Nutrient Reduction in the Great Lakes: Dialogues on Solutions

Presented by the Great Lakes Sediment & Nutrient Reduction Program

August 20-21, 2024

Initial conversation about climate resilience: first Dialogues event in August 2022

Aerial image (left, credit:
(known as the "Keystone

Key Takeaway

GLSNRP-supported work has long resulted in co-benefits that will become increasingly important as our region's climate changes. Whether sequestering carbon within riparian forest buffers or mitigating the impact of storms through nature-based detention systems, people involved with sediment and nutrient reduction activities in the basin will continue to be key partners in building a resilient Great Lakes basin.

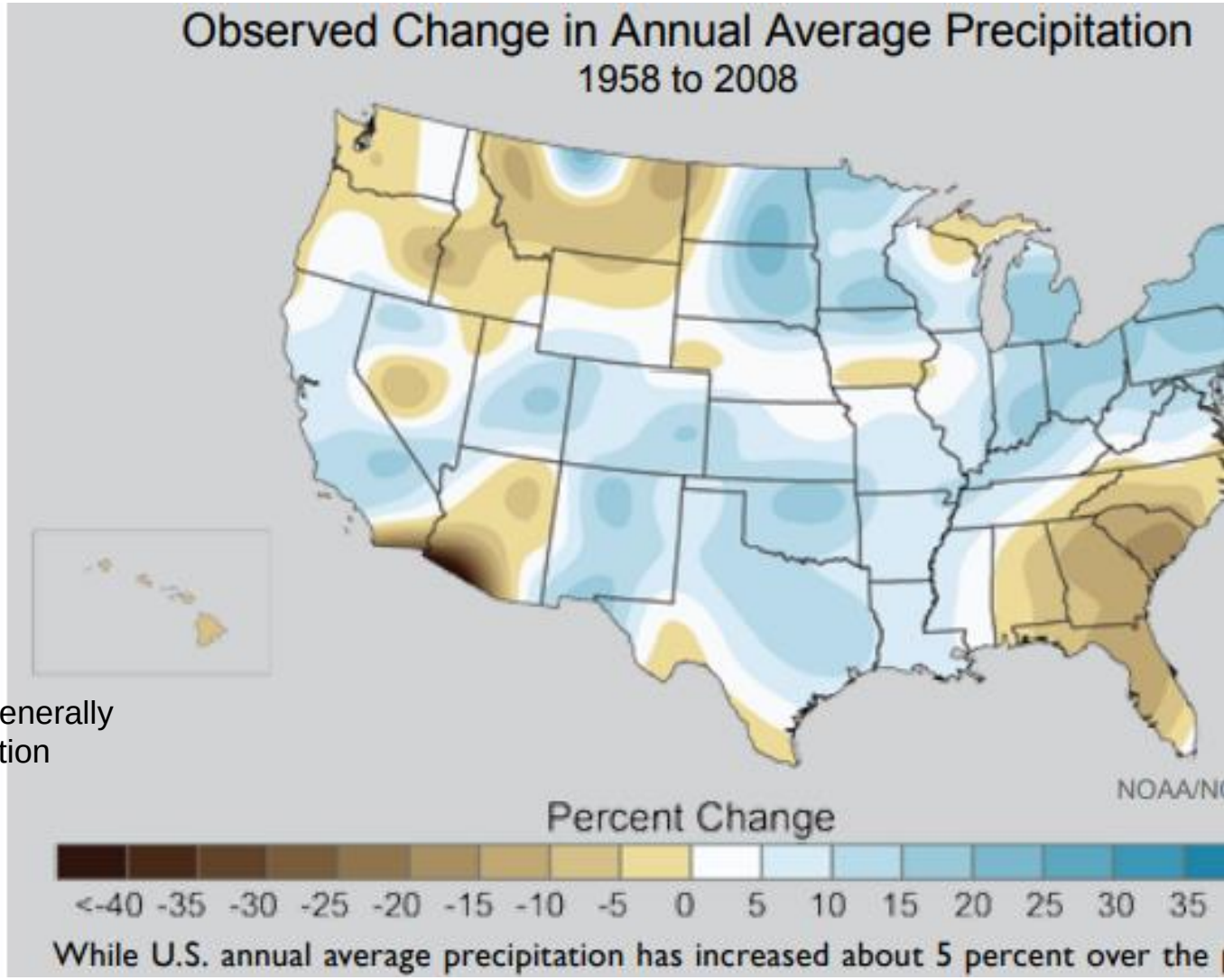
of the proposed Phase 3

Slides presented by Mark Williams, USDA- ARS, April 2024

Climate is changing

The Great Lakes region is generally experiencing more precipitation

Karl et al. (2009)



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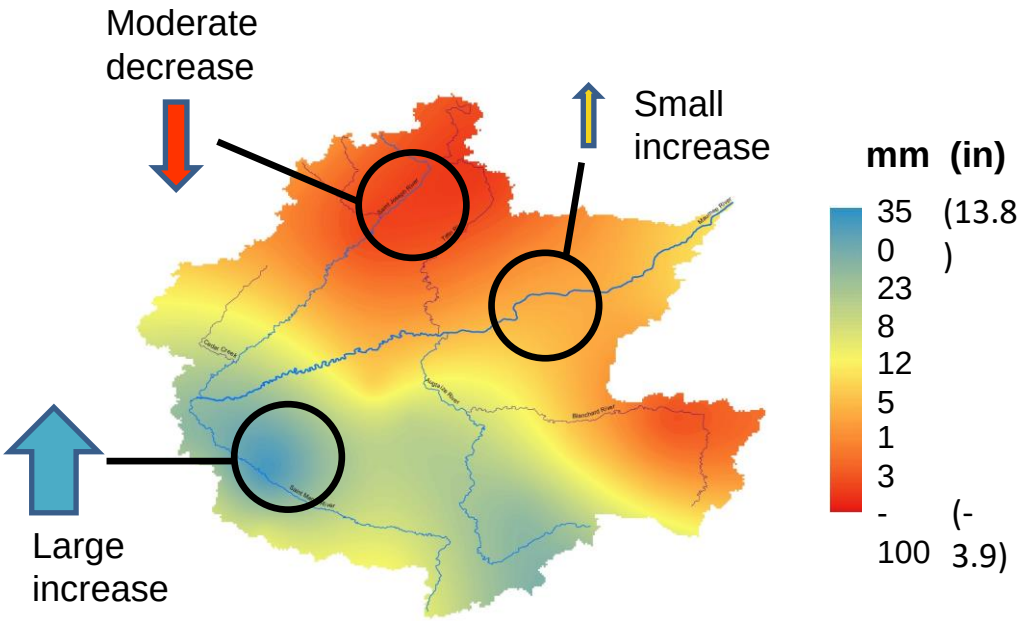
Changes in rainfall aren't spatially uniform

Change in annual rainfall over the past 45 years in the Maumee watershed

Williams & King (2020)



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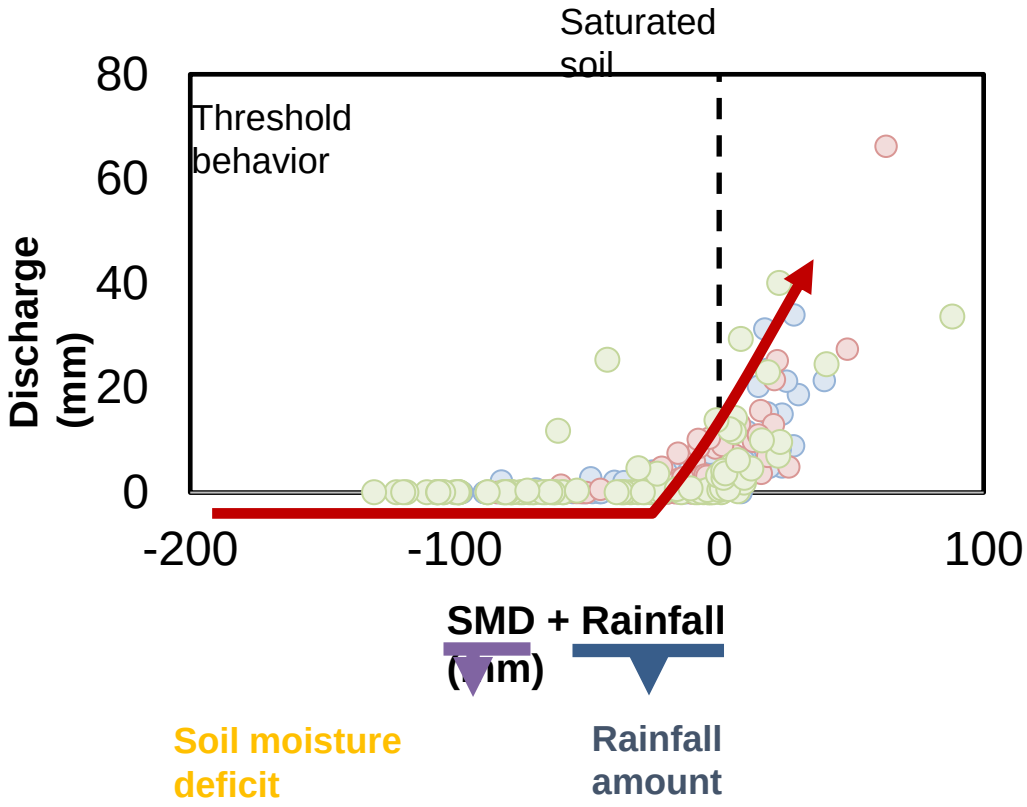
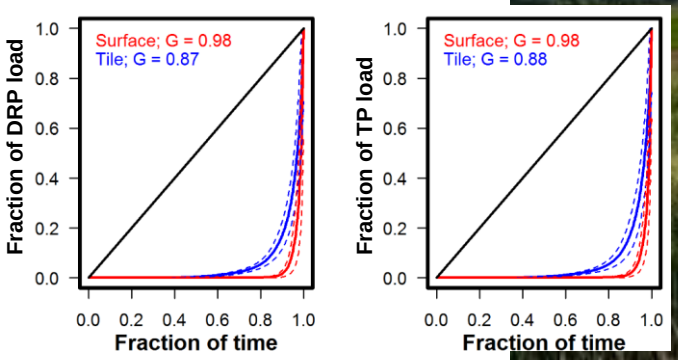
Why do we care about climate?



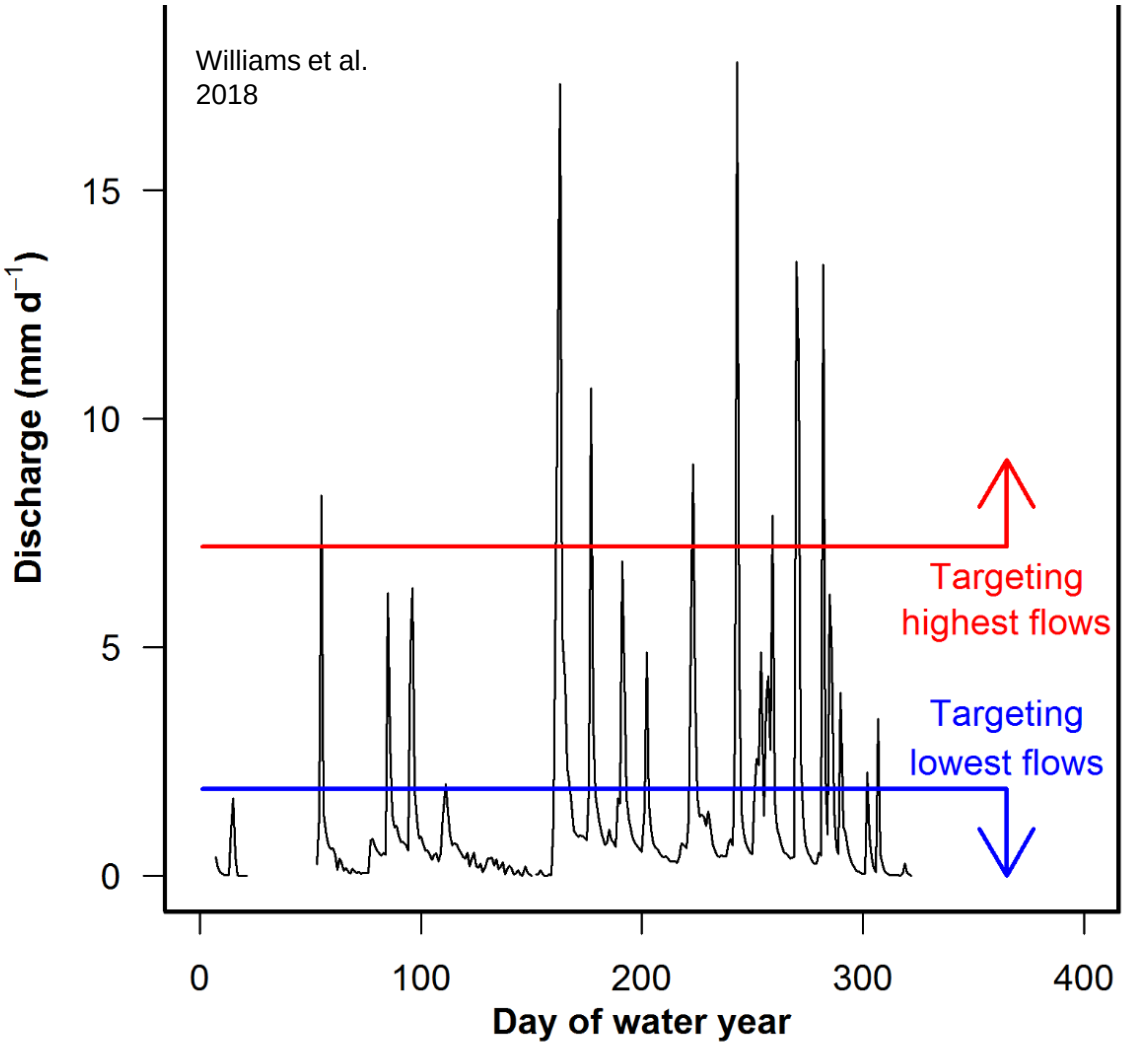
Phosphorus loading is event driven



Williams et al. (2018)

80% of P loading in runoff occurs during 10 days per year

80% of P loading in tile drainage occurs during 45 days per year



Stuck between a rock and a hard place?

Do we target high flows?

Treat water for short intervals when loads are greatest

Do we target low flows?

Treat water for long periods of time when loads are much smaller

Conservation practices aren't typically designed for large storm events

Large volumes of water tend to overwhelm most (if not all) conservation practices resulting in large nutrient loads reaching nearby waterways

Evidence suggests that increases in rainfall amount and intensity have outpaced increases in storage on the landscape

Conservation practice effectiveness is often greater at low flows – increased residence time, manageable volumes of water, increased nutrient removal rates

BUT…

They would need to be perfect (100% nutrient removal) for long periods to achieve modest nutrient reduction goals

FOR EXAMPLE

To achieve a 30-40% reduction in P loading in tile drainage at the edge-of-field, 100% of P would need to be removed during >75% of days with tile flow

Williams et al. 2018

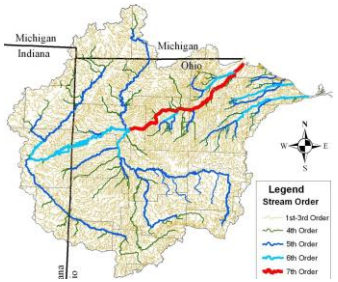
Improving water quality in a changing climate

- ✓ Decrease the supply of P available for transport
- ✓ Decrease the volume of water leaving fields
- ✓ Stack practices for increased nutrient removal
- ✓ Extend conservation beyond field boundaries









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Slides presented by Mark Williams, USDA- ARS, April 2024

Summary

Rainfall amount and intensity have increased over the past 40 years with patterns expected to continue to change in the future

Phosphorus loss is event driven which poses a challenge for conservation efforts

Innovative nutrient and water management practices can help decrease nutrient loss in a changing climate

Conservation efforts must extend beyond field boundaries and into waterways

Conservation implementation across the Great Lakes should be regionally tailored and adaptive

Today's Dialogue:

- Who is charge of drainage in your state/locality?

- How do we work together to store increasing volumes of water?
  - *And how can you engage with skeptical landowners?*

Dialogue #1:Water management/drainage

Directions:

1. Split up into small teams (next slide)
2. Discuss how water is managed in your state/locality
   - ✓ Opportunities to grow partnerships
   - ✓ Past successes or challenges
   - ✓ Big ideas to consider
3. Use sticky notes to jot down ideas to compile onto large flip-chart sheets after the break

ACPF in the Great Lakes

- Agricultural Conservation Planning Framework (ACPF):
  - tool for agricultural watershed management
  - used to identify site-specific opportunities to install conservation practices across small watersheds
  - uses high-resolution data and an ArcGIS toolbox

ACPF in the Great Lakes

The ACPF National Hub works to :

- Facilitate the use of ACPF
- Maintain a repository of data, results, and GIS tools
- Provide training and outreach resources
- Collaborate on ACPF related research
- Coordinate a network of ACPF users
- Offer ACPF user support

Agricultural Conservation PLANNING FRAMEWORK

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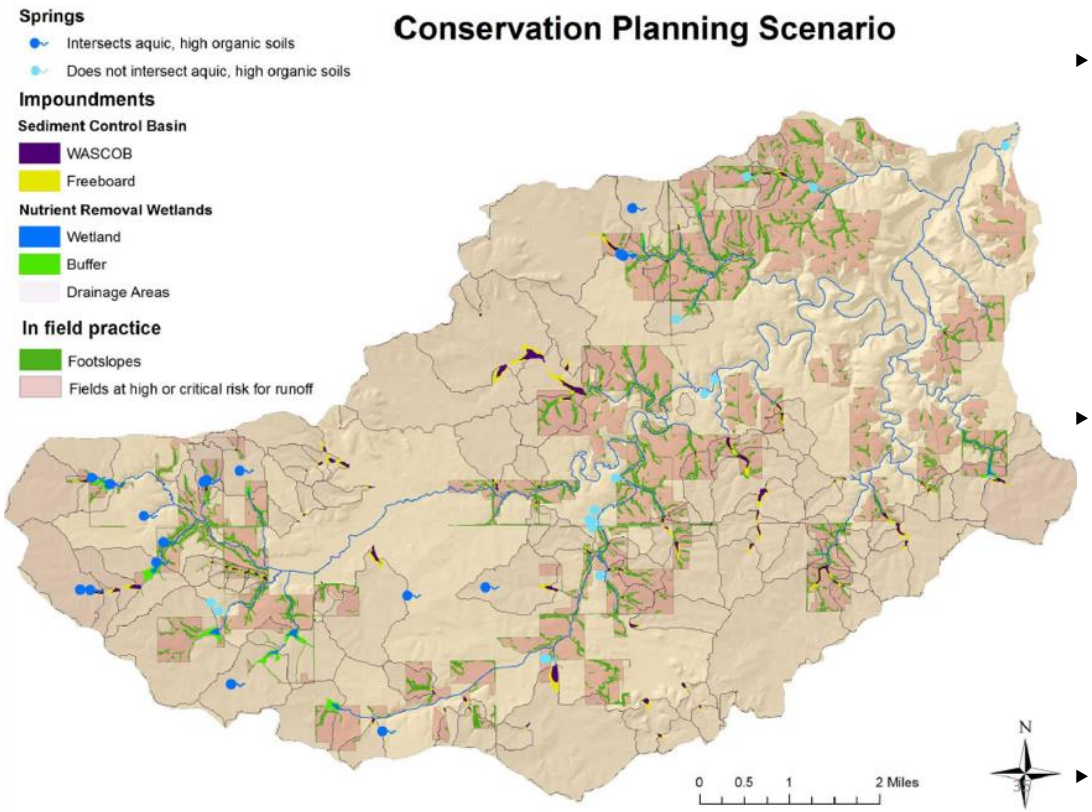
ACPF TOOLBOX & RESULTS

EXAMPLE ACPF RESULTS



- **ACPF Results Stream Network and Catchment Features**
  - Stream Reach
  - Catchments
- **ACPF Results Field Characterization Features**
  - Runoff
  - Drainage
- **ACPF Results Precision Conservation Practice Siting Features**
  - Grassed Waterways
  - Bioreactors
  - Drainage Water Management
  - Contour Buffer Strips
  - Depressions
  - Depression Drainage Areas
- **ACPF Results Impoundment Siting Features**
  - WASCOBs
  - WASCOB Basins
  - Farm Ponds
  - Farm Pond Drainage Areas
  - Nutrient Removal Wetlands
  - Nutrient Removal Wetland Drainage Areas
- **ACPF Results Riparian Assessment Features**
  - Saturated Buffers

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ACPF in the Great Lakes

Watershed coordinators use ACPF analyses & outputs to:

- Facilitate targeted conservation
- Support watershed planning & encourage watershed thinking
- Promote stakeholder engagement
- Make more efficient use of field visits
- Provide scientific validity to funding proposals and conservation plans

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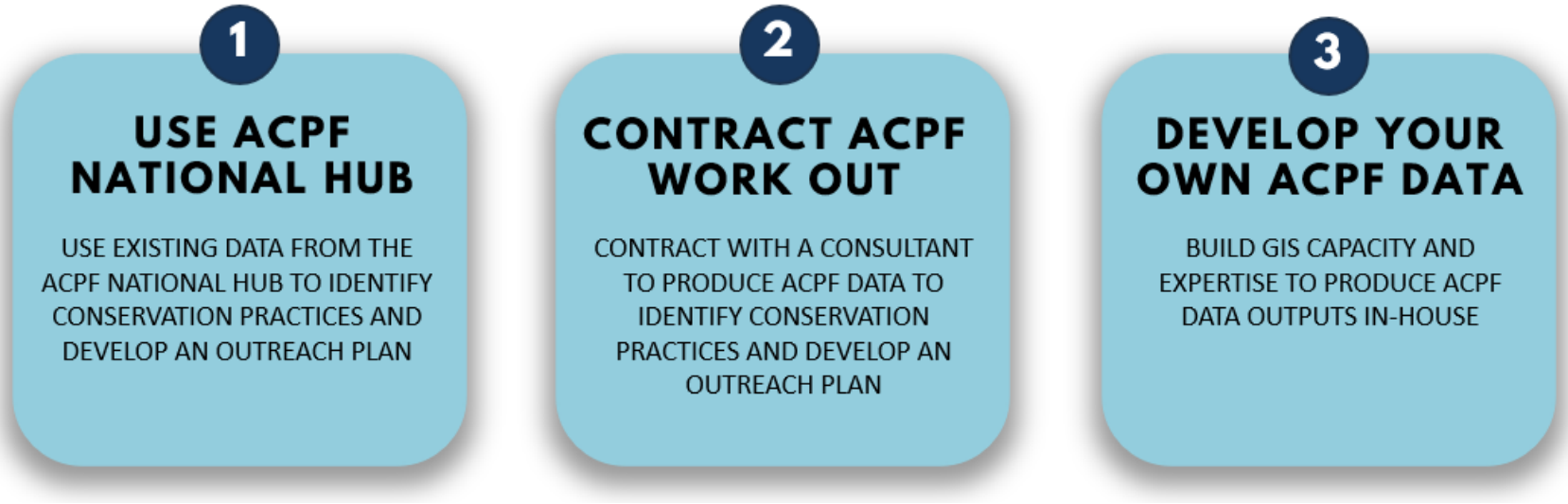
ACPF in the Great Lakes

- GLC pilot microgrant opportunity:
  - Providing $10,000 awards to conservation districts in basin to use ACPF for conservation planning
  - Funding to build capacity through use of training/consultants plus hardware/software costs and salary/travel costs
- Deliverable for microgrant:
  - Focused outreach plans and materials to optimize reduction of sediment, phosphorus, and nitrogen runoff from agricultural land by engaging with landowners
  - Field verified ACPF result data completed for selected watershed

ACPF in the Great Lakes



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Dialogue #2:Maximizing water quality benefits AND resilience

Directions:

1. Split up into small teams (next slide)
2. What do you need to maximize benefits, store water, and inspire landowner participation?
3. Jot/Map/Sketch your proposed solutions/design a program on the team's flip chart

Great Lakes Basin River Water-Quality Trends (USGS)

https://rconnect.usgs.gov/glritrends/

GLC Updates

- Conservation workforce needs
- GLC resolution on Ag-Climate-Water Use
- HABs Collaborative summary from April 2024 workshop

Group ideas: youth engagement on GLSNRP projects/other program improvements?