Introduction to Wetland Hydrology

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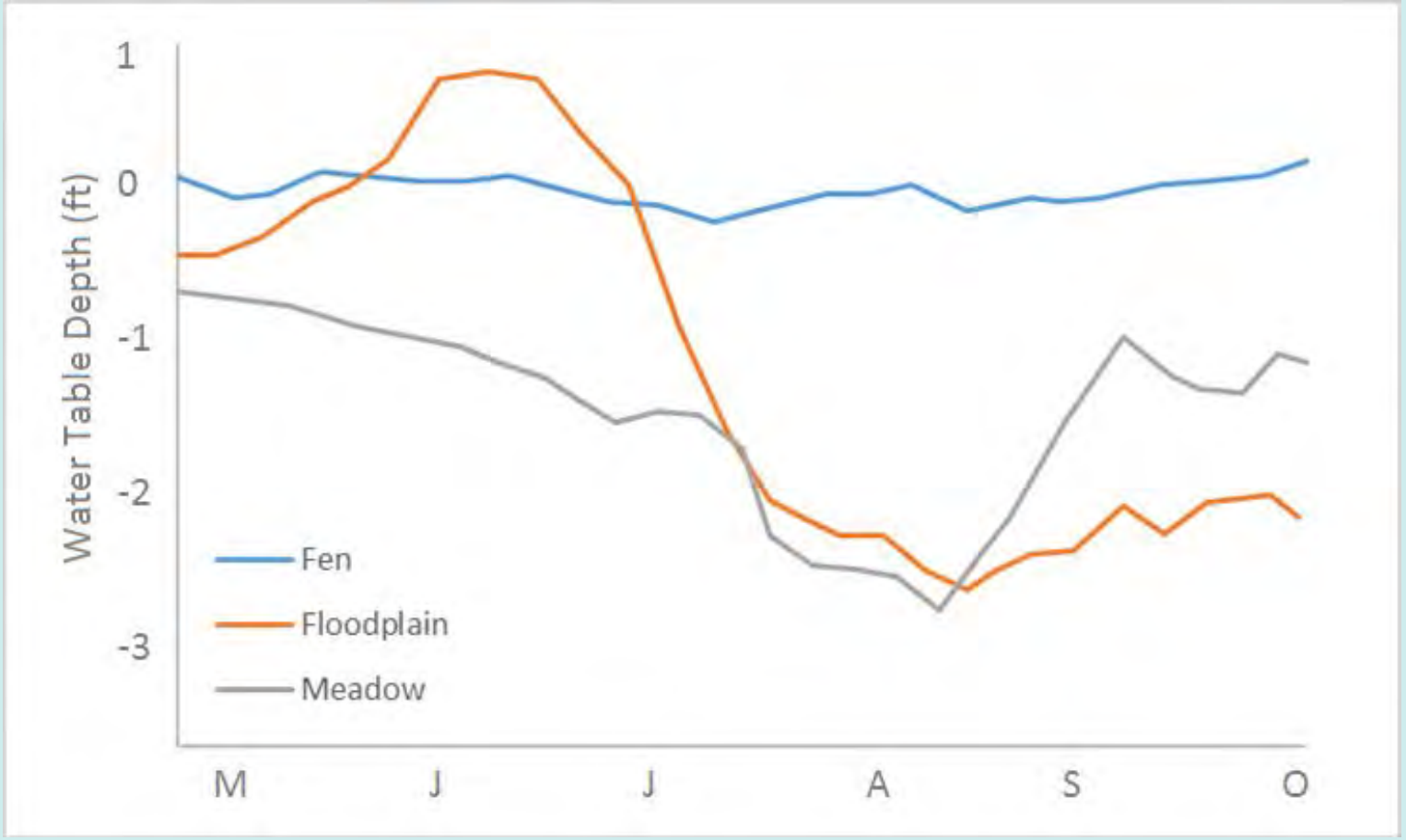
Roadmap

- How water flows across and through the landscape
- How we measure water levels
- Hydrologic regimes by wetland type
- Restoration
  - Data-driven restoration designs
  - Things to ask when reviewing a proposal

Hydrology Drives Wetland Form and Function

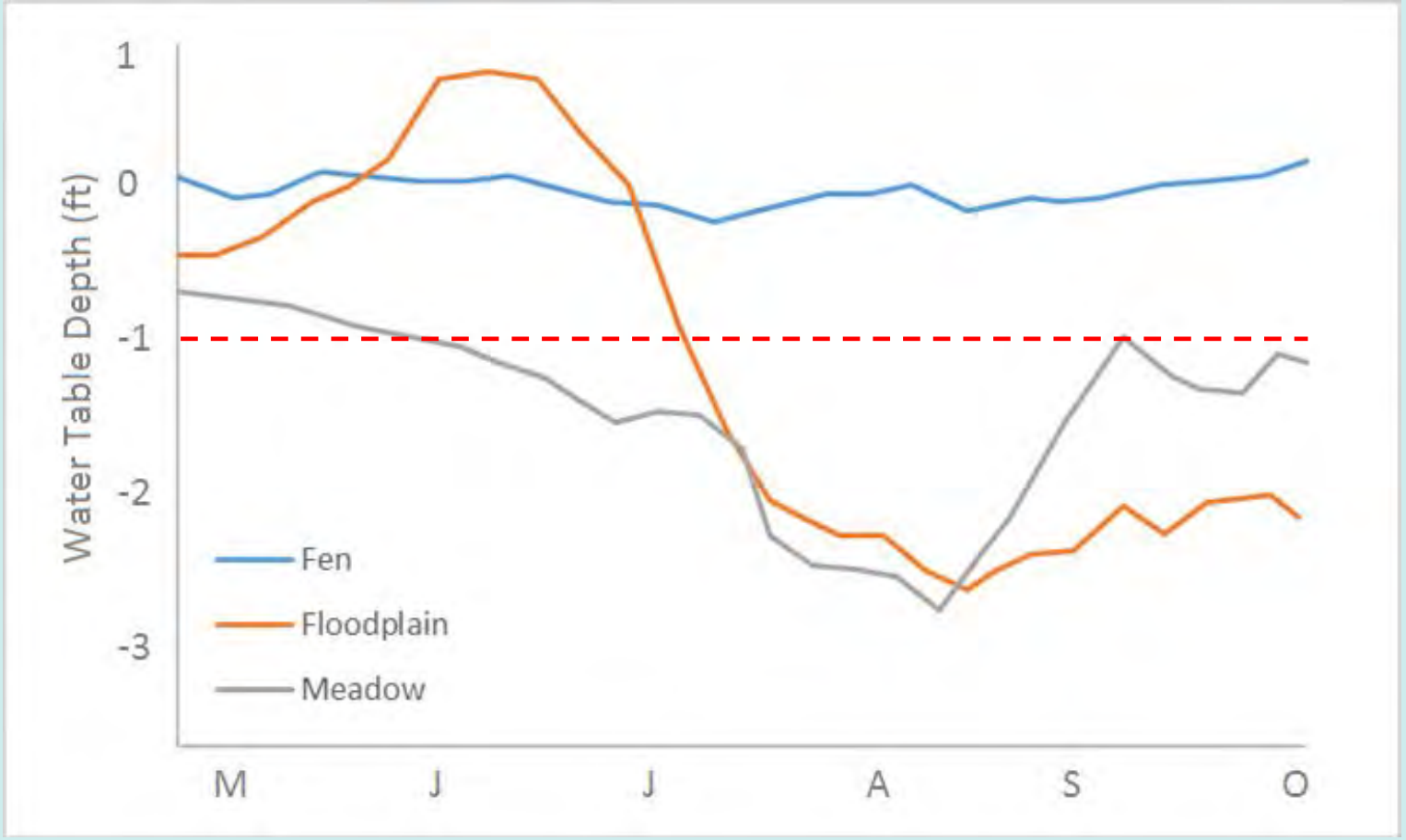
- Wetland hydrology is the primary driver of..
  - Soil formation
  - Vegetation composition
  - Animal use

- Wetland types differ in their hydrologic regime



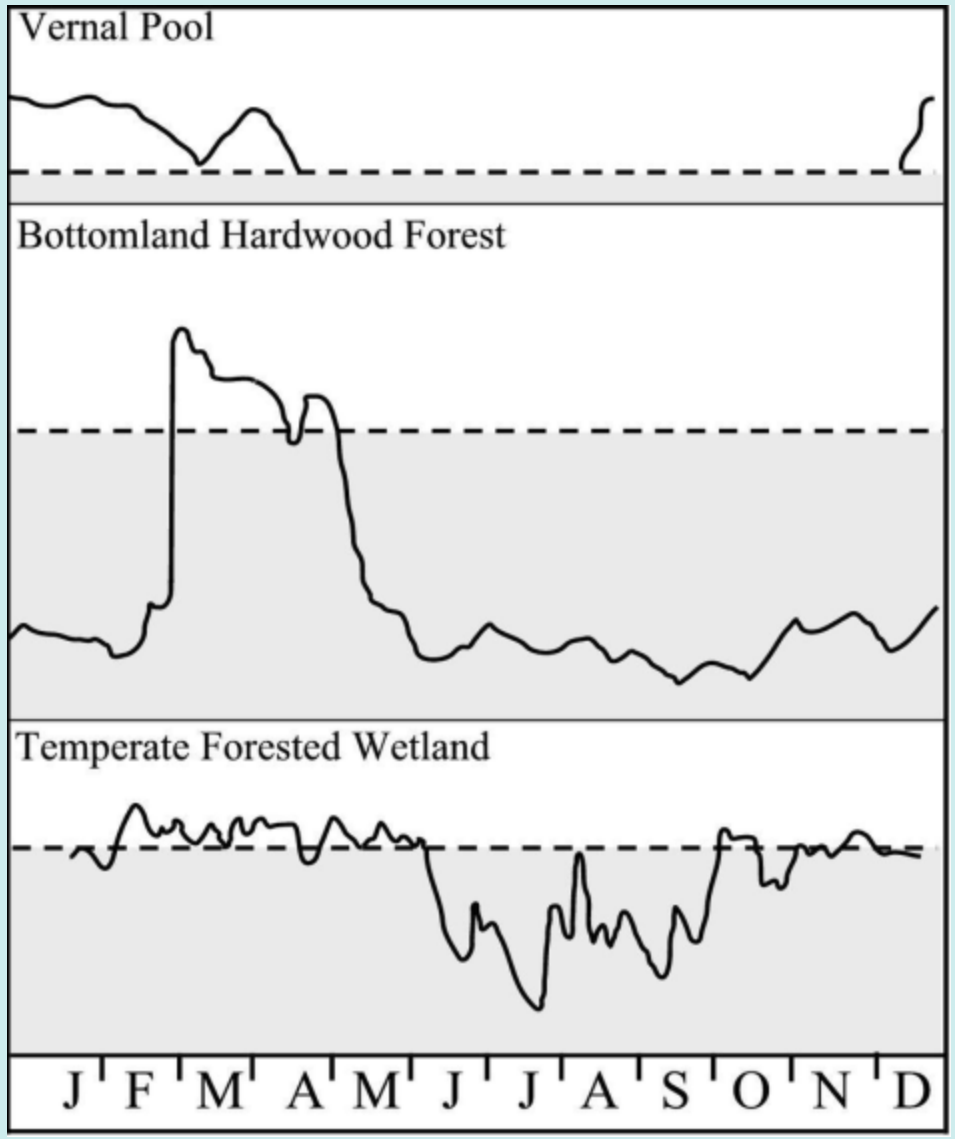
Hydrology Drives Wetland Form and Function

- Meeting Technical Standard for wetland hydrology does not mean it is the right kind of wetland!



Minimum Water Level vs Optimal Hydrologic Regime

- 3 Types of “Forested Wetlands” in Northeastern US
- All three are jurisdictional wetlands, but each with a distinct hydrologic regime



Wetlands are highly variable!

How water flows across the landscape - Groundwater

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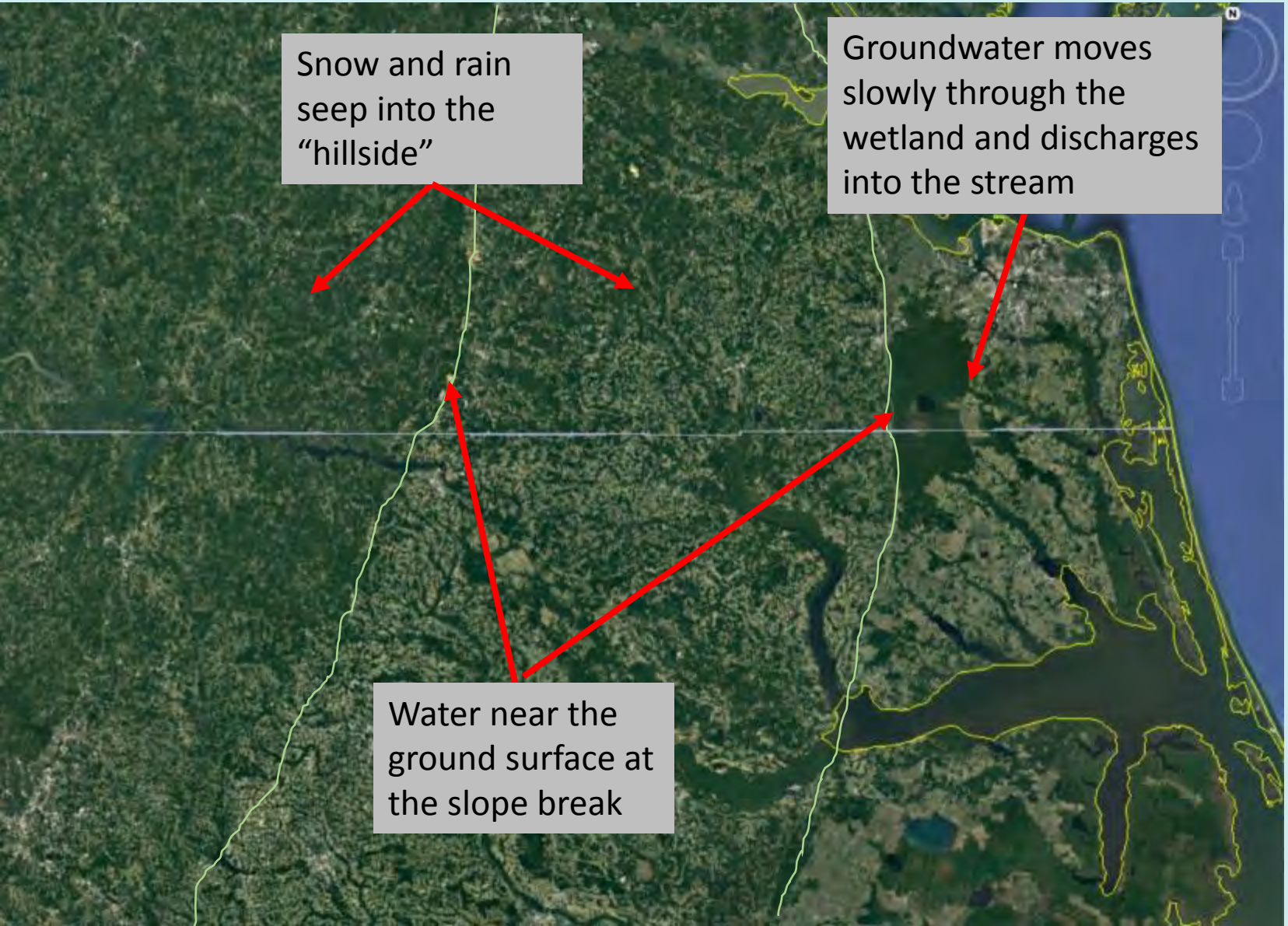
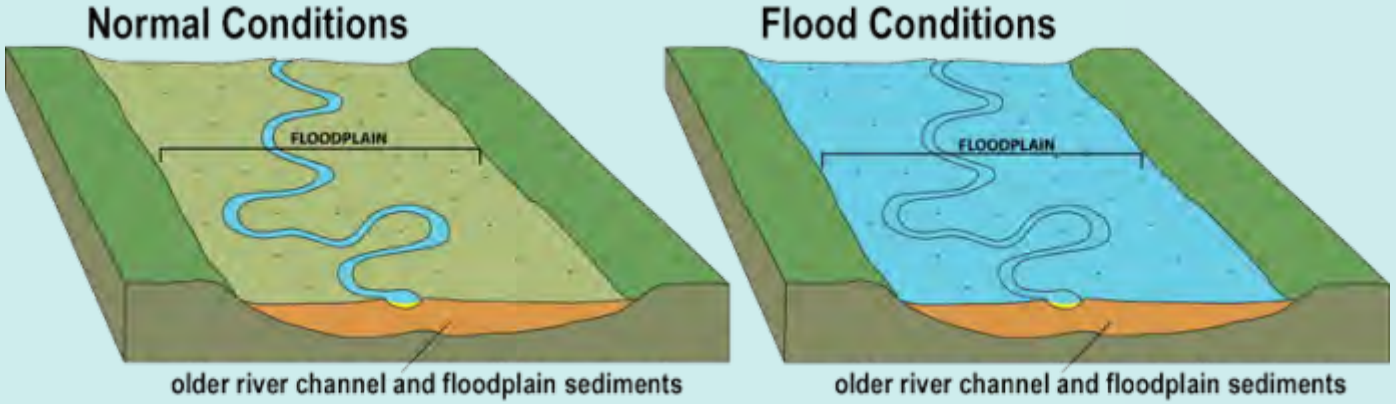
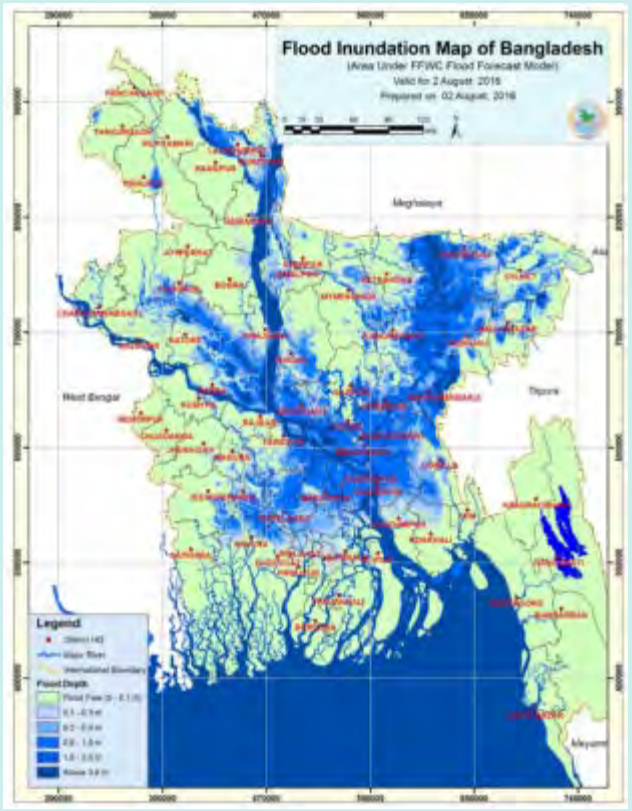


How water flows across the landscape – Surface Water

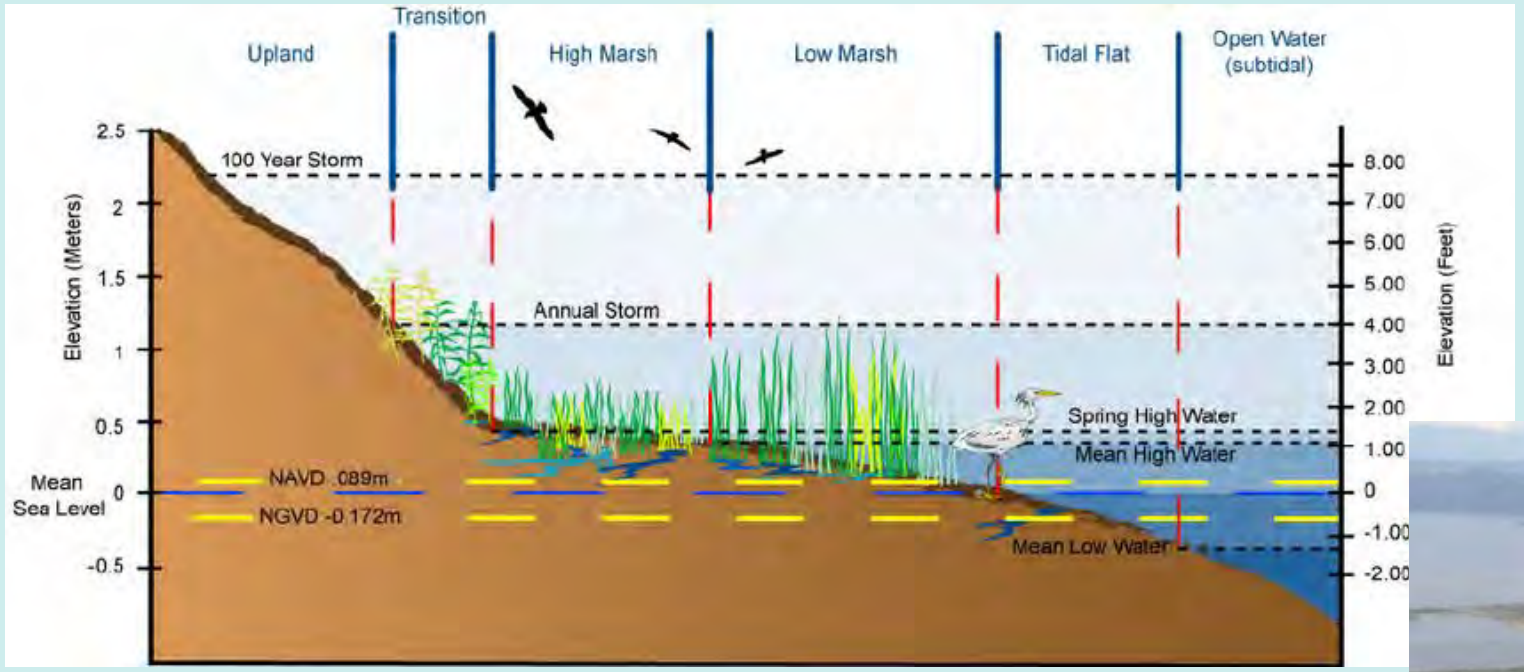




- Areas far from the river can still be in the floodplain
- Water moves through the ground parallel to the river

Mississippi River – 1944
Harold Fisk, USACE

How water flows across the landscape – Surface Water



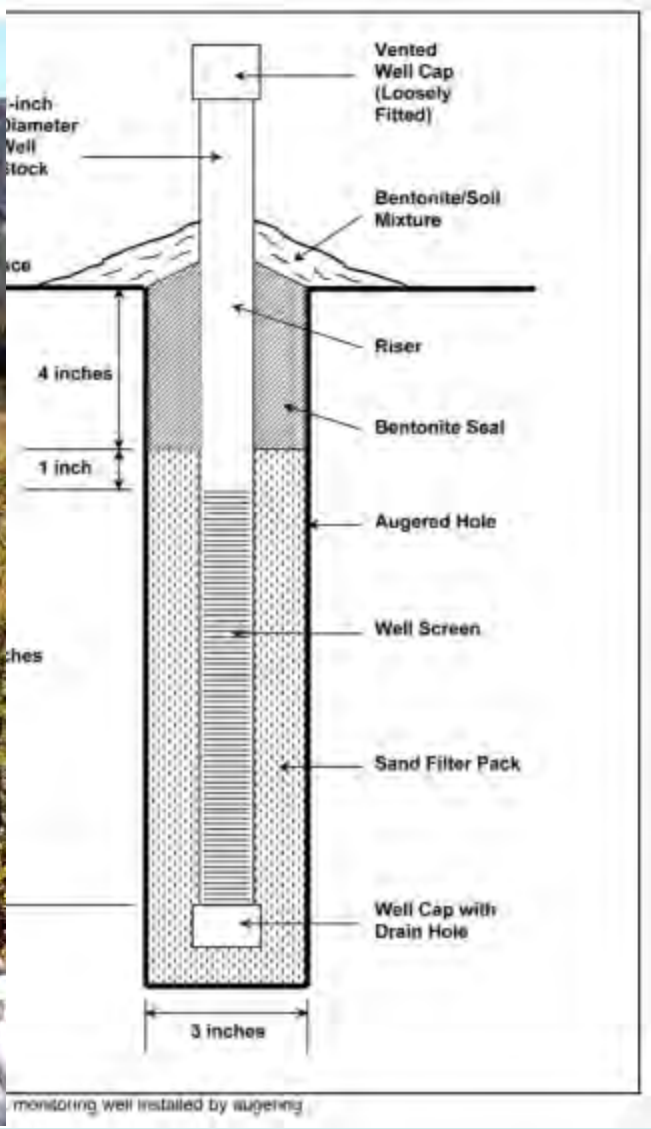
- Tidal wetland water levels are controlled by elevation
- Small changes in elevation have drastic consequences!

- Lewis and Clark National Wildlife Refuge
- Levees removed at 9 locations to reestablish tidal influence

Monitoring Methods

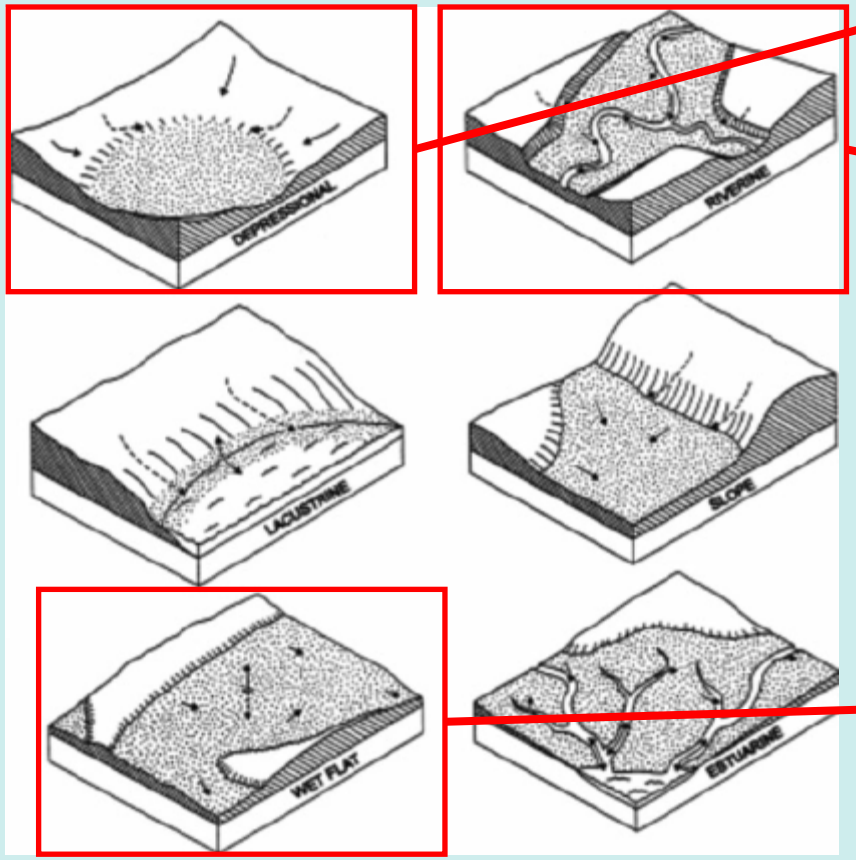
- Groundwater Monitoring Wells
- Staff Gauges

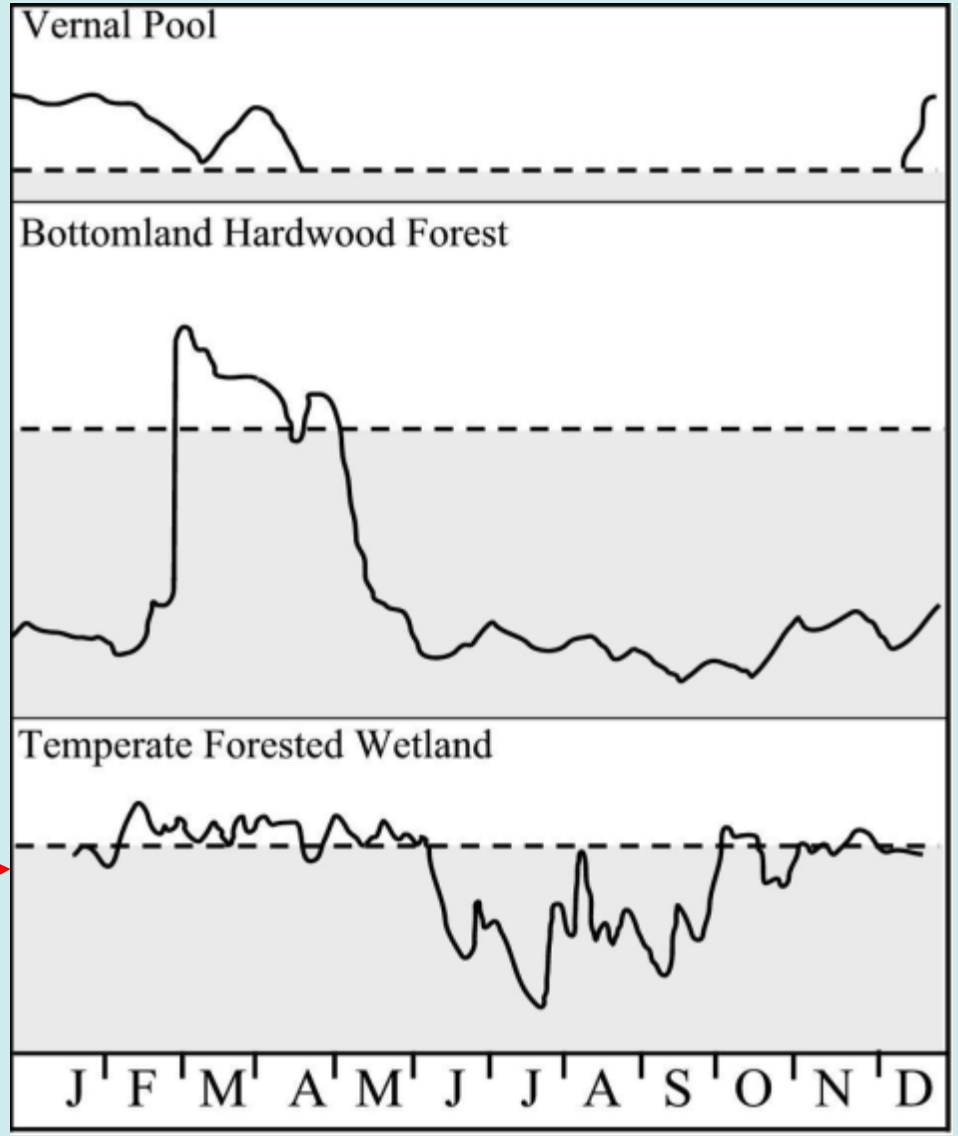
- Frequency of monitoring
  - Automatic loggers – daily
  - Manual readings – weekly



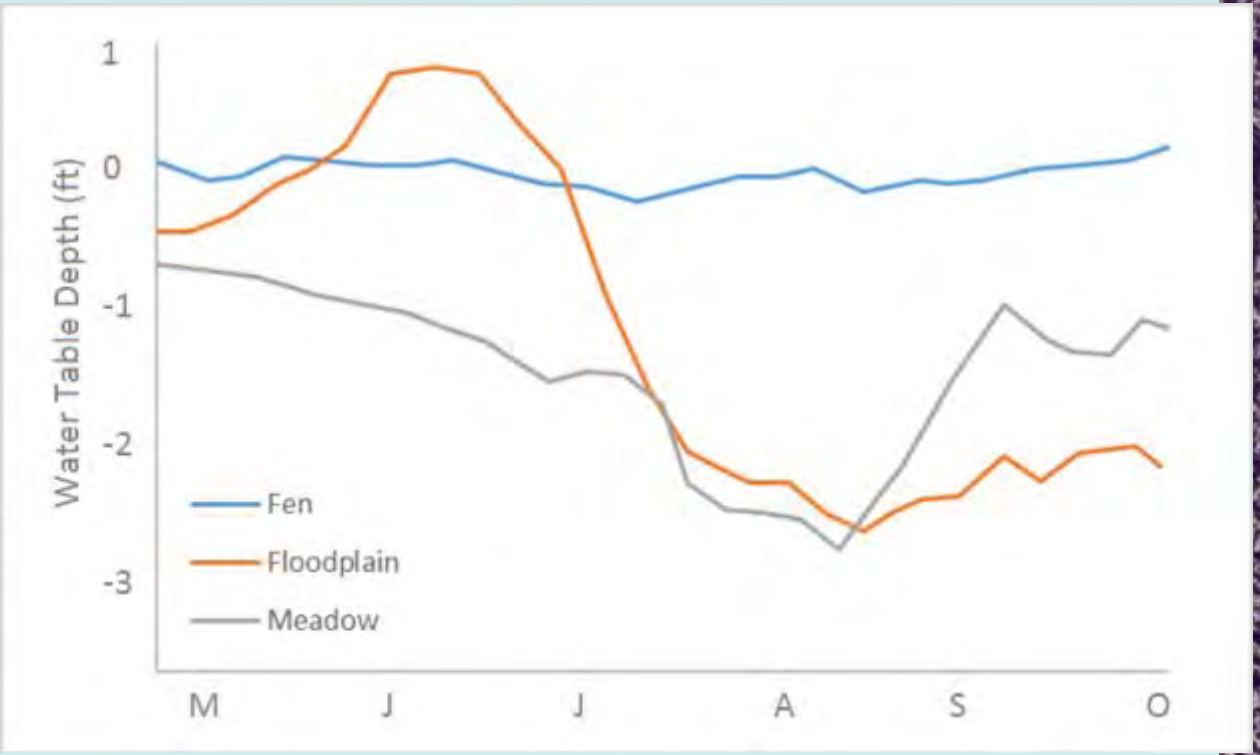
USACE Technical Standard 2005

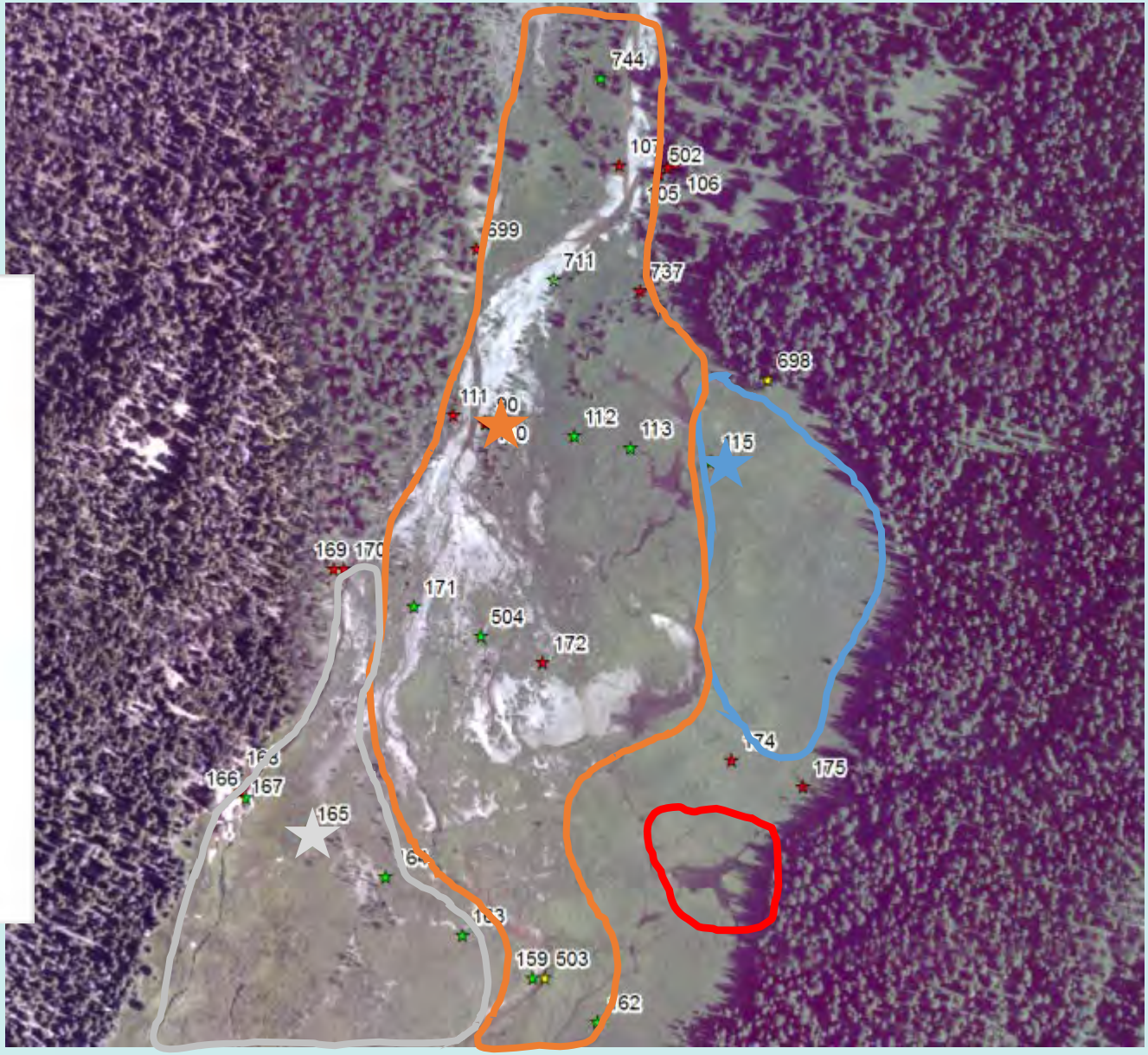
Hydrographs by Wetland Type





Hydrographs



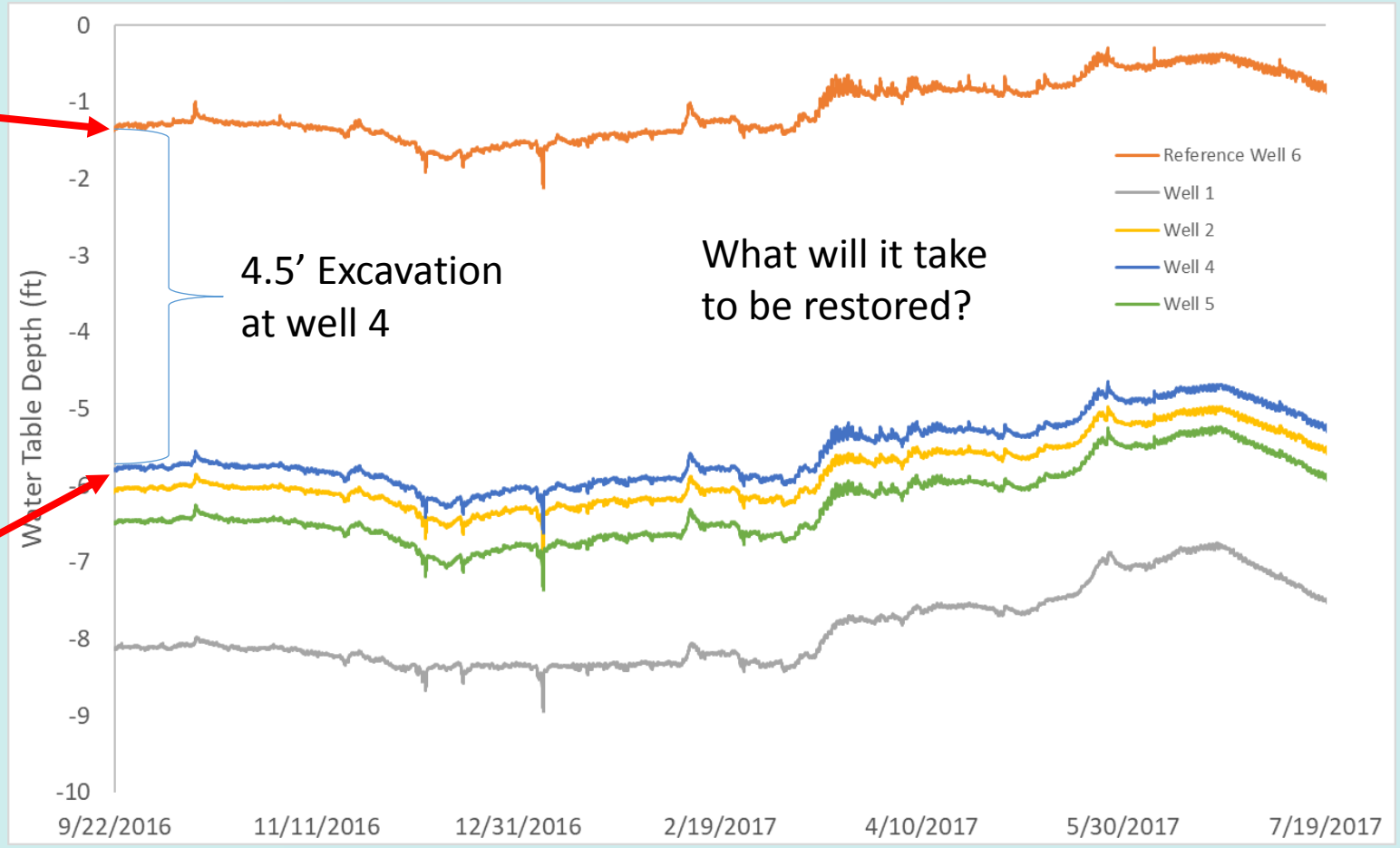


Wetlands have been highly altered

A Restoration Plan should allow you to answer these questions

- What did the area used to be?
  - Wetland Type, Water Source, Landscape Connection
- What impacts occurred to bring it to what it is today?
  - Changes to water depth only, or fundamental changes to landscape connection?
- How do the proposed actions restore the altered hydrology?
  - Prove it with data!

Data-driven design



So…What should I ask for?

You should have enough information to know:

- What a wetland used to be
  - Historical information, adjacent reference sites
- What the site is like now
  - Hydrologic impacts, e.g. tile drains, diversions, discharges, physical barriers
  - Diagrams of key hydrologic processes (Hillsides, floodplains, water sources)
- How restoration will reestablish altered water levels
  - Diagrams of *restored* hydrologic processes

- If you don’t have enough information, ask for it!

Things to remember

- Wetlands are part of a larger landscape
  - Ask for diagrams that place a wetland in context of the broader landscape
- Understanding landscape connections, water sources, and position on the landscape is critical to understand how water will flow through a wetland
- If you don’t get the water levels right, the rest likely won’t follow
- Restoration should be done using an inter-disciplinary team!!!

Thanks!

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