Alternative Ditch Design and Management Strategies: Lessons Learned

Indiana Watersheds Webinar Series

March 14, 2012

The Need for Drainage

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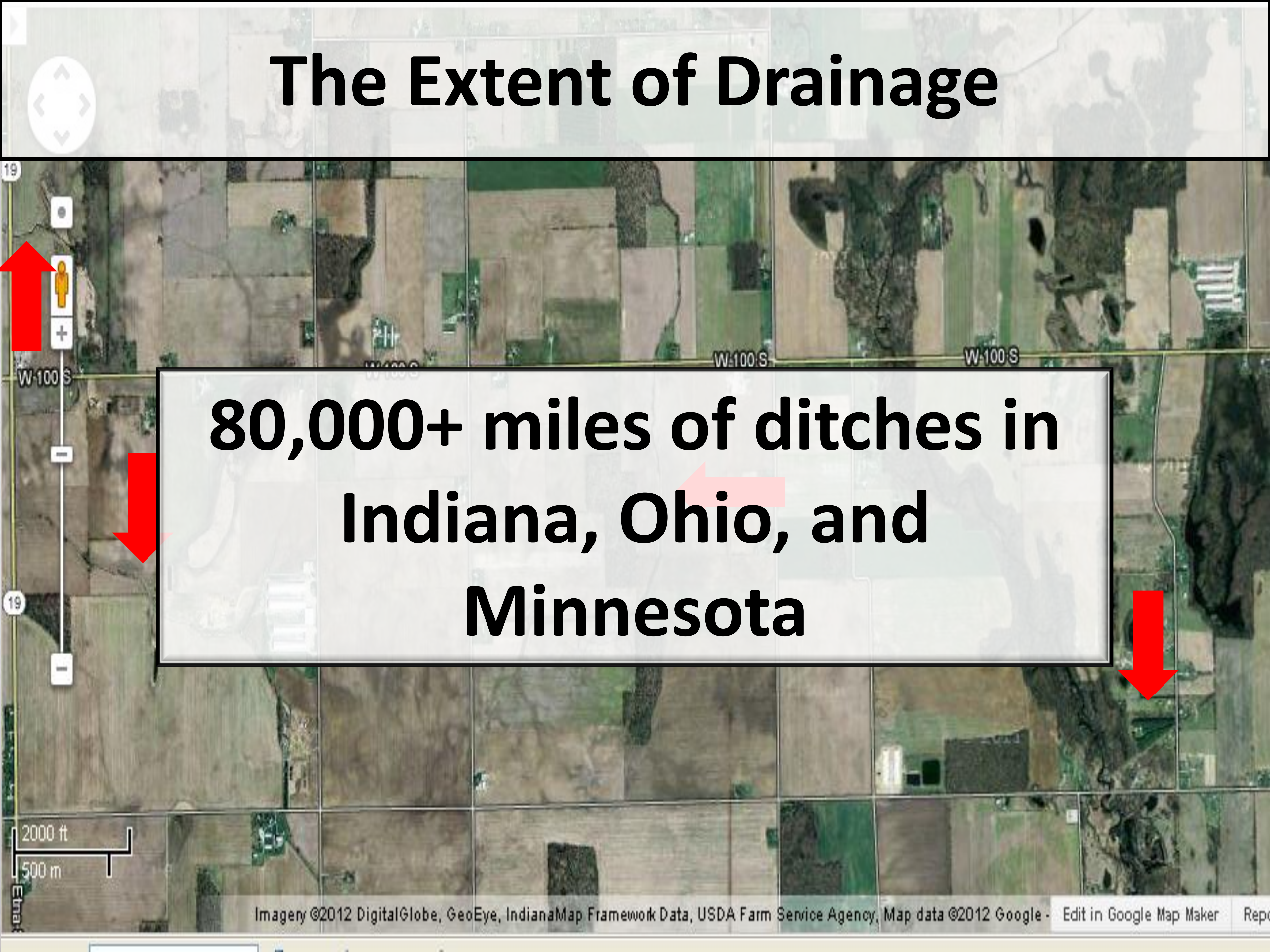
The Extent of Drainage



80,000+ miles of ditches in Indiana, Ohio, and Minnesota

The Drainage Network as a Source of Pollutants

Streambank Erosion:
Mass Failure

Given:

- 100-ft of ditch, 1 side
- 8-ft deep
- 1:1 side slopes

Scenario:

- Flowing water undercuts bank toe making ditch bank too steep leading to mass bank failure.

Bank Erosion:

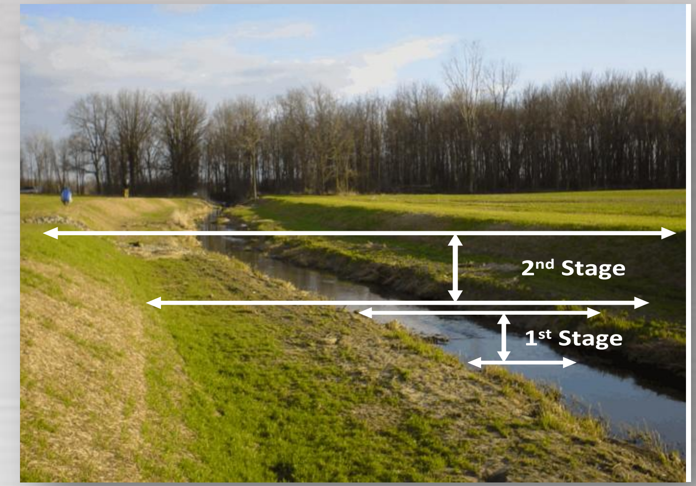
- ~125-tons

The Drainage Network as a Sink for Pollutants

Ditch Design And Maintenance Approaches

Trapezoidal Design

Two-Stage Design



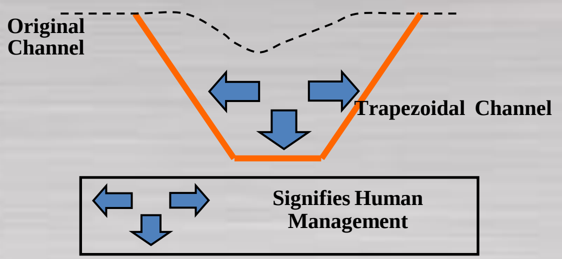
Self-Forming Design

Natural Channel Design

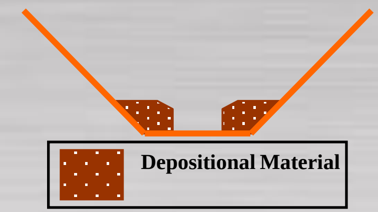
“Do Nothing” or Passive Approaches

Channel Design and Maintenance Approaches

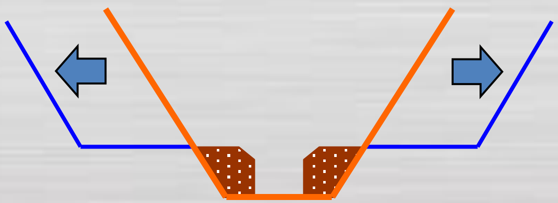
A. Trapezoidal Channel



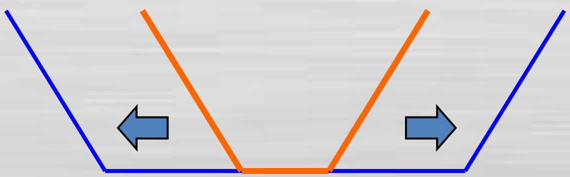
B. Two-Stage Channel (Natural)



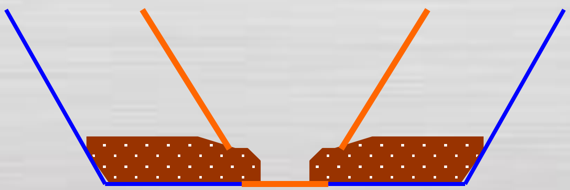
C. Two-Stage Channel (Constructed)



D. Self-Forming Channel (1-month old)

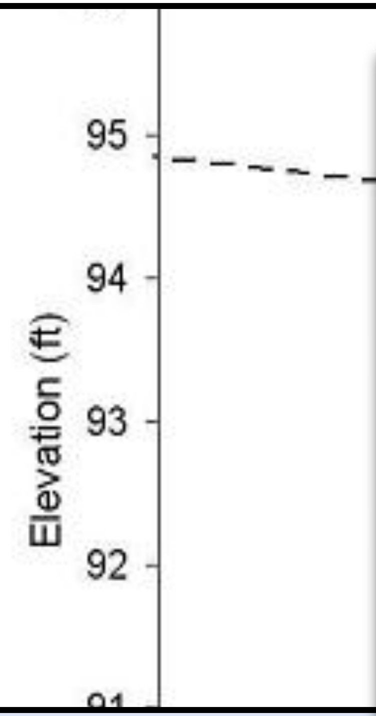


E. Self-Forming Channel (1-year old)



What are the Goals?

Tradeoffs



36 August 2011

Farm Equipment

Jon Witter

Applied Engineering

Considerations for implementing two-stage channels

Channel management practices

Key issues to consider

Summary

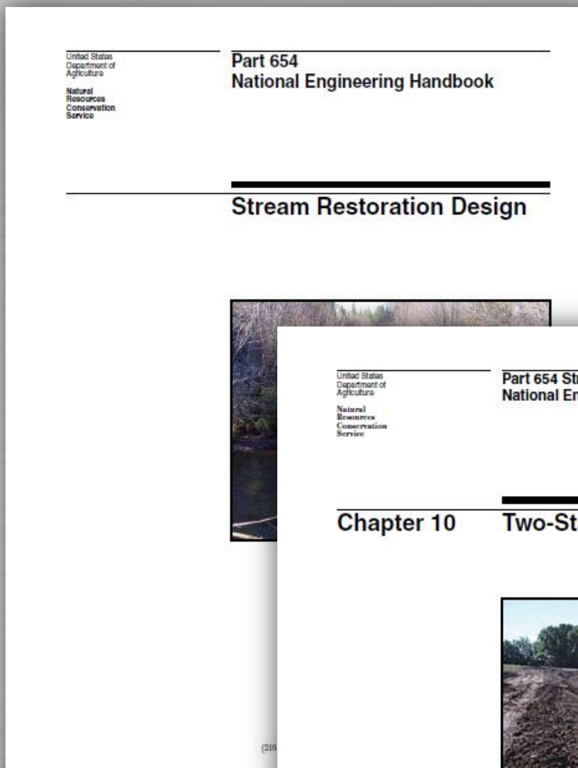
Traditional trapezoidal drainage ditch

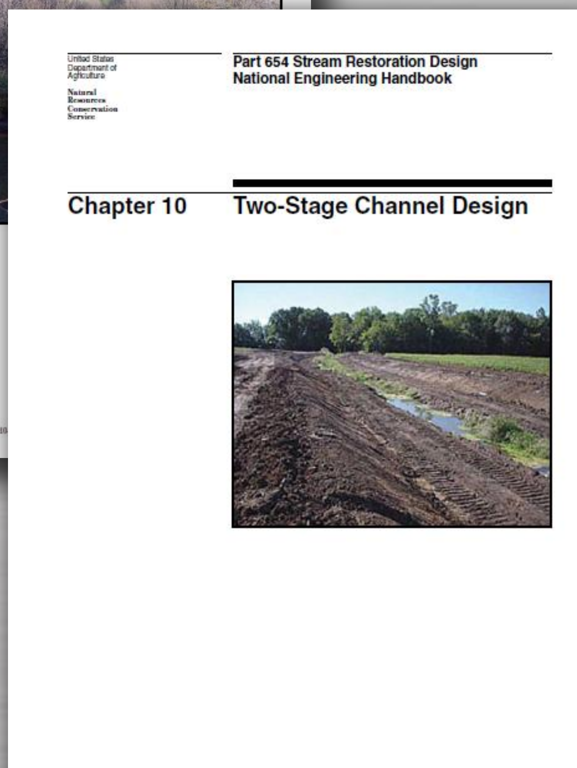
Two-stage channel

- Land require
- Construction
- Drainage cap
- Enhanced pr
- Maintenance
- Environment
- Stability

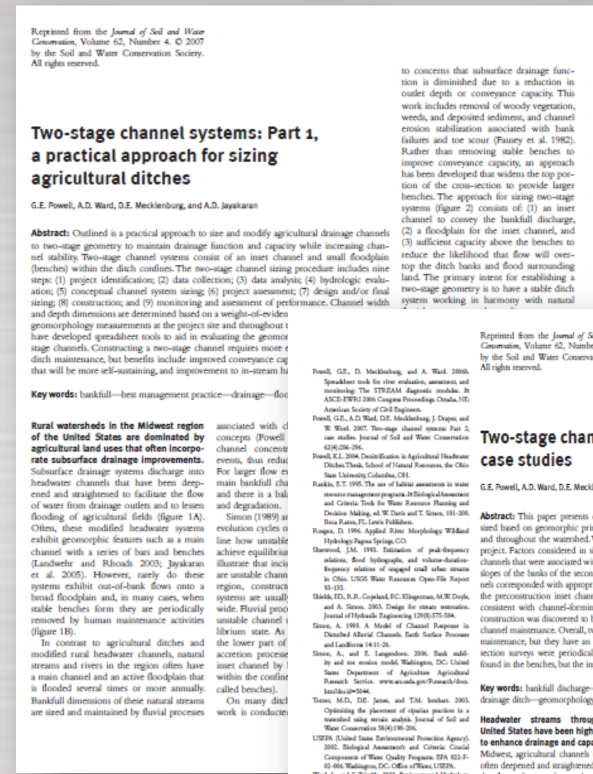
Bull Creek Tributary, Wood County, OH

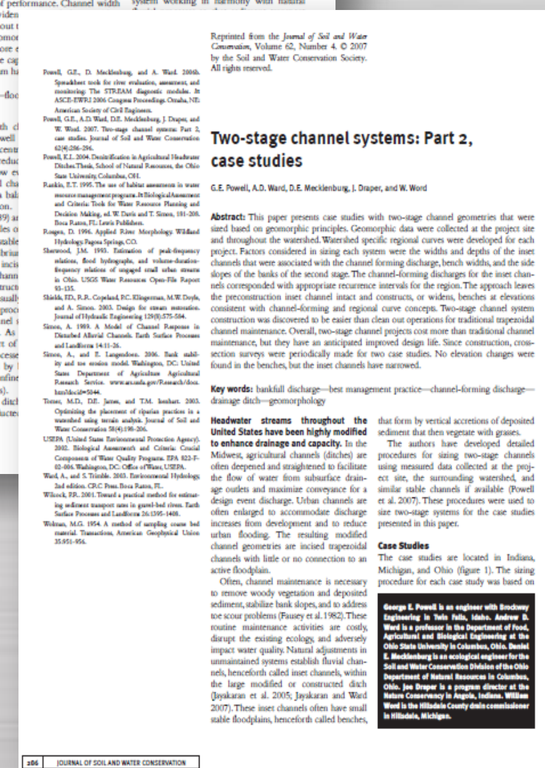
Two-Stage Ditch Publications





http://policy.nrcs.usda.gov/viewerFS.aspx?hid=21433





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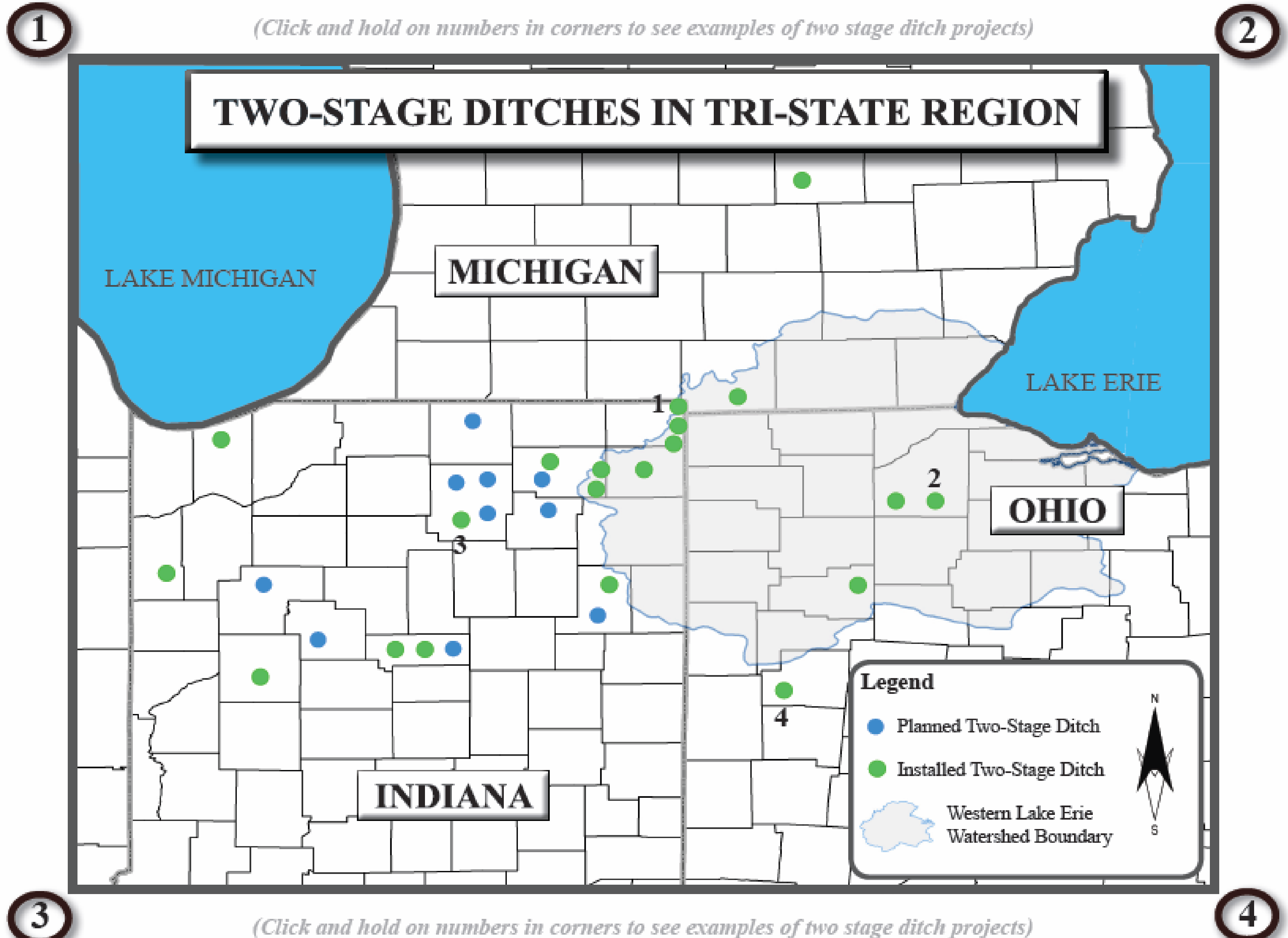
To Build a Better Ditch

http://vimeo.com/7901535

(Click and hold on numbers in corners to see examples of two stage ditch projects)

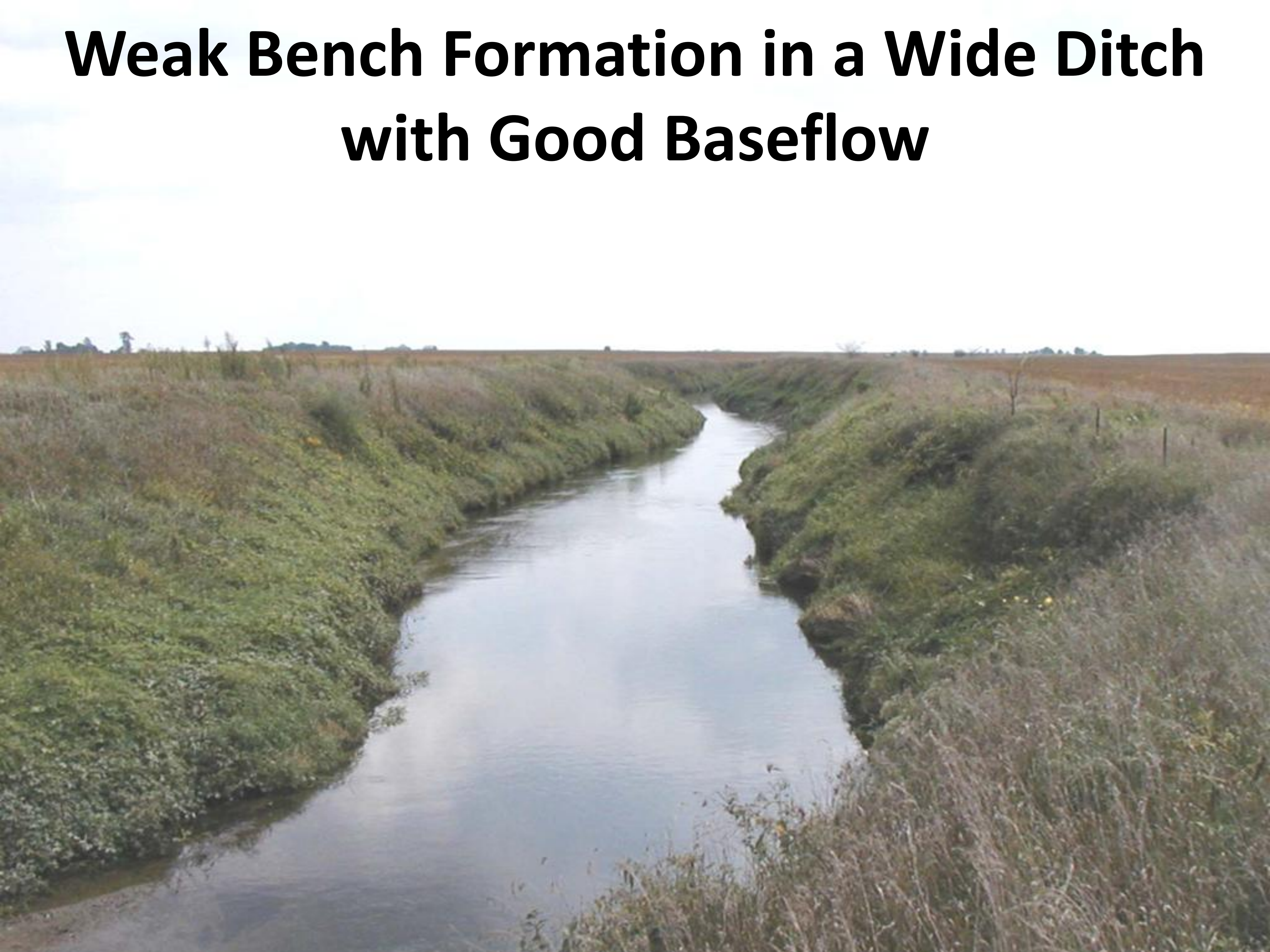


(Click and hold on numbers in corners to see examples of two stage ditch projects)

Bench Formation Issues

May have difficulty maintaining two-stage form if 1) the ditch is very narrow, 2) small drainage area, 3) very low energy

Weak Bench Formation in a Wide Ditch with Good Baseflow



Spoil Distribution

Compacted or Poor Bench Soils

Establishing Vegetation

One Side Construction & Shading

Surface Runoff Control

Velocity Around Bends

Sizing Bench Widths

Bench Heights and Tile Outlets

Tile Outlet Design

Education, Outreach, Demonstration, and Communication

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