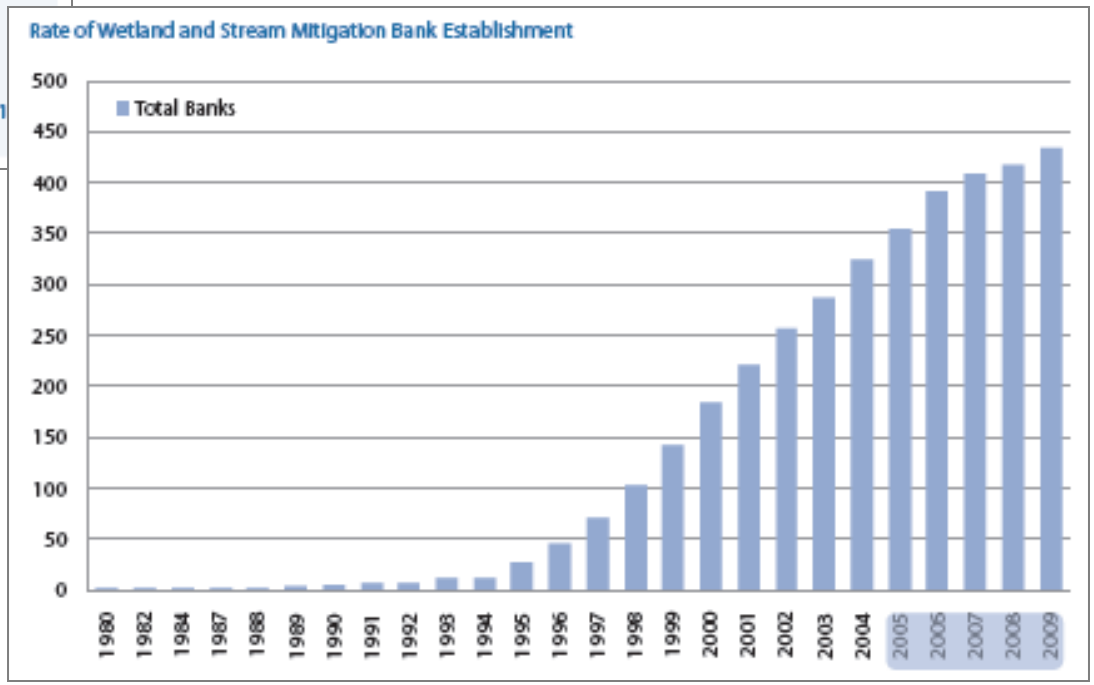


Ecosystem Banking

- **Authorized by different programs**
- Viable credit markets –
  - Wetlands – Sec. 404 Clean Water Act (CWA)
  - Stream – Sec. 404 CWA
  - Species – Sec.s 7 & 10 Endangered Species Act
  - Water Quality & Nutrients – Sec. 402 CWA
- **Need to be spatially separate**
- Hierarchy:
  - **Banks**
  - **In-lieu-fees**
  - **Permittee-Responsible w/a Watershed Approach**
  - Permittee-Responsible on-site &/or in-kind
  - Permittee-Responsible off-site &/or out-of-kind

Status of Wetland & Stream Banks

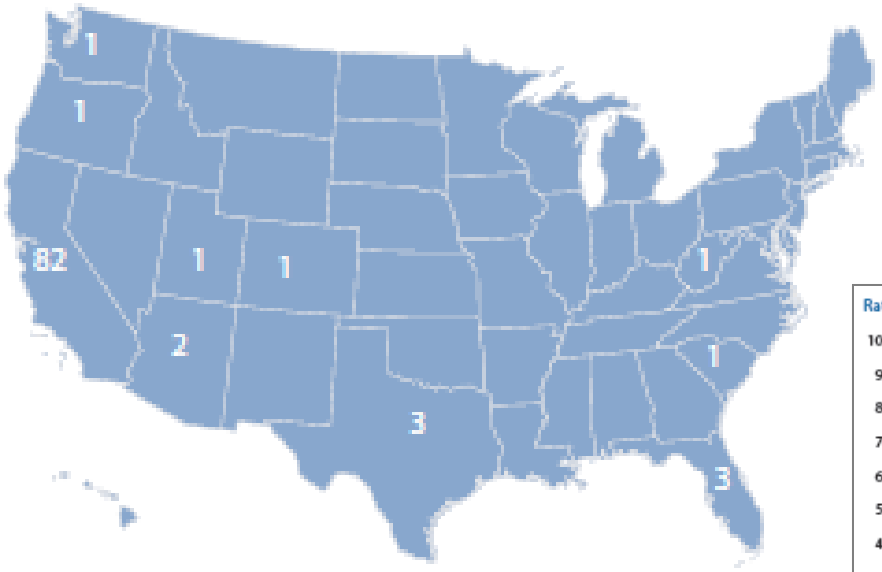




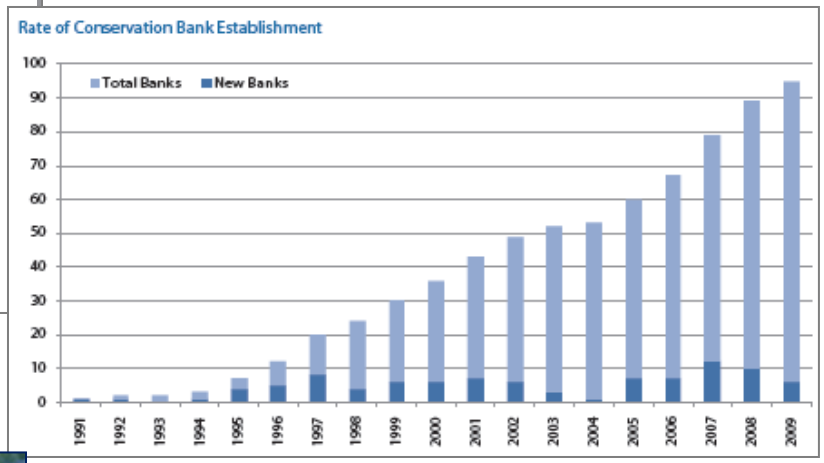
from Ecosystem Marketplace 2010

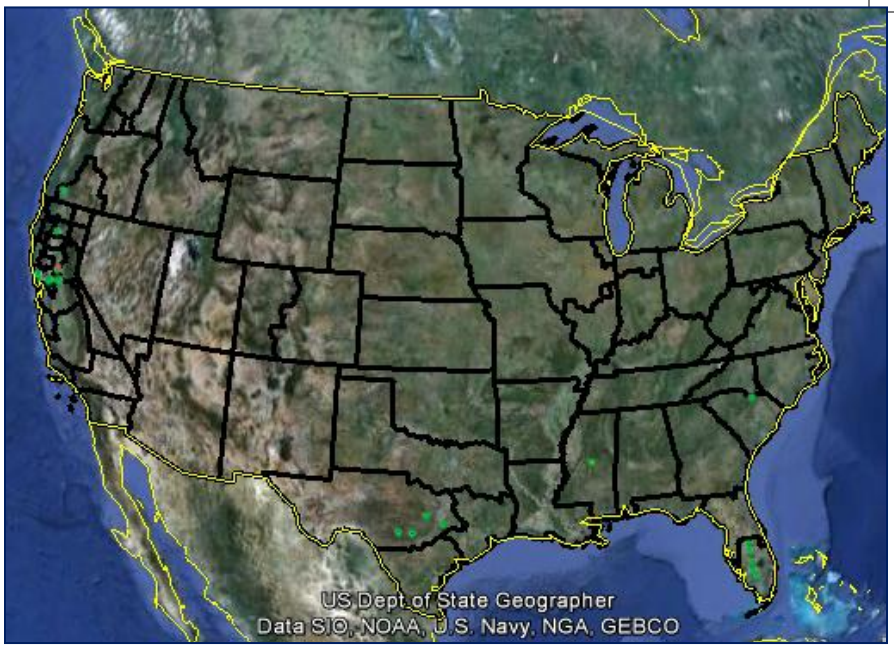
Species Banks Status

- Operates under a USFWS Guidance Memo



Ecosystem Marketplace 2010



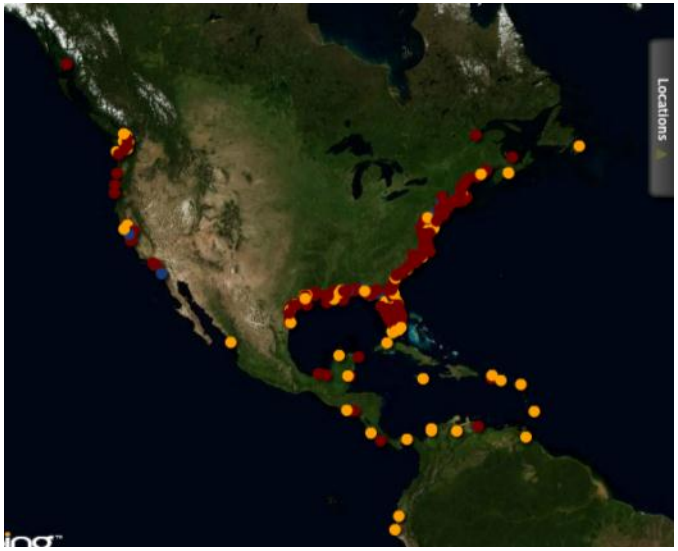


RIBITS – May 31,2012

- 26 “species” active conservation banks nationwide
  - 6 in FL – panther, various
  - 15 in CA – various
  - 4 in TX

WQ Markets – some details

- Mechanisms
  - Sales of credits
  - Bartering
  - Cooperative allocations
- Credits
  - Based on pounds of reduction
- Transactions are Within-Watershed
- Credits typically generated by:
  - point source over-controlling its discharge or
  - nonpoint source installing BMPs beyond its baseline.



Graphic courtesy of WRI

http://www.wri.org/project/eutrophication/map

What's needed for an ecosystem bank

- A market
  - Regulatory Drivers
  - Buyers
- A willing landowner
  - To allow this permanent, restrictive land use change
- A long term manager
  - To ensure the project's benefits continue
- Financial backing to get up and running
  - Implementation expenses
  - An endowment may need to be set aside
- An understanding of the regulatory underpinnings

Ecosystem Banking

- Factors
  1. bank planning (is there a market with room for a new bank? etc.)
  2. natural resource assessment (are there watershed restoration plans in place or needed to guide bank site selection?)
  3. ecosystem restoration (which sites are well placed in the watershed and technically feasible to restore? etc.)
  4. regulatory factors (what regional regulatory requirements exist and can they be met? etc.)
- Who needs them (*just you? others?*)
- Are there banks now?
- With the right types of credits?
- Are there new or nearly sold out?

Credit Users / Buyers

Developers

Responsible Parties

Power Companies

Public Works Projects

Public Agencies

Department of Interior (NRD Trust Funds)

DOT's

Pipelines

School Boards

Municipalities

Industry

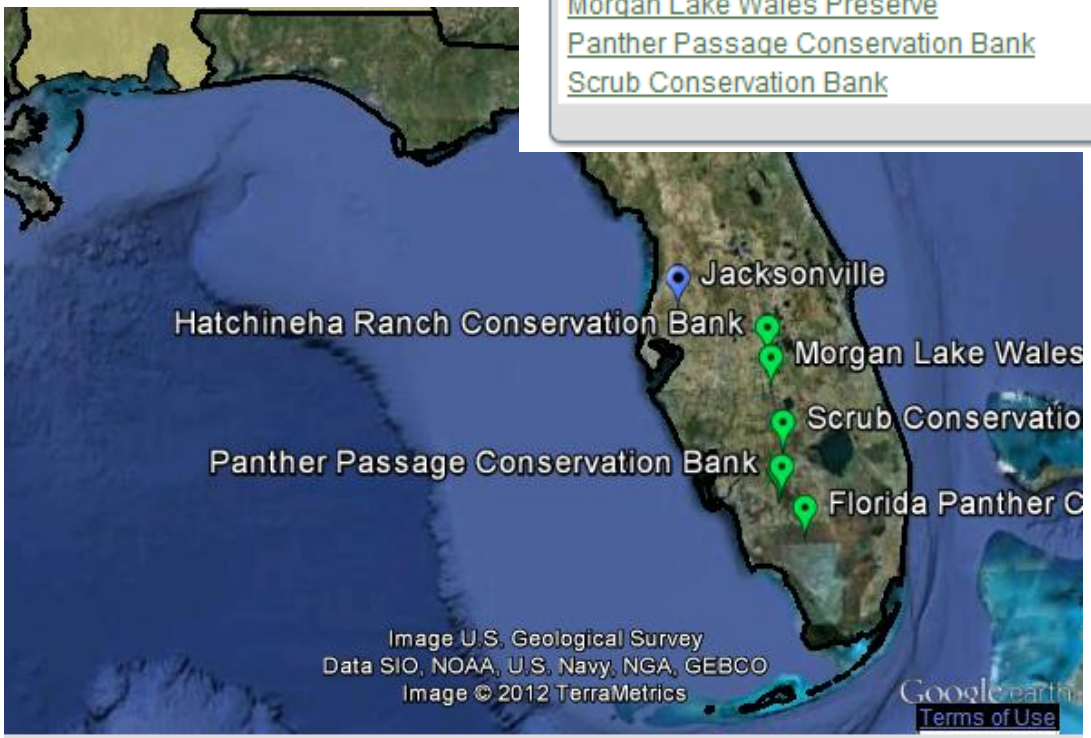
ANYONE who needs to offset or balance their impacts

Federally Approved Species Banks - Florida

Map Results

6 banks in USACE District of Jacksonville including single clients with Species credit type

Bank Name	District	Status
Florida Panther Conservation Bank	Jacksonville	Approved
Florida Panther Conservation Bank II	Jacksonville	Approved
Hatchineha Ranch Conservation Bank	Jacksonville	Approved
Morgan Lake Wales Preserve	Jacksonville	Approved
Panther Passage Conservation Bank	Jacksonville	Approved
Scrub Conservation Bank	Jacksonville	Approved



from National RIBITS database

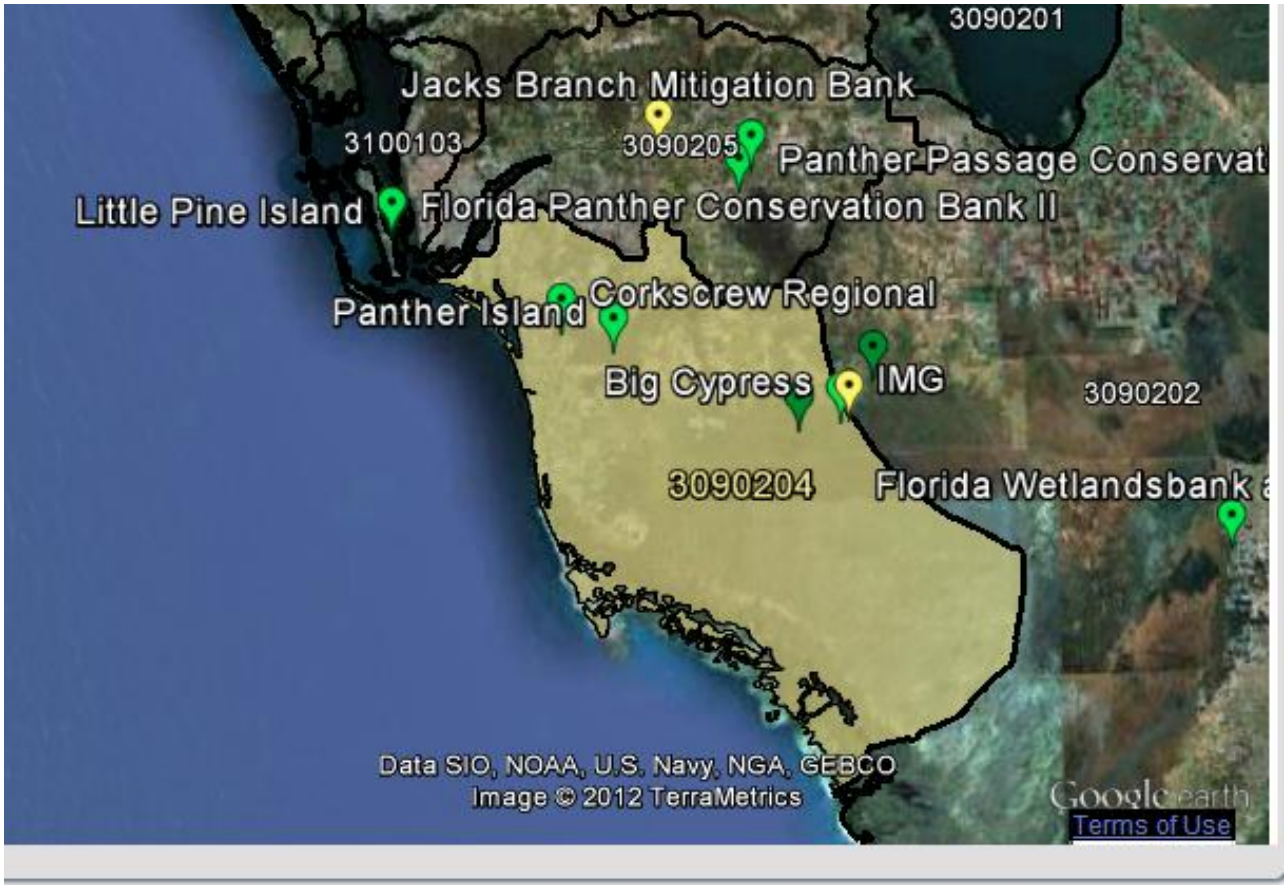
https://rsgis.crrel.usace.army.mil/ribits

Federally Approved Wetland Banks - Florida

- 57 federally approved banks
- 8 pending

RIBITS, May 31, 2012

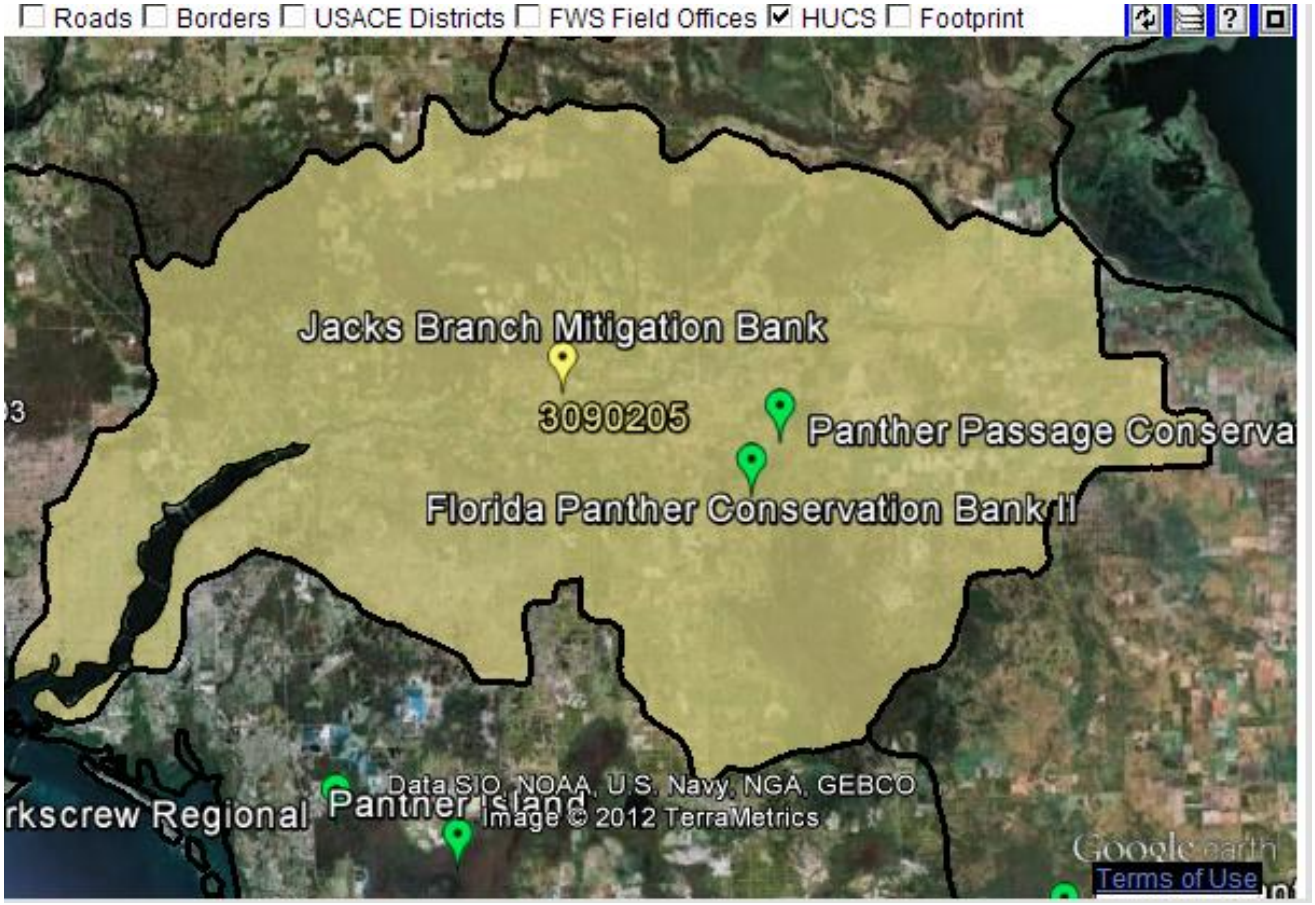
Species and Wetland Banks – by Watershed



- HUC 03090204-
  - 3 wetland banks approved, 1 pending
  - No species banks

RIBITS, May 31, 2012

Species and Wetland Banks – by Watershed



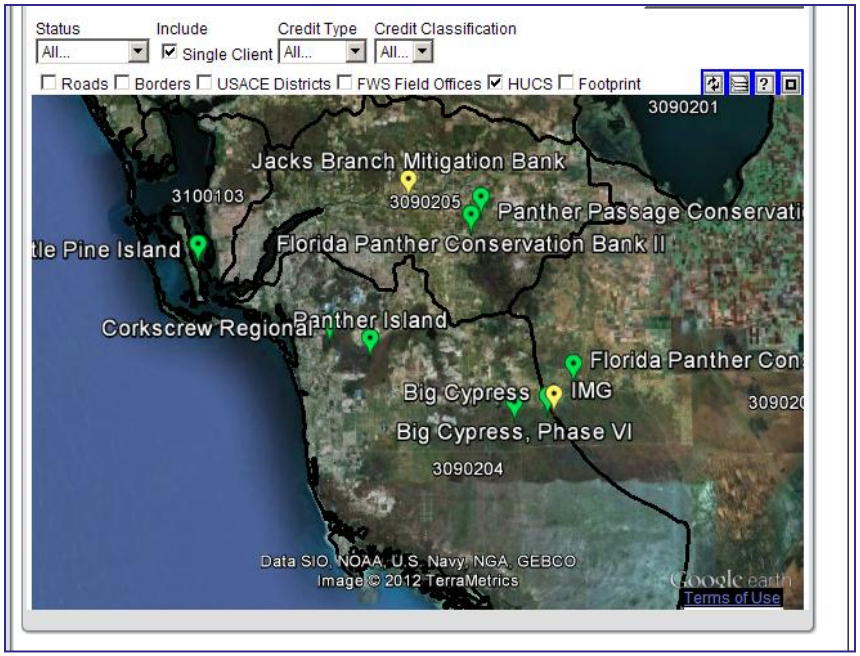
- HUC 03090205-
  - 1 wetland banks pending
  - 2 species banks approved

RIBITS, May 31, 2012

Deciding on Banking

- Do you have permitting issues that require mitigation?
- Can you characterize them by type?
- Do the banks supply them? Are there enough? Are they affordable?
- These watersheds have:
  - HUC 03090204 has Palustrine credits available
  - HUC 03100103 has Palustrine & Estuarine credits available
  - HUC 03090205 has pending wetland credits, plus panther and wood stork credits available

From RIBITS



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All watershed studies have to start somewhere

- What are the over-riding ecosystem services issues?
  - Loss of flood storage?
  - Habitat corridors?
  - Fishery reductions?
  - Pollinator losses?
  - Poor water quality?
  - Flashy runoff due to impervious surfaces
  - Channelized stream corridors
  - Lack of open space
  - Nutrients -> water quality degradation
  - Low biodiversity
  - Safe outdoor spaces
  - *Etc. .....*

Why a Watershed Scale Approach?

- Not all sites are equally suitable
- Per Bedford (1999), a mitigation program would achieve greater short- and long-term results by looking at each permitting decision over a broader space and longer time period.
  - i.e., modifying the boundaries of permit decision-making in time & space.
- Magee et al. (1999) found that both natural and mitigation wetlands in Portland, Oregon had been degraded due to hydroperiod alteration and land use changes in rapidly urbanizing areas.

Corkscrew Regional Ecosystem Watershed (CREW)

- Watershed divides had been cut through to send water to the gulf MORE quickly (*i.e.* – to drain lands). Result:
  - Drained lands
  - Flashy runoff
  - Freshwater starvation in western Everglades & Fakahatchee Strand
  - Flooding to the west
  - Habitat corridor shifts
  - Altered freshwater flows to Florida Bay
- Long Term plan made to restore historic flow patterns & processes

Watershed Approach @ CREW

- Two wetland mitigation banks
  - 1 private
  - 1 public
- Audubon's Corkscrew Swamp Sanctuary
- South Florida Water Management District land acquisition
- State of Florida land acquisition
- Local land trust land acquisition

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Watershed–Level WI Study by TNC & ELI

- Water quality objectives to be met via wetland restoration
- Map current functioning wetlands
- **Use GIS to assess low functioning or non-functioning (former) wetlands**

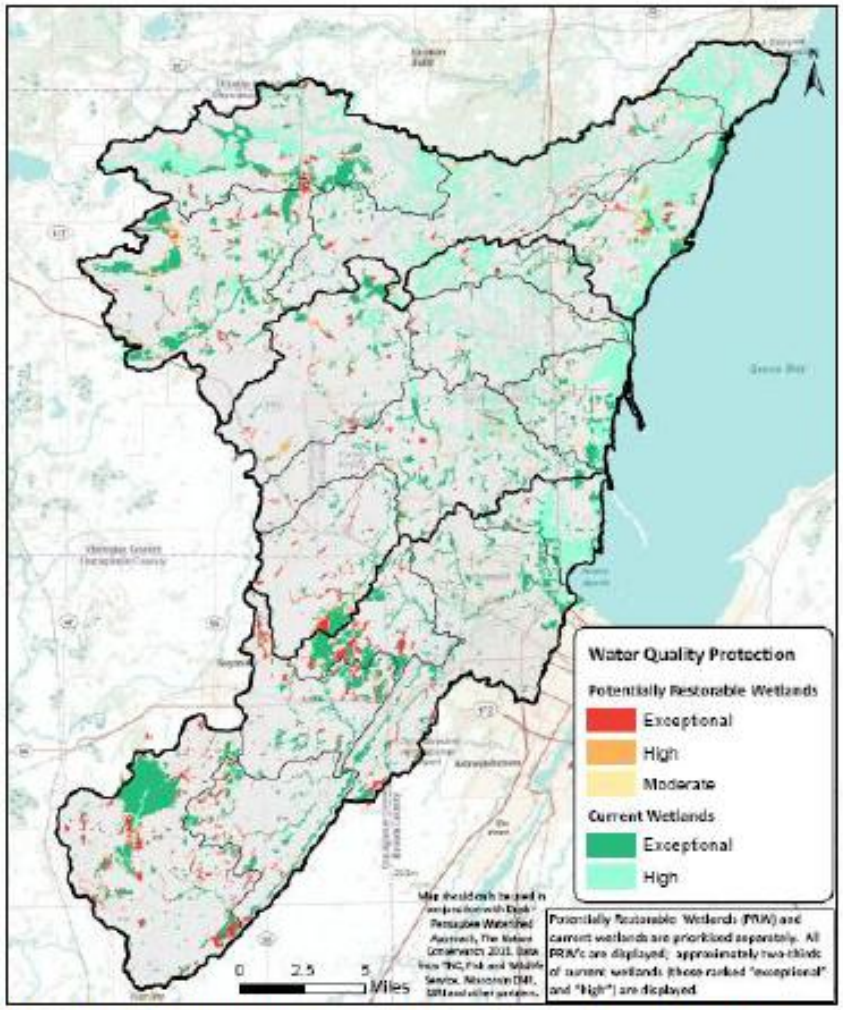


Figure 3: Water quality suitability analysis based on WET, TNC-ELI Duck-Pensaukee, WI watershed approach pilot

Potentially restorable wetlands - WI

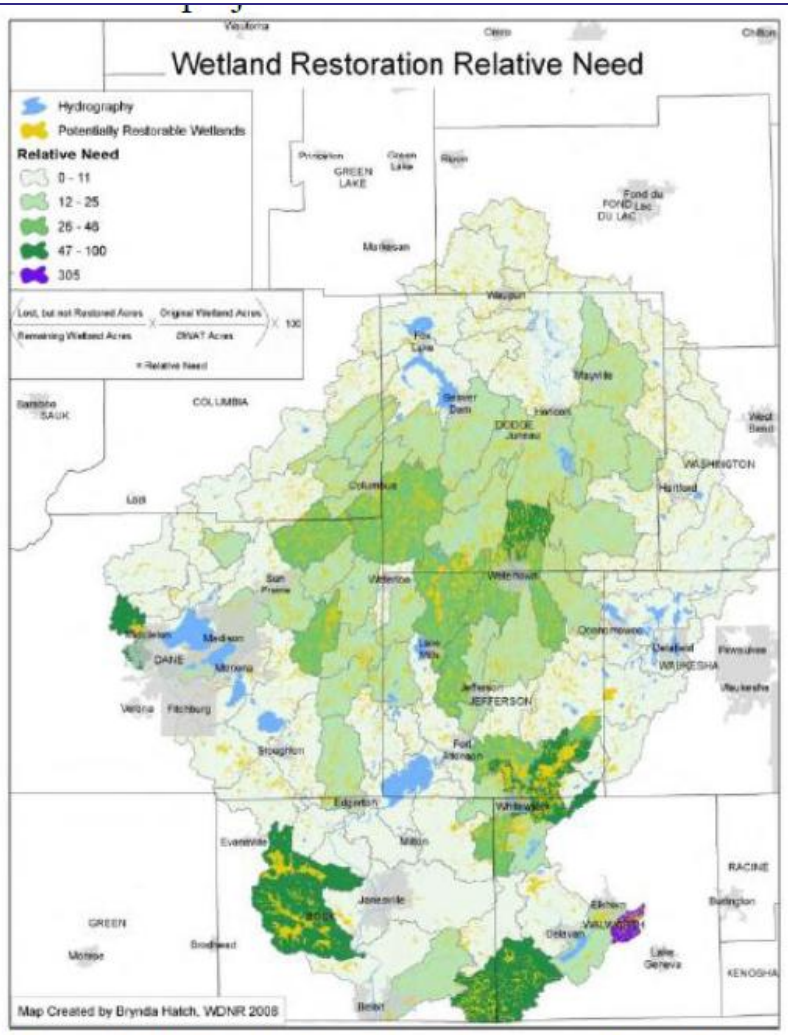


Figure 1: Wetland restoration relative need by subbasin in the Rock River watershed, WI

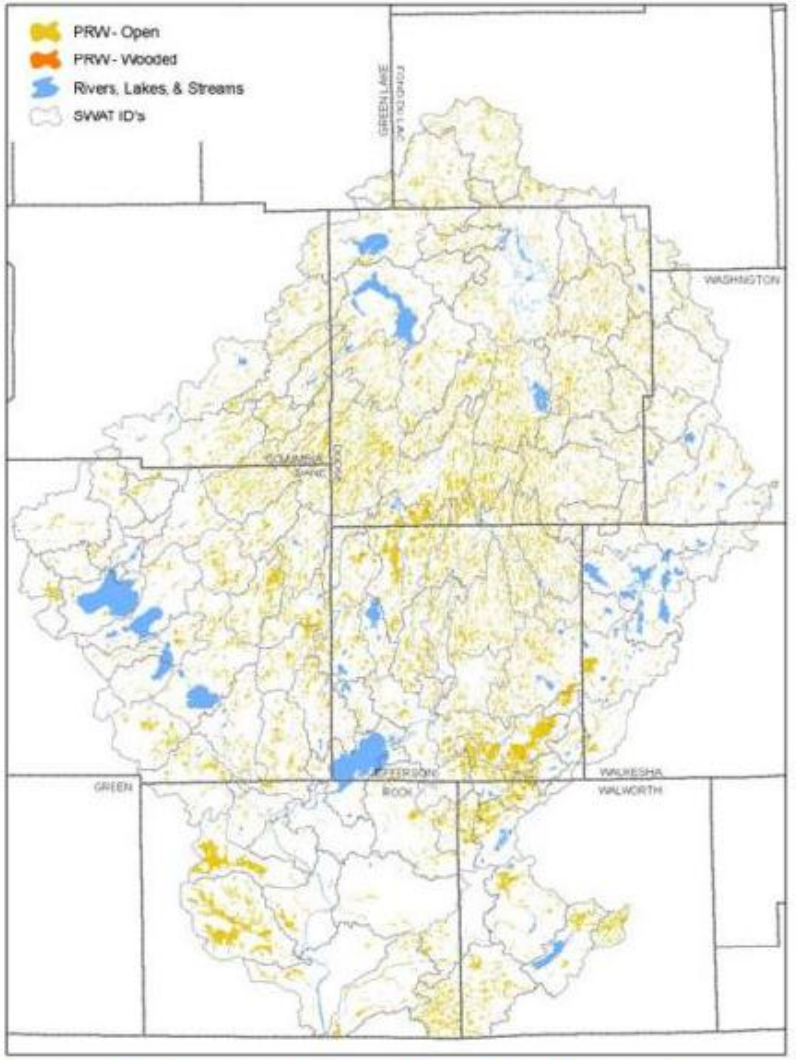


Figure 3: PRW map, Rock River Basin, Wisconsin

http://dnr.wi.gov/topic/Wetlands/strategy.html

Aquifer-based watershed

Can relate to recharge activities and surface restoration

Meets multiple goals

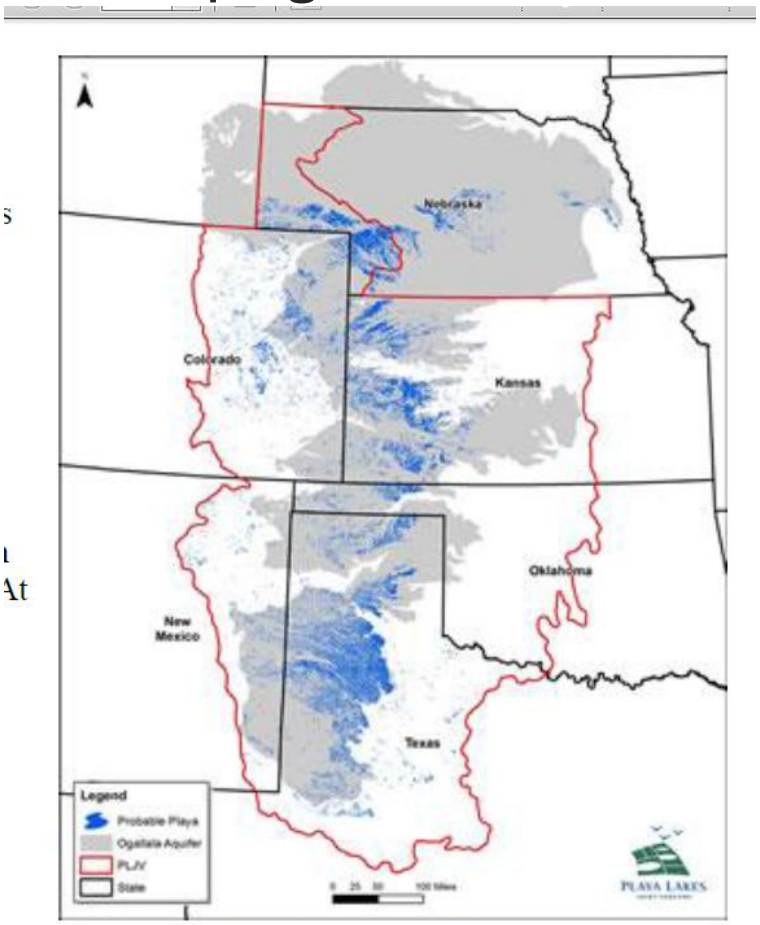
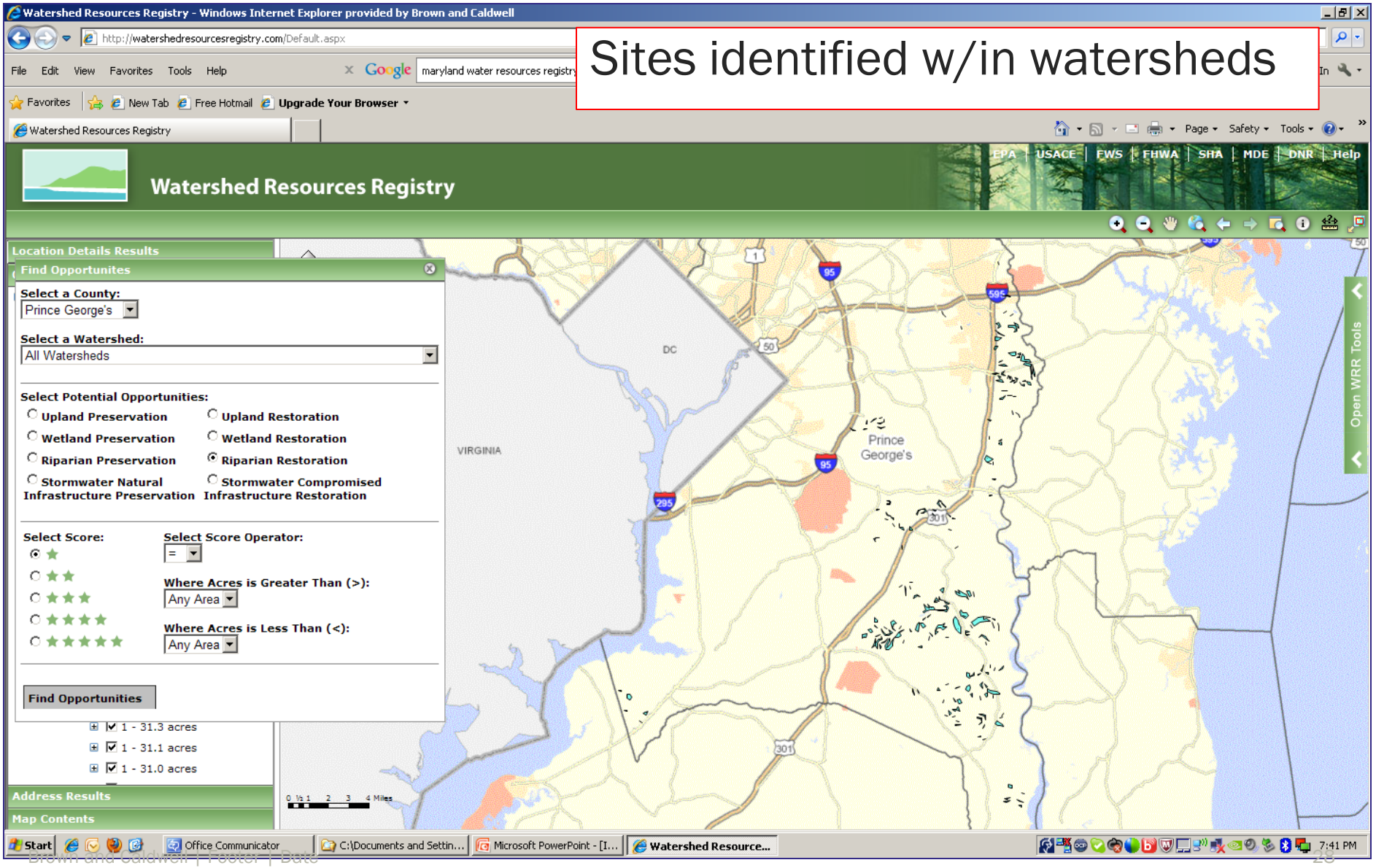


Figure 2: Probable playas in Ogallalla Aquifer region, Playa Lakes Joint Venture

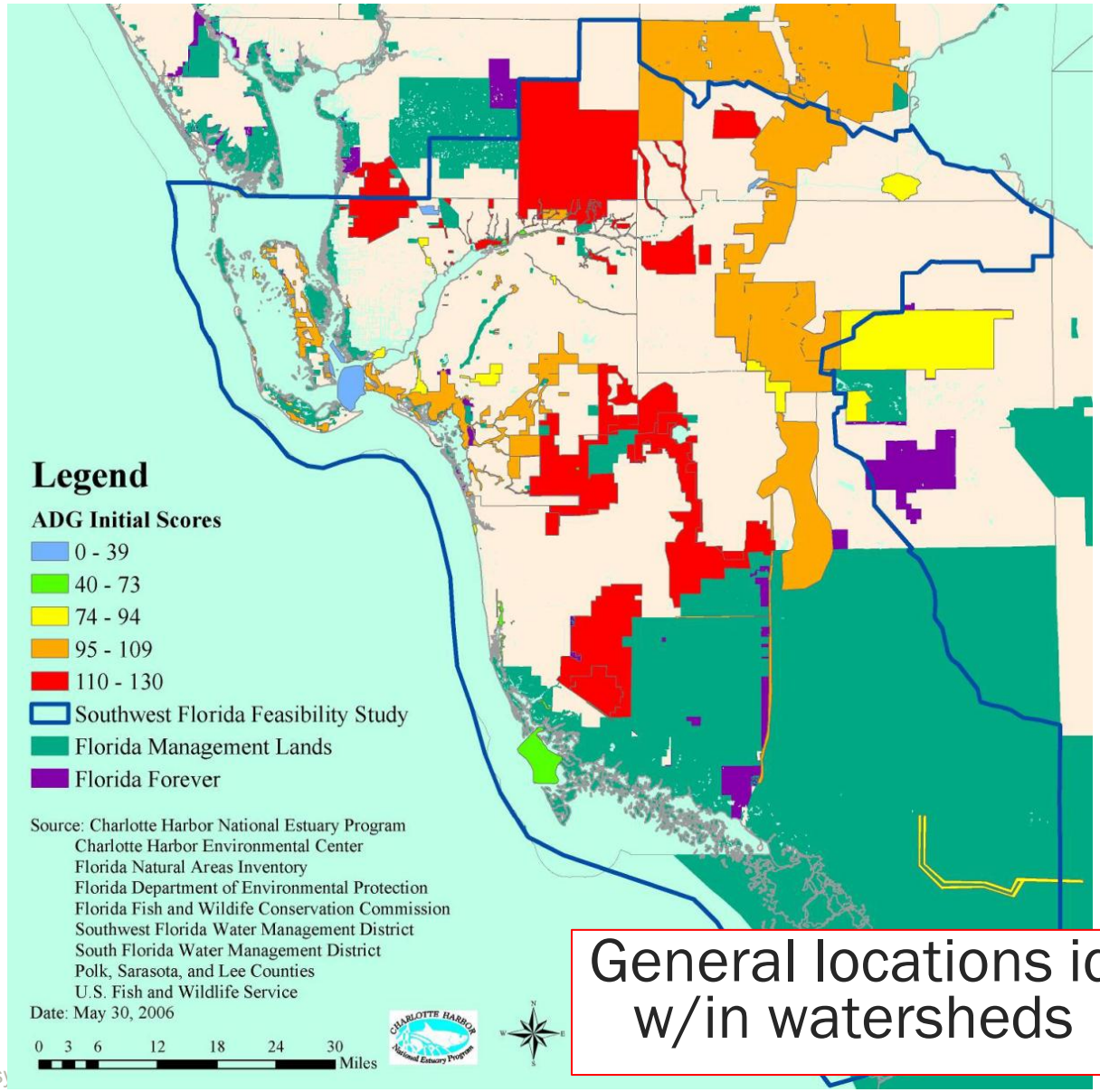
General locations identified

http://www.pljv.org/

Maryland Water Resources Registry



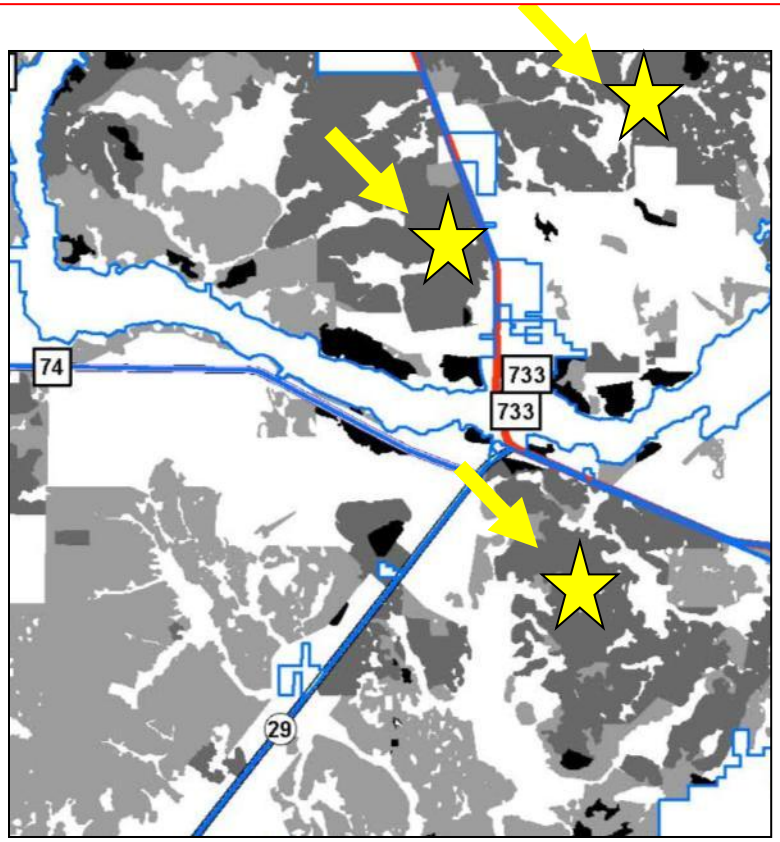
CREW - Regional Restoration Group Scoring



General locations identified w/in watersheds

Gopher Tortoise Species Model

General locations identified



- Use GIS and field verification to assess best sites
- Verify future land use needs for site, then designate

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  4. regulatory factors (what regional regulatory requirements exist and can they be met? etc.)

- *And*

Does it make sense for you?

Should You pursue an ecosystem bank?

1. Assess land assets for potential credit generation
2. Can site be managed as intended in perpetuity?
3. Will ongoing bank area management be compatible with existing and likely future land uses?
4. Need to assess the “Value” of the proposed bank using ecosystem services.
5. What does the revenue and expense analysis indicate?
   a. Can the most significant expense factors be adjusted?
   b. How certain is the revenue stream? Its timing?
   c. Time to sell the credit inventory in relation to expenses?
6. Would it address watershed & ecosystem services objectives?

Questions?

Brown AND Caldwell