DNR Thresholds Project: Negative Impacts to Surface Waters – Wetlands

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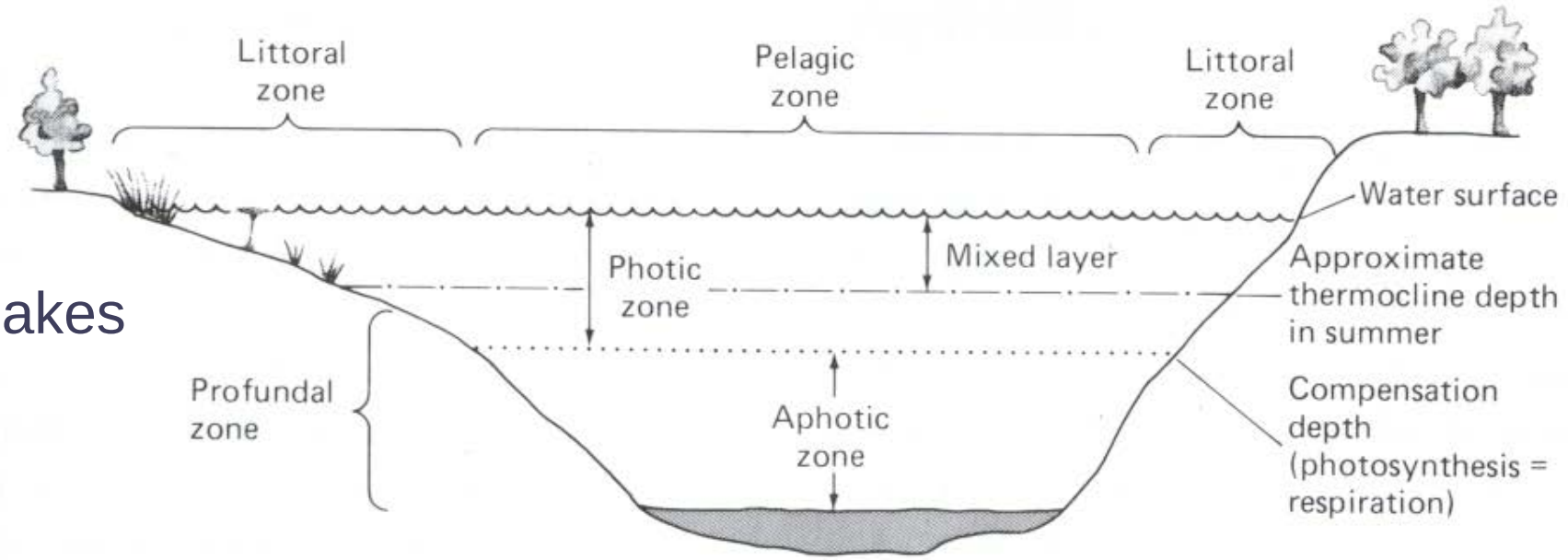
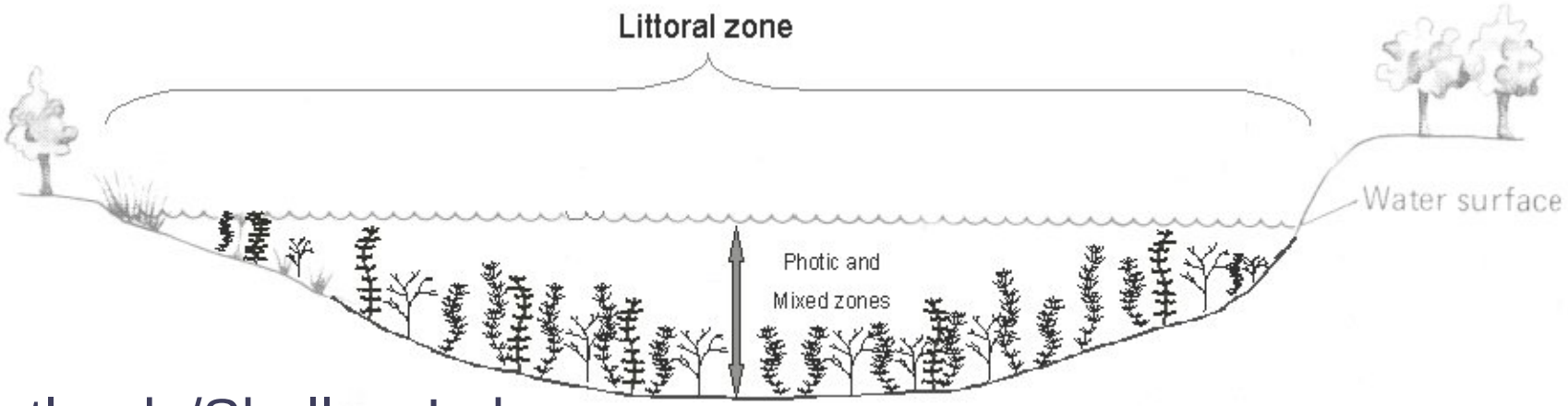
What is a wetland?

- Wetlands are characterized by:
  - **Water** – inundation/saturation by surface or groundwater during the growing season
  - **Hydric soils** – developed under anaerobic conditions
  - **Hydrophytes** – plants adapted for wet conditions

Wetlands vs. Lakes



Lakes

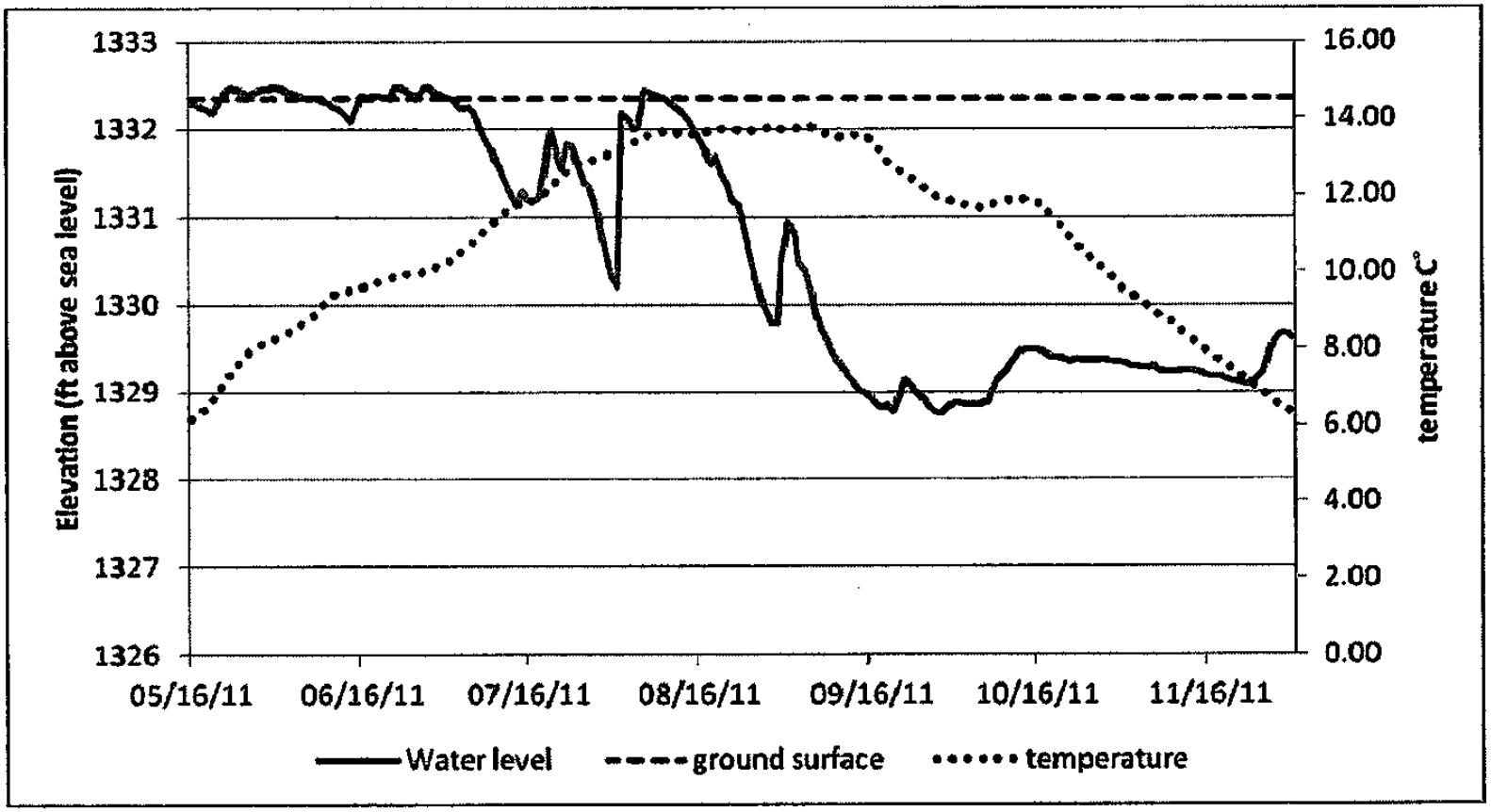


Wetlands/Shallow Lakes

Different Types of Wetlands:

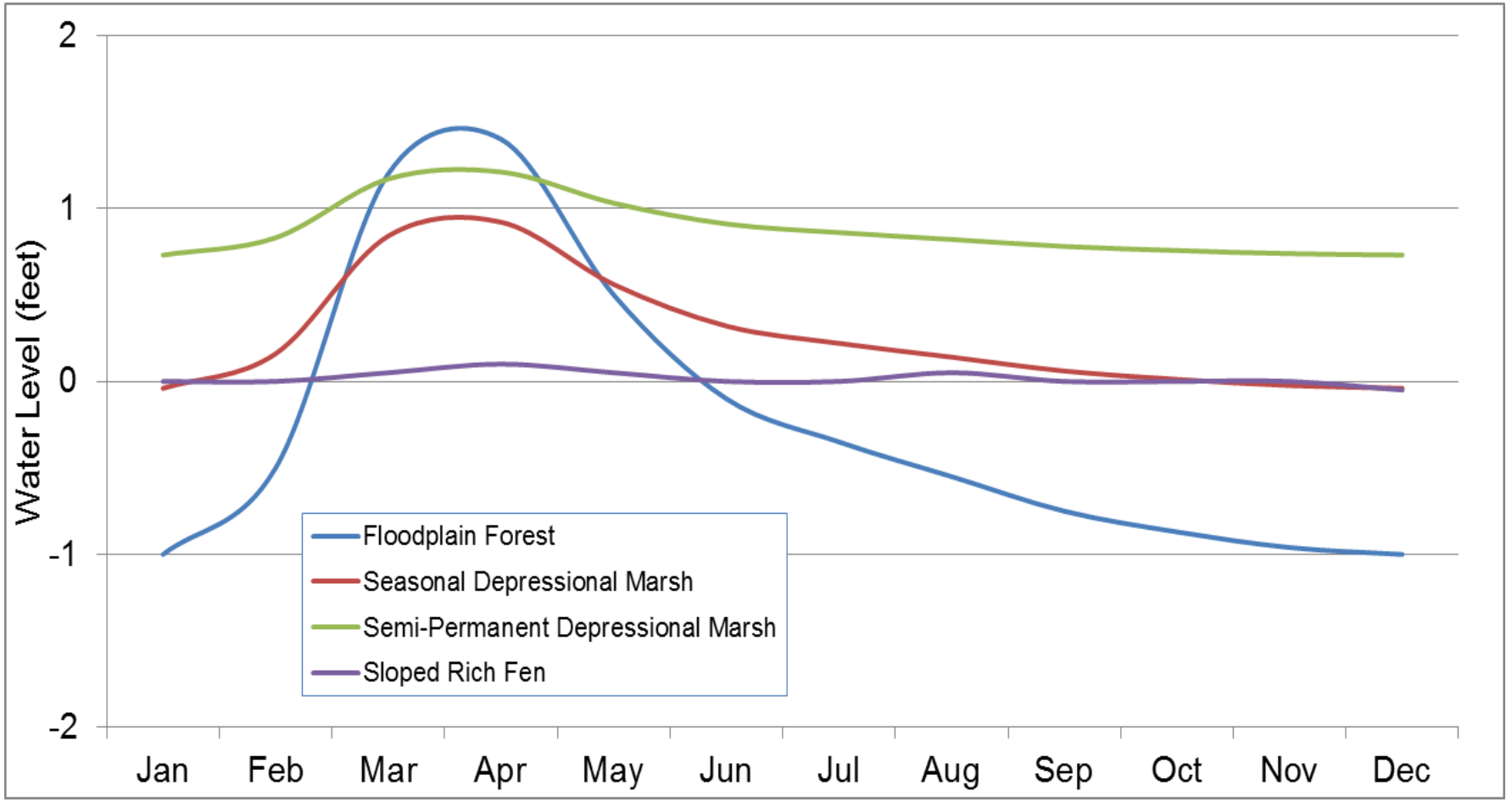
Hydrology drives plant community:

- Depth
- Duration
- Timing
- Frequency



Black ash wetland in Itasca County (Lenhart, et al. 2012)

“Typical” Wetland Hydrographs



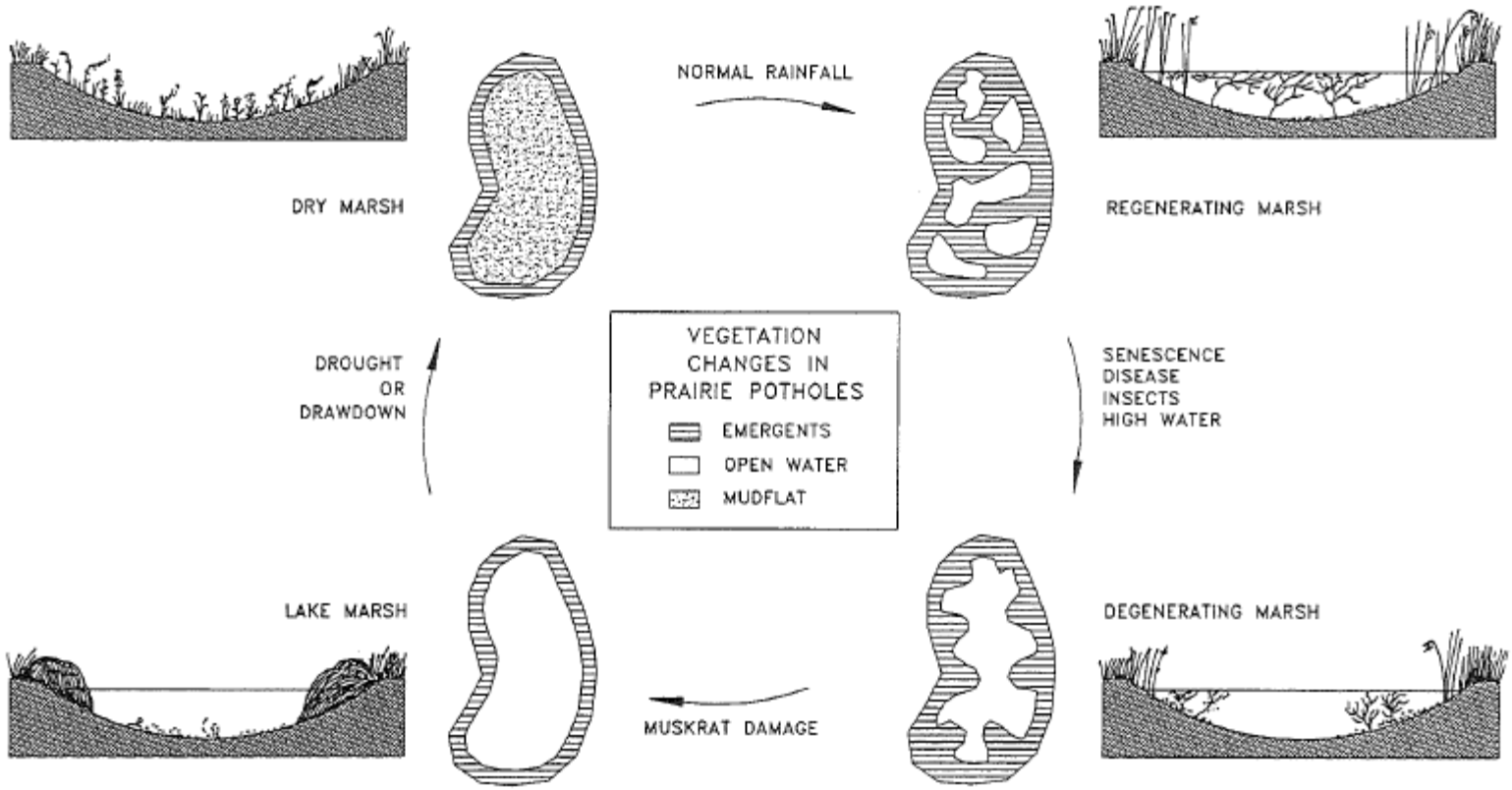
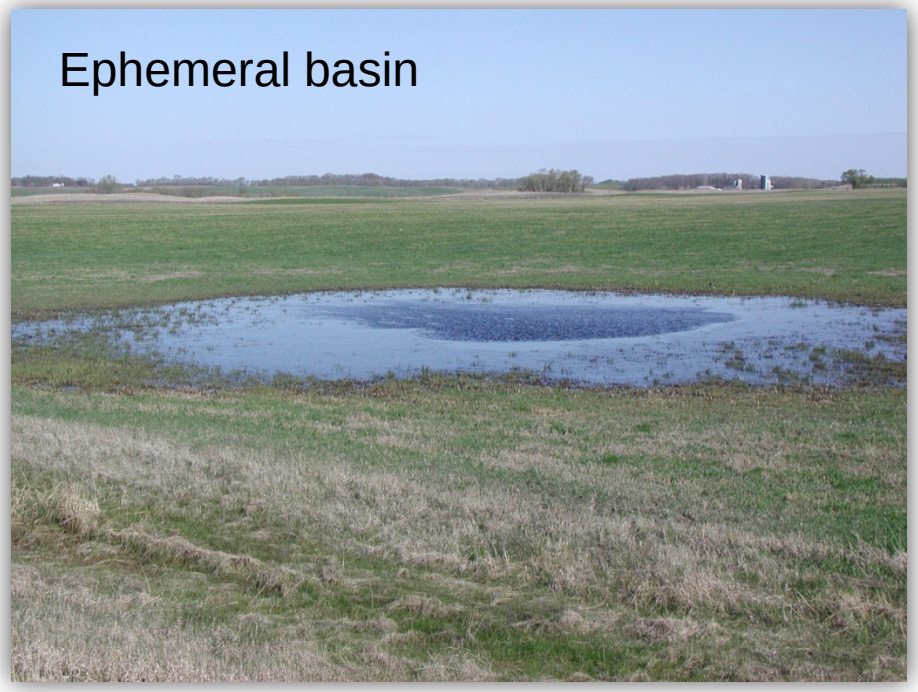


Figure 2.3. Vegetation dynamics of prairie pothole wetlands. (Adapted from van der Valk and Davis, 1978)

From: Galatowitsch and van der Valk, 1994

Wetland – Groundwater Interaction



Groundwater Input

High

Low

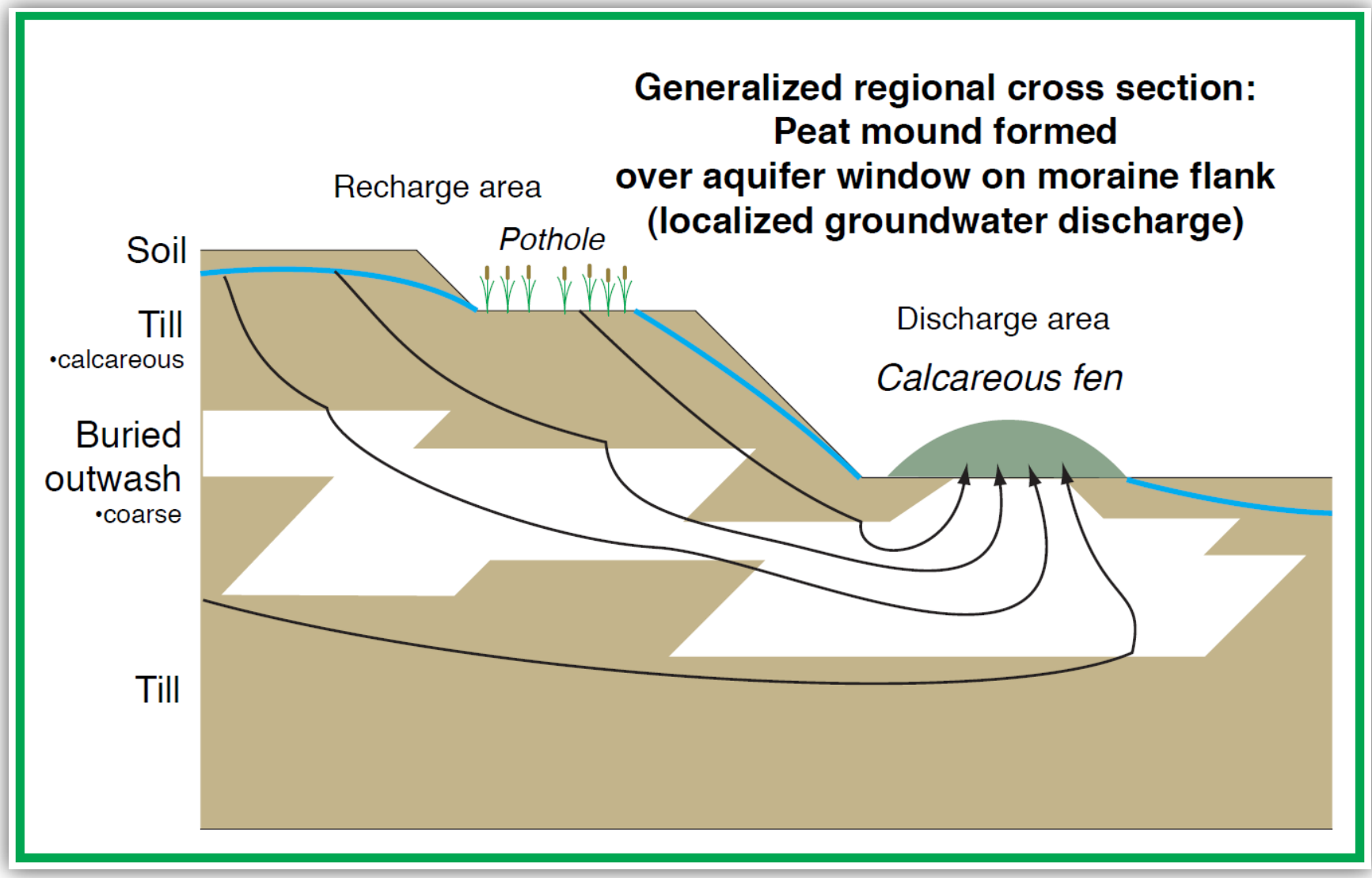
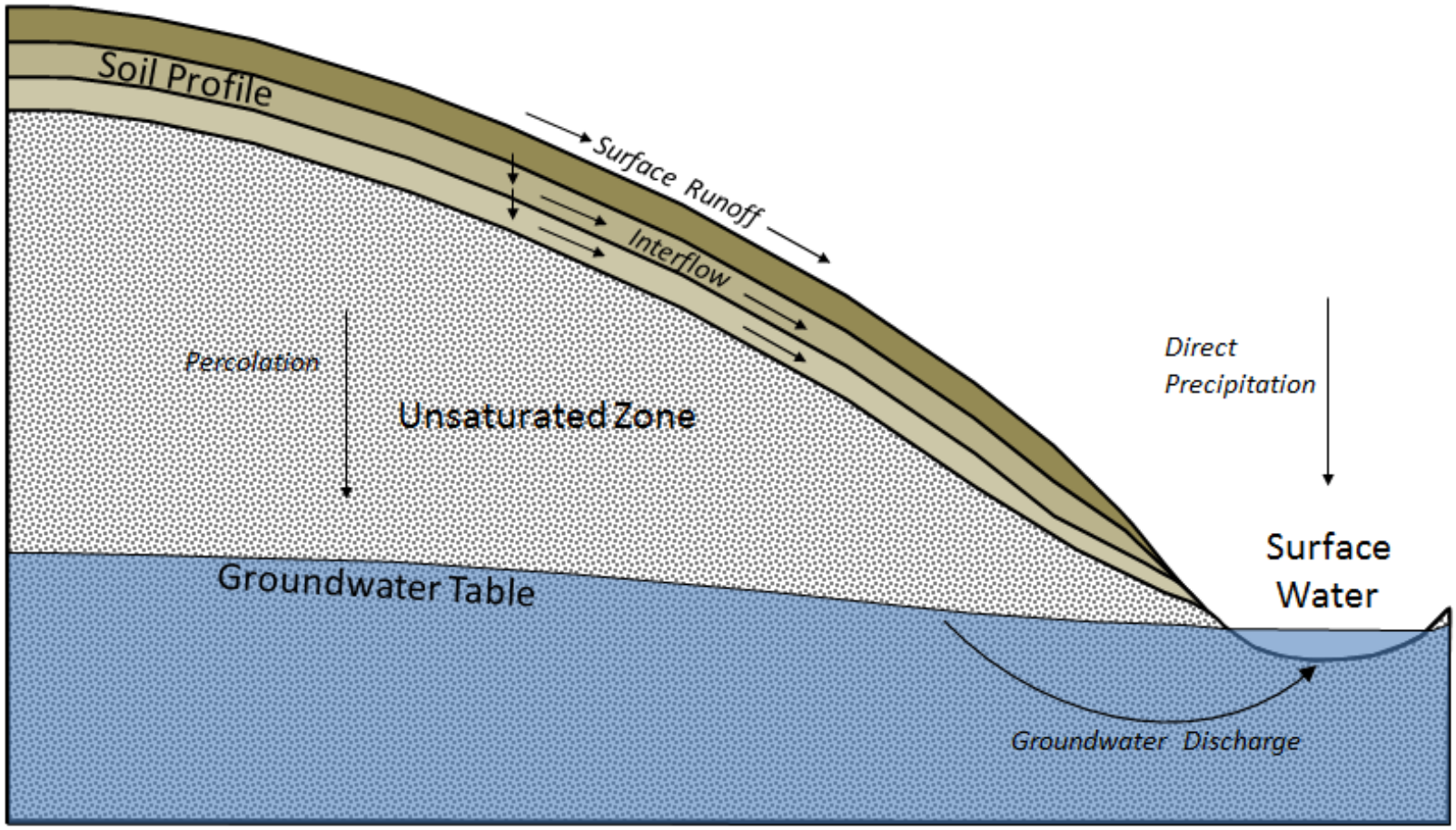


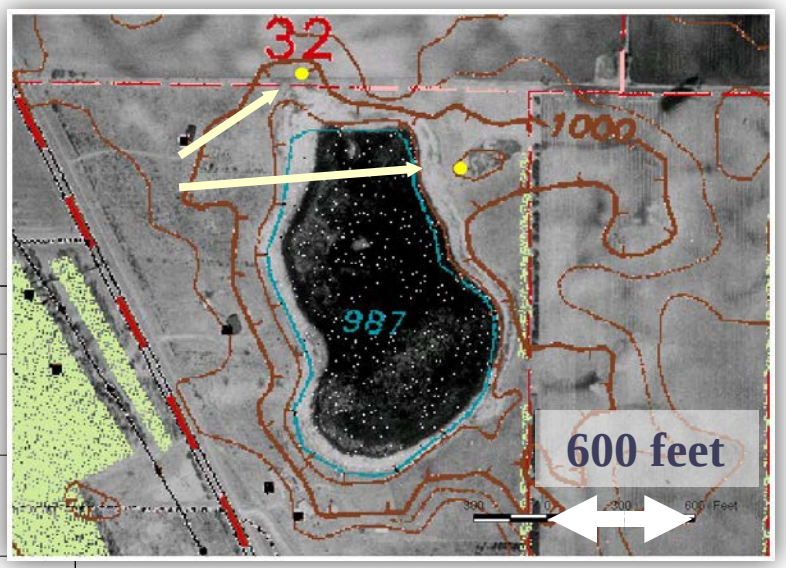
Illustration by James Almendinger

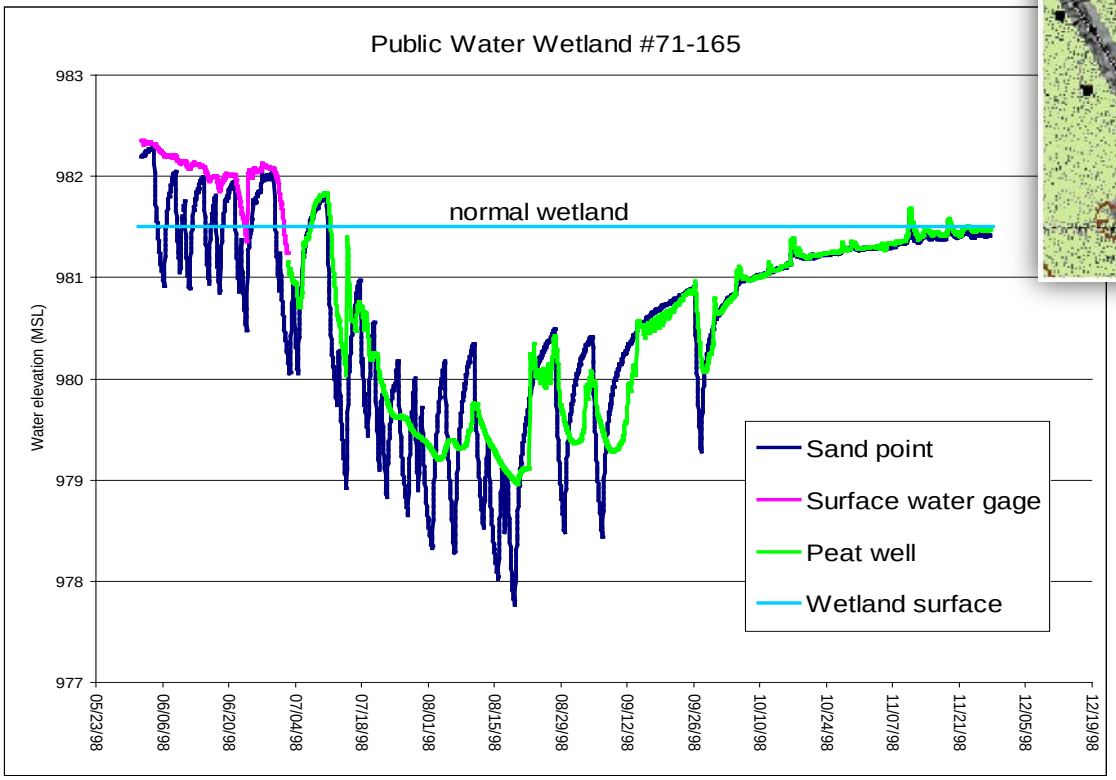

Soil Profile
Surface Runoff
Interflow
Percolation
Unsaturated Zone
Direct
Precipitation
Surface
Water
Groundwater Table
Groundwater Discharge

Why it's important: groundwater is connected to surface water

Nearby irrigation…

Production wells





Defining “Negative Impact” for Wetlands

Current statutes and rules:

- Achieve **no net loss** in the **quantity, quality, and biological diversity** of Minnesota's existing wetlands;
- **Wetlands must not be drained** or filled, **wholly or partially**, unless replaced by restoring or creating wetland areas of at least equal public value under a replacement plan
- "Impact" means a **loss in the quantity, quality, or biological diversity** of a wetland caused **by draining** or filling of wetlands, **wholly or partially**

Defining “Negative Impact” for Wetlands

- 103G.223 Calcareous Fens

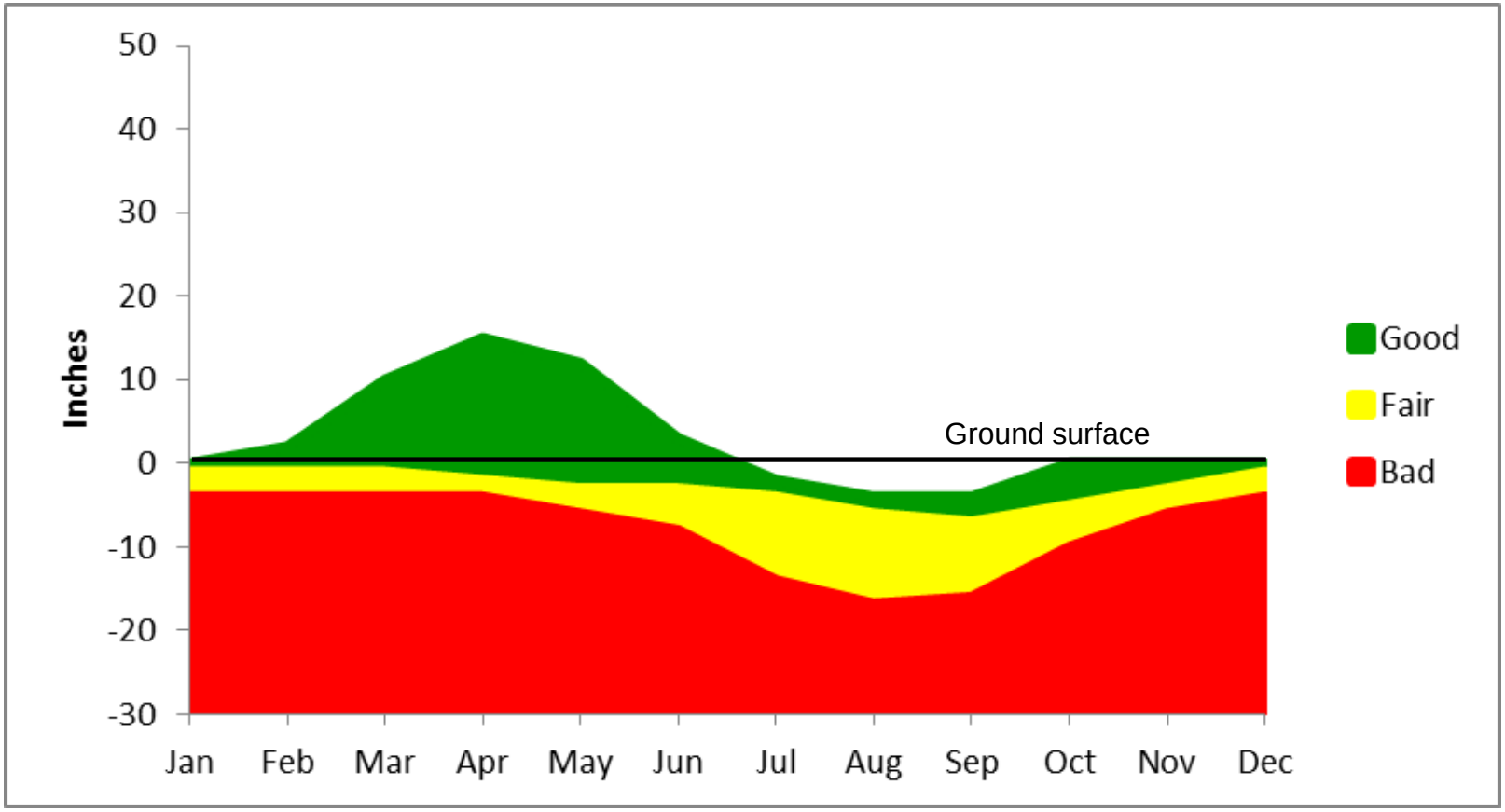
  Calcareous fens, as identified by the commissioner by written order published in the State Register, **may not be filled, drained, or otherwise degraded, wholly or partially**, by any activity, unless the commissioner, under an approved management plan, decides some alteration is necessary.

Negative impact =

Loss of wetland area or change in hydrology sufficient to alter the characteristic, long-term wetland plant community

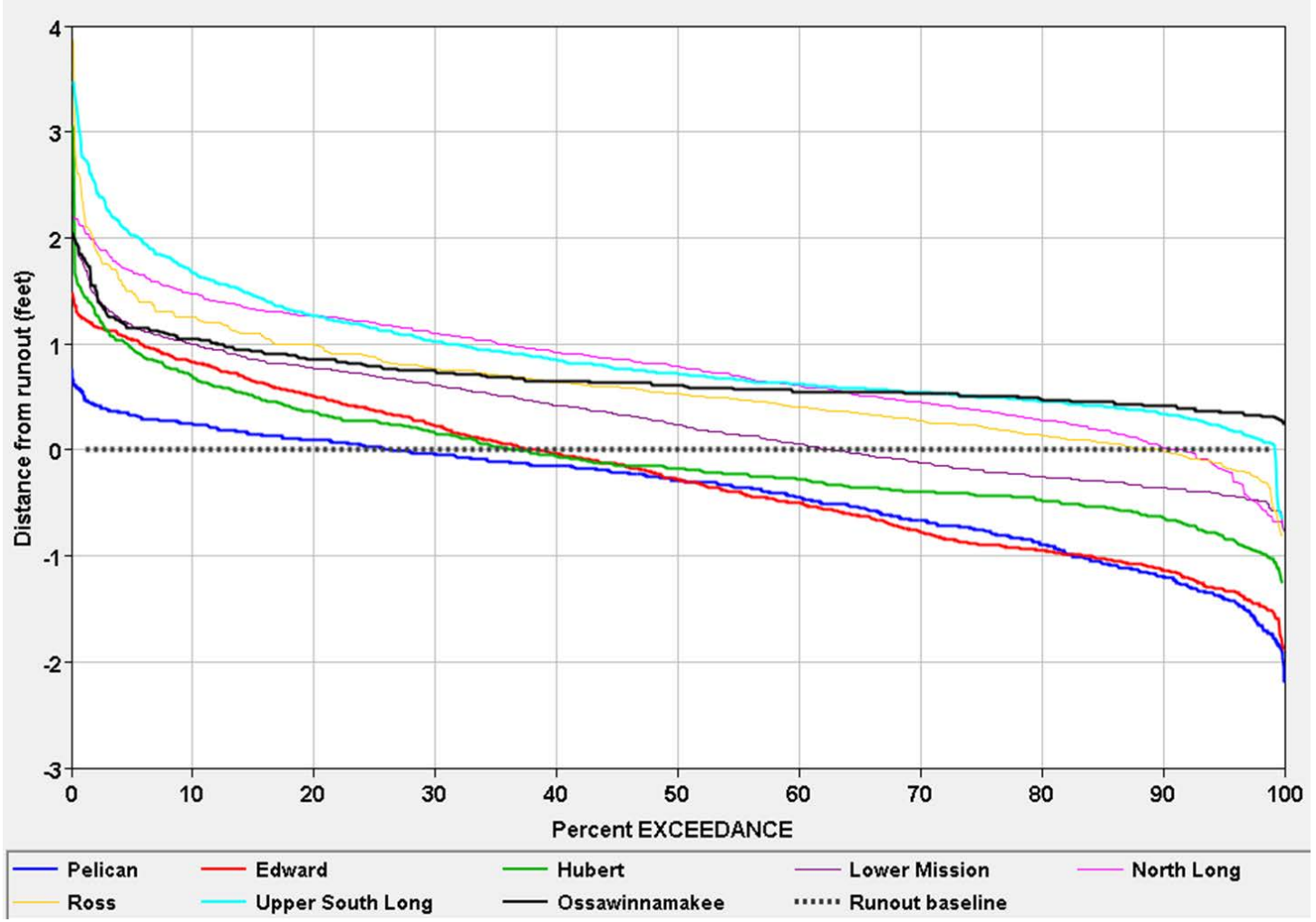
Possible Approach for Determining Thresholds

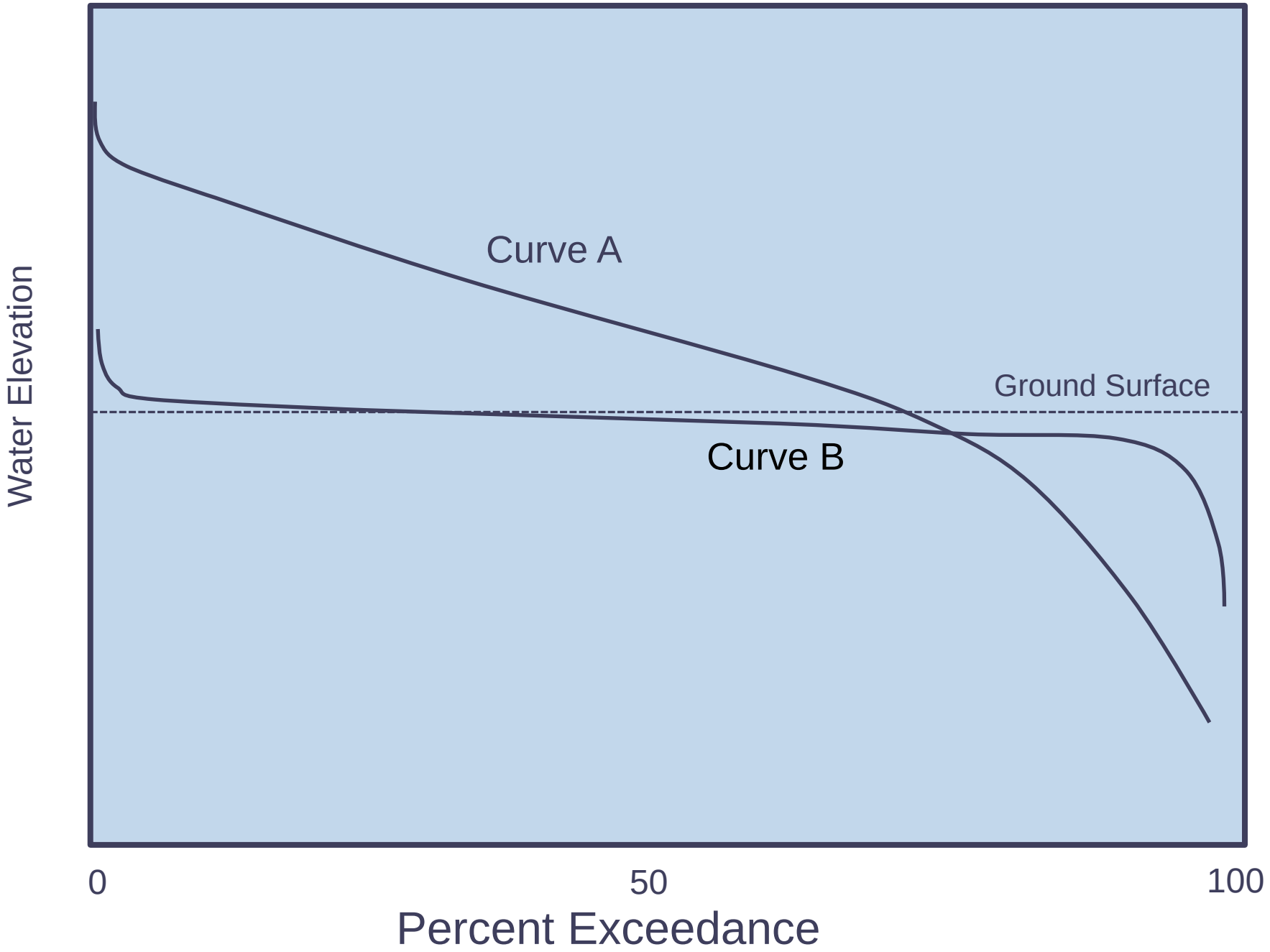
Target hydrographs:

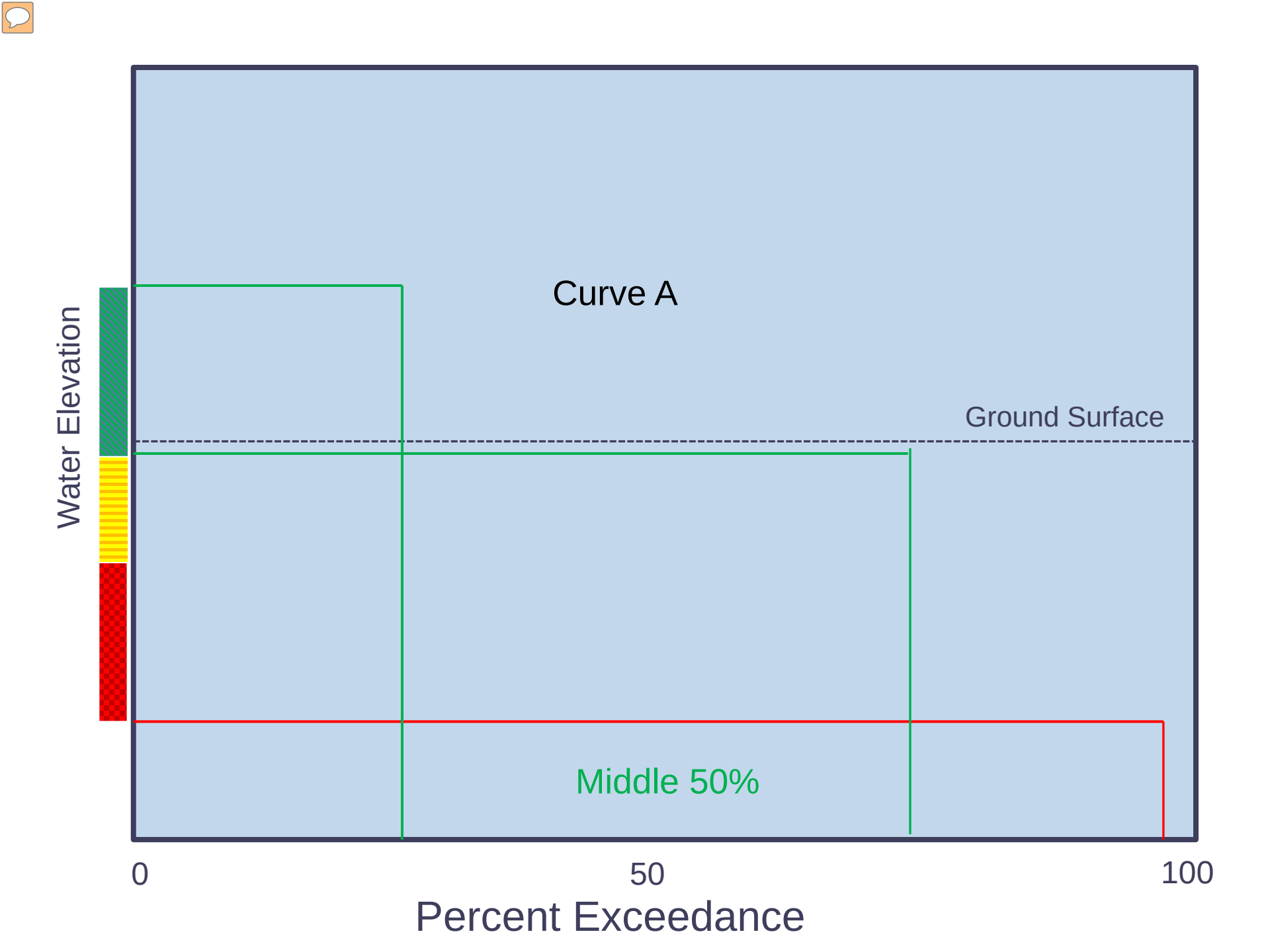


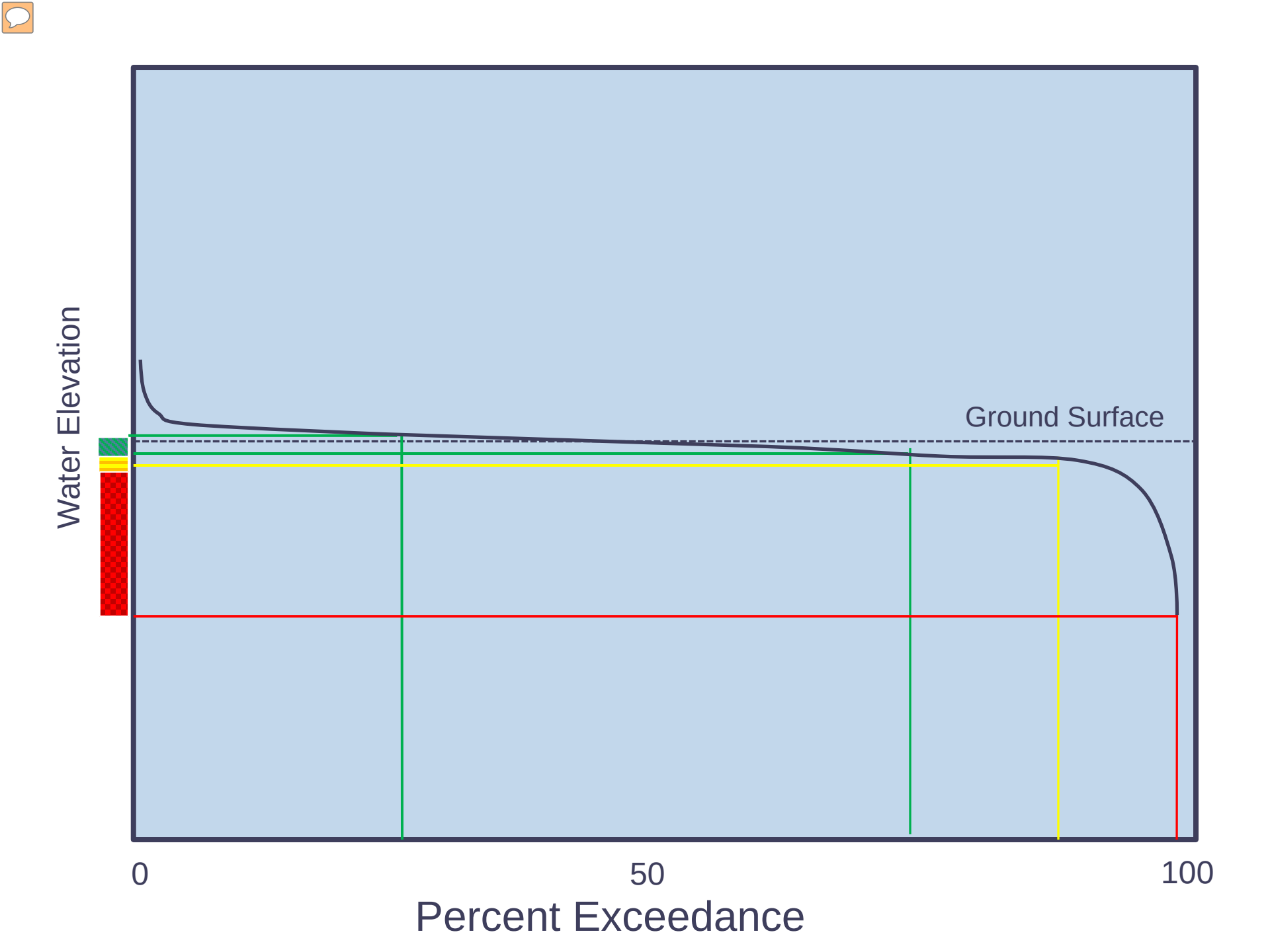
Adapted from Wheeler et al., 2004

Long term dynamics

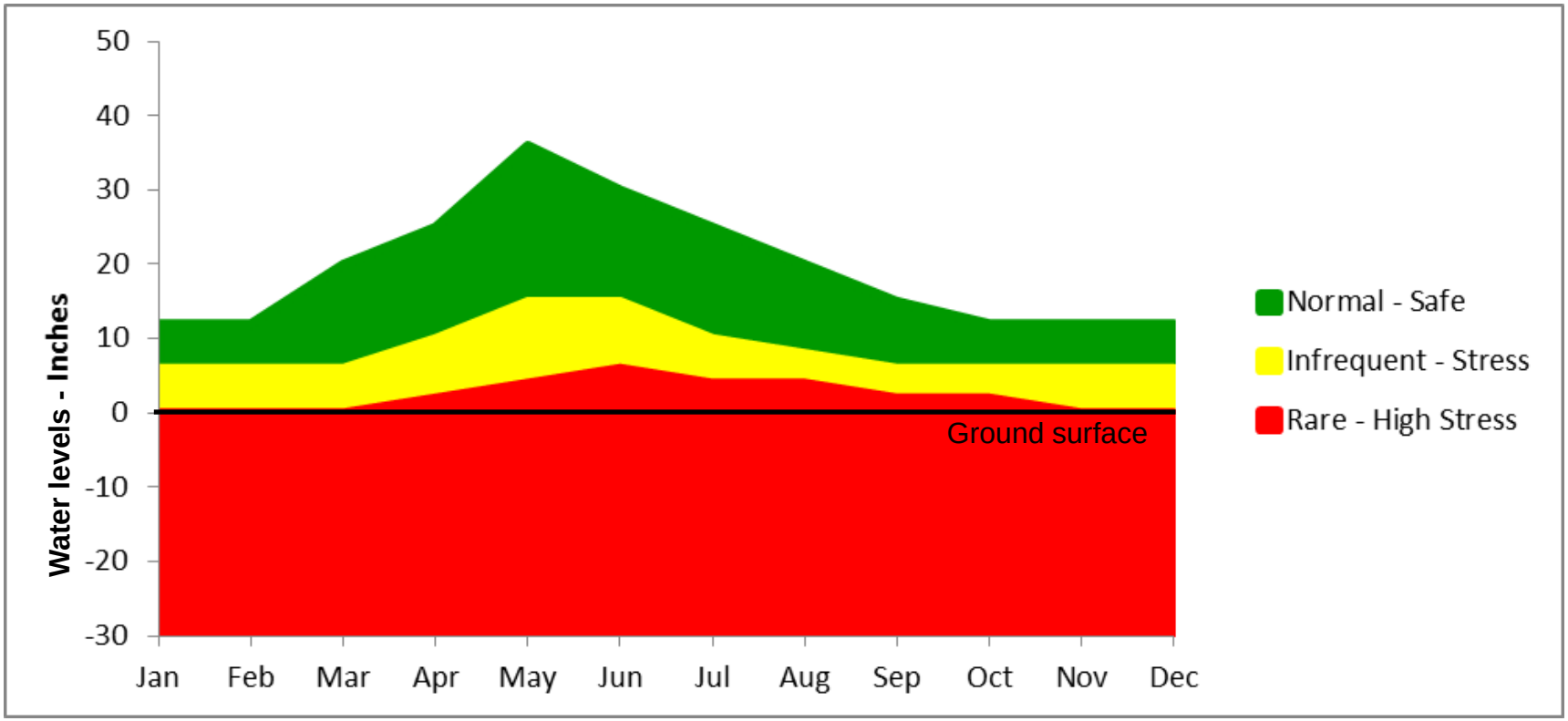



Water Elevation
Curve A
Ground Surface
Curve B
0
50
100
Percent Exceedance


Curve A
Ground Surface
Water Elevation
Middle 50%
0
50
100
Percent Exceedance

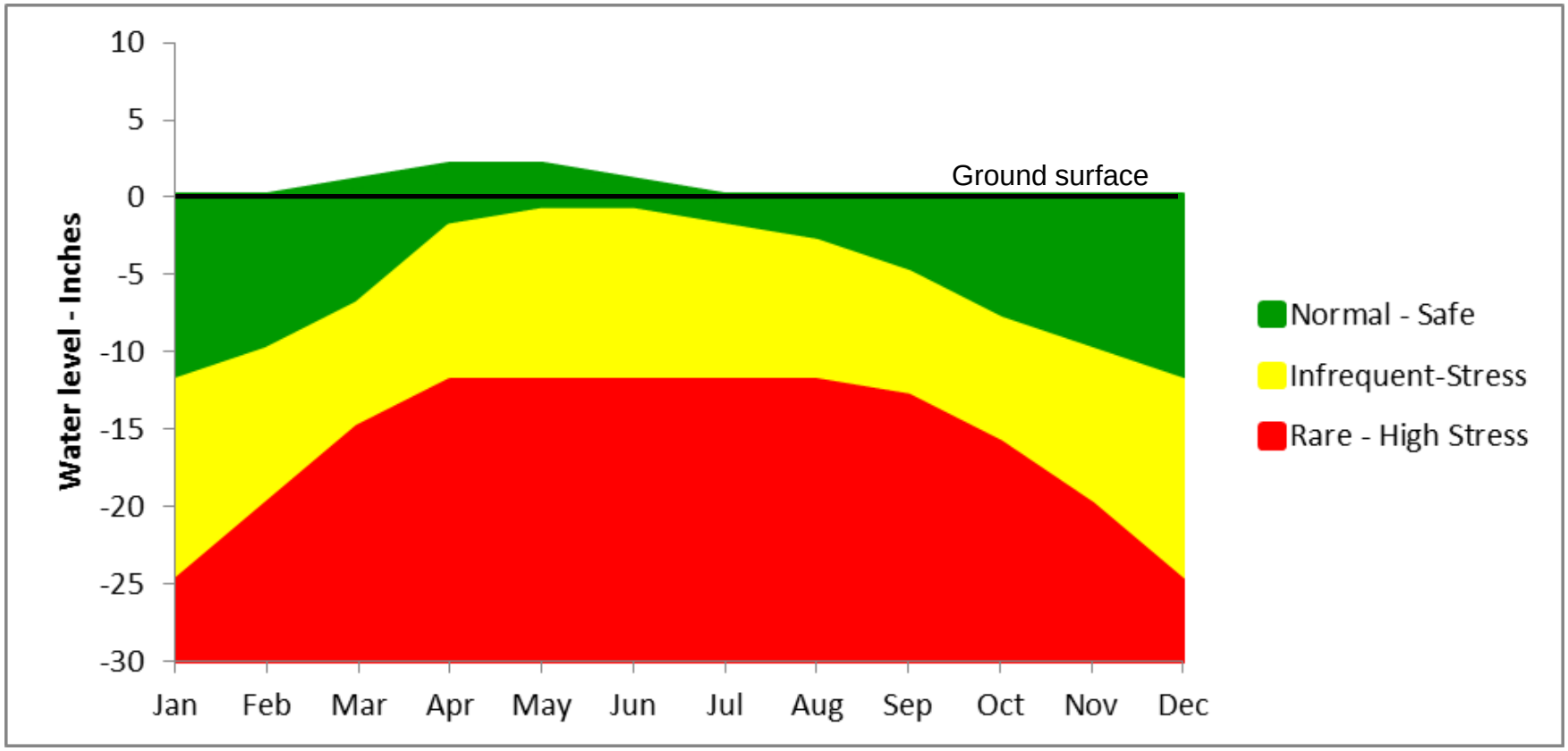

Water Elevation
Ground Surface
0
50
100
Percent Exceedance

Deep Marsh



Note: Water levels are for illustration purposes only

Wet meadows, sedge meadows, coniferous bogs, coniferous swamps, hardwood swamps, shrub-carrs, alder thickets (peat/muck soils)



Note: Water levels are for illustration purposes only

US Army Corps of Engineers ®
St. Paul District

MEMORANDUM

To: Regulatory Branch Staff

Date: October 4, 2007 and Revised July 26, 2012

Subject: *Target Hydrology for Compensatory Mitigation*

C. **Hardwood Swamps, Shrub-Carrs and Alder Thickets (Mineral Soils).** *Hydrology shall consist of a water table within 12 inches of the surface, to inundation by up to 6 inches of water, for a minimum of 28 consecutive days or two periods of 14 consecutive days, during the growing season under normal to wetter than normal conditions (70 percent of years based on most recent 30-year record of precipitation). Inundation by up to 12 inches of water during the growing season shall not occur except following the 10-year frequency or greater storm/flood event. Inundation by up to 12 inches of water shall have duration of less than 14 days. An exception can be made for sites with hummocky microtopography -- hollows between hummocks can have standing water depths of 6 to 12 inches for extended duration.*

Issues for further discussion

- “Pre-disturbed” wetlands
- Operational issues
  - Data needs
  - Modeling capabilities – precision