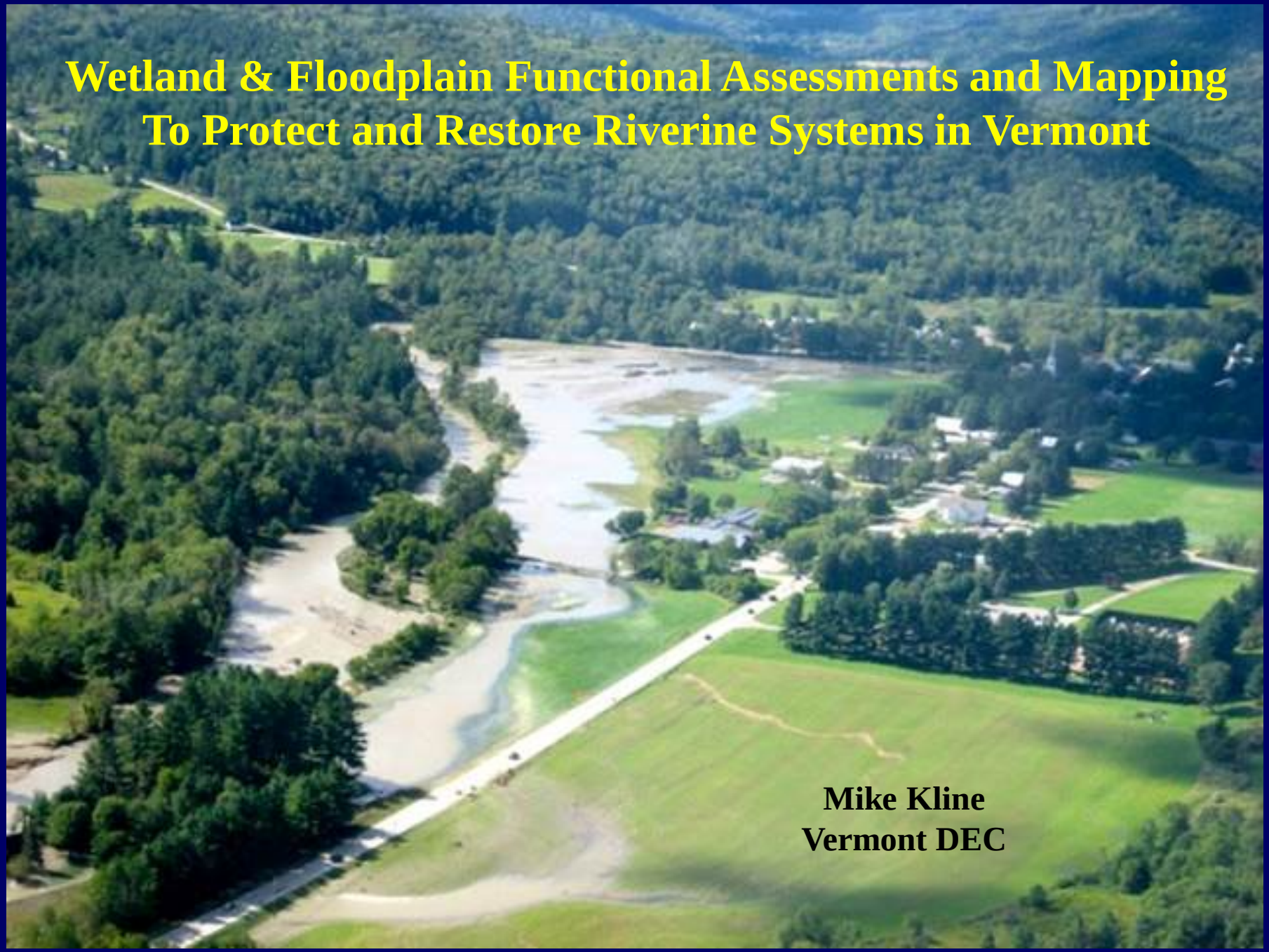
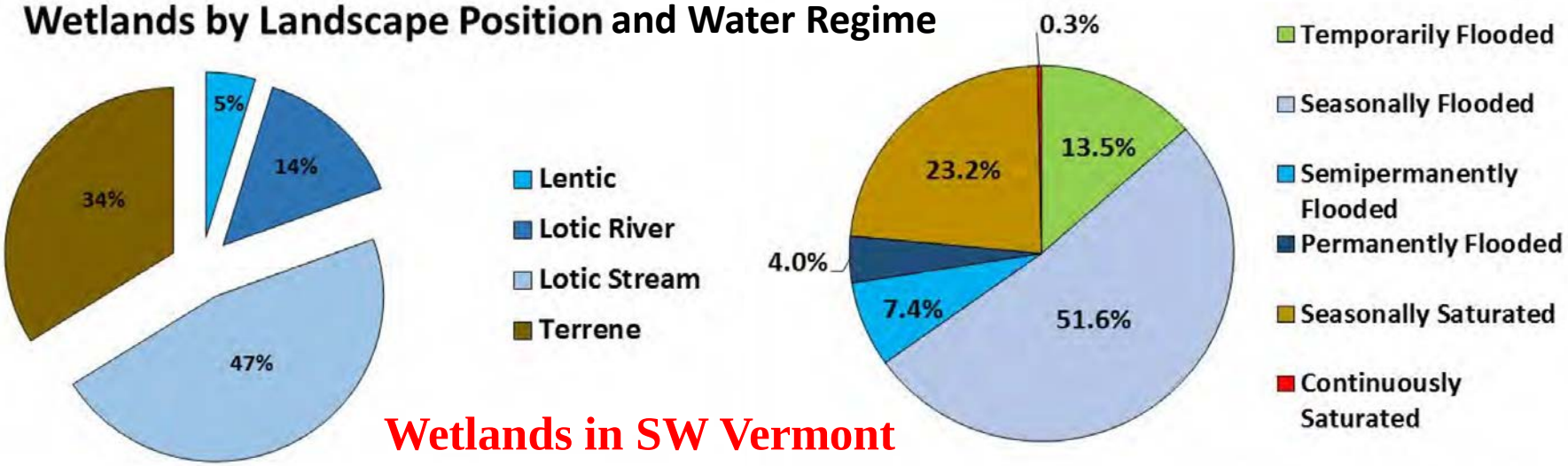
Wetland & Floodplain Functional Assessments and Mapping To Protect and Restore Riverine Systems in Vermont



Mike Kline
Vermont DEC

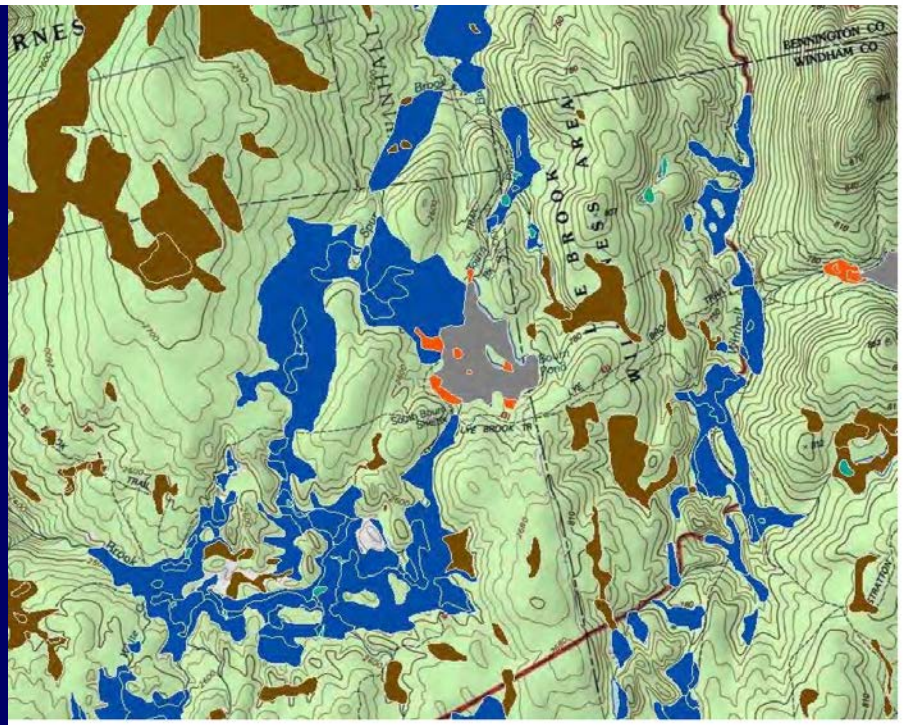
NWI+ Hydro-Geomorphic Characterization of Wetlands



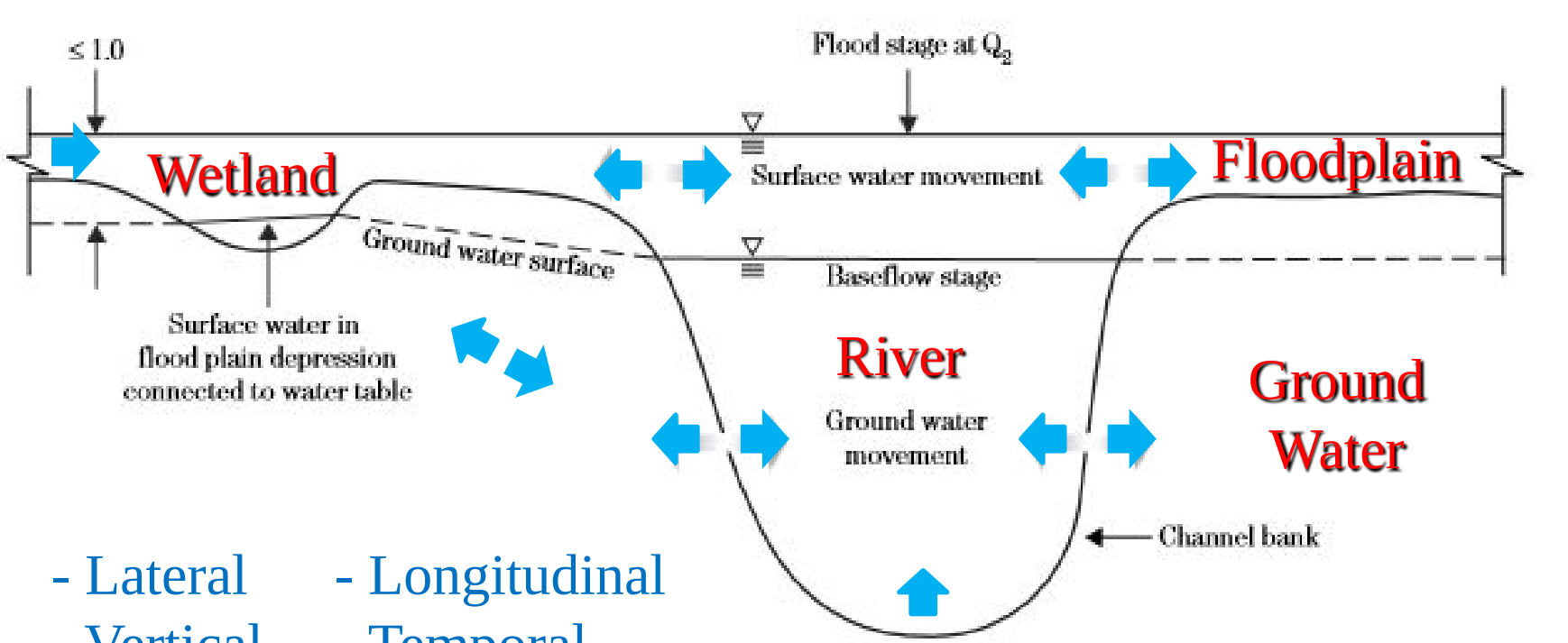
Wetlands in SW Vermont

Understanding the natural hydrology will improve wetland restoration.

Vermont is working on mapping tools that will advance our ability to restore of the hydrology and fluvial processes of the entire "riverscape."



Vermont Wetland and Floodplain Management Goals:
Maximize Flood Attenuation, Habitat & Water Quality

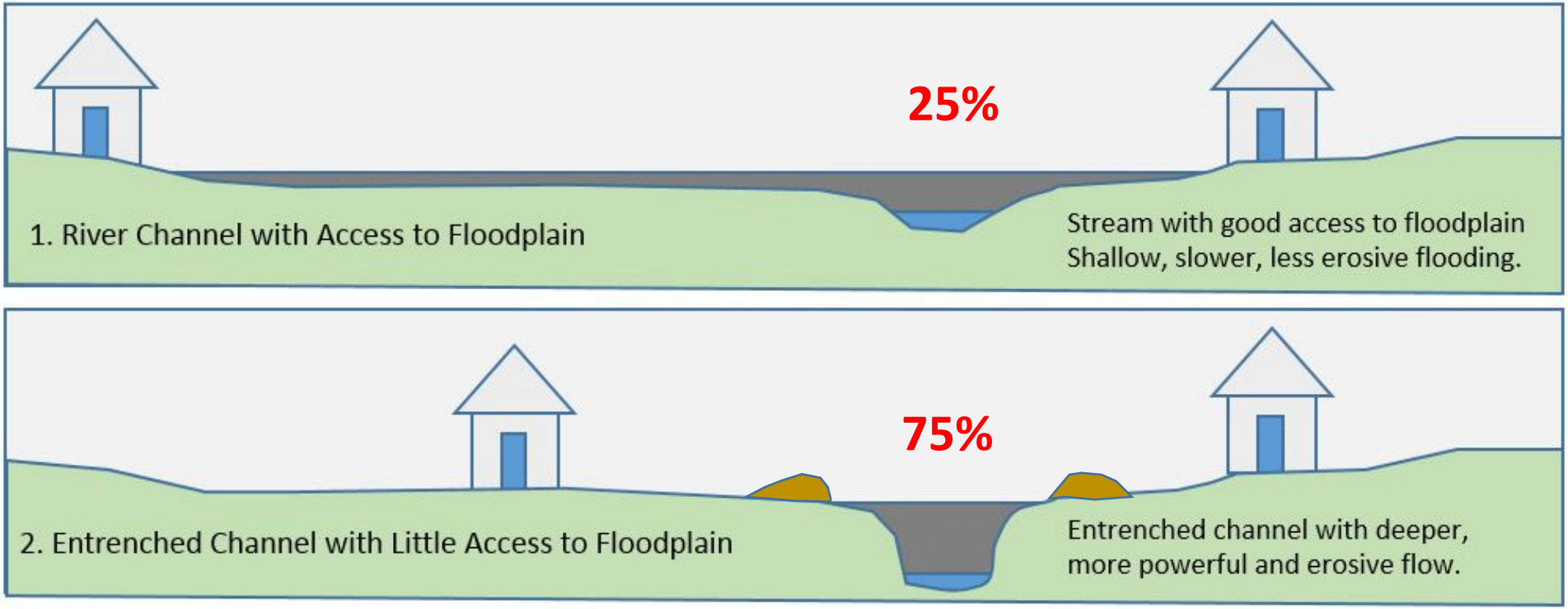


USDA Tech Note 2008

Mapping tools to examine the connectivity of flows, energy, and sediments

Our wetland and floodplain mapping needs to start with the river

Deposition, Storage, and Higher Soil Moisture



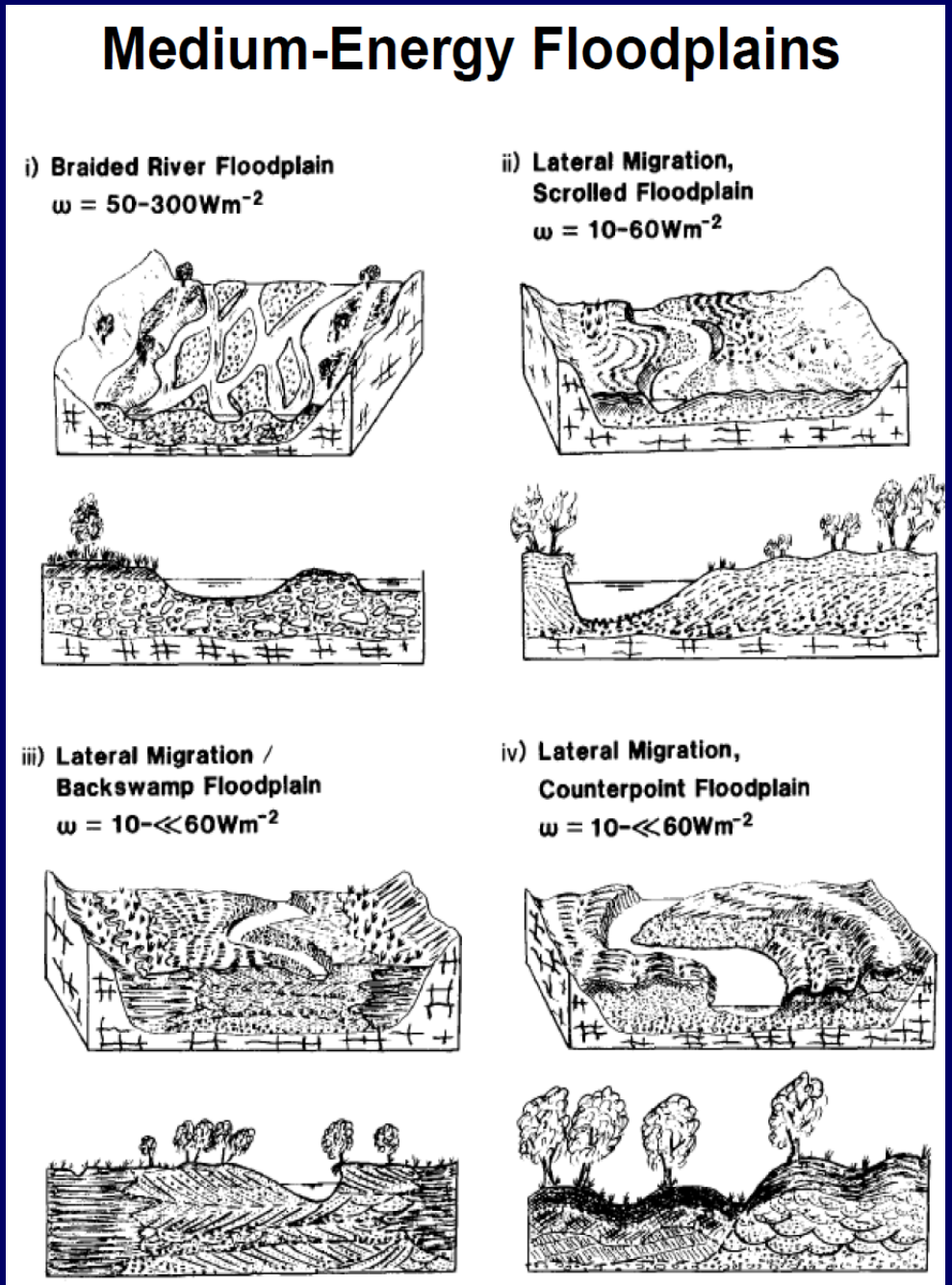
Erosion, Transport, and Decreased Soil Organic Content

Disconnected Floodplains – flood less frequently and for shorter duration, which influences erosion and sedimentation, floodplain morphology (topography), soil characteristics, and vegetation.

Connectivity, fluvial processes and floodplain topography may be difficult to visually interpret with photos and DEMs

Need accessible, summary parameters to characterize hydro-geomorphic processes

Specific Stream Power and Sediment Caliber



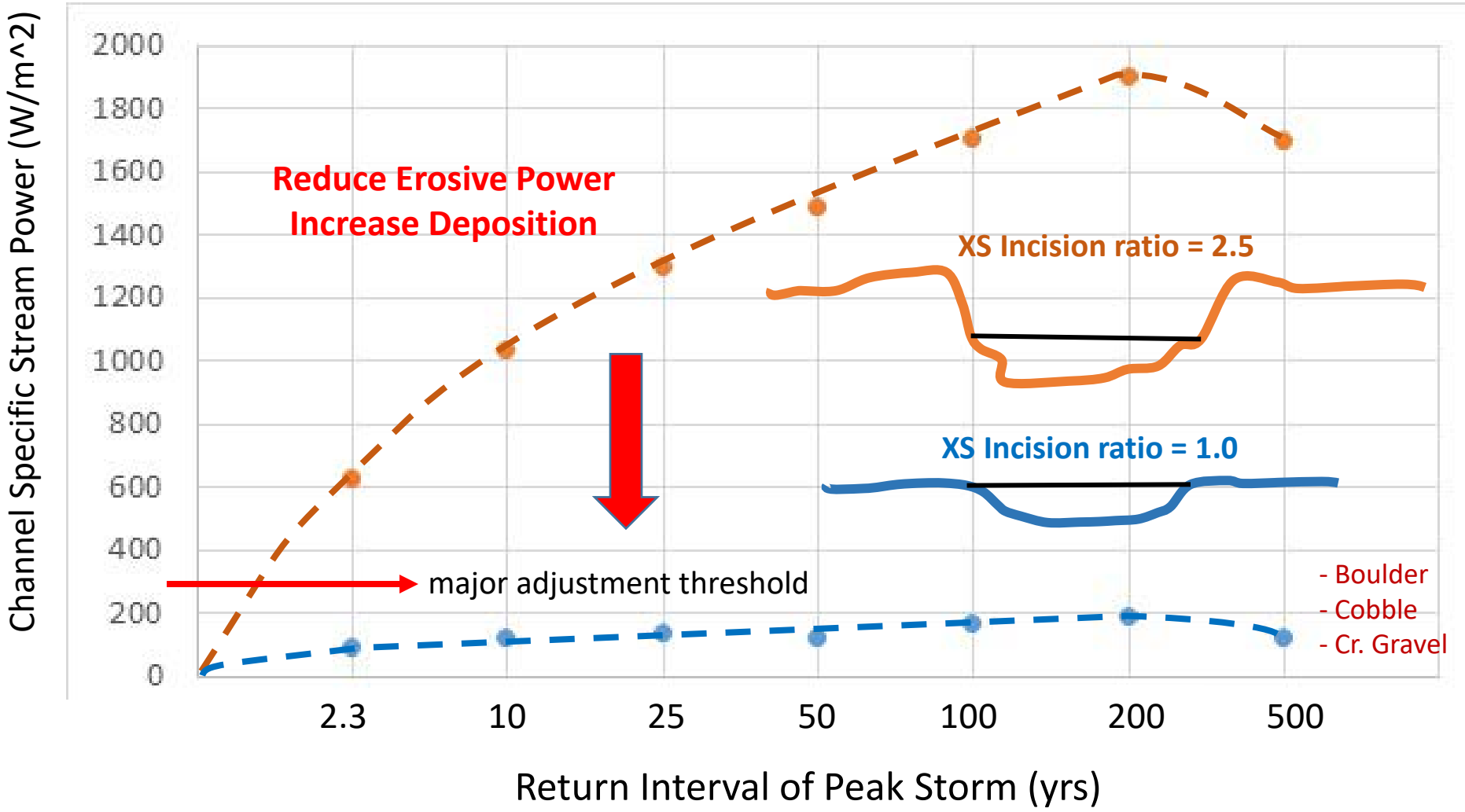
Nanson and Croke 1992

Floodplain connectivity moderates specific stream power which governs erosion and depositional processes and may indicate floodplain and wetland type and function in different valley settings and sediment regimes.

Total Stream Power = $\Omega = \rho\ g\ Q\ S$

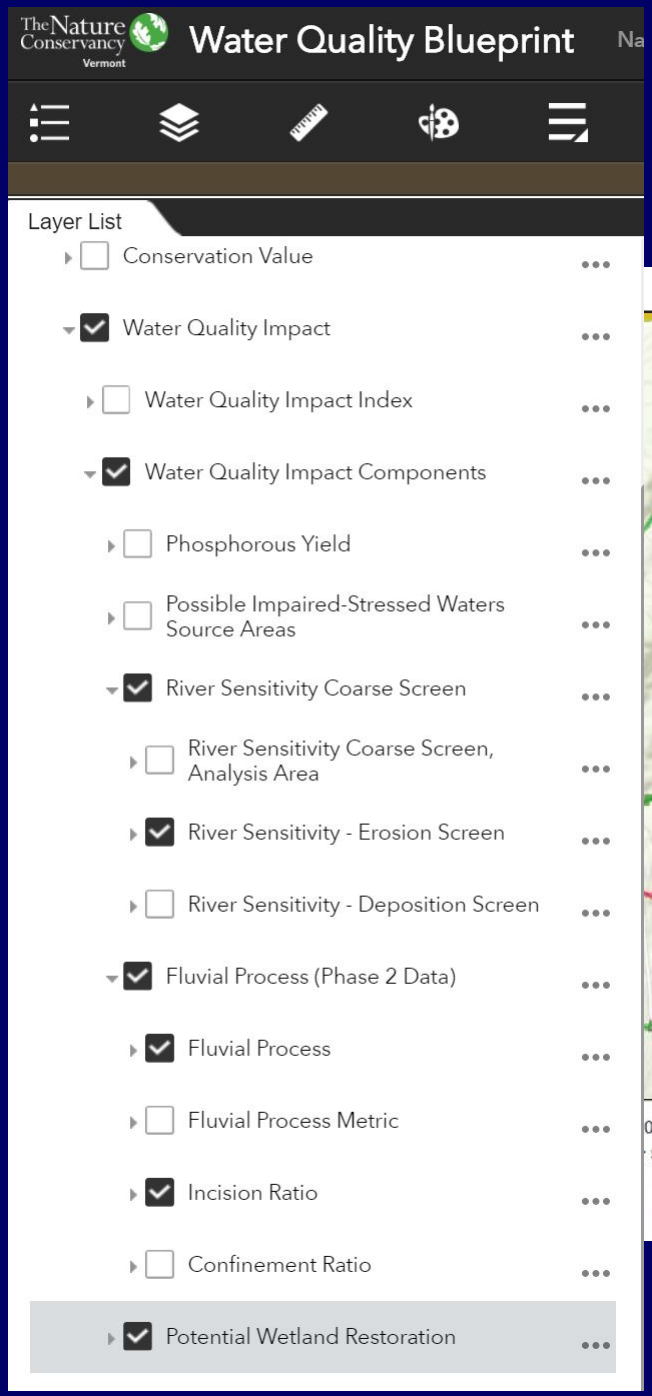
Specific Stream Power = $\omega = \Omega / W$

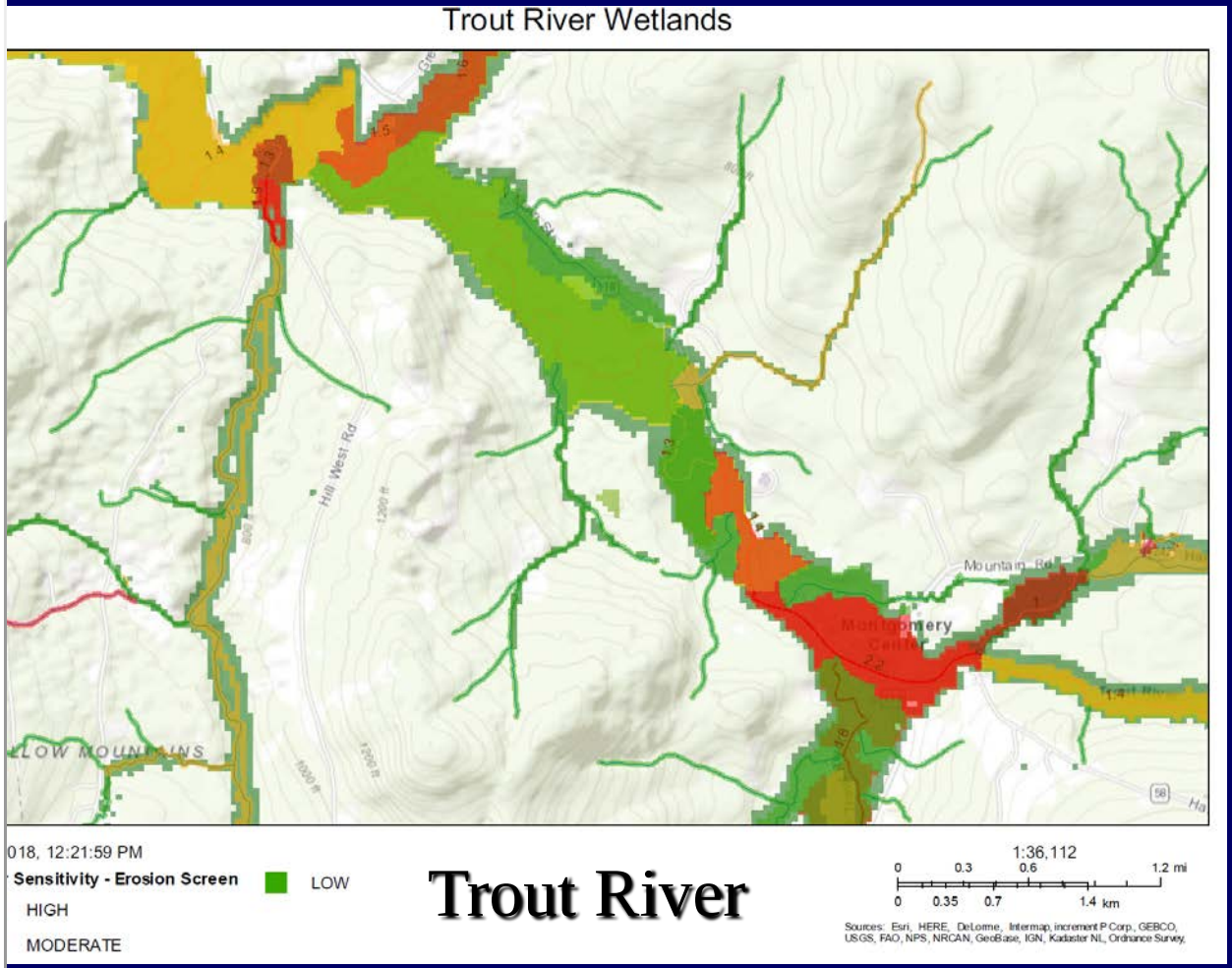
ω is a function of flow depth and slope



Adjoining reaches on the Mad River, VT

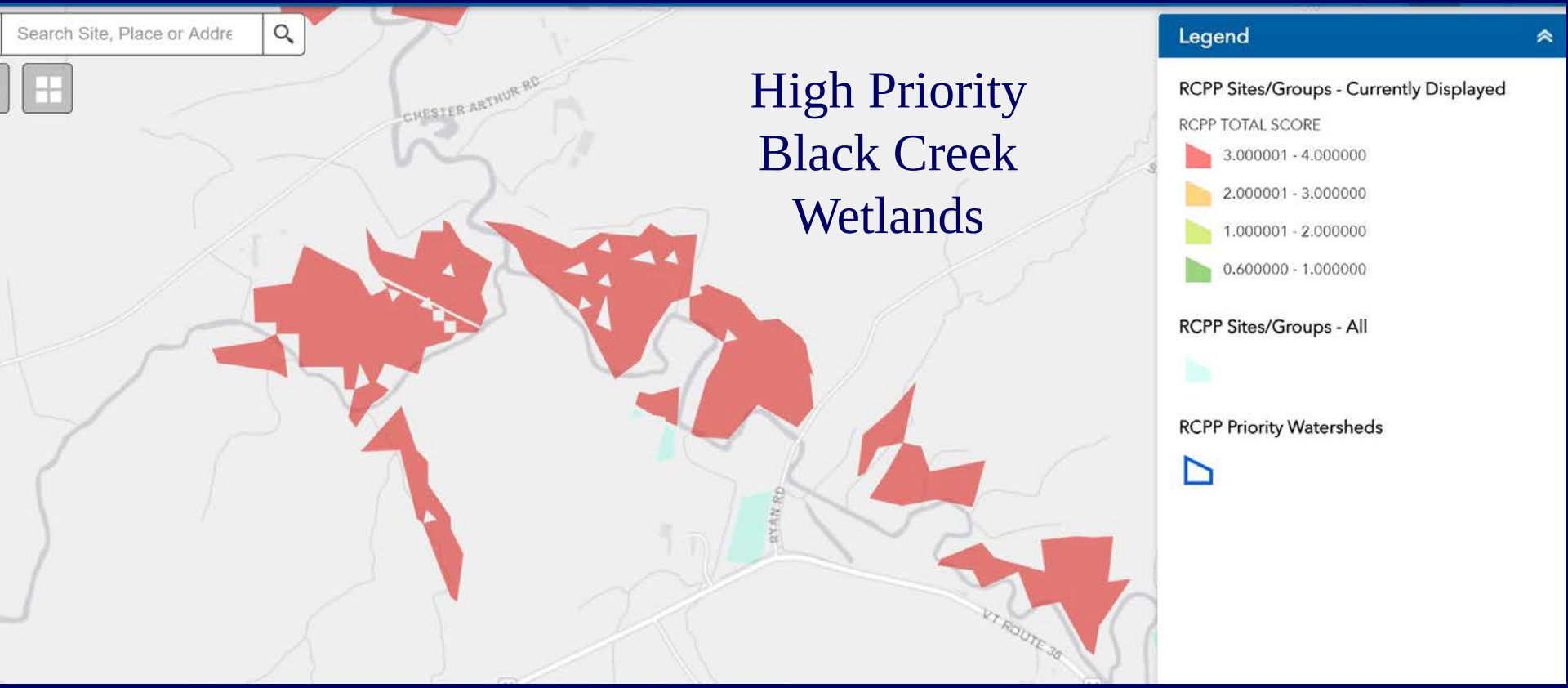
VT TNC Water Quality Blueprint





Toward a Watershed Approach

TNC Blueprint includes the Lake Champlain Wetland Restoration Plan



Prioritizing wetland restoration (for nutrient retention):

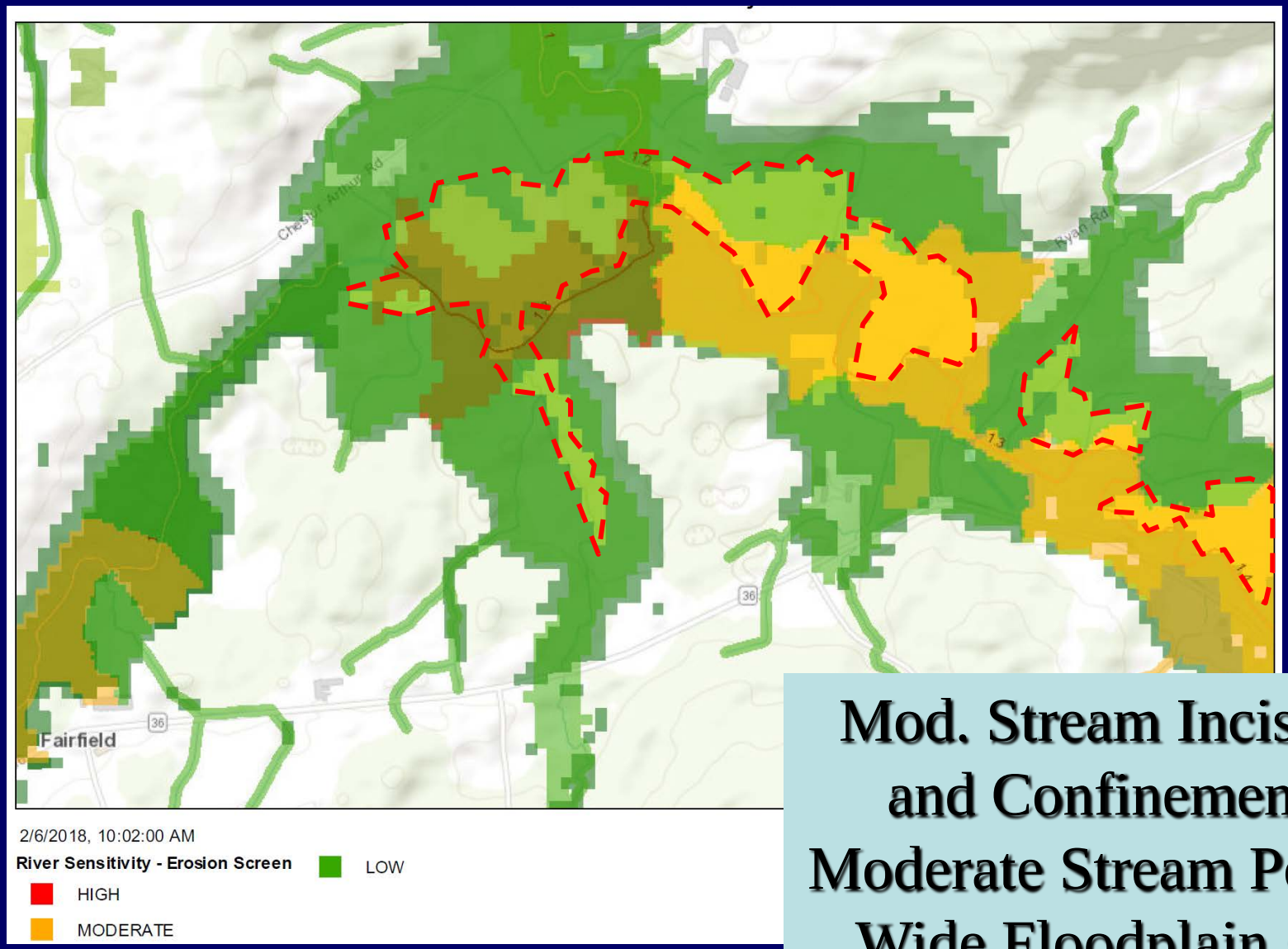
Site Function

- Soil texture and Erosion risk
- Size class
- Flood class
- Proximity to surface waters (river corridors/floodplains)

Upslope drainage

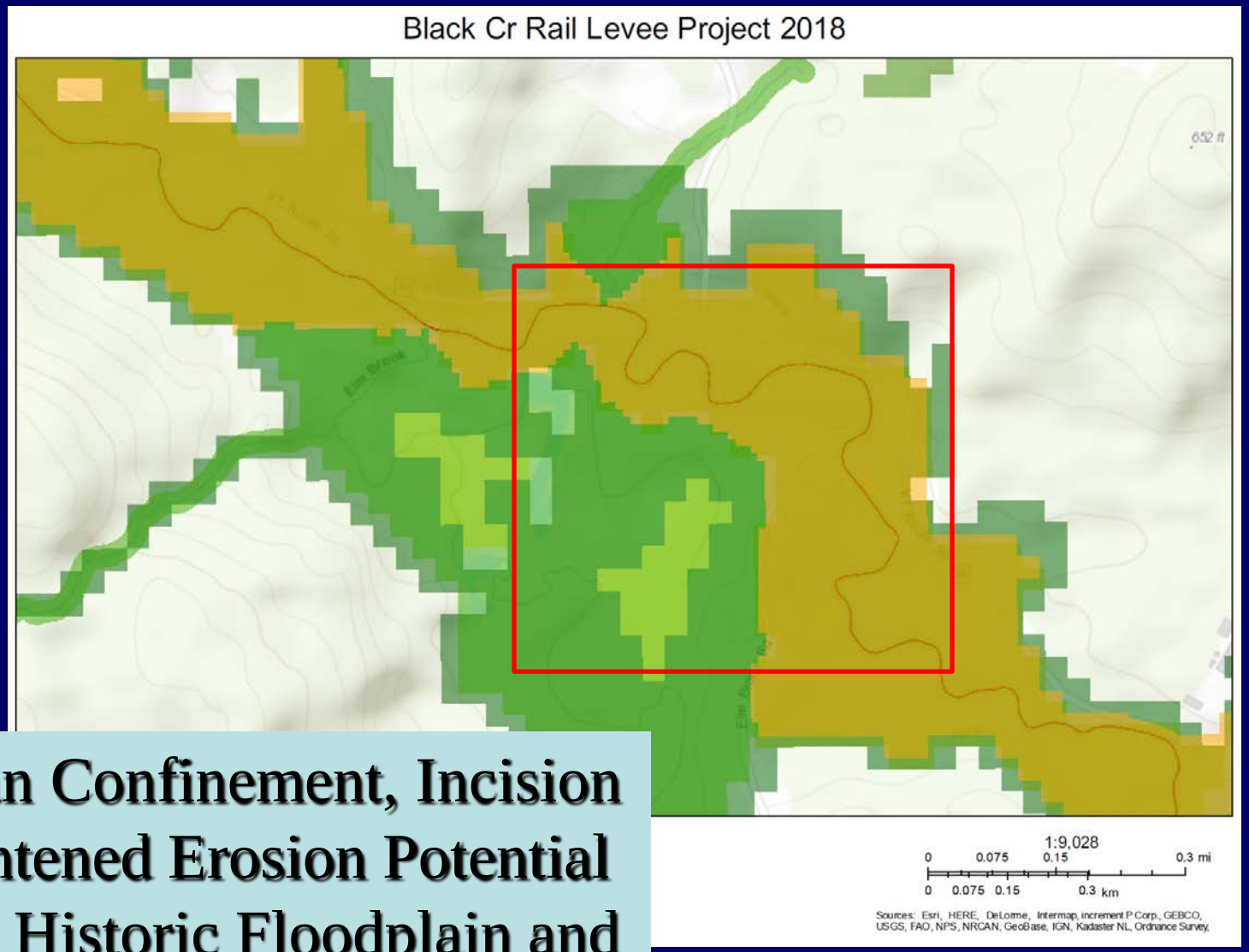
- Slope and Erosion risk
- Estimated P load
- Land cover
- Hydrologic soil group
- Drainage to wetland area ratio

High Priority Black Creek Wetlands and Floodplains



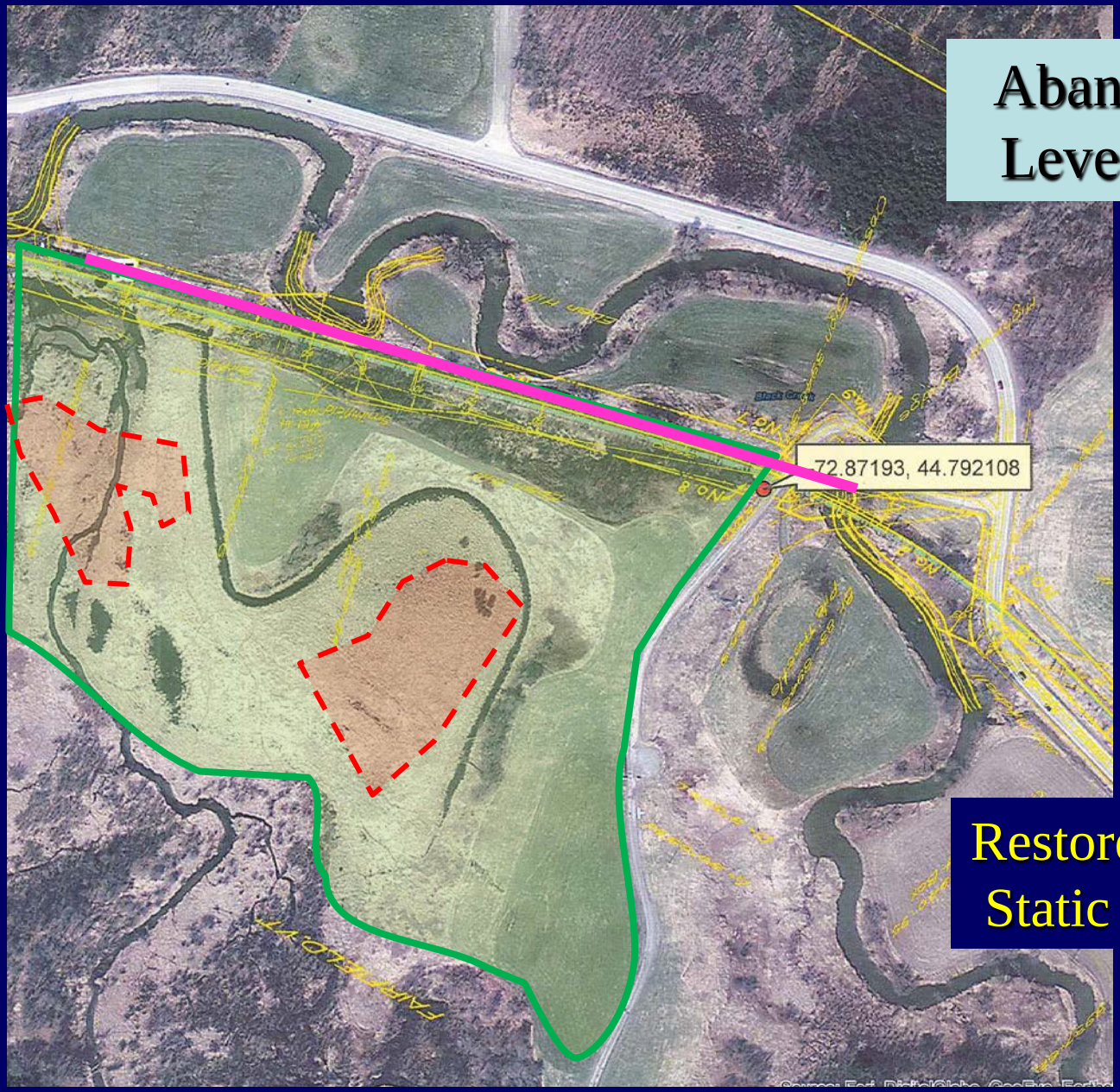
Mod. Stream Incision and Confinement, Moderate Stream Power Wide Floodplain and High Priority Wetland

Black Creek Floodplain-Wetland Restoration Project



Human Confinement, Incision Heightened Erosion Potential Wide Historic Floodplain and High Priority Wetland

Black Creek Floodplain & Wetland Restoration Project



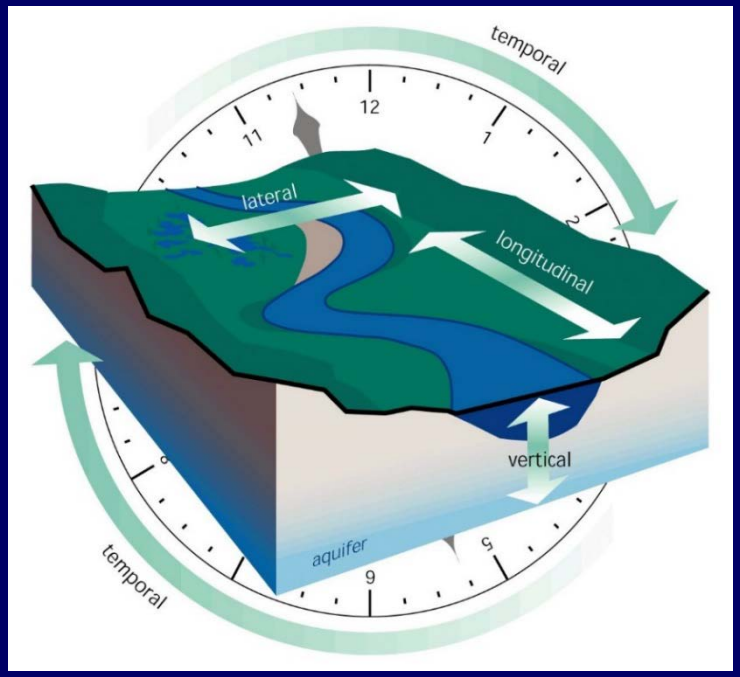
Abandoned Rail Levee Removal

Restore Processes not Static Wetland Form

Maps Needed to Apply VT Performance Standards

Flood Resilience – Habitat -- Water Quality

- **Natural Flow Regime:** no change in the pattern of flow rates, annually, seasonally, and daily that would result in less than the full support of designated WQ uses . Flow pattern is characterized by the magnitude, frequency, duration, timing, and rate of change of hydrologic conditions.



- **Equilibrium**: stream alterations shall not result in channel conditions that cause or perpetuate unnatural:
  - aggradation (raising) or
  - degradation (lowering).

- **Connectivity**: stream alterations shall not create a significant disconnect in:
  - the stream bed or banks; or
  - channel from its floodplain.

- **River Corridors**: Proposed development shall not cause the river reach to depart from or further depart from natural stream processes and equilibrium conditions, or the need for stream channelization within the river meander belt.


Mike Kline
Vermont DEC
Rivers Program