

Intro to Ecological Offsets- March 2024

res
Restoring a resilient earth
for a modern world

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Agenda

- What happened to our watersheds (leading to all these crazy regulations)?
- Overview of Ecological Offsets (vs. "Mitigation")
  - Market-based, generating offset products, at large scale
- Wetland/Stream Mitigation
  - Project Examples & Results
- Endangered Species Mitigation
- Water Quality/Stormwater Offsets
- Corporate Social Responsibility (CSR or ESG) Offsets
- Who is RES is how do we generate offsets
  - "Full-delivery", "Turnkey", "Performance-based" terminology
- How we work with AEC firms

Why are we here again?

- Since European settlement of North America, thru the development of the United States, **we have 're-plumbed' our watersheds**
- Modern society faces unprecedented challenges associated with clean air, clean/available water, habitat modification, and loss of floral and faunal biodiversity
- Modern society will need to address these challenges, in order to maintain our current quality of life, through **evolving regulatory programs**:
  - Compensatory mitigation 'now' required to **offset** (hopefully better) unavoidable **'new' impacts**
  - MS4/TMDL/CSO programs **addressing legacy impacts** to watersheds
- It will be expensive, both to rebuild our existing outdated infrastructure, preserve (but more importantly restore and steward) critical natural habitats, and respond to the climate/water-related disasters that are becoming more frequent
- **Progressive procurement is critical to reduce costs, and implement projects faster**

Land Use Change & Hydromodification, Pre-Industrial Era



Pennsylvania State Archives

Deforestation & Logging Roads



University of Minnesota Extension

Tillage



"The heroic effort it took to finally drain the Black Swamp merited a state historical marker, which is located at Archbold. Ditching and tiling helped transform the 1,500 square miles of swamp into productive farmland."



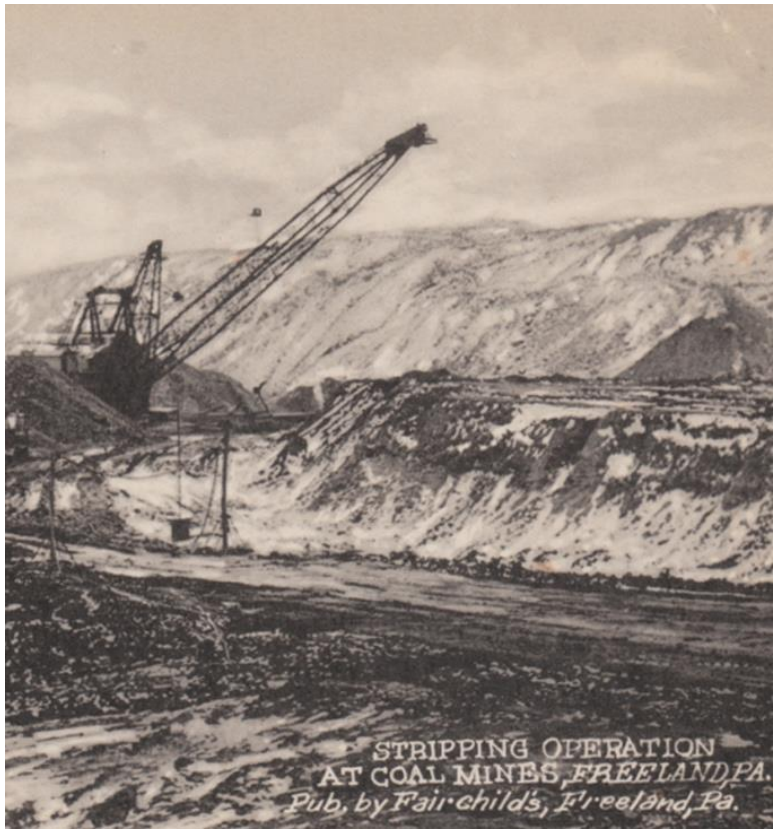
HISTORIC WETLANDS	AREA IN ACRES	DATE DRAINED	SOURCE
Black Swamp	3,072,000	1859–1885	Ohio Dept. Nat. Res., 1988
Pickaway Plains	4,800	1821	Gordon, 1969
Scioto Marsh	16,000	1859, 1883	Gordon, 1969
Other marshes, Hardin County	9,000	1860's	Howe, 1900
Hog Creek Marsh	8,000	1868–1874	Gordon, 1969
Cranberry Marsh	1,000	Unknown	Gordon, 1969
Lake Erie Marshes	300,000	1936–1974	Bednarik, 1984
Dougan's Prairie	Unknown	1827	Middleton, 1917
TOTAL	3,410,800		

National Water Summary on Wetland Resources
United States Geological Survey Water Supply Paper 2425

Ven Wert, Ohio Times Bulletin

Ditching & Drainage

Land Use Change & Hydromodification, Industrial Era



Tillage, Erosion, & Sedimentation



PHMC PA Agricultural History Project

Industrial Agriculture

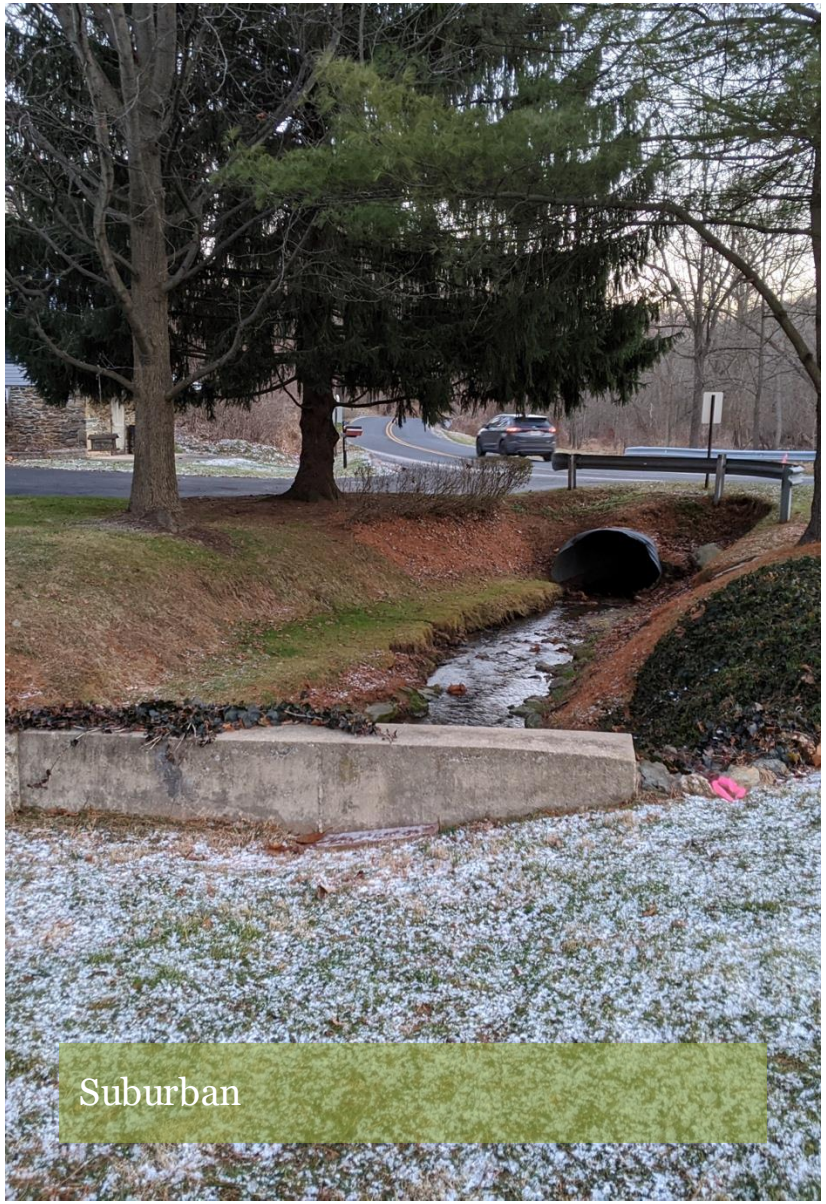


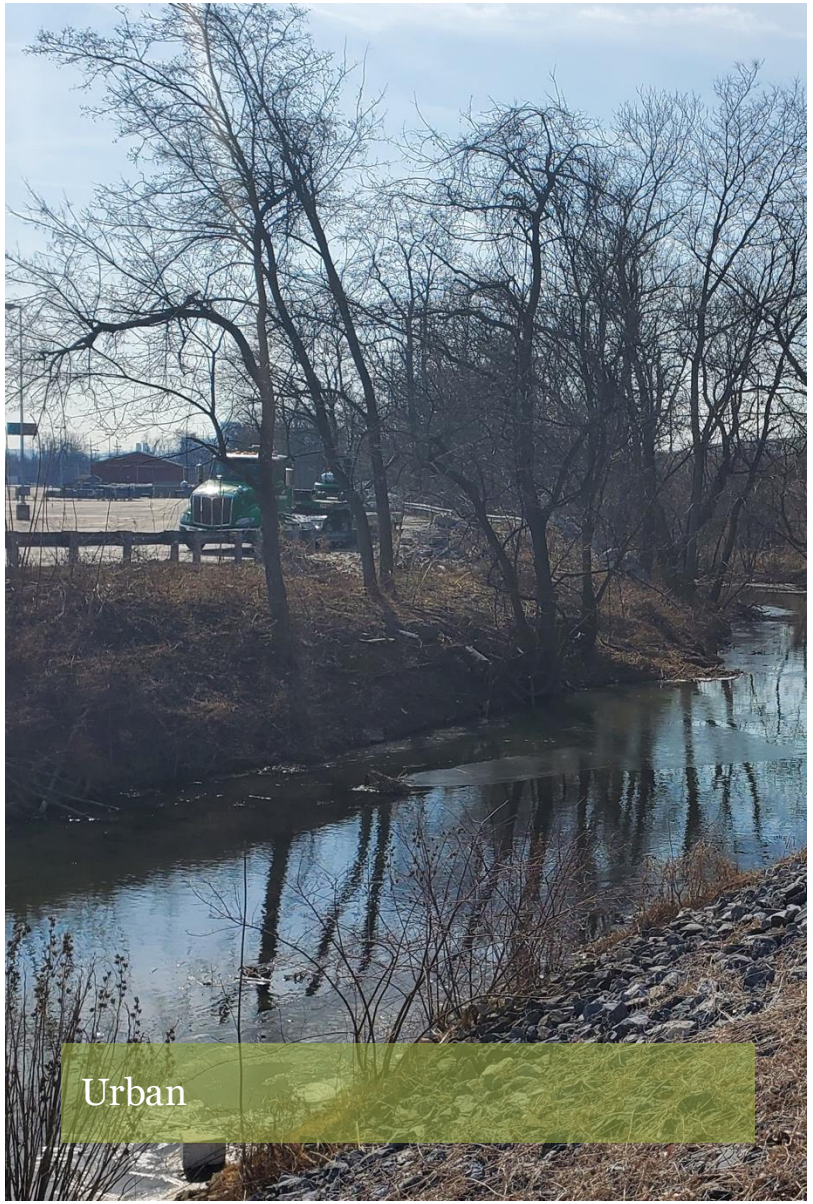
Ohio State University Library

Drainage & Channelization

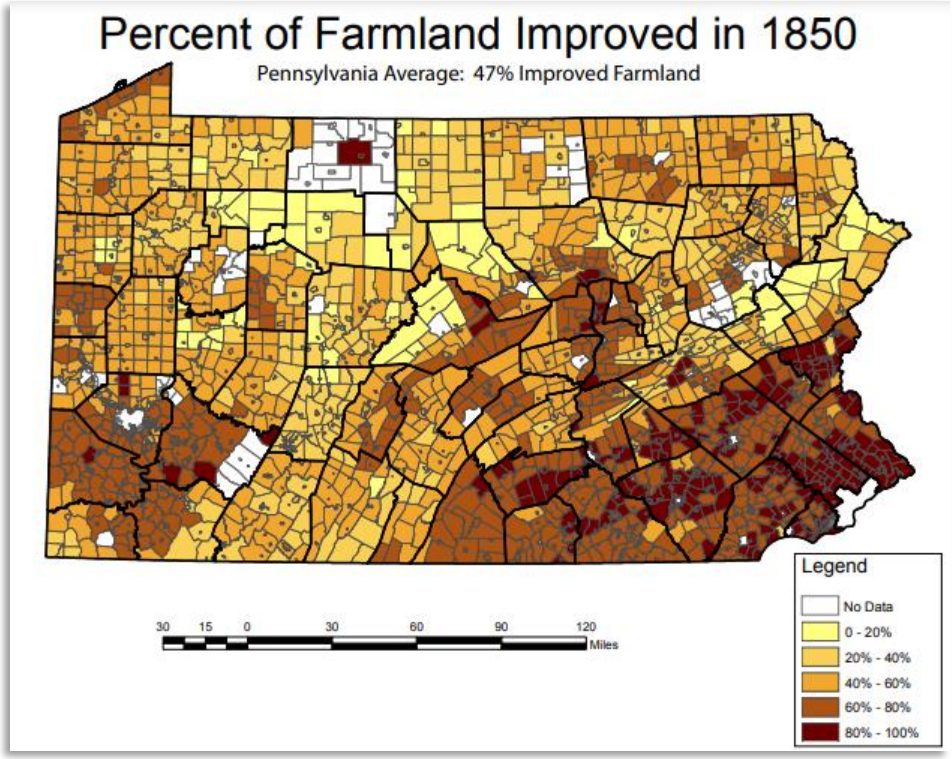
Land Use Change & Hydromodification, Modern Realities

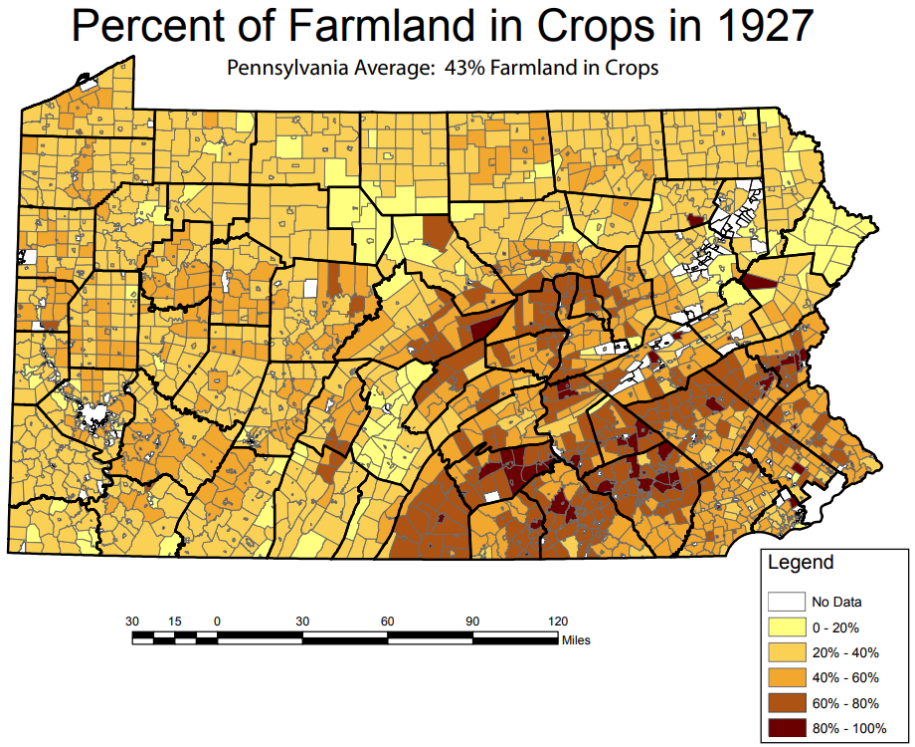




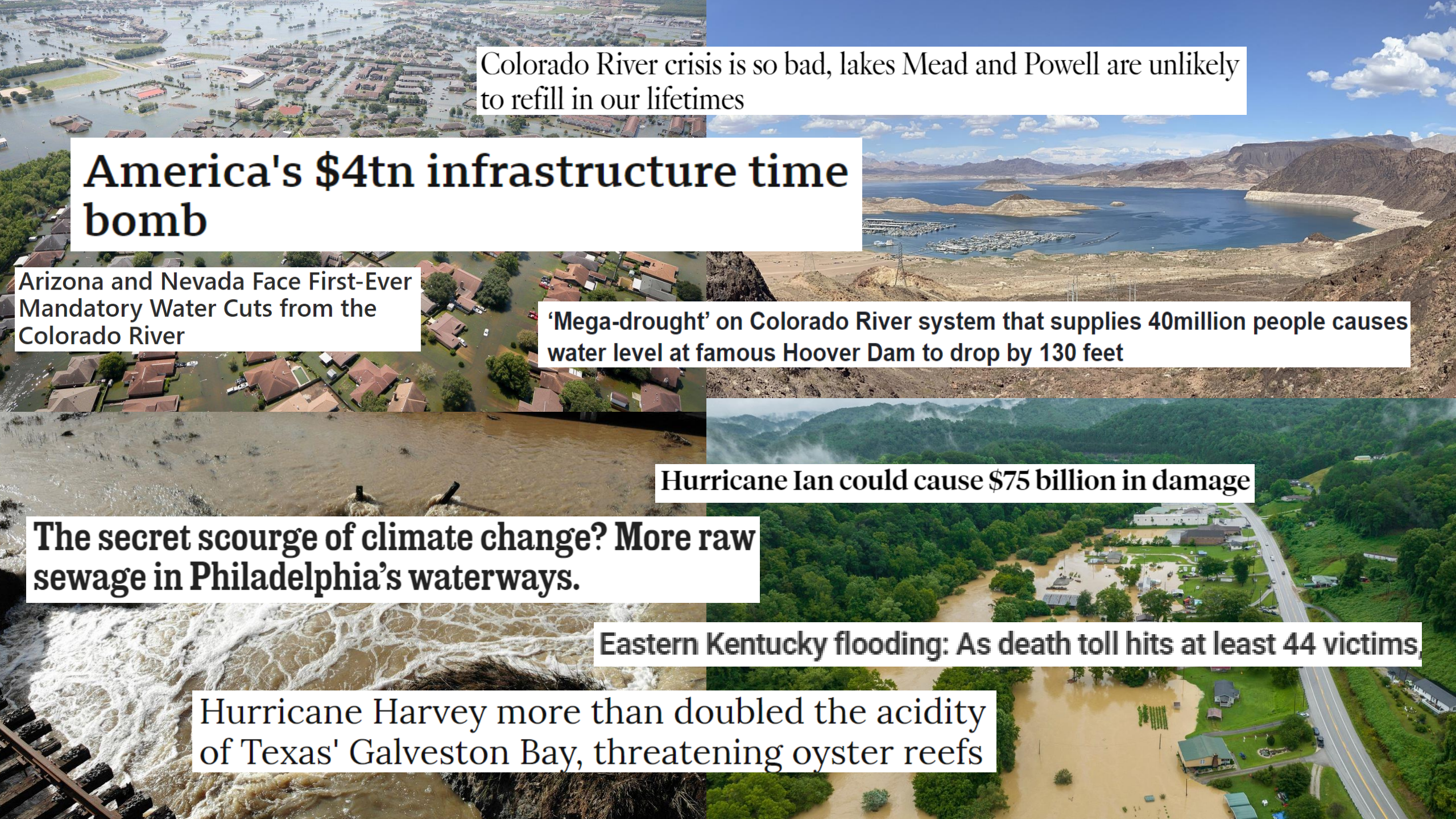


How did we get here again? Modern society built on top the farms





- We turned the woodlands and wetlands into farms
- Then we built modern society on top those farms
- Where did the wetlands and streams go? (They're under our stores, our roads, our houses)
- Our watersheds are starting to unravel, and fixing them will be expensive



Colorado River crisis is so bad, lakes Mead and Powell are unlikely to refill in our lifetimes

America's $4tn infrastructure time bomb

Arizona and Nevada Face First-Ever Mandatory Water Cuts from the Colorado River

'Mega-drought' on Colorado River system that supplies 40million people causes water level at famous Hoover Dam to drop by 130 feet

Hurricane Ian could cause $75 billion in damage

The secret scourge of climate change? More raw sewage in Philadelphia's waterways.

Eastern Kentucky flooding: As death toll hits at least 44 victims,

Hurricane Harvey more than doubled the acidity of Texas' Galveston Bay, threatening oyster reefs

Ecological Offset Drivers



Compensatory Mitigation Requirements

"Classic" wetland, stream, endangered species offsets for project impacts



Environmental Lawsuits

Regulatory and/or legal settlements for compliance and enforcement actions



Water Quality/ Stormwater Offsets

Restoration to satisfy governmental (and DOT's) compliance for TMDL's, CSO Consent Decrees, MS4, etc.



Corporate Sustainability

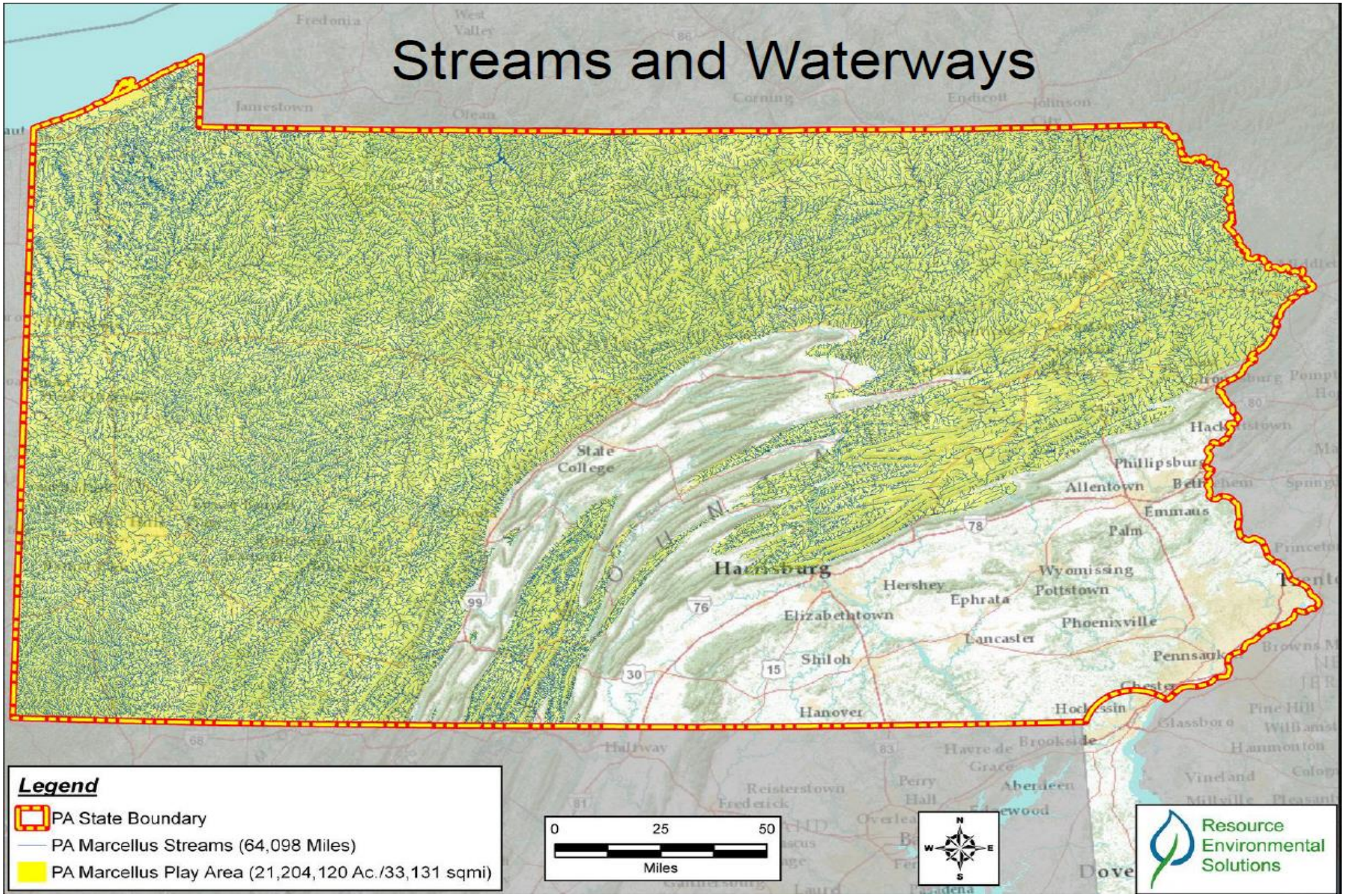
Private companies engaging in voluntary restoration for greater public good, creating positive environmental benefits.

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Wetland/Stream Mitigation Overview

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Wetland/Stream Mitigation

- Replacement of unavoidably lost aquatic (wetland or stream) functions and/or area by establishing, enhancing, restoring and/or preserving wetlands and streams somewhere else.
- *Compensatory Mitigation* fulfills federal (CWA, Section 404, Section 10) and Pennsylvania state regulatory (Chapter 105) requirements
- Steps:
  - Avoidance
  - Minimization
  - ***Mitigation***

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Final Rule Prioritizes Mitigation Banks First

USACE/EPA 2008 Final Rule, Section 332.3(b)(3)

Order of Preference for Compensatory Mitigation:

1. **Mitigation Banks**
2. In-Lieu Fee (ILF) Programs
3. On-site or Off-site Permittee Responsible Mitigation (PRM)



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Mitigation Banking

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Why Use Mitigation Banks? Ecological Benefits

BIGGER/ BETTER RESTORATION PROJECTS

- Larger scale, more ecologically significant restoration

LESS RISK

- Natural resource restoration, construction, and operations expertise

PERMANENTLY IMPROVED HABITAT AND WATER QUALITY

- Robust O&M and accountable long-term stewardship

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Why Use Mitigation Banks? Regulator Benefits

LESS RISK(EASY BUTTON FOR THEM TOO)

- Banks approved, with released credits “pre-approved” for satisfying mitigation

SIGNIFICANT TIME SAVINGS

- 250+ credit transactions past 8-9 years saving thousands of PADEP and USACE reviewer hours (over life of standard mitigation project)

INCREASED ACCOUNTABILITY FOR MITIGATION SPONSORS

- Staged release of credits as bank milestones are met, over several years

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Why Use Mitigation Banks? Permittee Benefits

LESS RISK (EASY BUTTON FOR PERMITTEE)

- No uncertainty over whether the compensatory mitigation will be successful in offsetting project impacts

SAVE TIME AND MONEY

- Reduced staff and consultant time (regulatory, legal/contracting, operations)

FASTER PERMITS

- Reduce permit processing times to benefit of both regulators and applicants

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Key Bank Development Steps

- The mitigation banking instrument (or "MBI") and PADEP Statewide Operating Permit
- The bank/project site(s) and service area(s)
- Bank project permitting
  - Chapter 105/102 and Section 404

All Mitigation Banking is regulated through the Interagency Review Team (IRT) as defined by Final Rule (33 CFR Parts 325 and 332), which includes USACE, PADEP, USEPA, USFWS, NOAA, PAFBC, DCNR, etc.

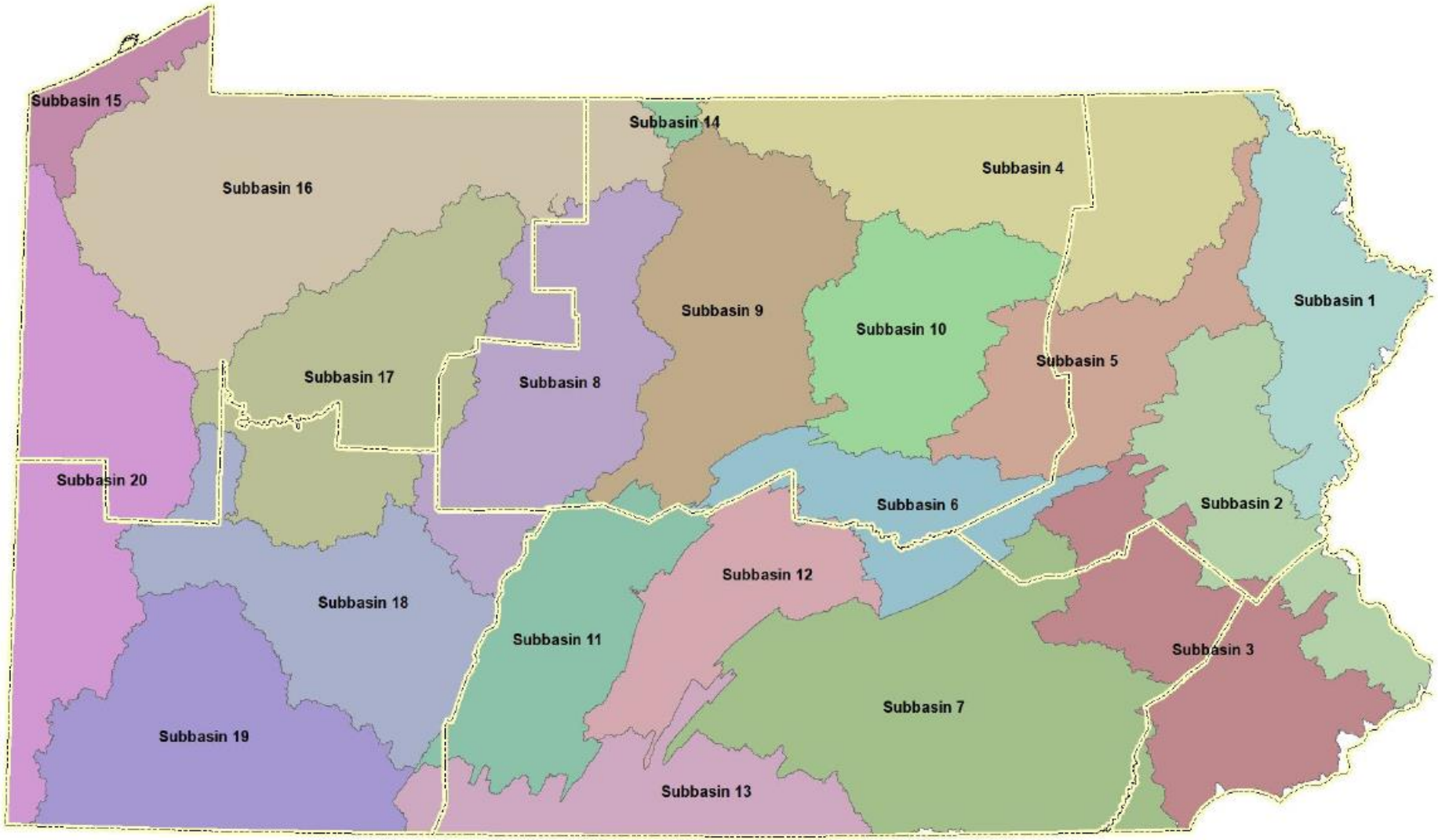
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Bank Credit Sales in PA

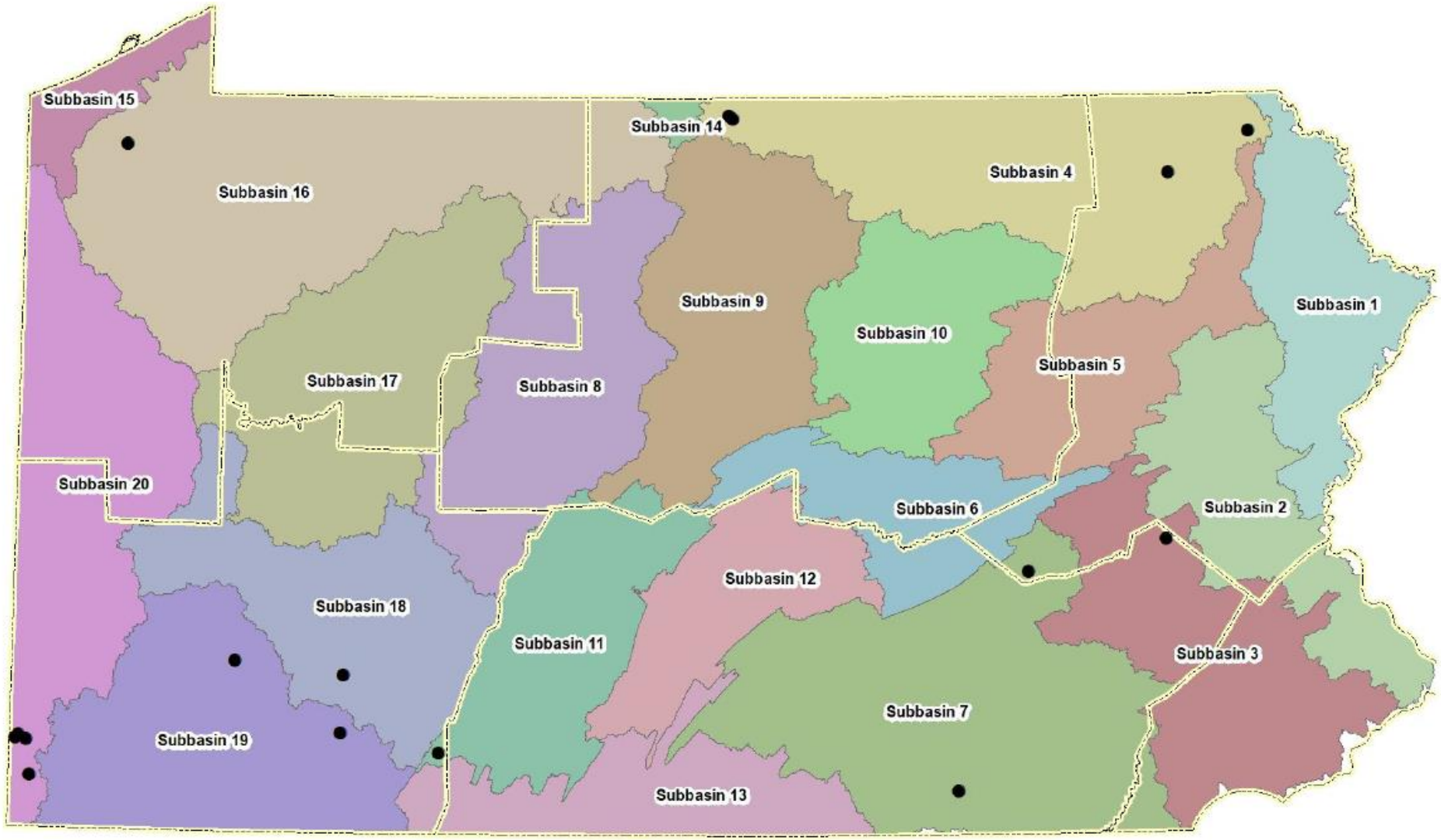
- Projects completed in every PADEP and USACE district
- PA Turnpike Commission – Numerous projects in western, southcentral and eastern PA, totaling over 60,000 stream and 20 wetland credits
- PennDOT – Numerous wetland and stream credit purchases, with 5 different Districts around state
- Airports – Pittsburgh International, Harrisburg International, and others
- Energy – Pipelines, coal, powerlines/substations
- Commercial/Residential Development – Multiple projects around the state, including residential, mixed-use, logistics, industrial
- ***In your backyard***: Kennett Square trail, Wings Field municipal airport in MontCo, Bucks County bridge replacement, West Chester commercial development, several PennDOT Dist 6 projects, warehouses, PPL substation, etc.

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PA State Water Plan



Private-Commercial Wetland and Stream Banks



3-Step Process to Use Bank Credits

#1: Coordination Between Applicant and Bank Sponsor

- Advanced planning is key to ensure released credits will be available at time of permit application submission, or permit authorization

#2: Credit Commitment Letter

- Letter from RES to agencies, documenting commitment to provide credits to project, ideally with initial permit application
- Ledger included, confirm bank has not been over-committed
- Technically no review required since the bank was already approved

#3: Credit Transfer Letter

- Use of credits noted in special conditions, bank sponsor confirms credits have been debited from bank (via email/PDF letter) and documents action on RIBITs

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But what if no bank is available?

Alternative (PRM) Solutions

- Similar to "standard" PRM's in PA, but bigger and meet "bank" objectives
- Larger, multi-project sites with larger ecological uplift
- Financial assurances in construction/maintenance bonding and stewardship funding

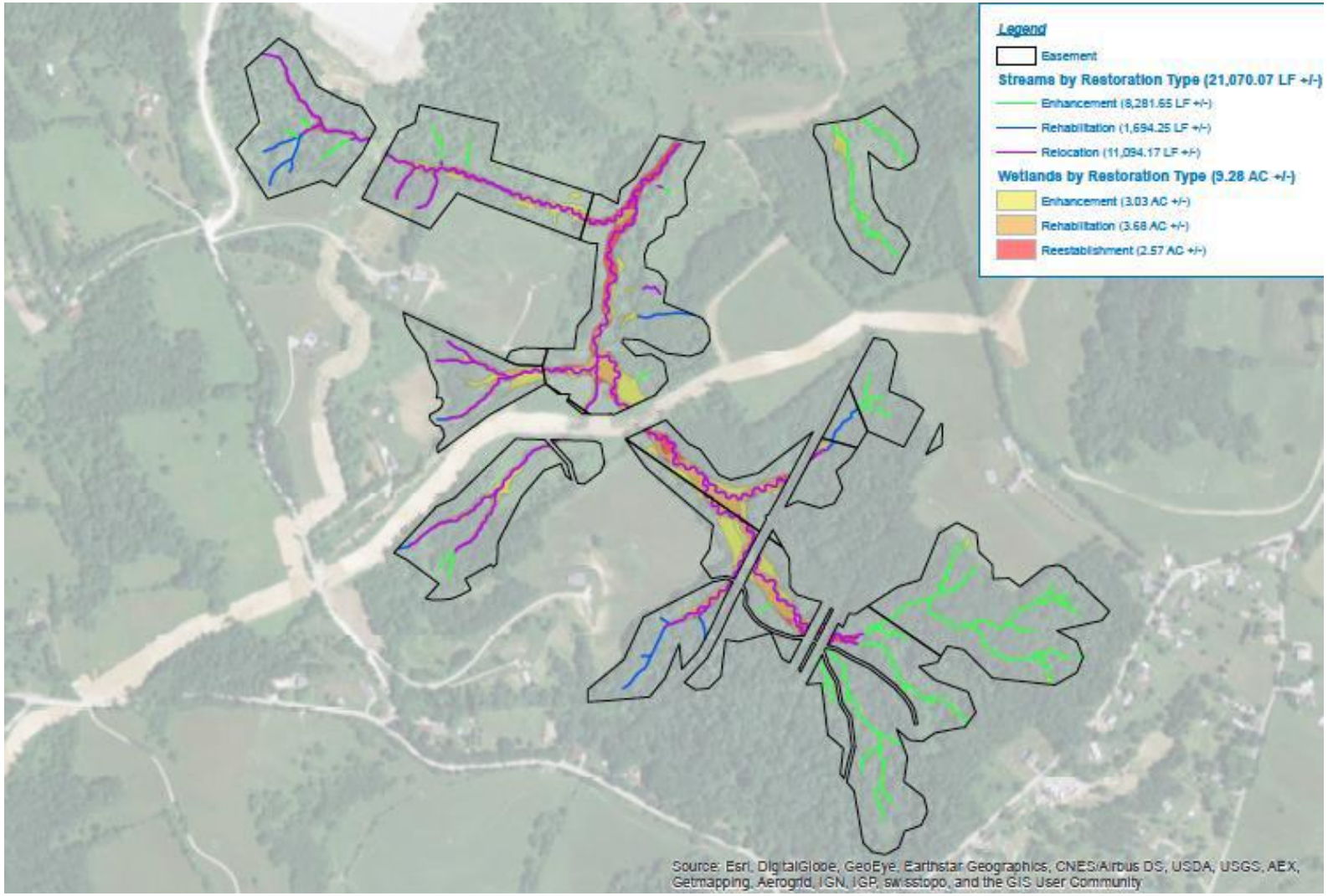
Examples

- Cross Creek (Washington County): Mitigating stream impacts for large petrochemical facility and wetland impacts for two pipelines
- Seeley Creek (Bradford County): Mitigating stream and wetland impacts for over a dozen separate projects
- Buck Run (Washington County): Mitigating over 16,000 linear foot of stream impact associated with a transportation project
- PA Turnpike/ Northeast Extension Widening: Combination of bank credits and offsite PRM

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Headwaters on down…

- Ensures benefits to the rest of the watershed downstream
- More difficult for your site to be negatively affected by developments upstream from you
- Mitigation Final Rule directs practitioners to use a watershed approach



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Just because it's forested, doesn't mean it's high quality



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PA Bank Site: Example Larger Stream Reach





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PA Bank Site: Example Mid-size Stream Reach





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PA Bank Site: Example Headwater Stream Reach



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Endangered Species Mitigation

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Species/Conservation Banking Background

- Established “industry” in California, Florida and a few other states
- Gaining momentum nationally
- Typically driven by federally-listed species (common critters including bats, herps, mussels, sage grouse, prairie chicken, etc.)
- Generally follows the wetland/stream mitigation hierarchy:
  - Conservation banks
  - In-lieu Fee (ILF) programs: Examples include Range-wide Indiana Bat ILF and PA Indiana Bat Conservation Fund
  - Project-specific or “PRM”
- Process: determine how many credits your projects needs, buy credits, get clearance letter

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Species/Conservation Banking in PA

- Two available Indiana bat conservation banks in PA, offsetting pipelines, powerlines, roadways, mining, commercial developments, with a focus on roosting habitat (large acre tree clearing)
  - Effectively replaces existing IBCF (though it's still viable alternative)
  - New bat listings (northern long-eared and tri-colored) may affect southeast PA
- Future targets in PA: Bog turtle (yup), Mussels







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Stormwater/Water Quality Offsets

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Stormwater/Water Quality Offsets

Stormwater

- Focus on urban areas due to EPA consent decrees for combined-sewer overflows (Phila., Pittsburgh, Harrisburg, etc.)
- Typically focus on volume, utilizing grey vs. green infrastructure

NPDES Permitting

- Volume vs. water quality
- Coming down the pike: On-site volume control vs. off-site water quality offsets (**PCSM Manual update coming**)
- Act 162/ Riparian Buffers

MS4/ TMDL Compliance

- Huge topic across Pennsylvania, and will continue to be so, suburban municipalities adopting/considering "stormwater taxes"
- Innovative approach from PennDOT (Design-build-operate-maintain for 'offsets')

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PennDOT Pilot MS4 Project

- RES was awarded PennDOT's *first* turnkey, performance-based RFP for Design, Build, Operate & Maintenance
- BMP to provide 167,411 pounds of sediment reduction "credit" towards PennDOT's anticipated MS4 permit approval (which includes a new sediment reduction requirement)
- RES awarded at $4.48/ pound (bids ranged to $29/ pound)





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PennDOT Sinking Springs MS4 BMP

Pre-construction





PennDOT Sinking Springs MS4 BMP

Post Construction- December 2019



April 2020



PennDOT Sinking Springs MS4 BMP

September 2021





PennDOT Sinking Springs MS4 BMP

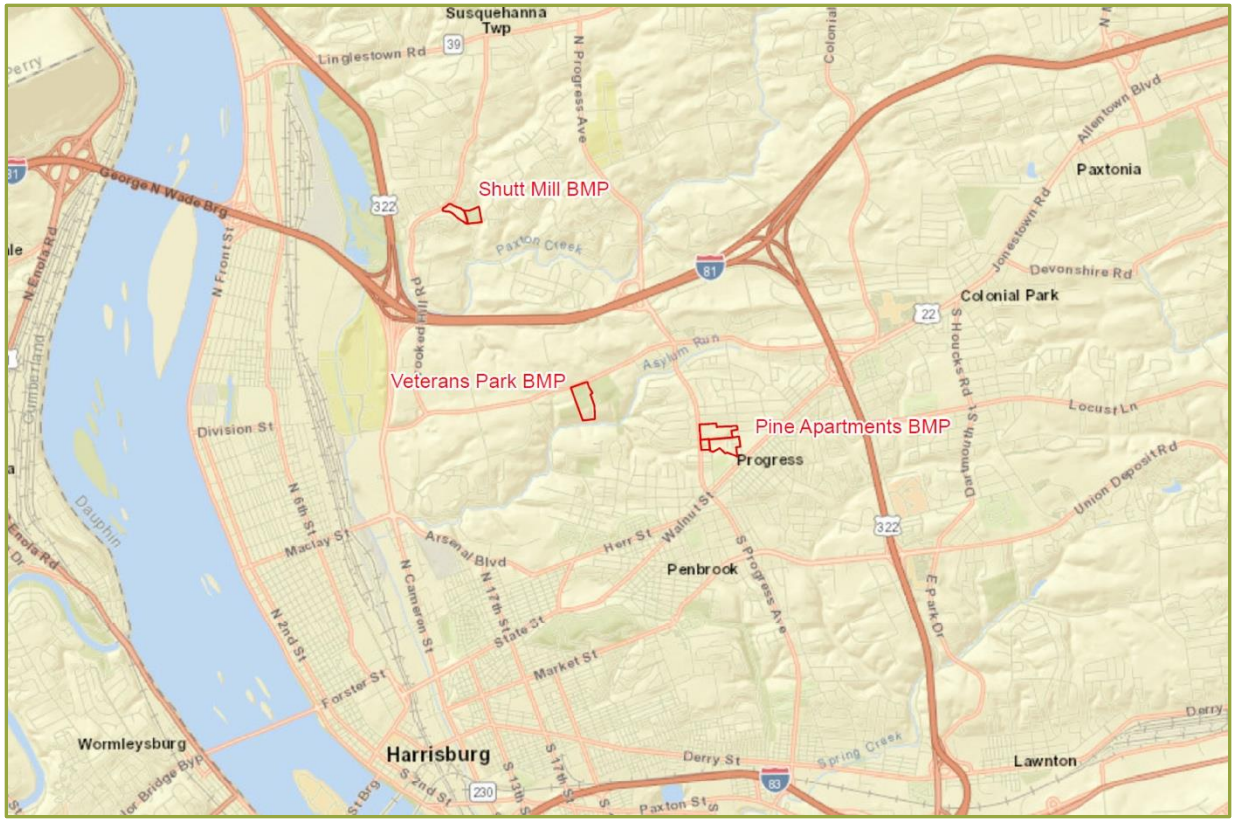
September 2021 (bottom of project, looking at restored vs un-restored)





PennDOT MS4: Paxton Creek Municipal Partnership

- "Design-build-operate-maintain" contract seeking most lbs of sediment reduction for $2M contract value
- Proposed unit costs ranged from $3.49/lb to $12.77/lb, with RES the low-bid (equating to 573,066 lbs)
- Funded by PennDOT and three municipal partners (Susquehanna and Lower Paxton Townships, and Capital Region Water)
- **Contracted September 2020**
- **Designed/permitting/constructed in 2021**



MS4 BMP Cost-comparison (and why scale is critical)

Project	BMP Type	Pounds	Cost	$/Pound
Shope Gardens	Rain Garden	1,500	$160,000	$106.00
Greenfield	Detention Basin Retrofit	4,500	$120,000	$27.00
Cicada Hill	Detention Basin Retrofit	9,100	$110,000	$12.00
Konhaus North	Detention Basin Retrofit	2,400	$130,000	$54.00
Konhaus South	Detention Basin Retrofit	3,800	$103,000	$27.00
Township Building	Detention Basin Retrofit	900	$5,000	$6.00
Deer Run	Stream Restoration: one-off	483,000	$2.5M	$5.18
PennDOT Ohio	Stream Restoration: large-scale	484,485	$1.73M	$5.21
PennDOT Paxton	Stream Restoration: large-scale	573,066	$2.0M	$3.49
PennDOT Delaware	Stream Restoration: large-scale	1,013,650	$4.0M	$2.05
PennDOT Ches. Bay	Stream Restoration: large-scale	1,282,051	$2.5M	$1.95

Darien Crossing Regional Stormwater Retrofit Project

- RES was awarded a $13M Greened Acre Retrofit Program (GARP) grant on a parcel owned by the Philadelphia Industrial Development Corporation thru PWD's innovative Green City, Clean Waters Program
- Largest Greened Acre project (67) to date in Philadelphia
- Removed portion of vacant warehouse, to install retrofit underground, with parking facility on top for beneficial use of parcel
- 2018-2020 (Design and Construction)
- 2021- 2065 (Operations and Maintenance Period)
- Works to help Philadelphia meet its goal of 10,000 Greened Acres



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Darien Crossing Regional Stormwater Retrofit Project

Existing Building



Building Demo



Darien Crossing Regional Stormwater Retrofit Project

Excavation and SWM Basin



Parking Lot Complete



Act 162 Riparian Buffers

- 2014-15 regulations, generally tied into projects within NPDES
- Focus on ‘special protection’ watersheds, IE Chapter 93-listed HQ and EV
- Avoid, minimize, mitigate (on-site or off-site)
- Key considerations:
  - Siting: within the same ‘drainage list’, we use Chapter 93 (and work out from there, but **how close is close enough?**)
  - Easement/ deed restriction
  - Replace or enhance existing
- **5+ year success criteria, including survivorship and ‘uniform woody cover’?**
- There is NOT a ‘bank’ for this topic, so every project is ad-hoc and project-specific, leading to **inconsistency**



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Bayou Terrebonne Marsh Restoration Chauvin, Louisiana

Scope: Design, permit, construct, plant, and monitor for 5 years post-construction

- 25 acres
- 11,871 LF of Marsh Terraces
- 5,000 Restorative cypress trees
- 35,000 Marsh grass plugs

Community outreach: Protection of citizens in Chauvin, Montegut, Bourg, Houma by external protection and stabilization of levee system. Opportunity for nearby schools and communities to be educated on the need for resiliency projects in the area.

Five years of Monitoring to ensure stabilization and establishment of marsh and cypress species within the project area. Replanting will occur within project area to ensure success

Reportable and Measurable: Annual Monitoring Reports and Aerial Mapping with Drone Flights Pre & Post to demonstrate project success

Site Disposition Options:
Donation of site to State of Louisiana LDWF: PAC WMA
Donation of site to USFWS: Rockefeller WMA
Donation of site to City of Chauvin or City of Houma
Long term stewardship by U.S. Land Conservancy

CO_2 Sequestration: 111 to 114 tons per year

Water Quality Nutrient Elimination:

- Phosphorus: Up to 85 pounds removed per year
- Nitrogen: Up to 3,426 pounds removed per year





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2024 Case Study?

- Early-stage AMD-treatment project in NC PA, anticipating to be fully funded by private energy developer, as part of their water-neutral program
- Many Fortune 500 companies have water-focused programs
- They want an ‘easy-button’ to press, that gets projects in the ground quickly, with someone accountable for various KPIs (key performance indicators)



Who is RES?

RES is restoring a resilient earth for a modern world, project by project.



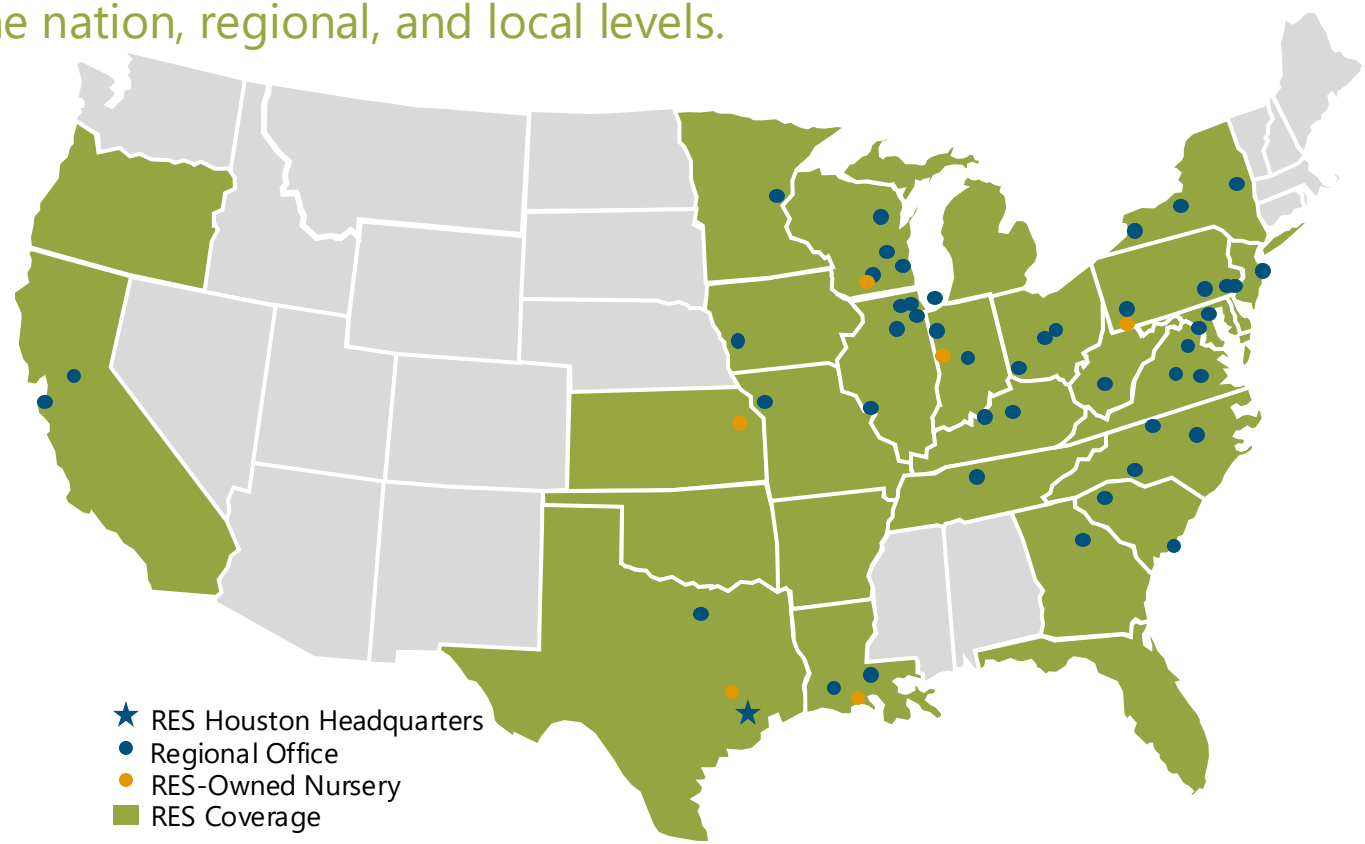
- Founded in 2007, inspired by notion that restoration can be a win/win for both humanity and the environment
- Nation's largest **ecological restoration company**, creating ecological uplift by doubling down on nature's own processes
- Pioneered how to make **ecological offset/ mitigation markets** work with a full-delivery, total-stewardship business model
- **Not consultants or contractors**, we design, implement, and steward ecological and water-resource restoration

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RES Today

Understanding the needs of the resource, client, regulators, and stakeholders at the nation, regional, and local levels.

- In-state teams with locally experiences, industry-leading talent
- Backed by national experts across the ecological disciplines
- Over 1,100 dedicated staff in 30 operational hubs



Recognition

Fastest Growing

Inc. 5000

Ten Years in a Row
2010 - 2020

Project Merit Awards

Environmental Business Journal
Six-time Winner

Milestones

- Founded 2007
- KKR investment, 2016
- Awarded largest PRM mitigation contract in U.S. history, 2018

Acquisitions

- Applied Ecological Services, 2021
- Blueway, 2020
- Redwing Ecological Services, 2020
- Carolina Environmental Contracting, 2020
- Apache Environmental, 2018
- Angler Environmental, 2016
- EBX, 2014

RES in PA

- Pittsburgh, Philadelphia and Lancaster offices, with southwest PA in-house nursery/equipment yard
- 1 full-time PA employee in 2010 ---> over 100 full-time employees 2024
- 60+ miles of stream restoration, 400+ acres of wetland restoration, 600+ acres of endangered species conservation implemented to date in PA
- Notable accomplishments:
  - First commercial wetland/stream mitigation bank in PA
  - First USFWS-approved conservation bank (for endangered bats) in PA
  - First turnkey, or 'design-build-operate-maintain' MS4 BMP implementation with PennDOT
  - RES' first in-house native plant nursery

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How RES Delivers Full-Delivery Offsets

- **Design–Bid–Build**
  - Traditional project delivery with separate contracts for land acquisition, design, construction, operations, etc.
  - Relatively intense administration
- **Design–Build** & **Engineering–Procurement–Construction (EPC)**
  - Separate contracts for land acquisition, design/construction, and operations
  - Can accelerate the project development phase
  - Guaranteed Maximum Price (GMP) and Fixed-Price common
- **Full-Delivery**
  - A single contract to acquire the real estate (site), develop, and operate the project up to a future regulatory closeout
  - A "product" is delivered, in the form of a measure of performance
  - Guaranteed regulatory compliance, transfer of liability
  - ***Typically includes 5-10 years (or forever) of guaranteed performance***

Full-Delivery Project Delivery is also referred to as:

- "Turnkey"
- "Design, Build, Operate, Maintain (DBOM)"
- "Pay for Performance"
- "Performance Based"

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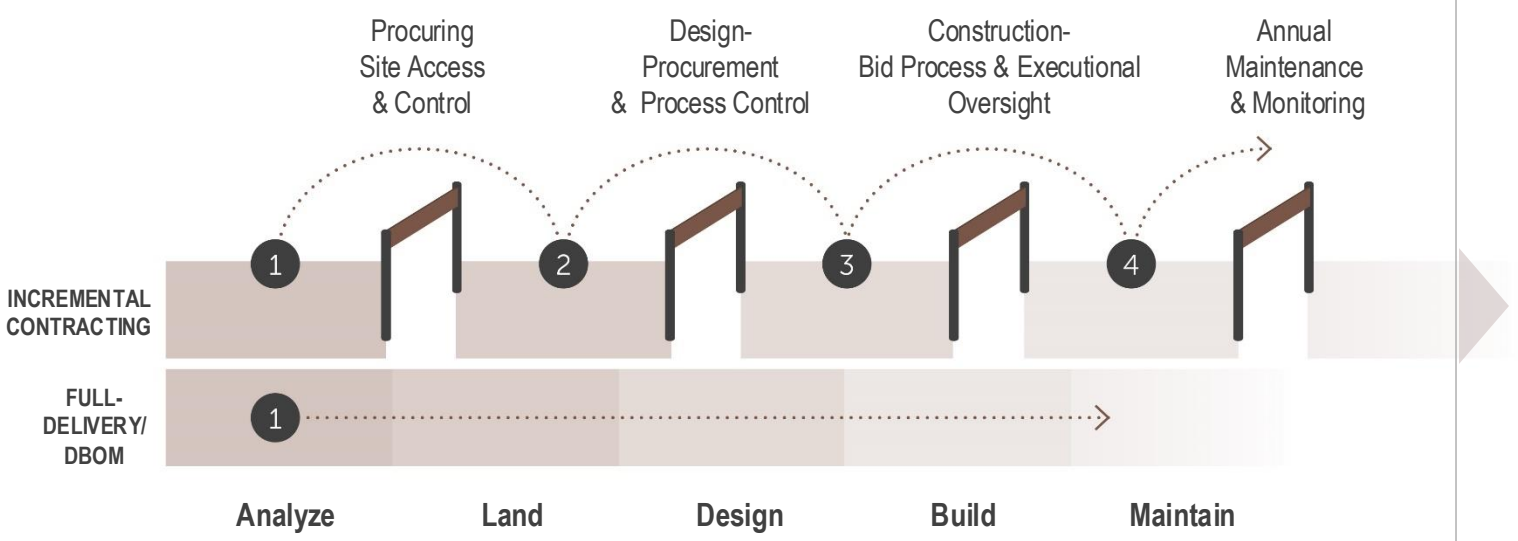
- "Turnkey"
- "Design, Build, Operate, Maintain (DBOM)"
- "Pay for Performance"
- "Performance Based"

The Power of the "Full-Delivery" Approach

Transfer of Financial and Regulatory Risk

- Single contract makes RES responsible for all phases
- Guarantee delivery, of the 'product', on time, on budget

Each 'hurdle' adds cost and opportunity for error



Faster Implementation and Lower-cost

Results= Top-notch Restoration on the Ground (in PA alone)

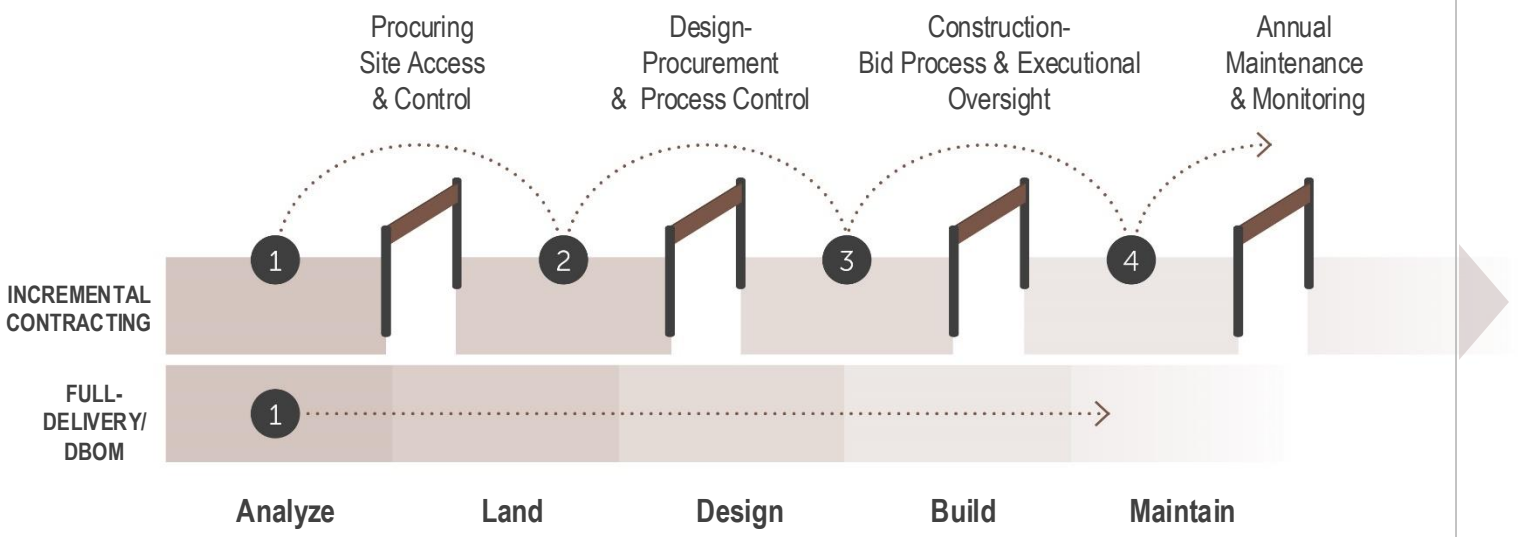
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- 400+ acres of restoration
- 600+ acres of species conservation
- Several million trees planted

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How RES works with AEC Firms

Developing RES Projects

- We routinely need some level of external subcontracting support. Examples:
  - NPDES permitting, survey, archaeology, construction-support
- Customized project (non-bank credits) typically provide more opportunity to collaborate.

Our goal is to provide the best value and solution for the end-client, knowing most projects will likely not require mitigation or RES involvement.

Use RES as a resource, within the ecological restoration and water resources space!

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Question and Answer

What keeps us up at night?

What's the largest challenge or area of risk for a full-delivery implementor?

Full-delivery procurement and traditional procurement challenges?

Thank you!

Jon Kasitz | jkasitz@res.us

res