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2024 Conference

Canada's Premier Stormwater and Erosion and Sediment Control Conference

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March 26th
2024

Ecosystem Restoration in Urban Stream Management Corridors

AWE - STIMULATING MENTAL HEALTH RECOVERY
AND COMMUNITY REVIVAL

RiverSHARED.org

501(3c) Non- Profit est. 2020 dreamed 2012

- **S**hare knowledge with humility
- **H**ave patience and discernment for innovation
- **A**dvocate excellence
- **R**espect the risk and uncertainty in rivers systems
- **E**mpower, challenge and question
- **D**ocument and learn from unexpected results



Wonderment and Awe

“Dreams are our internal calling to go back to Wonderment and Awe”

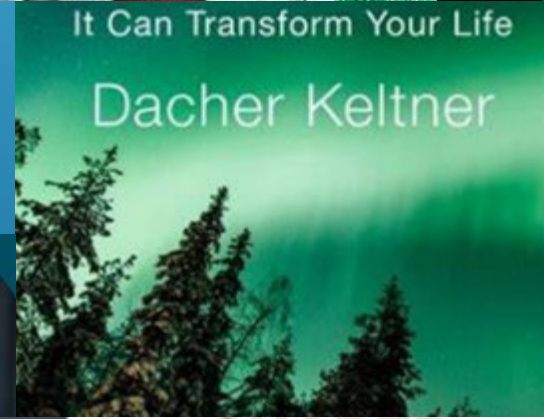
“Work Matters but does not make us Matter”



- ▶ Does the things that divide us matter?
 - ▶ The Chronicles of Narnia, Mere Christianity C.S. Lewis
- ▶ Western Culture is on 31% of the world's population
- ▶ Any given group/club/religious affiliation is much
- ▶ We are degraded by power, greed, and the need
We need restoration of Awe in our communities



SO MUCH DIVISION, THE WORLD DOES NOT NEED TO UNDERSTAND OTHERS AND NATURE BUT ... TO BE IN AWE AND LOOK FOR GOOD



1. Dream big, stay in wonderment and awe of natural ecosystems.
2. Ecosystem restoration is a privilege to be thankful for.
3. Humans are a species of concern for ecological restoration.
4. Ecological Restoration is generally a luxury.
5. Teach the children early in ecological restoration.
6. Restoration should provide social and economic benefits to communities/nations.
7. Share with others while we have time and a voice.

Wonderment and Awe

“Dreams are our internal calling to go back to Wonderment and Awe”

“Work Matters but does not make us Matter”



Normally a Video – Sorry no time

Humility, Grounded and The Humic Soil

Pride above it all

What Tools are being used for Restoration?

- Bio-engineering
- Change of Point of Diversion
- Fisheries Improvements with structures
- Floodplain Corridor Shear Stress
- Floodplain Restoration Legacy Sediment Removal
- Four - Stage Urban Restoration
- Low Maintenance High Functioning
- Low Tech Design
- Natural Channel Design (D,P,P, Rosgen Structures)
- Natural geomorphic Recovery
- Process-Based Design (Beechie 2010)
- Beaver Dam Analogs

- Stage Zero Design
- Stormwater Management and Masterplanning
- Threshold Channel Design
- *Bank Stabilization*
- *Reducing Sediment Supply*
- *Property Protection*
- *Fish habitat Improvements of pools Toe Wood and J-hook vanes (log and rock)*
- *Grade Control for Irrigation diversions*
- *The multi-stage channel (inner berm, bankfull, active floodplain and floodprone area) is a dominant method.*
- *Zedyke Zuni Bowls*
- *AutoCAD*

- *Survey Grade GPS*
- *Lidar*
- *Process-based Design*
- *Gravel Augmentation*
- *Braided and Stage Zero Channels*
- *Engineered Log Jams*
- *Reference Reach*
- *Hydraulic Models*
- *404 mitigation*
- *Emergency Watershed Protection*
- *ESA*
- *Natural Recovery*

Trends – In the Intermountain West

- Natural Areas → Biodiversity and Variability
- Agricultural Areas → Recreation and Stability
 - Gentleman Ranchers → Recreational Fisheries
 - Working Ranches/Irrigation → Stability and Reliability
- Urban planning → Stabilization Multi-stage Channel
 - Geomorphic Channel (Effective, Bankfull, Professional Judgement)
 - 70% of the 2-year
 - 10% of the 100-year
 - 4-Stage (Inner-berm, Bankfull, Flood Terrace, Regional Terrace)
 - Flood Protection



Comparison of Philosophy and Tools

A theory or attitude held by a person or organization that acts as a guiding principle for behavior:

Philosophy

(Humans think Truth is found through)

- Nihilism – Nothing
- Existentialism – Anti-Human
- Stoicism – Acceptance
- Hedonism – Pleasure
- Marxism – Anti-Capitalist
- Positivism – Logic
- Taoism – Humility
- Rationalism – Reason
- Relativism – Perspective
- Buddhism – Suffering

Tools

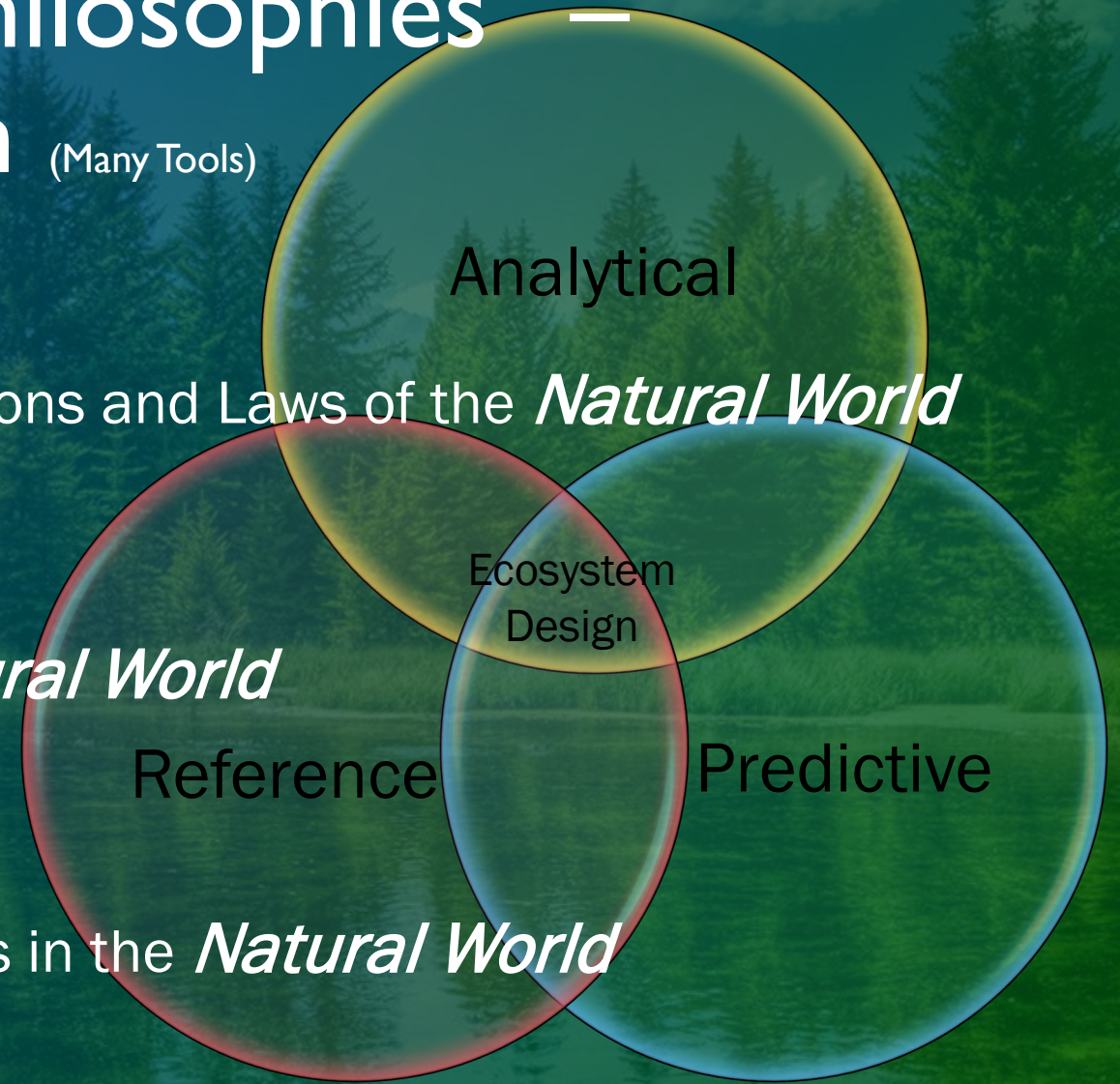
(Humans use to carry out a particular function)

- Natural Channel Design
- Process Based Design
- Stage Zero Restoration
- Large Woody Debris
- Hay Bale Grade Control Structures
- Fly Links Ecosystem Sport
- AutoCAD 3-D design
- Beaver Dam Analogs
- Ground Based Lidar
- Functional Assessment
- Stream Quantification Tool
- Survey Grade GPS
- Innovative In-channel Structures

Stream Restoration Did not make the Top 10

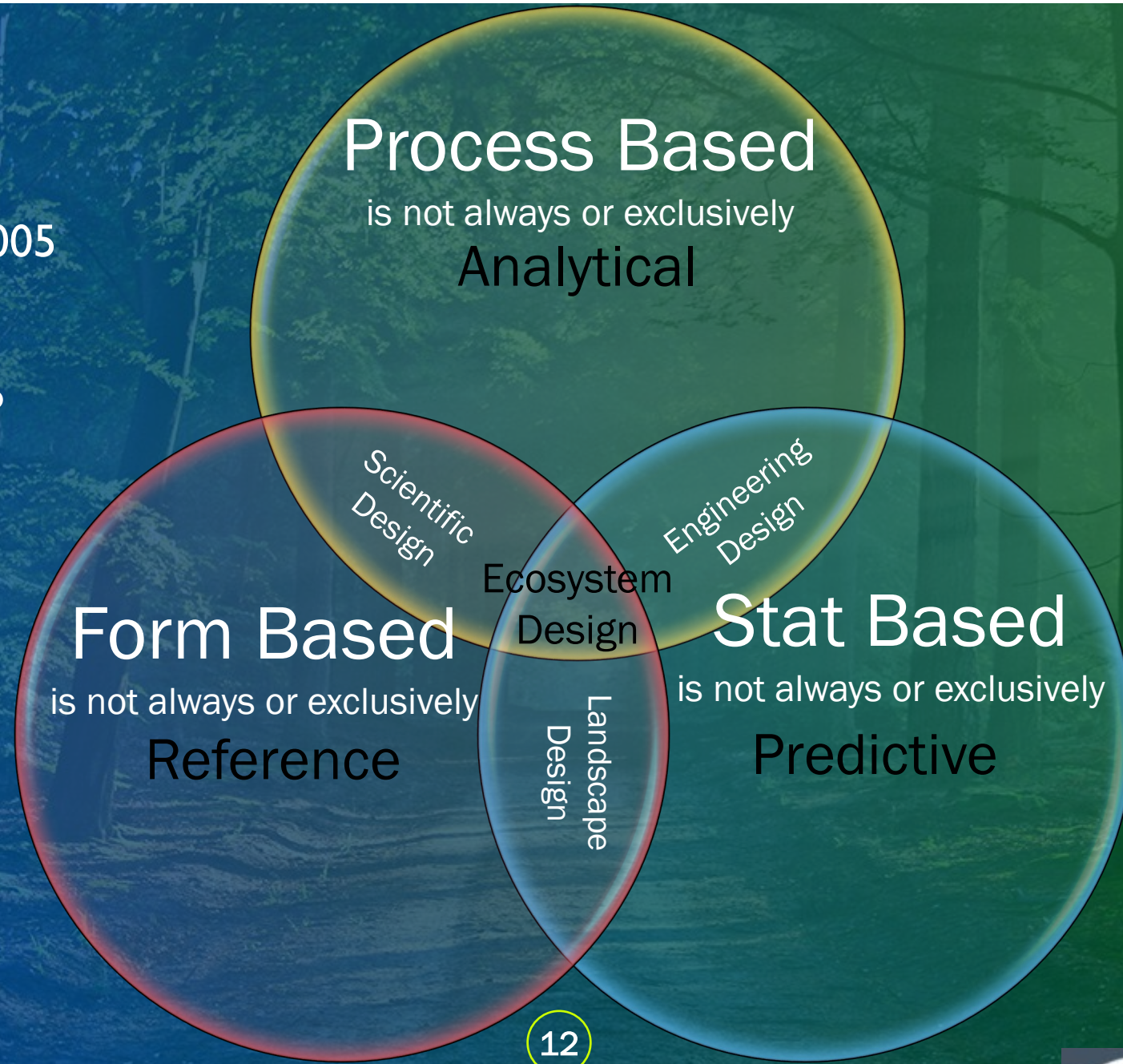
3 Design Toolbox – “Philosophies” – Ecosystem Restoration (Many Tools)

- Analytical Based Design
 - Understanding of *Scientific* Equations and Laws of the *Natural World*
- Reference Based Design
 - *Scientific* observation of the *Natural World*
- Predictive Based Design
 - *Scientific* prediction of interactions in the *Natural World*



(Many Tools)
Process vs. Form

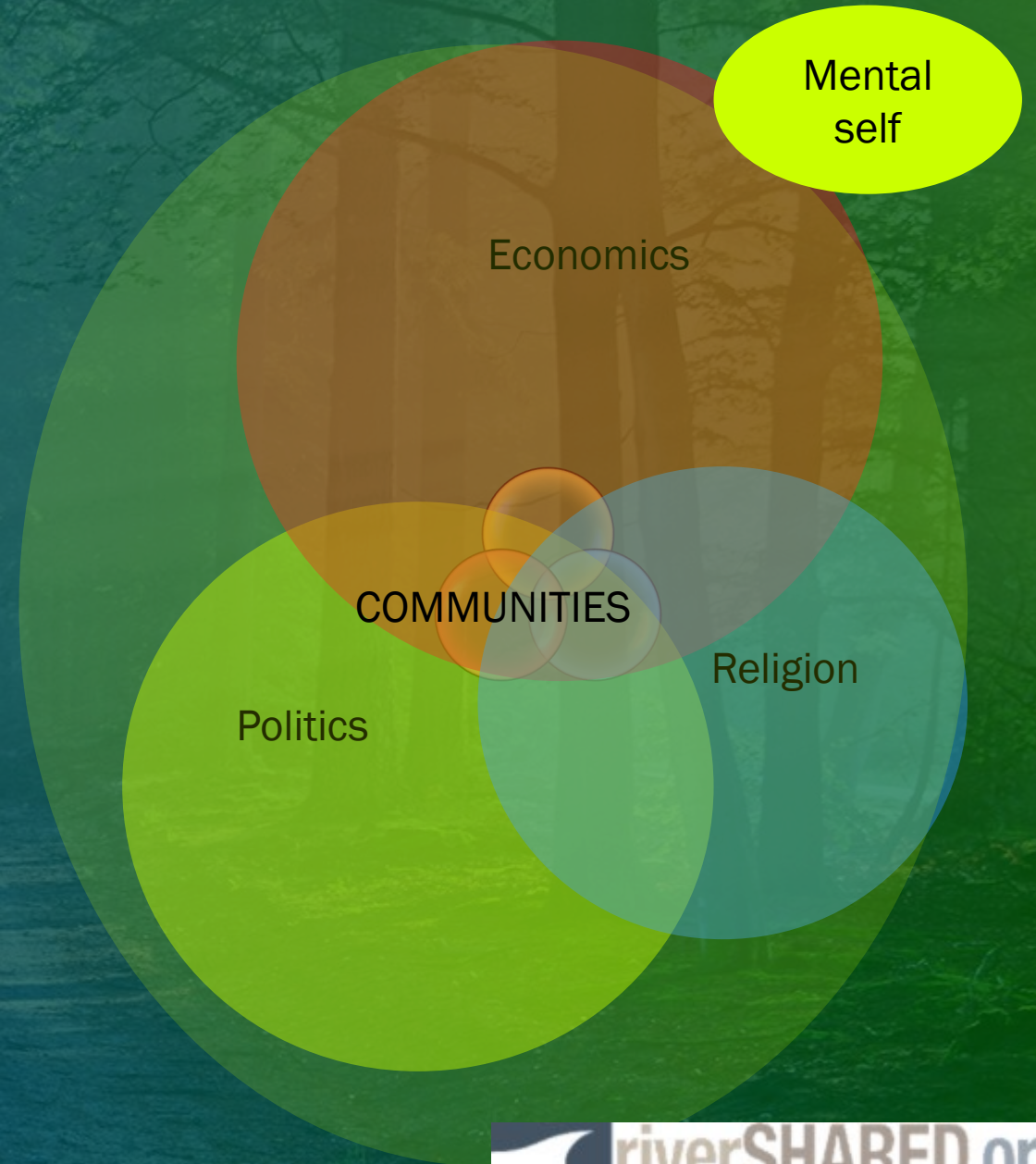
Montgomery, 1999
Bernhardt, et al, 2005
Kondolf, et al, 2006
Beechie, 2010
Kasprak, et al, 2016



(Many Tools)

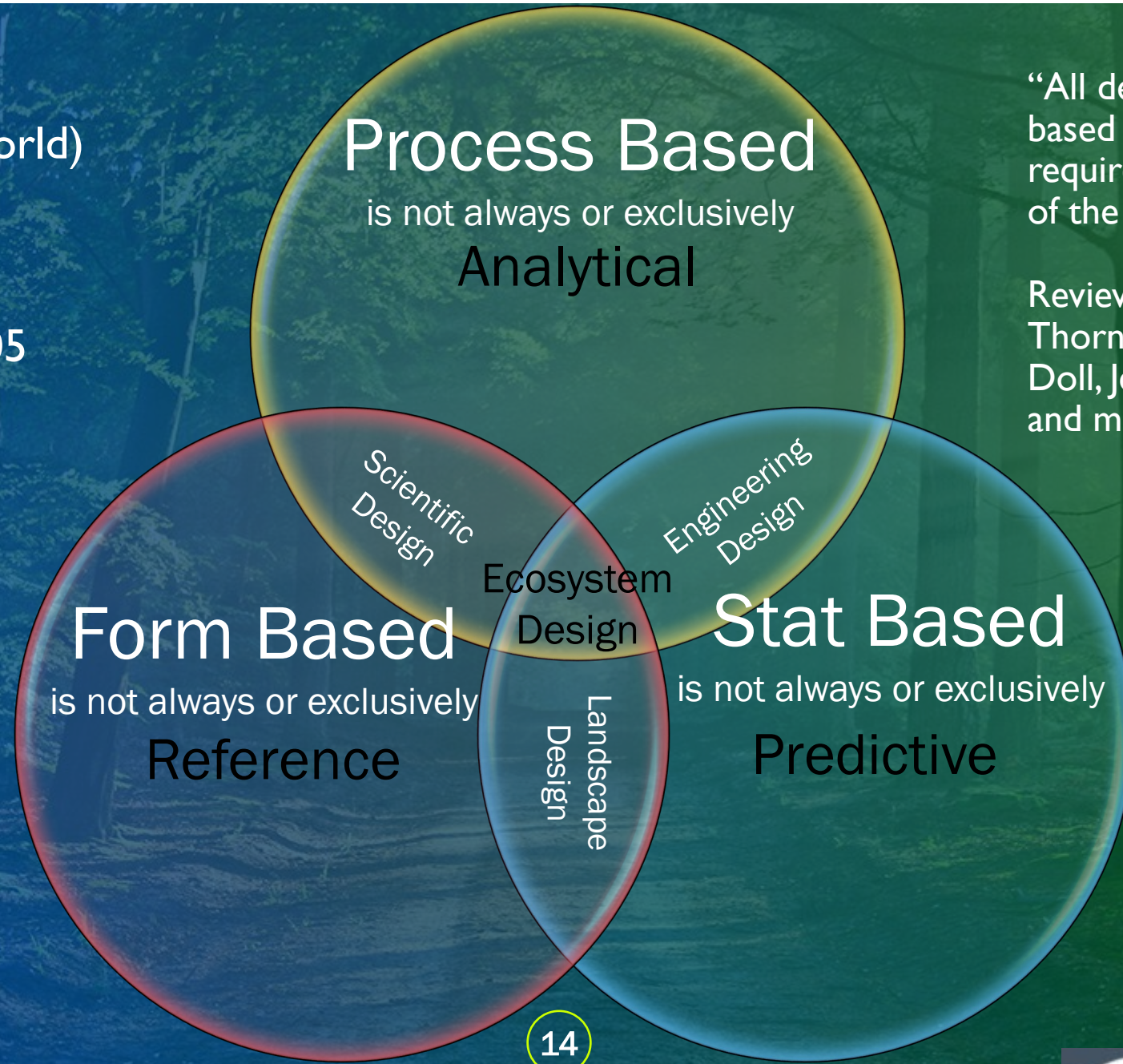
Parallel Universes (Scientific American, 2022)

- Statement
- Designing with Goals and Objectives in Mind
 - Sharing Experiences Promotes Excellence



(Many Tools – Big World)
Process vs. Form

Motgomery, 1999
Bernhardt, et al, 2005
Kondolf, et al, 2006
Kasprak, et al, 2016



“All design should be process-based design and some designs require reference in the form of the design”

Reviewed by
Thorne, Schmidt, Rosgen
Doll, Jennings, Skidmore, Wohl,
and many others 2023-2024

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- *Natural Recovery*

Why are these Tools being used for Ecosystem Restoration?

- They are relatively good to set a system on the Trajectory of Ecosystem Restoration – They work
- They are relatively simple to set a system on the Trajectory of Ecosystem Restoration – I understand them
- They provide me with credit for my effort/involvement– They are mine
- Others
- Community Revival
- Mental Health Recovery

- Urbanization
- Terrorism
- Runoff Rates
- Evaporation/Transpiration
- Waste of Agricultural Water
- Drought
- Industrialization
- Earthquakes
- Climate Change

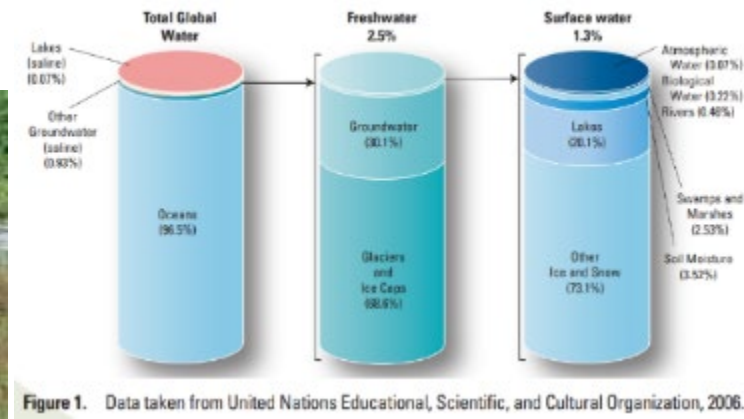
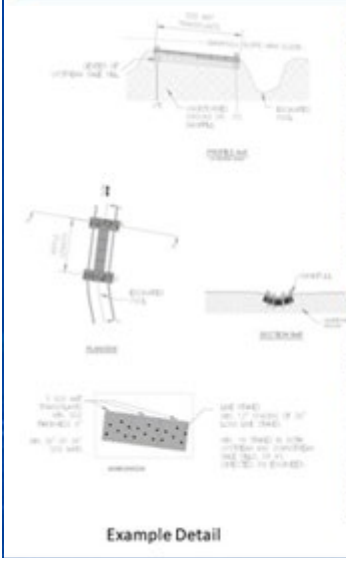
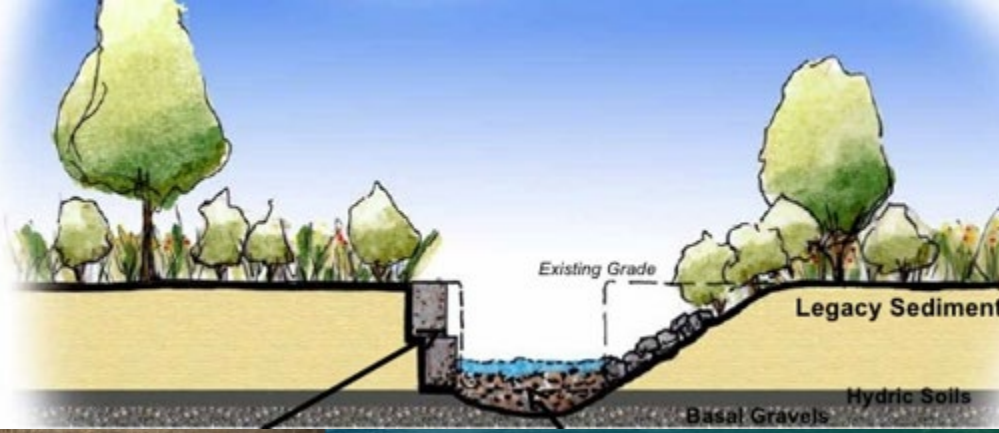
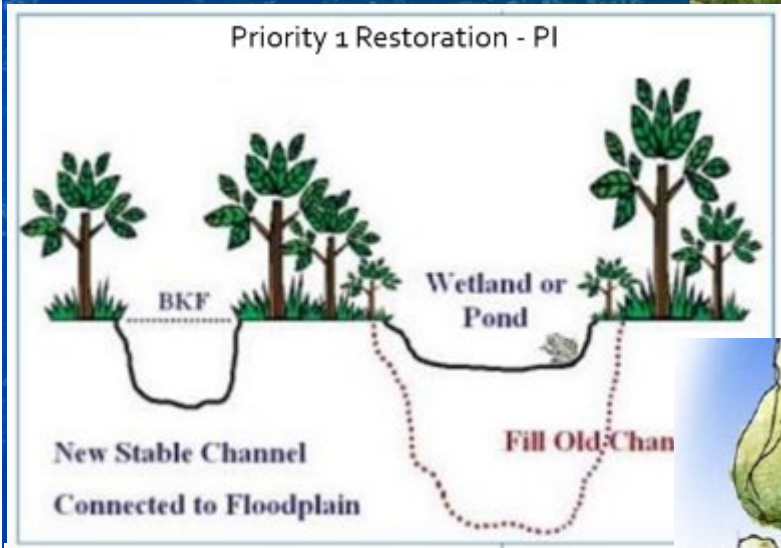
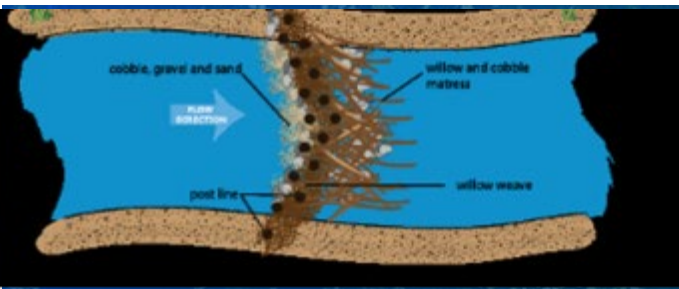


Figure 1. Data taken from United Nations Educational, Scientific, and Cultural Organization, 2006.

- World Bank is aware of the seriousness of water-security issues.
(Young 2006)
- Since ancient times, limiting access to water has been used as a weapon through the destruction of water resources and distribution facilities

Water Development and Security

- Water Quality
- Water Intakes
- Water Diversions
- Water Storage
- Water Protection



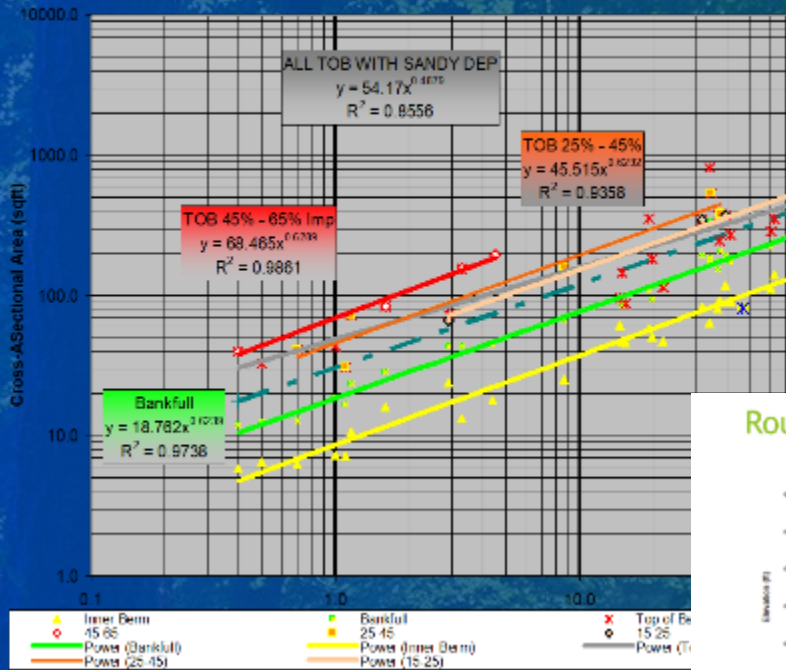
Post-Construction

2 years Post-Construction

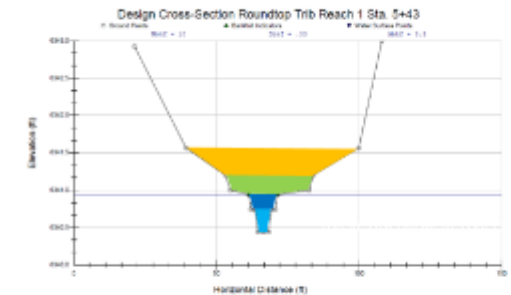


Floodplain Connectivity

- Priority Restoration
- Floodplain Restoration
- Stage Zero Restoration
- Beaver Dam Analogs
- Hay Bale Grade Control
- Engineered Hard Structures



Roundtop Tributary Reach 1



- 100-yr Discharge = 200cfs
- 100-yr Design Applied Shear Stress < 1.1psf
- Applied Shear Stress greater than 2psf will significantly increase the risk of failure
- Discharge of 870cfs will reach an applied shear stress of 2psf

Channel-forming (dominant) discharge

Estimated using:

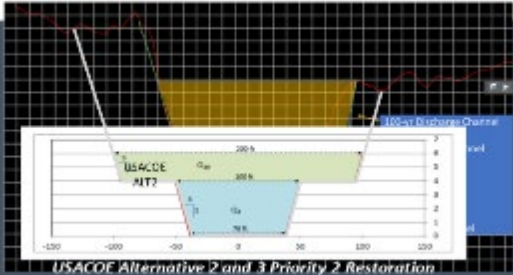
- Effective discharge
- Bankfull discharge
- Discharge associated with recurrence interval (typically 1 to 2 year)



Discharge Profile	BASE (ft)	DEPTH (ft)	WATER SURFACE ELEVATION (ft)	WATER SURFACE WIDTH (ft)	WATER SURFACE AREA (sq ft)	WATER SURFACE VELOCITY (ft/s)	WATER SURFACE DISCHARGE (cfs)
Bankfull	4915.50	0.5	4916.00	100	10000	0.5	5000
Effective	4915.50	0.25	4915.75	50	2500	0.5	1250
100-yr Flood	4915.50	1.0	4916.50	100	10000	1.0	10000
200-yr Flood	4915.50	1.5	4917.00	100	10000	1.5	15000

Watershed Response Factor

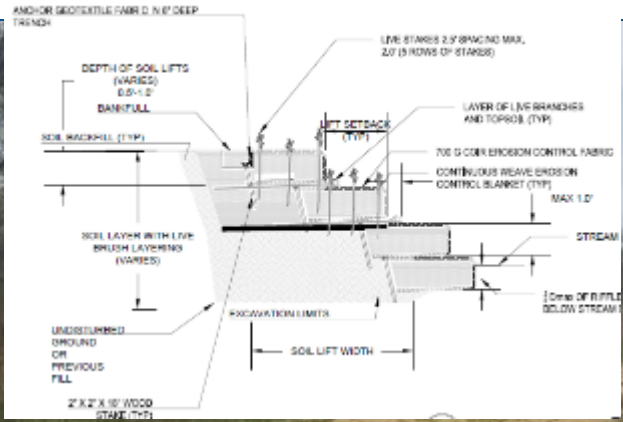
- Global implications for using a tool to address water security



USACOE Alternative 2 and 3 Priority 2 Restoration

Channel Sizing

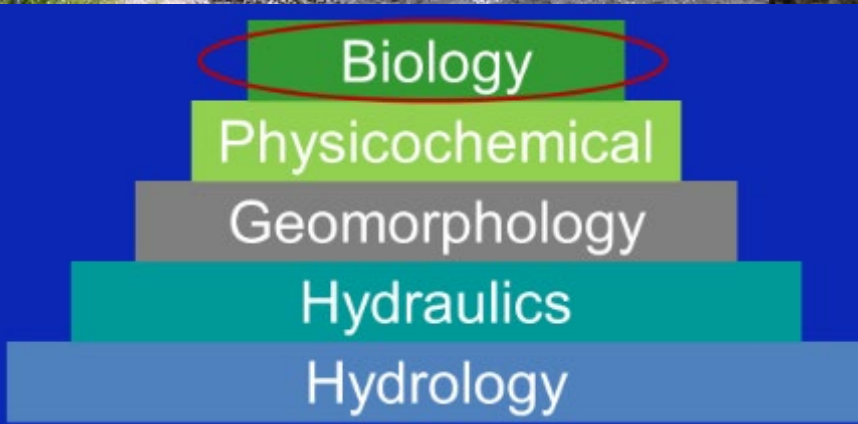
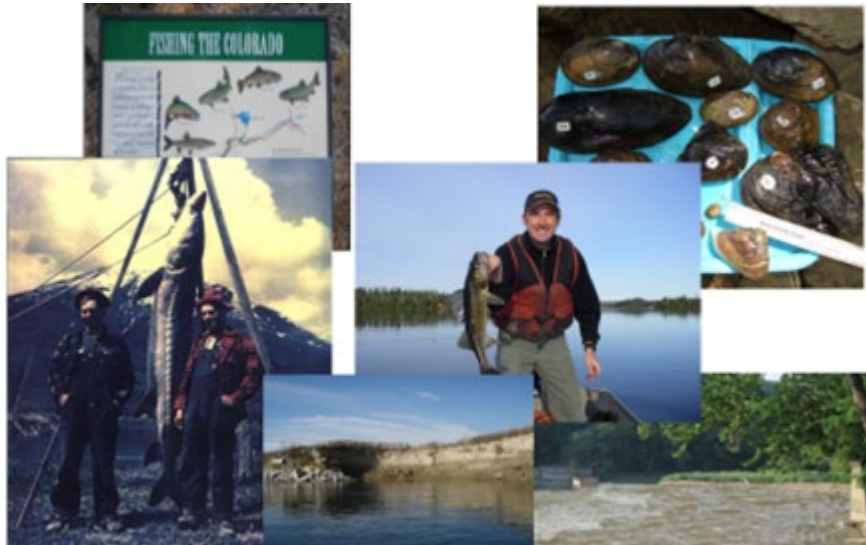
- Effective Discharge
- Regression Equations
- Regional Curves
- Reference Reaches
- Recurrence Intervals
- Analytical Analysis
- Landscape and Aesthetics



Bio-Engineering

- Floodplain Reference Shear Slope Stabilization
- Vegetated Liner Channels
- Tractive Channel Design
- In Conjunction with Modeling Scale





Biodiversity Complexity

- Floodplain Function
- Wetland Diversity
- Regenerative Agriculture
- Aquaculture
- Geomorphic Hazard Zones



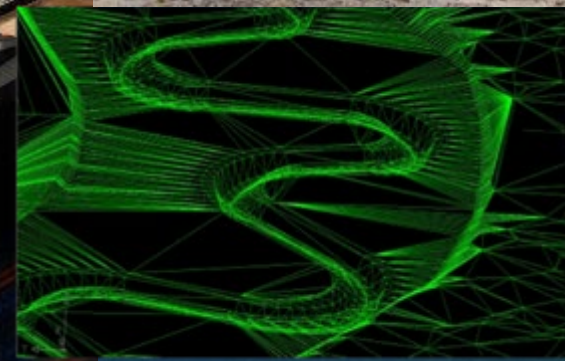
Tech Training

(AutoCAD, Construction)

Tools that can be rapidly introduced

- Construction
- Drafting
- Survey

Introduction to the Industry
Used in other Industries





Bespoke Education

5:1 Student Instructor Ratio
Listen to the Industry
Work with existing educators
Create the opportunity for

- Adventure
- Community
- Enrichment
- Action



Ecosystem Adventure

- Travel to learn
- Travel to experience
- Travel to be with
- Short training course
- Shared instruction
- Eating, Music and Dancing
- Meet a new community





Ecosystem Sport



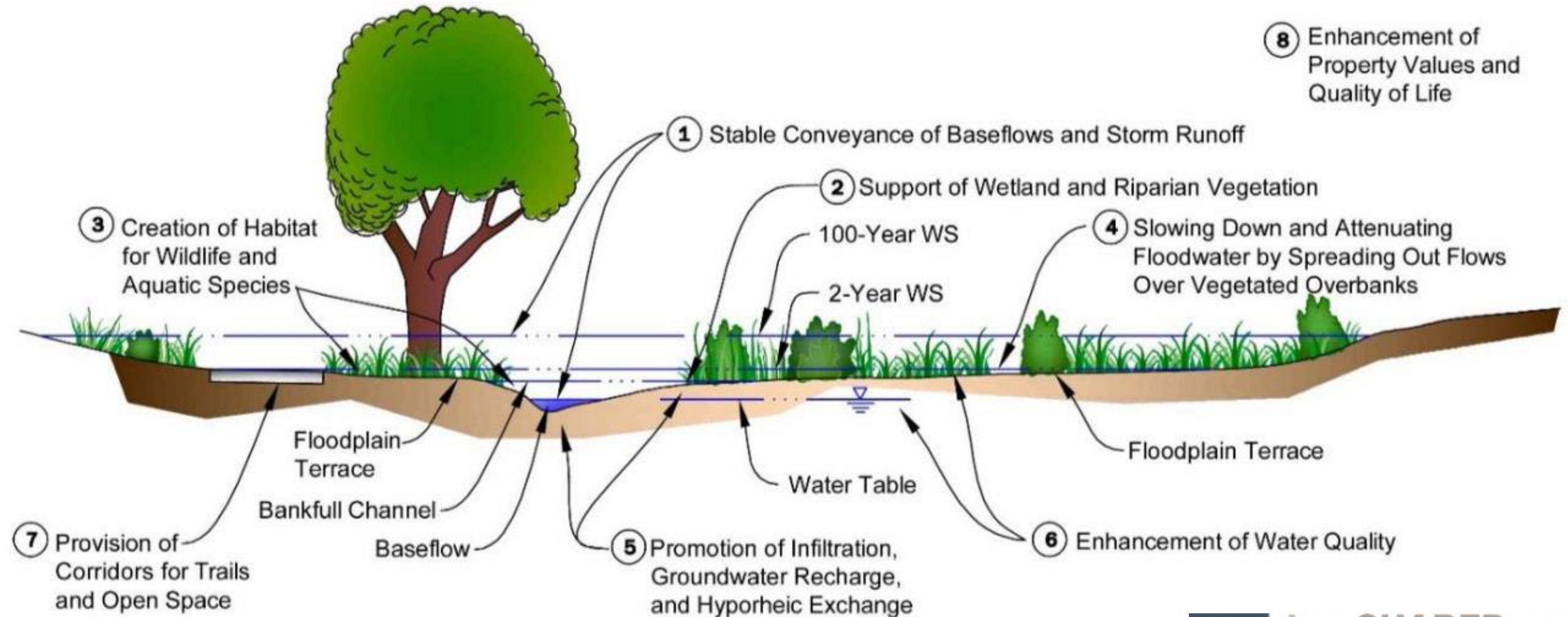
- Demonstration of ecosystem function
- 3-hr journey at defined location
- Promote native species
- Digital applications
- Connect to wonderment and awe

Natural Streams Are Corridors Not Just The Bankfull Channels

NEW: Process-Based Natural Corridor Design (**PBNCD**)



Functions and Characteristics of Natural Stream Corridors

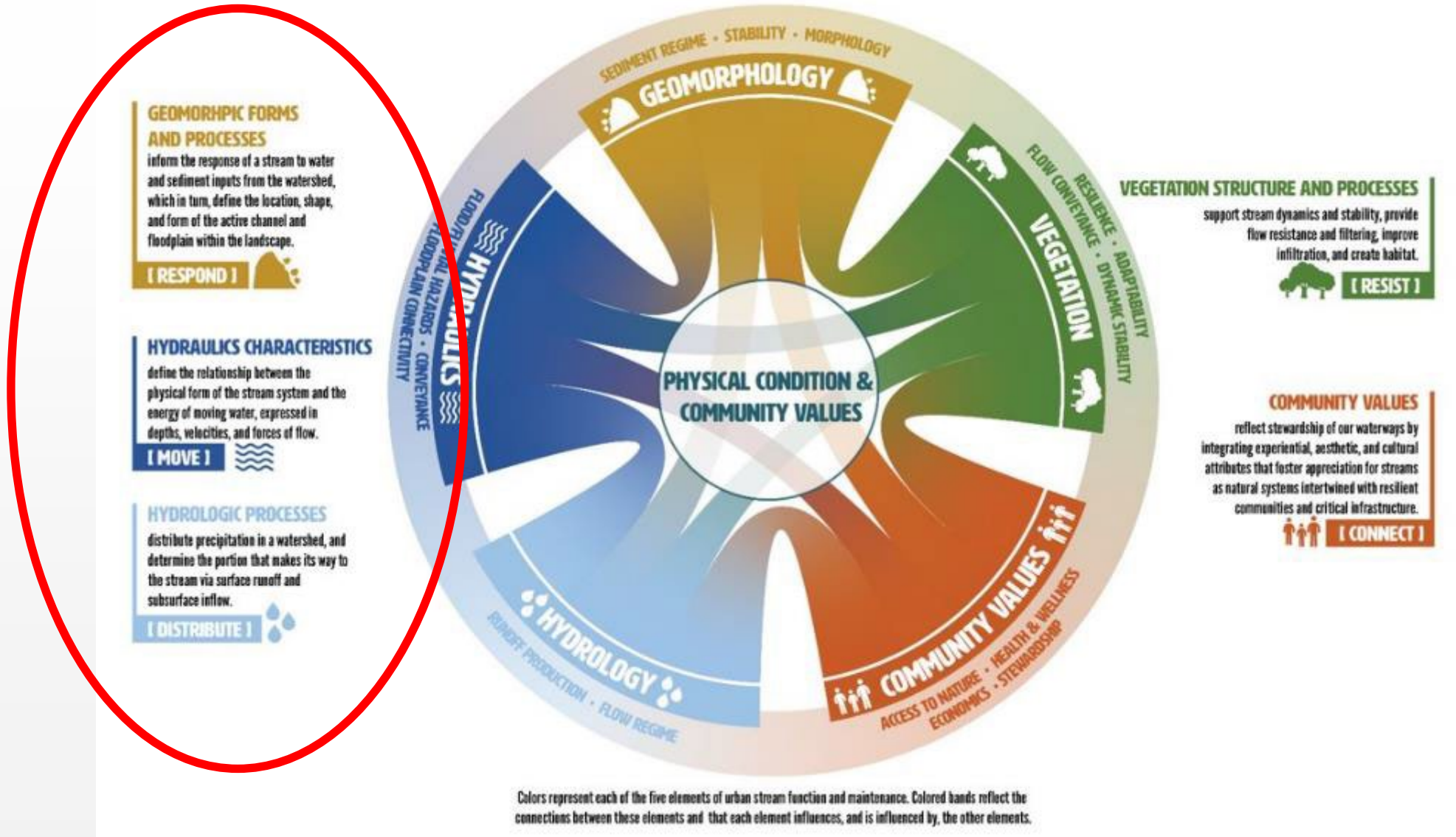


What is a Stream Management Corridor?



“The area needed to protect and preserve urban stream corridors while also identifying an overall width that the stream may require to function.”

THE FIVE ELEMENTS OF URBAN STREAM FUNCTION



Example
Toulmins
Spring
Reach 4

Cross Section View

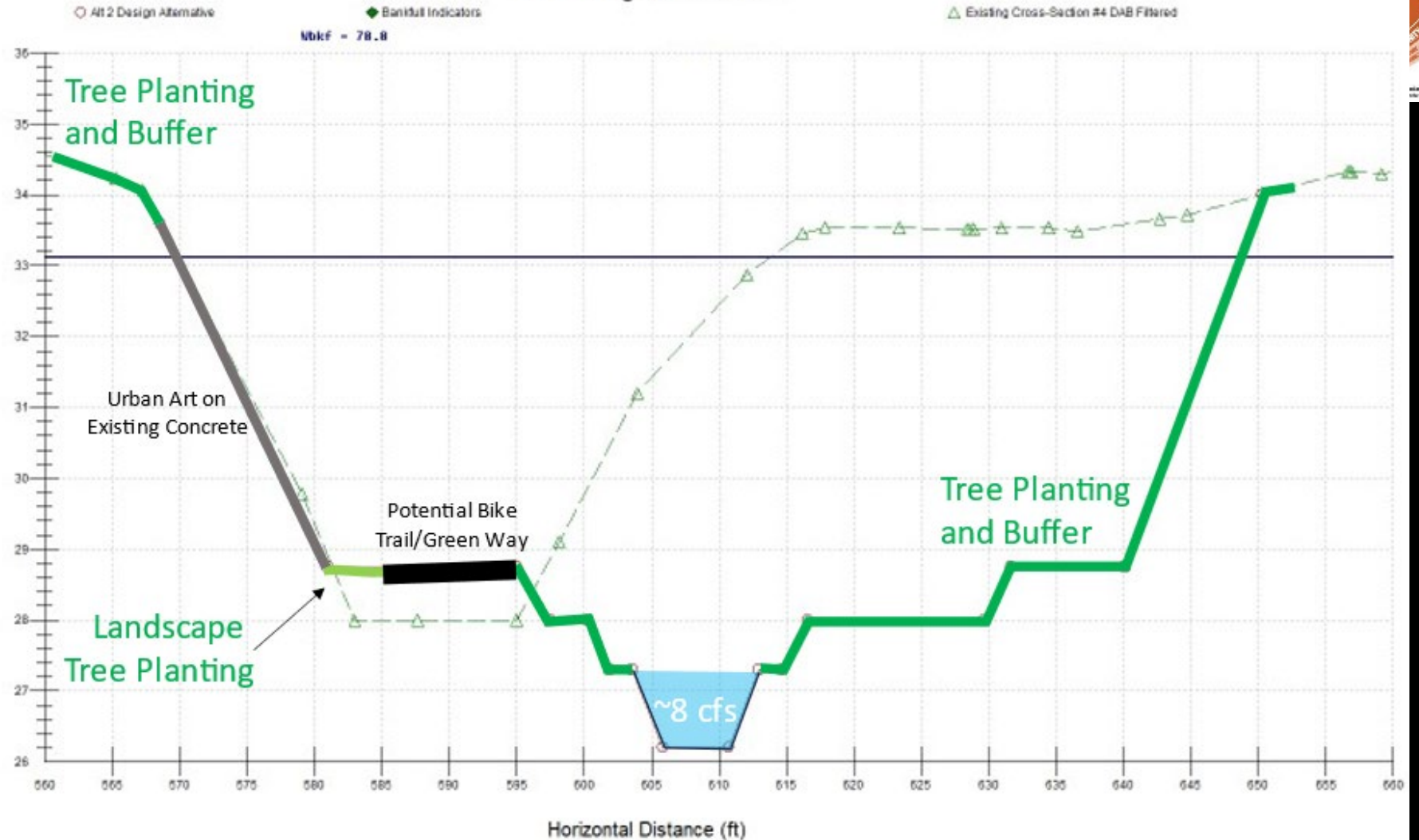


What Can We Do to Promote Restoration?



Priority 2 Restoration

Alt 2 Design Alternative



WATER QUALITY
 and quantity of water
 available for the
 ecosystem and
 human use.

WATER QUALITY
 and quantity of water
 available for the
 ecosystem and
 human use.

WATER QUALITY
 and quantity of water
 available for the
 ecosystem and
 human use.

WATER QUALITY
 and quantity of water
 available for the
 ecosystem and
 human use.

awE³

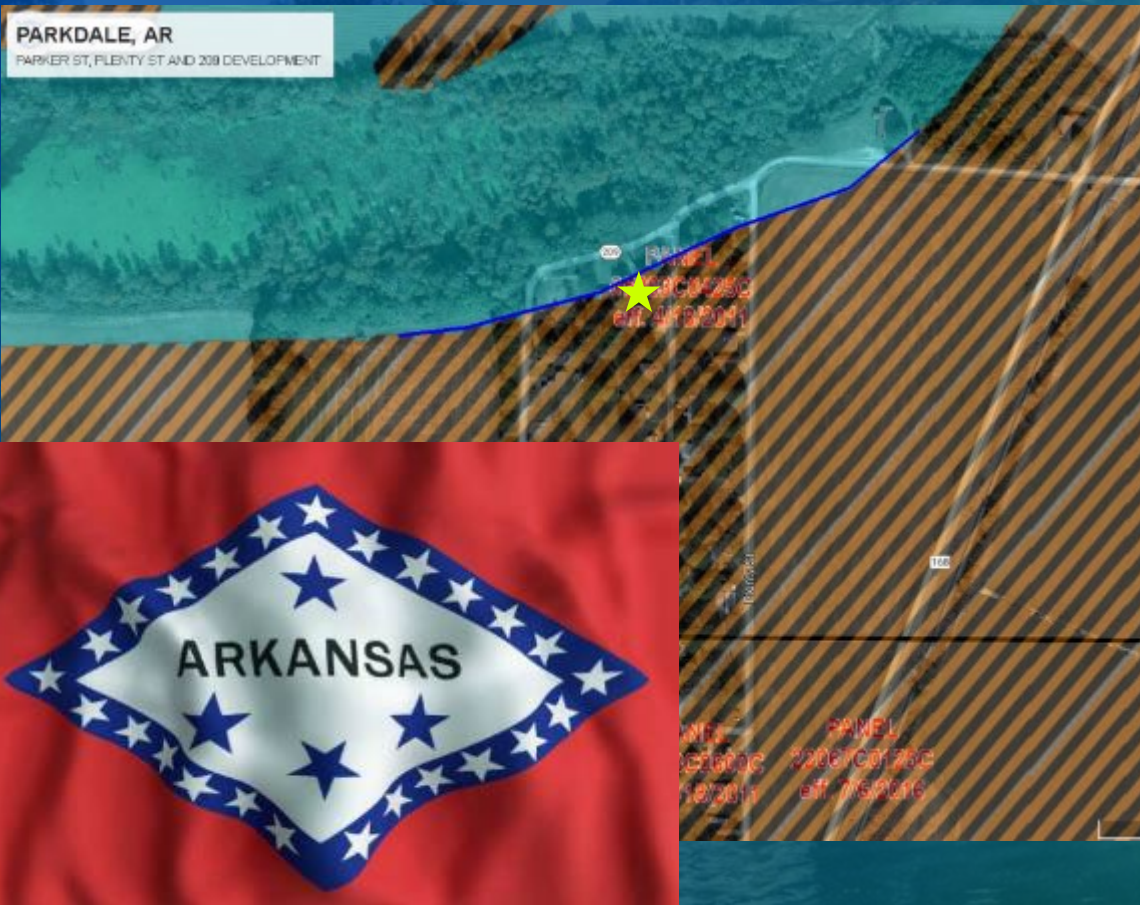
- Ecosystem Restoration (Awe of Diversity)
- Economic Restoration (Awe of Sharing)
- Ekklessia Restoration (Awe of Gathering)

USA Domestic Underserved Regions

A loss of Hope



USA Domestic Underserved Regions



NRCS-AMBA

How did we get here

Cotton Gin 1793

<https://mlpp.pressbooks.pub/ushistory1/chapter/slavery-king-cotton/>

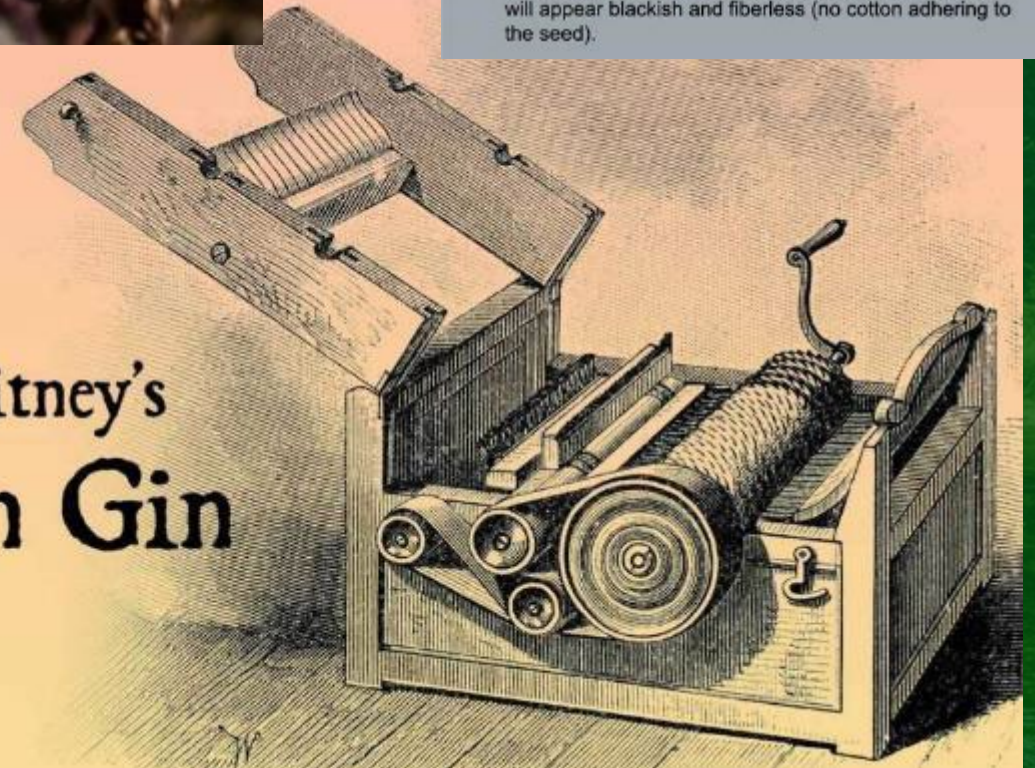


COTTON SEED



The seed from the cotton plant. The seed is approximately 3/8 inch long and 3/16 inch wide. It is covered by a soft fibrous white substance. Sometimes the seed will appear blackish and fiberless (no cotton adhering to the seed).

Eli Whitney's Cotton Gin



NRCS-AMBA

How did we get here

Cotton 1793 - 1860

<https://mlpp.pressbooks.pub/ushistory1/chapter/slavery-king-cotton/>



NRCS-AMBA

How did we get here

Share Cropping 1865 -1970

<https://mlpp.pressbooks.pub/ushistory1/chapter/slavery-king-cotton/>



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NRCS-AMBA

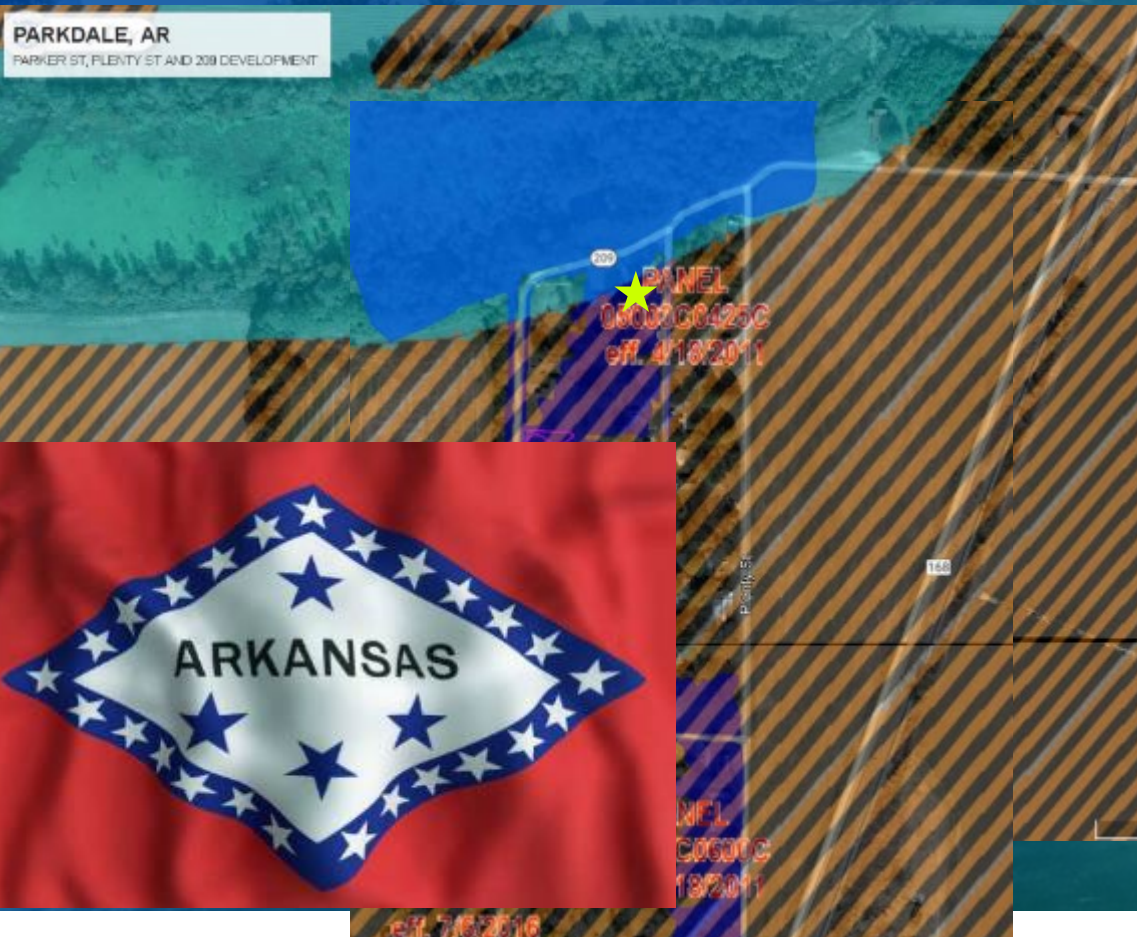
How did we get here

Share Cropping 1865 -1970

<https://mlpp.pressbooks.pub/ushistory1/chapter/slavery-king-cotton/>



USA Domestic Underserved Regions



Domestic Underserved Regions

Drainage Improvements - Security

Green-based Economy - Jobs

Co-op value – Investment Capital

Training and Education – Hope



Rochester University Property
Eastern MI – University

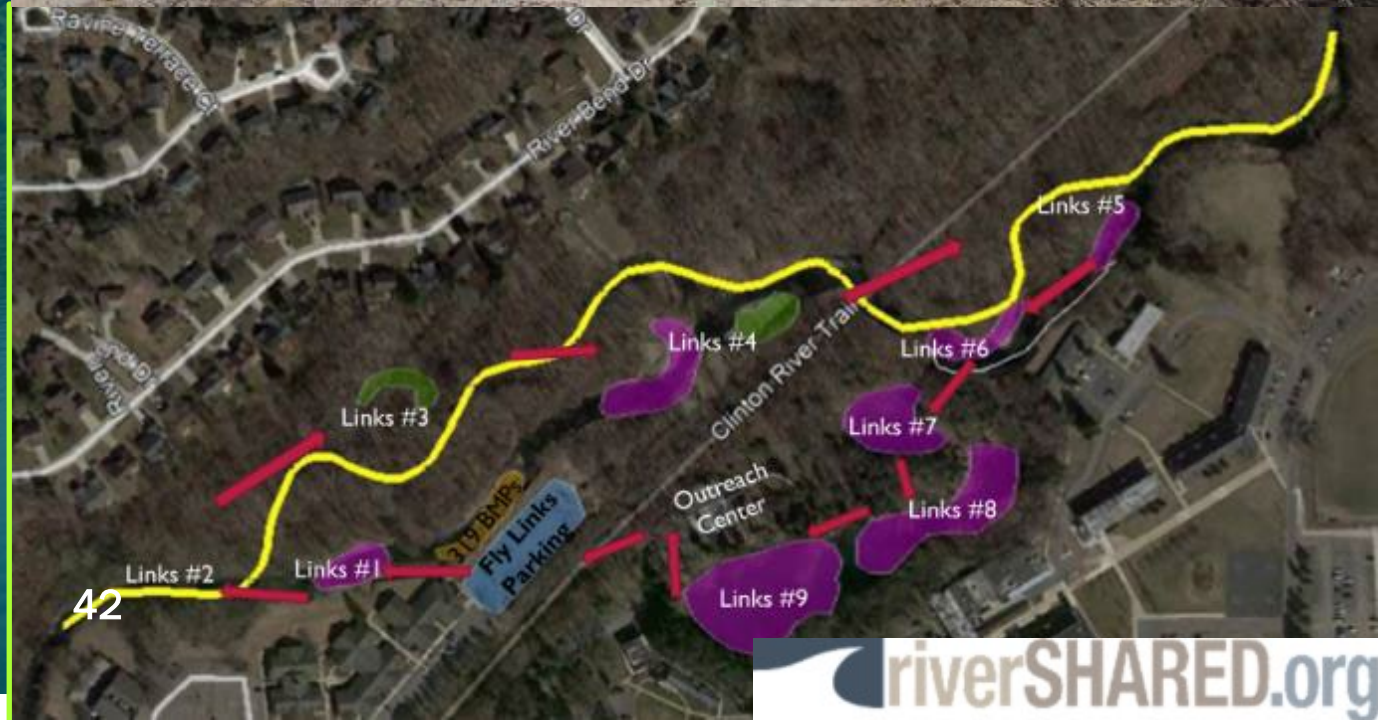
Clinton River, Educational Center, Outreach
and Trails – Construction Started October
2021 - 2028

Fishing Links – Concept of 9 holes potential for
expansion into 18 holes. Managed for many
species including conservation species

Creating a sport of **Fly Links** as a family and
community experiences wonderment and gets
a chance to experience every hole. 319 Grants

Fly Links Course – Municipal Course City of
Rochester Hills

Create new fishing techniques including Trophy
creation (I-phone 13)



Wiregrass Property
Eastern Alabama (Shorter)



Construction Start Date October Fall 2024 - 2025

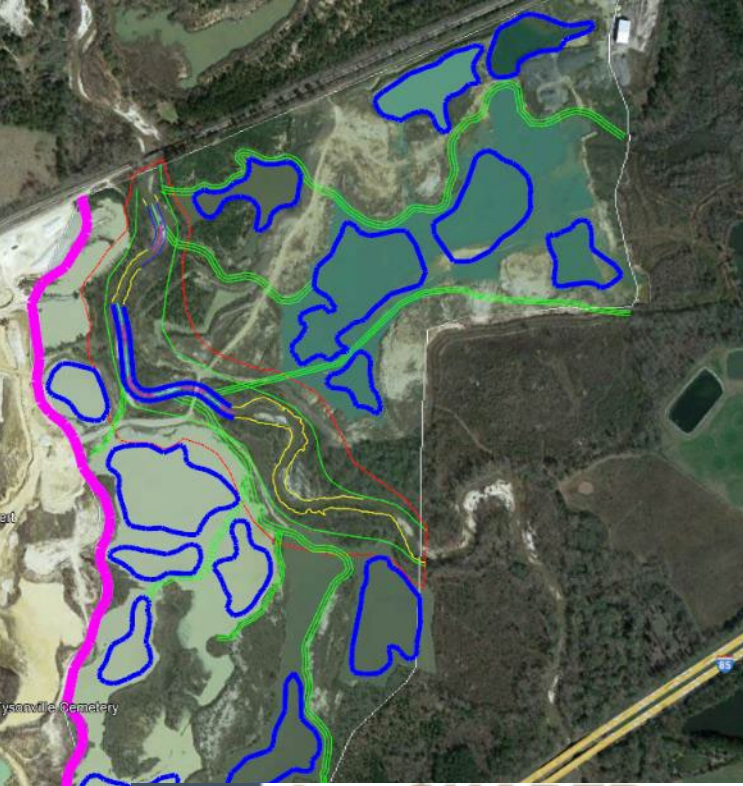
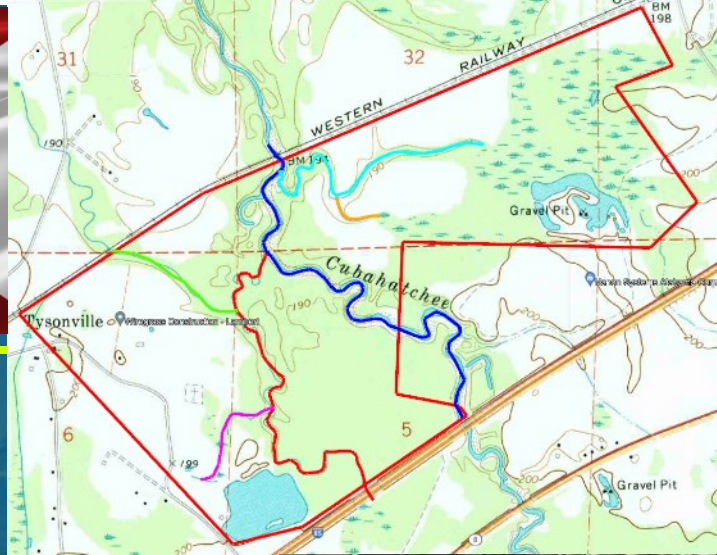
Fishing Links – 18 holes. Managed for many species including conservation species. EPA Ordered and privately funded restoration

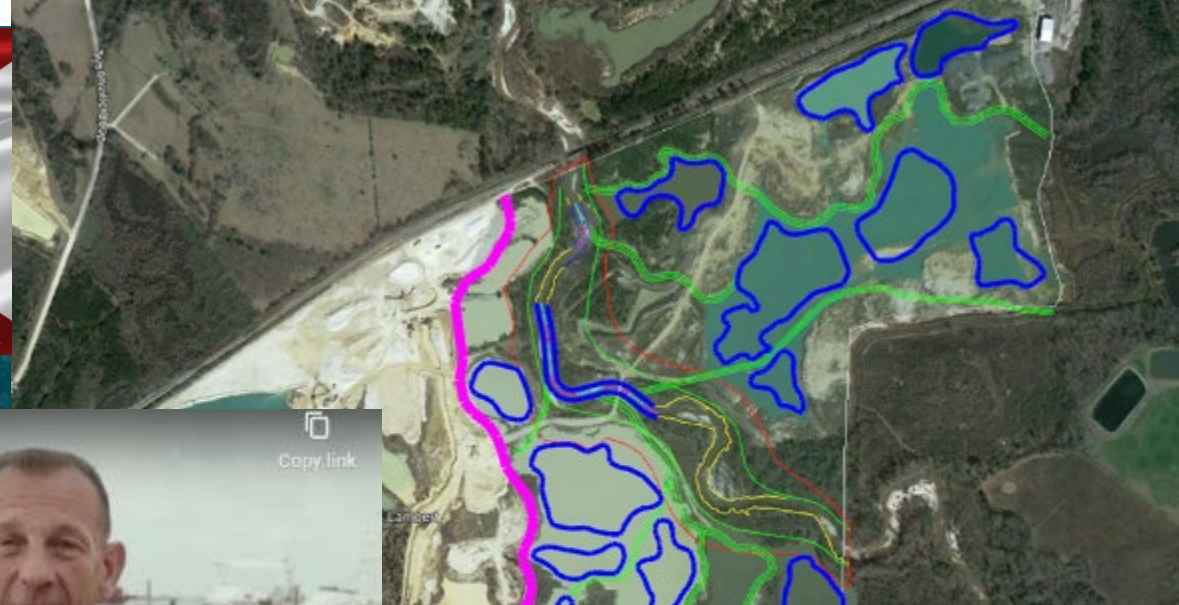
Creating a sport of **Fishing Links** as a community experiences for wonderment and wild awe

Fishing Links Course – Potential non-profit Course
City of AHERO and RiverSHARED

Near Tuskegee University and Auburn University

Guardian Program (Stewardship) and Links Guides (Caddies)





- Awe
- Wonderment
- Gathering
- Community
- Fellowship
- Stewardship



Fishing Links can be a gathering place to promote Ecological, Economic, Ekklesia and emotional/mental Restoration

How do we implement treatments?



• Vocational Heavy Construction Technology (VHCT) Program Program Results

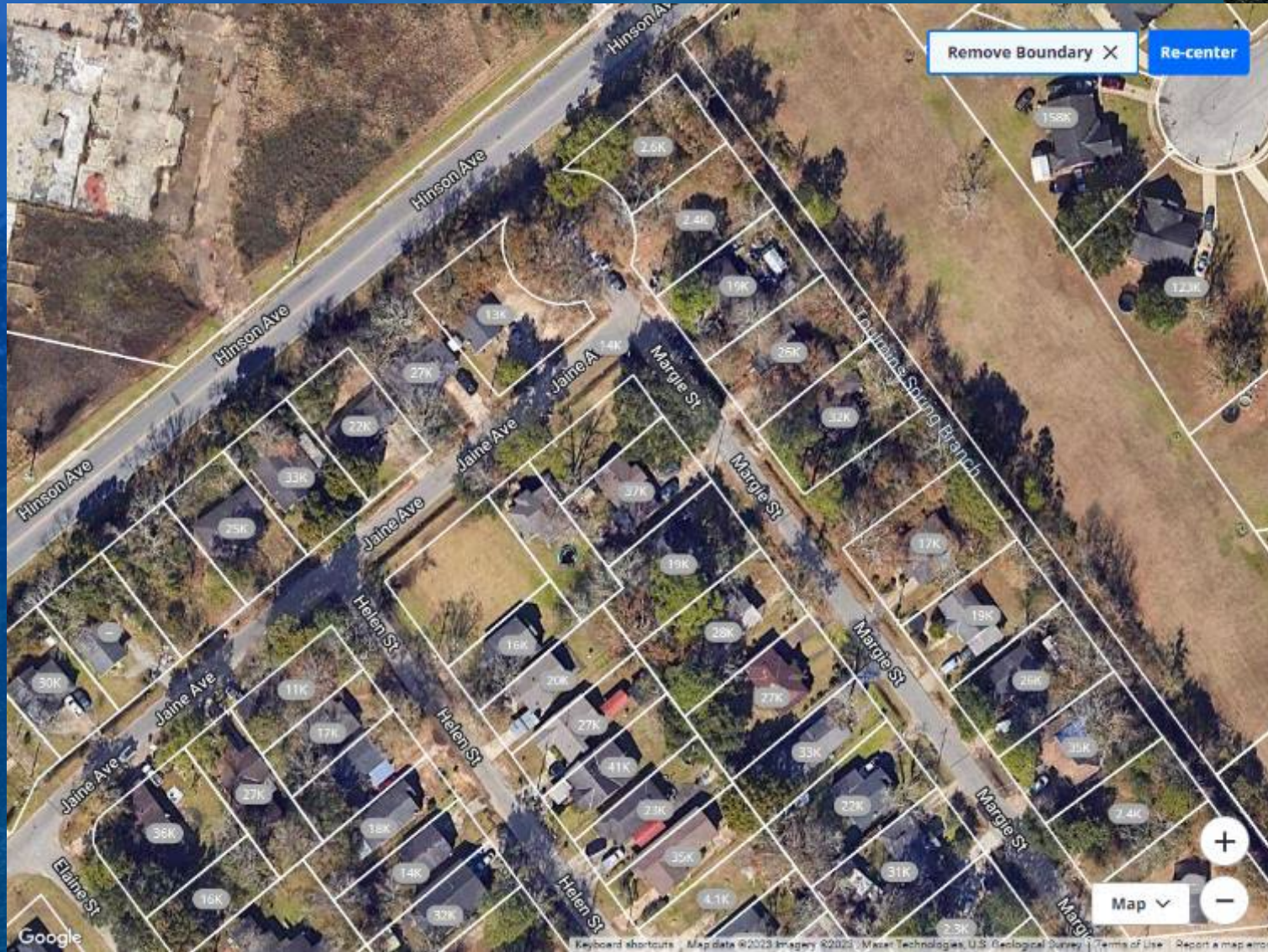
- Lives
 - Redirected lives (>150 program graduates)
 - Work ethic (12% recidivism vs. > 70 %)
 - Self confidence growth
- Rivers
 - > 12 mi. restored river habitats
 - Low-elevation flood control dam & channel
 - Constructed new stream channel (0.7 mi.)
 - Constructed new trout spawning channel

Location - Prichard Alabama

1960 post WWII – Boom Time

- *Cultural History since*
- Schooner **Clotilda** 1860





Zillow Save Share Hide More
\$20,000 3 bd | 1 ba | 880 sqft

Prichard AL Real Estate & Homes For Sale

No matching results

Try changing your search.

Similar results nearby

Results within 2 miles



19 days on Zillow

\$155,000

5 bds | 2 ba | 1,947 sqft - House for sale
 2508 Berkley Ave, Mobile, AL 36617
 OIL REAL ESTATE LLC



45 days on Zillow

\$20,000

1 bd | 1 ba | 1,829 sqft - House for sale
 806 Reynolds Ave, Prichard, AL 36610
 KELLER WILLIAMS MOBILE



47 days on Zillow

\$37,500

2 bds | 3 ba | 1,240 sqft - Foreclosure
 1207 Clara Ave, Prichard, AL 36610
 THE CUMMINGS COMPANY LLC



Price cut: \$19,000 (Apr 19)

\$38,000

3 bds | 1 ba | 1,032 sqft - House for sale
 621 Seminary St, Prichard, AL 36610
 RE/MAX REALTY PROFESSIONALS

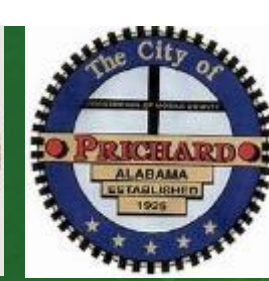
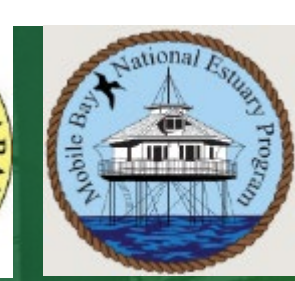
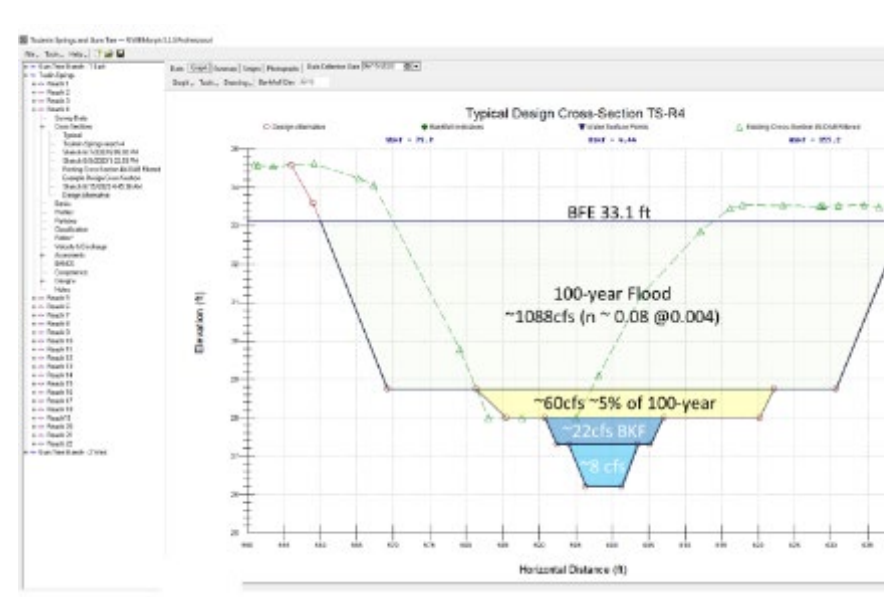


59 days on Zillow



62 days on Zillow

period, employment climbed 6.1% nationwide.



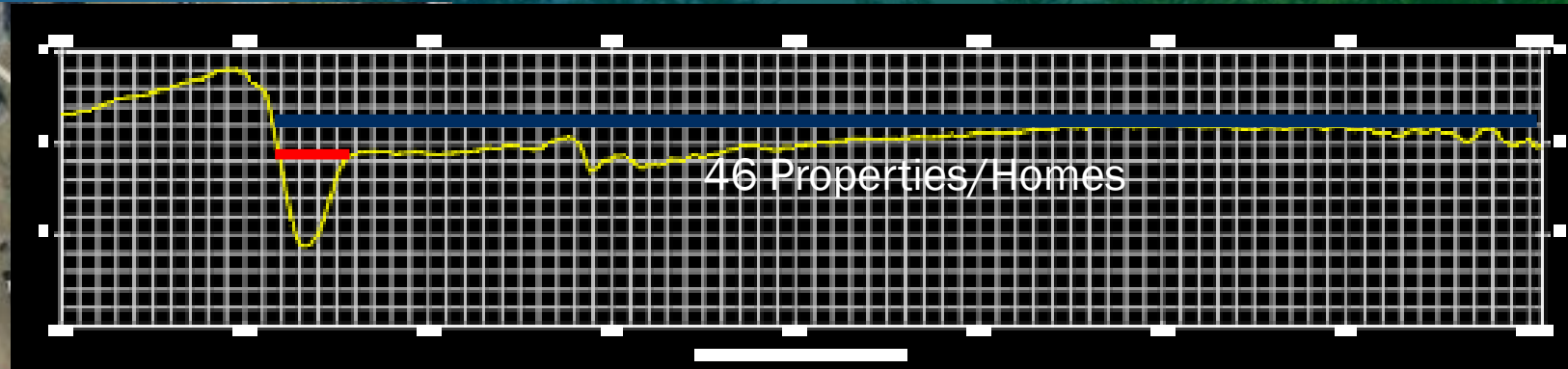
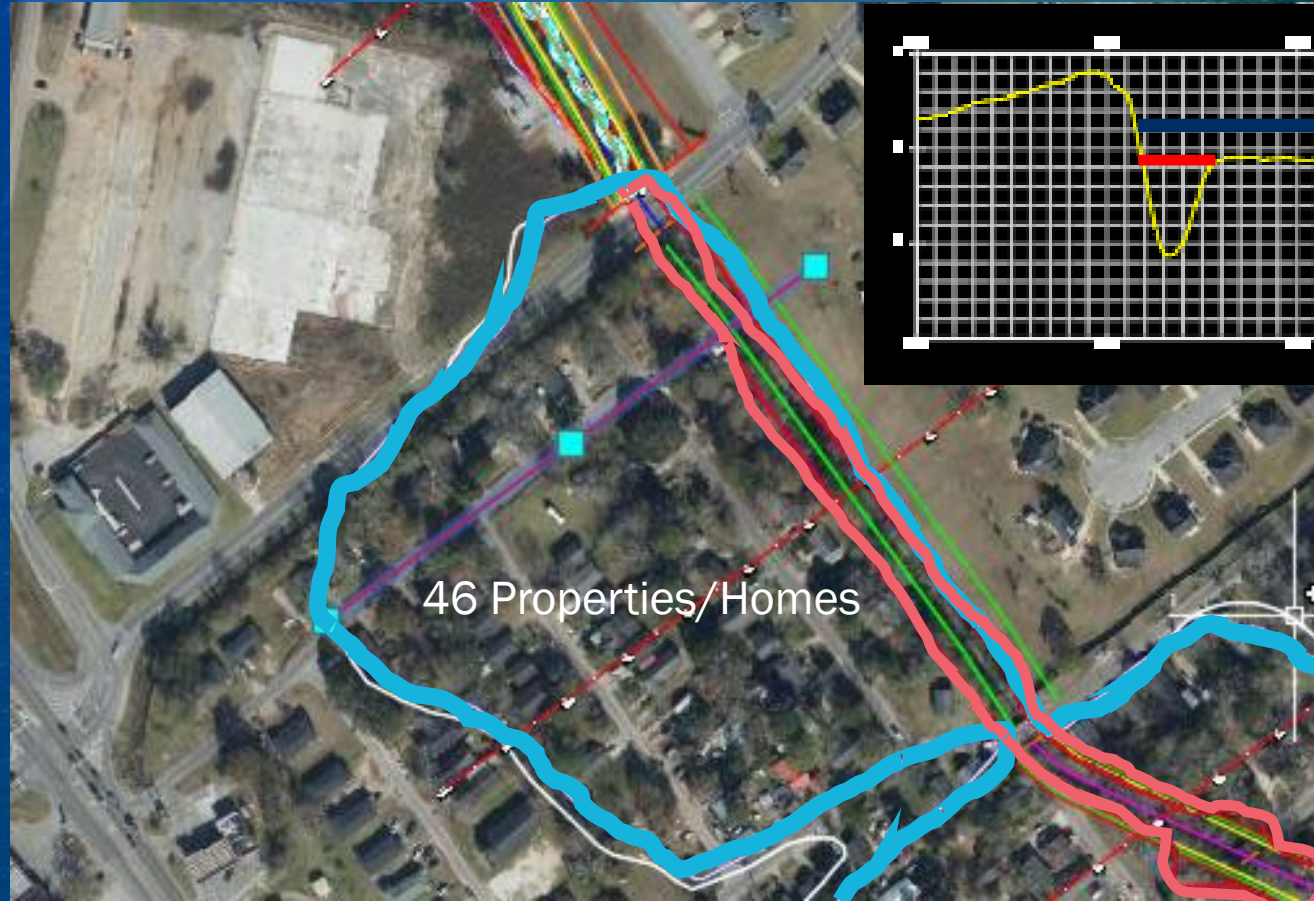
Prichard, Alabama



Toulmins Spring, Flooding and Revival



Data Toulmins Spring -FEMA



What could be done?
Toulmin Springs is a
“Problem”

Baltimore County and Beyond,

Elementary and Middle
School Education



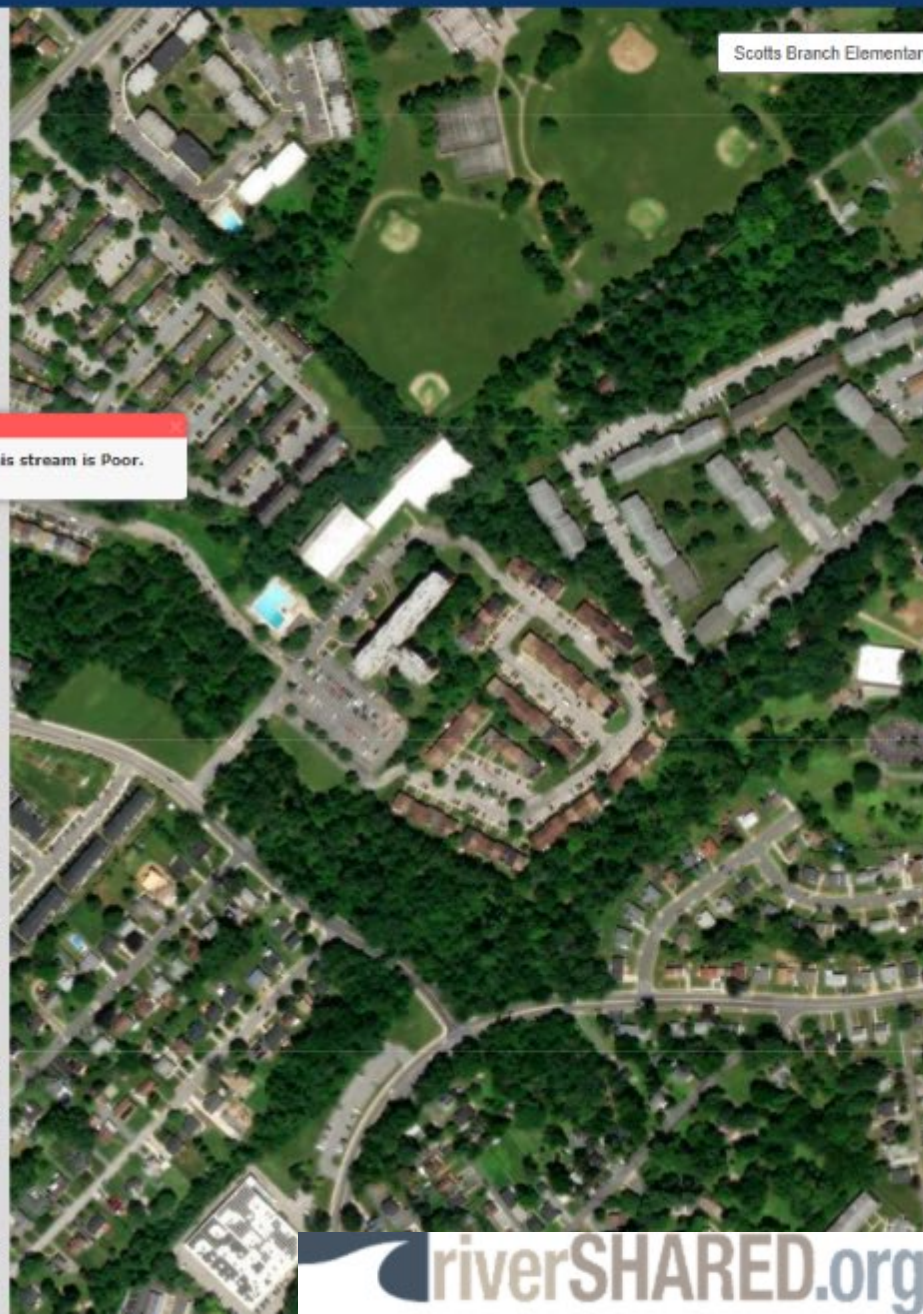
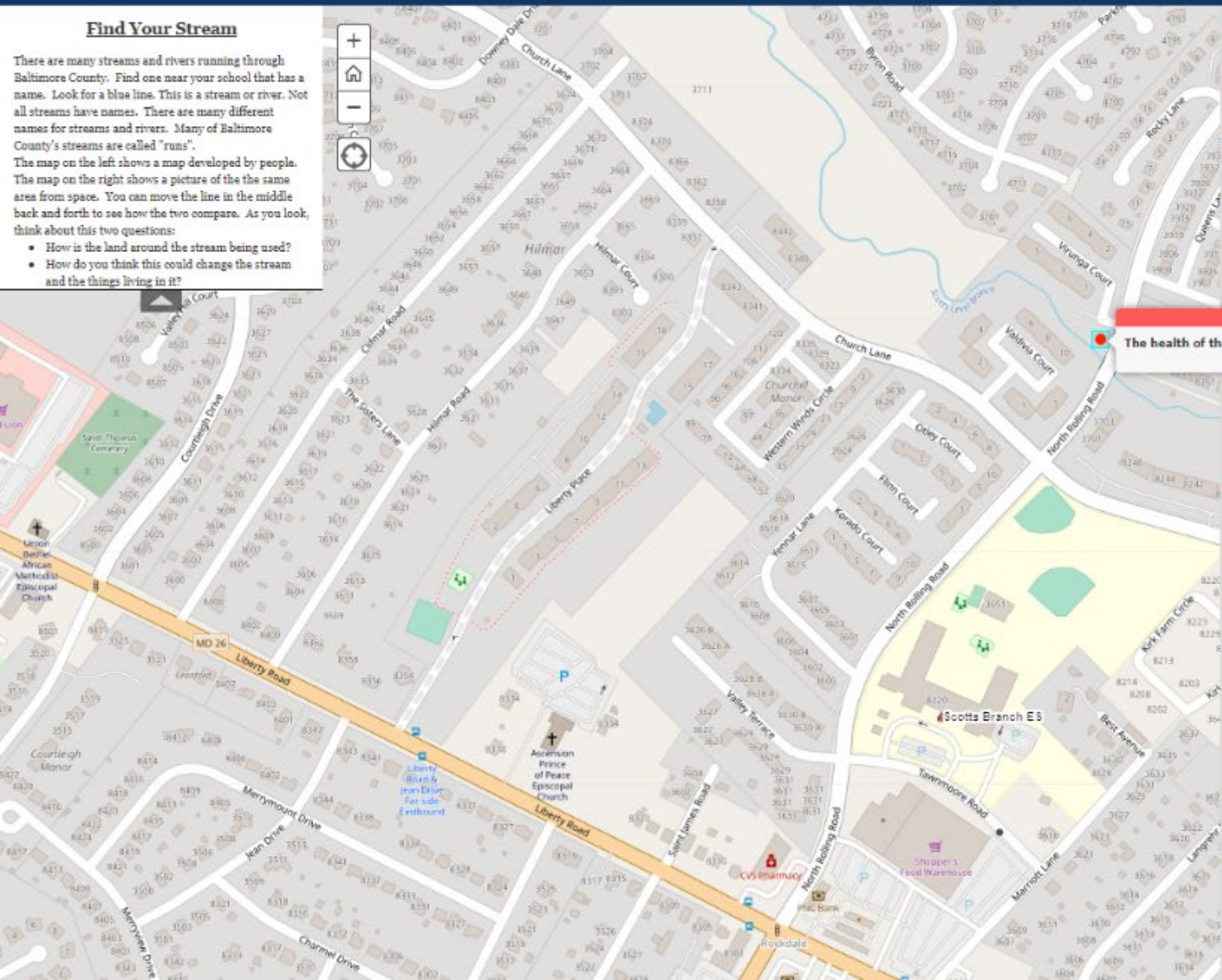
Map shows the locations of elementary schools in BCPS and the names of local streams.

Find Your Stream

There are many streams and rivers running through Baltimore County. Find one near your school that has a name. Look for a blue line. This is a stream or river. Not all streams have names. There are many different names for streams and rivers. Many of Baltimore County's streams are called "runs".

The map on the left shows a map developed by people. The map on the right shows a picture of the same area from space. You can move the line in the middle back and forth to see how the two compare. As you look, think about this two questions:

- How is the land around the stream being used?
- How do you think this could change the stream and the things living in it?



Scotts Branch Elementary



Photo by Bob Hendricks 2012 <https://goo.gl/E6n8vv>



STREAM'GINEERING



RELEVANCE



EXPOSURE



FIELD

Share wherever you are and wherever you go

1. Dream big, stay in wonderment and awe of natural ecosystems.
2. Ecosystem restoration is a privilege to be thankful for.
3. Humans are a species of concern for ecological restoration.
4. Ecological Restoration is generally a luxury.
5. Teach the children early in ecological restoration.
6. Restoration should provide social and economic benefits to communities/nations.
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Questions

awE³

- Ecosystem Restoration (Awe of Diversity)
- Economic Restoration (Awe of Sharing)
- Ekklessia Restoration (Awe of Gathering)

- dave@fivessr.com
- 919-218-0864



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