



How Private Companies are Putting Wetlands Back onto the Landscape (and who's doing it?)

Rowan University

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Agenda

- What happened to our wetlands (and therefore water quality)?
- How are folks in private industry restoring and re-establishing wetlands?
- Let's talk about procurement, because funding and procurement dictate what/when/how
 - "Full-delivery", "Turnkey", "Performance-based" terminology
- Case studies
 - Compensatory Mitigation/ Mitigation Banking
 - MS4
 - Enforcement/ Compliance
 - ESG/ Corporate Social Responsibility (CSR)
- Why consistent, high-quality wetland restoration is difficult
- Careers in ecological restoration: Who does this kind of work, what is their education and professional background?

What happened to our wetlands (and watersheds)?

- Since European settlement of North America, thru the development of the United States, we have 're-plumbed' our watersheds
- This re-plumbing included the loss of over 50% of wetlands in much of the US, including NY, and its more like 75-95% in many 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, and wetlands are critical to the 'kidney function' of our watersheds

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	1869-1885	Ohio Dept. Nat. Res., 1968
Pickaway Plain	4,800	1821	Gordon, 1969
Scioto Marsh	16,000	1869, 1883	Gordon, 1969
Other marshes, Hardin County	9,000	1860's	Howe, 1900
Hog Creek Marsh	6,000	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		

Ven Wert, Ohio Times Bulletin

Ditching & Drainage

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

Land Use Change & Hydromodification, Industrial Era



Tillage, Erosion, & Sedimentation

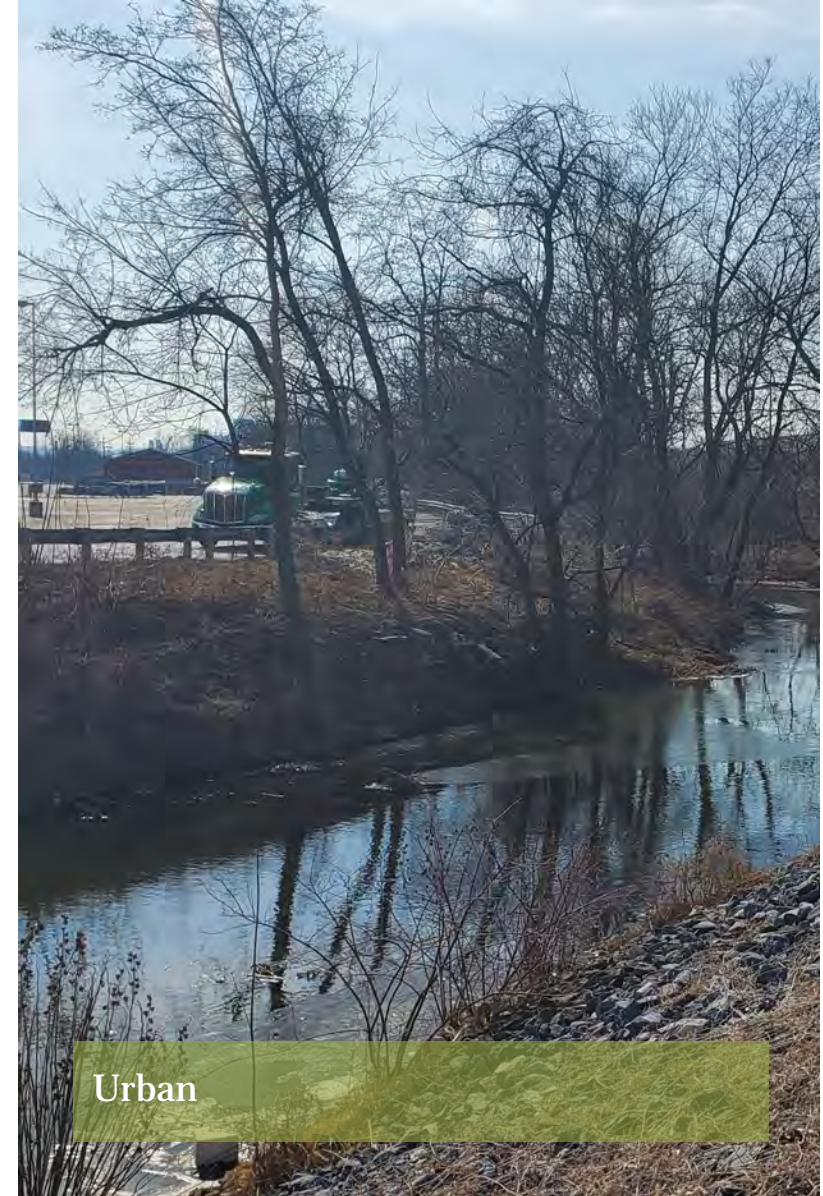


Industrial Agriculture

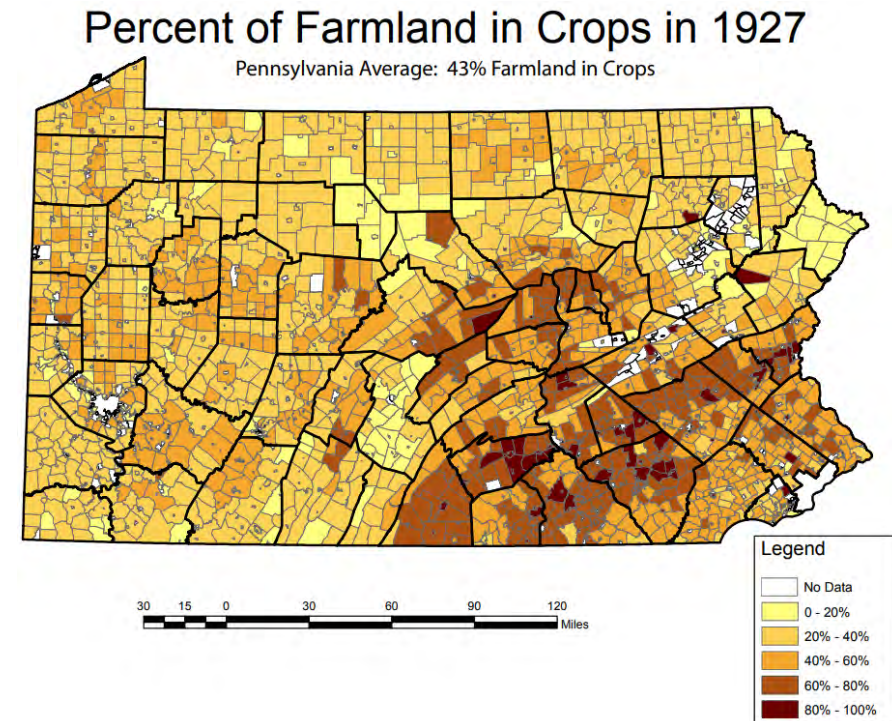
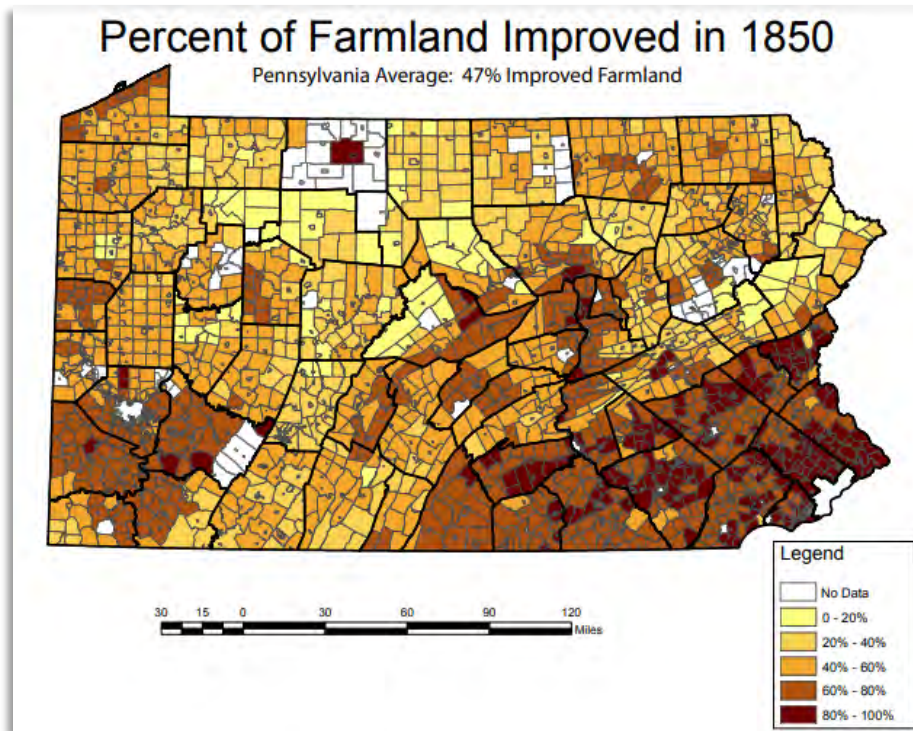


Drainage & Channelization


Land Use Change & Hydromodification, Modern Realities



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

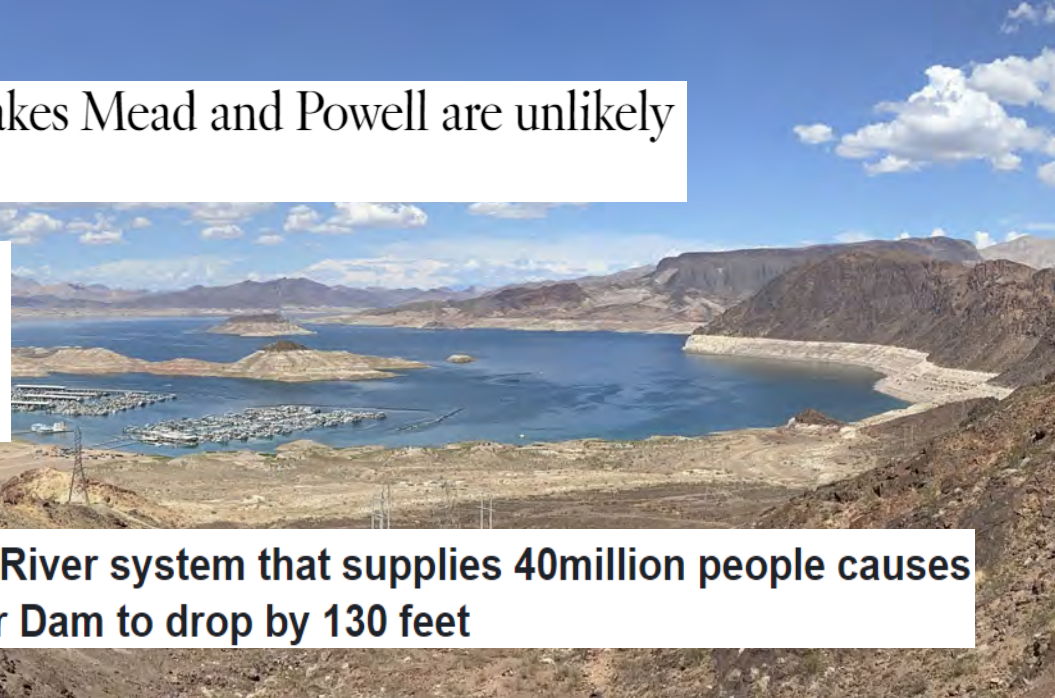


- We turned the woodlands and wetlands into farms
- Then we built modern society on top those farms
- Where did the wetlands go? (They're under our stores, our roads, our houses)




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

What are we doing about this (and does it involve wetlands)?

- Society is realizing we need to act now, to preserve our quality of life
- New or evolving regulations at state/federal level (CSO, MS4 and TMDL, updates to Chapter 105/Section 404)
- Funding will include a mix of local, state, federal funding, and different forms of 'impact-fees' (stormwater taxes)
- Trillions of \$ will be spent in the next few decades to rebuild our nation, in a better, more holistic manner (job security if you're in the infrastructure business)
- Economic development for myriad of staff across the project-life cycle (planners, engineers, construction, GIS, ecologists, attorneys, laborers, etc), and there may not 'be an app for that', IE technology will be critical, but we still need to build stuff
- Innovative procurement, to invest in large (watershed-scale) projects, will be key to using infrastructure funds most wisely. Nature-based infrastructure projects can help address multiple issues (water quantity, water quality, pollinator habitats, bio-diversity).
- **Wetlands are one of our best Nature-based infrastructure solutions to these challenges!**

How private industries are restoring wetlands (incl. in PA)



Compensatory Mitigation Requirements

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



Water Quality/ Stormwater Offsets

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



Enforcement Compliance

Regulatory and/or legal settlements for compliance and enforcement actions



Corporate Sustainability

Private companies engaging in voluntary restoration for greater public good, creating positive environmental benefits, often with performance 'scores' from investors

Let's talk procurement

- Design–Bid–Build
 - Traditional project delivery with multiple contracts = relatively intense administration
- Design–Build & Engineering–Procurement–Construction (EPC)
 - Separate contracts for land acquisition, design/construction, and operations
 - Can accelerate the project development phase
- **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 more) of guaranteed performance***

Full-Delivery Project Delivery is also referred to as:

- “Turnkey”
- **“Design, Build, Operate, Maintain (DBOM)”**
- “Pay for Performance”
- “Performance Based”

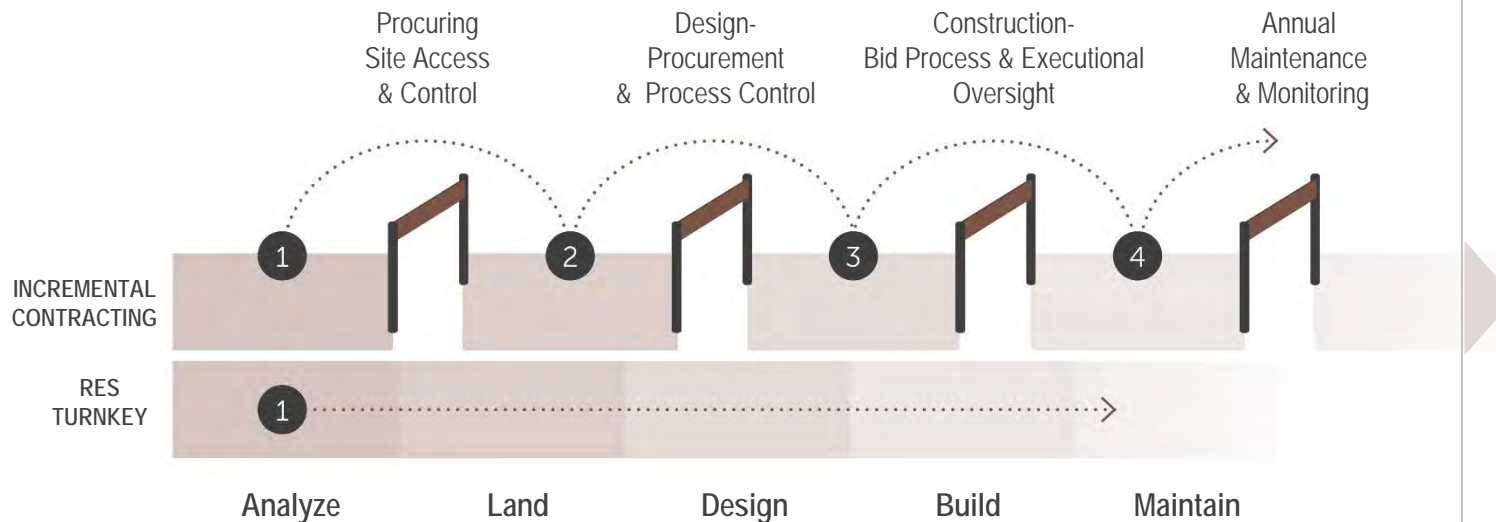
21st Century Challenges Require 21st Century Solutions

The Power of the “Full-Delivery” Approach

Transfer of Financial and Regulatory Risk

- Single contract responsible for all phases
- Guarantee delivery, of the ‘product’, on time, on budget

Each ‘hurdle’ adds cost and opportunity for error



Results= Top-notch Restoration on the Ground

- **Better** work, done by experts
- **Faster** to implementation
- **Cheaper** and lower administrative costs/effort

Faster Implementation and Lower-cost

Case Study #1: Wetland/Stream Mitigation Banking

- Replacement of unavoidably lost aquatic (wetland or stream) functions and/or area by establishing, enhancing, restoring and/or preserving wetlands and streams somewhere else.
- The easy example: PA Turnpike is widening their highway for safety and capacity, impacting one acre of wetland, they really cannot avoid it, they minimized as much as they could, so they need to replace that one acre of wetland somewhere else in the watershed
 - Or they can just buy one wetland credit from an approved wetland mitigation bank, 'write the check and walk away'
- *Compensatory Mitigation* fulfills federal (CWA, Section 404, Section 10) and Pennsylvania state regulatory (Chapter 105) requirements
- Steps:
 - Avoidance
 - Minimization
 - **Mitigation**

USACE Final Rule Prioritizes Mitigation Banks

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)



Net Benefit? Aren't you just replacing something?

- Yes, but there is a lot more to it, and a lot more benefits.....
- We're replacing degraded/impacted wetlands with much more diverse, resilient wetlands, integrated with stream hydrology
- Net increase in wetland acreage AND functions and values compared to what is being impacted/lost
- Projects are placed under perpetual protection and long-term stewardship
- High-degree of accountability between regulators and mitigation-bank operators
- From 2013 (RES' first approved bank) thru 2021:
 - 8 banks/sites, including over 1,100 acres of private land restored/protected/under stewardship
 - Includes over 270 acres of wetland restoration and 261,406 linear feet of streams restored
 - We hope to double these numbers by the end of 2025

Case Study #2: Paxton Creek MS4 Partnership

- “Design-build-operate-maintain” (IE full-delivery) contract seeking most lbs of sediment reduction for \$2M contract value, solely for MS4-compliance
- 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



Paxton Creek MS4 Municipal Partnership

- Three different BMPs, **equaling 6+ new acres of wetlands**
- One township park, one private HOA within a townhome community, one combo township park/state-owned property (different landowner-agreements for each)
- Aggregating all three projects under one contract lead to volume-savings/cost-efficiencies
- Partnerships!!!! The municipal partnership was started years in advance, leading to great efficiencies on the part of all parties
- First time a MS4 contract was co-funded by multiple municipal partners and PennDOT, with PennDOT facilitating the contracting and procurement



Veterans Park MS4 BMP

Pre-Construction (No wetlands)



Veterans Park MS4 BMP

Post-construction (wetlands!!!)



Veterans Park MS4 BMP

Post-construction (wetlands!!!)



Case Study #3: Enforcement Compliance

- Two types of enforcement compliance: legacy (chemical, petroleum, manufactured products, industrial wastes, etc) that require remediation VS unpermitted new impacts to wetlands or streams
- PA unpermitted-impact case study from western PA:
 - Confidential energy development project constructed in 2017
 - 2019 Order from DEP identified unpermitted impacts and additional violations
 - Final settlement with DEP (and federal agencies):
 - Big fine
 - Compensatory mitigation (with punitive ratios, which significantly increased the mitigation required)
 - Opportunity to implement a **Community Environmental Project (CEP)**

The Community Environmental Project

- On behalf of the litigant, RES is designing, building, and maintaining a \$2M ecological restoration project
- Removing 1930's era concrete dam, over 1,000 feet of stream restoration, approximately **6 acres of new functioning wetlands**
- Restores fish passage and improves wetland and stream functions
- Removes 'high hazard' dam, and the ecological benefits, in a state park, at no cost to the taxpayers/DCNR



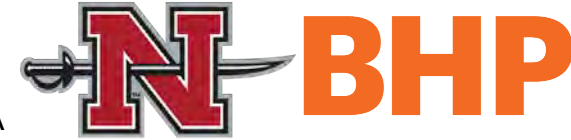
CEP Pre-restoration



CEP Post-dam removal (green = wetlands)



Case Study #4: ESG/CSR Funded Marsh Restoration



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

CO₂ 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



Sorry, one more local opportunity.....

- Early-stage water-quality project (maybe MS4, maybe mitigation bank, maybe partial grant funding)
- Focused on sediment and nutrient reduction potential upstream from public water reservoir, which services 30,000 customers, including env. justice communities
- Funding justification: hog the sediment out of the reservoir and chemical treatment vs keeping sediment and nutrients out (could an ounce of prevention offset a pound of treatment?)
- When we are done, the cow will no longer be in the stream, and **where he's standing will be new wetlands**



Challenges (and opportunities) with wetland restoration

- Ecosystem restoration is a 'new' field of study, relatively speaking
 - 1970's Clean Water Act
 - Wetland delineation (IE even getting serious about identifying wetlands) started to become commonplace in 1990's
 - New stuff is hard
- Doing it right tends to be expensive
 - We've been destroying natural ecosystems for hundreds of years, putting them back costs of a lot of \$
- Private vs public land
 - Most land in developed states (like NJ) is private
- Funding
 - As society learns more of the true cost of broken ecosystems, we're now struggling to figure out how to pay for fixing them

Who's doing this work? Me (Jon)

- Role: Regional Client Solutions Manager
- Core Responsibilities: Identify and develop business opportunities so people pay RES multiple \$M to restore wetlands, streams, habitats (sales and business development)
- What this means: I'm now a 'business guy'
- Quick bio:
 - 2002: BS in Biology/Ecology from Millersville University (PA)
 - 2004-2015: Env. Consulting (engineering firm), technical role and eventually into PM and sales
 - 2015-present: Sales at RES
- Favorite part of my current job: Being the 'tip of the spear' to find the \$ to do these big cool restoration projects (someone has to), and then watching the 'healing process' unfold and seeing restored habitats evolve



Who's doing this work? Hannah

- Role: Project Manager
- Core Responsibilities: Develop water quality and mitigation projects, oversee technical teams, manage scope-schedule-budget
- What this means: I work the problem and find a cost-effective solution (understanding regulations, and the life-cycle of complex eco-restoration work)
- Quick bio:
 - 2003: B.A., Environmental Biology, Augustana College, IL
 - 2011: M.S., Plant Biology, Southern Illinois University
 - 2002-2007: Staff Biologist with USFWS
 - 2009-2011: Illinois Heritage Program; T&E and Restoration Specialist
 - 2012-2017: Env. Consulting (various firms)
 - 2017-present: Regulatory Specialist/Project Manager/Water Quality Lead
- Favorite part of my current job: Collaborating with our team to implement watershed-scale and ecologically meaningful restorations, making money doing something I'm passionate about



Who's doing this work? Joe

- Role: Land Representative
- Core Responsibilities: Working with landowners to develop agreements to build our projects on their land
- What this means: Making sure our projects are compatible with the landowner's current and future plans.
- Quick bio:
 - 2013: B.S., Political Science, Penn State University, PA
 - 2014-2019: Professional 'land agent', incl. landowner negotiations and real estate title research
 - 2019-present: Land Representative at RES
- Favorite part of my current job: Introducing our company and projects to excited landowners who have never heard about the kinds of restoration and conservation we can offer for their properties.



Who's doing this work? Zach

- Role: Construction Project Manager
- Core Responsibilities: Early bids, proposals, & conceptual design support. Estimating, contracting, and supporting project implementation (from the office side).
- What this means: Determining financial viability of potential projects, finding and hiring subcontractors to implement projects
- Quick bio:
 - 2017: B.S., Environmental Geology, University of Pittsburgh, PA
 - Summer 2016: Seasonal Internship with Field Crew
 - 2017-2020: Full time Field Technician: Planting, Seeding, Invasive Species Control, Stream Enhancement, Erosion and Sediment Control
 - 2020-Present: 90% Office based, utilizing knowledge gained in the field to support construction operations
- Favorite part of my current job: Helping to bring a potential site from conceptual lines drawn on a GIS map to a fully designed and implemented ecological restoration project.



Who's doing this work? Ted

- Role: Project Manager
- Core Responsibilities: Manage the lifecycle of stormwater management and stream/wetland mitigation projects, work with team to take the project from start (planning) to finish (post-construction/maintenance & monitoring)
- What this means: Get the job done. Work with team to sell the project, find the land, design the thing, build the thing, make sure the thing works when it's finished being built, and trying to keep finance and accounting happy during the process.
- Quick bio:
 - 2010: B.S., Civil Engineering, University of Pittsburgh
 - 3 years of civil engineering consulting work
 - 3 years watershed planning at Temple University
 - 2016: M.S. City & Regional Planning, Temple University
 - 6 years of urban development / green stormwater infrastructure design
 - 2 years with RES as a PM
- Favorite part of my current job: Cause and effect! Understanding how all the project pieces fit together and planning for how something now affects other things later.





The “Why” again? For our children/ future

(they’re drinking that water, need those wetlands, and will be paying for it, so lets do this!)

Question and Answer

What's the largest challenge or area of risk for a full-delivery implementor?
Full-delivery procurement and traditional procurement challenges?
Questions from the audience?

THANKS FOR YOUR TIME!!!!

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