

Criterion for Wetland Hydrology: Effects of Growing Season

9th International Wetlands Conference
INTECOL
Orlando, FL
June 3-8, 2012

R. Wayne Skaggs

Need to Assess Wetland Hydrology

- Plants and soils are good integrators and reliable indicators of wetland hydrology **when the hydrology of the site has not been modified.**
- For sites in which the hydrology has been modified, wetland hydrologic status must be determined independently.



Hydrologic Criterion

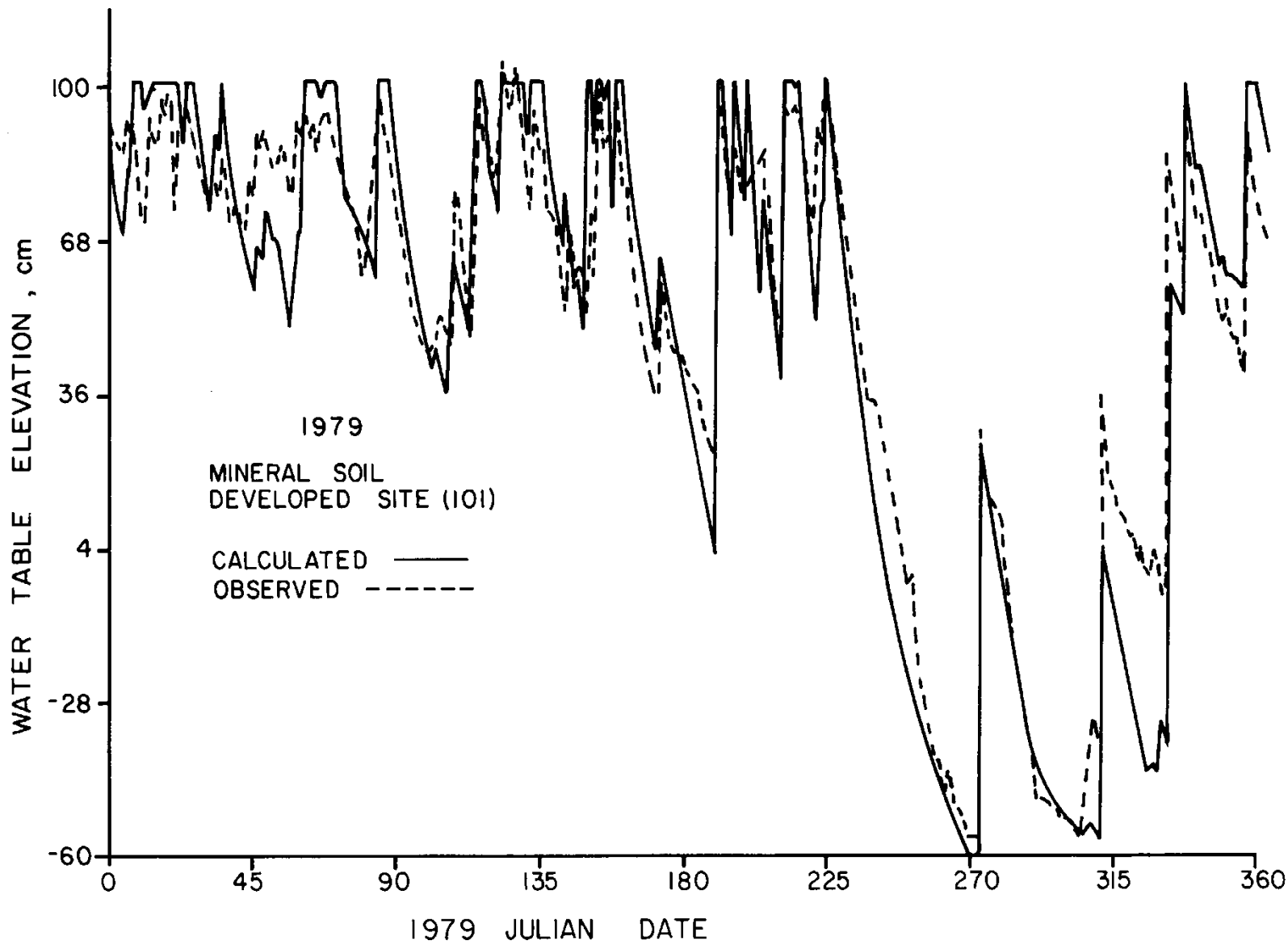
1. **Water Table Depth:** 30 cm (1 ft)
2. **Period** Growing Season
3. **Duration** 5% to 12.5% of G. Season
4. **Frequency** *Normal:* defined as occurring once in two years on average

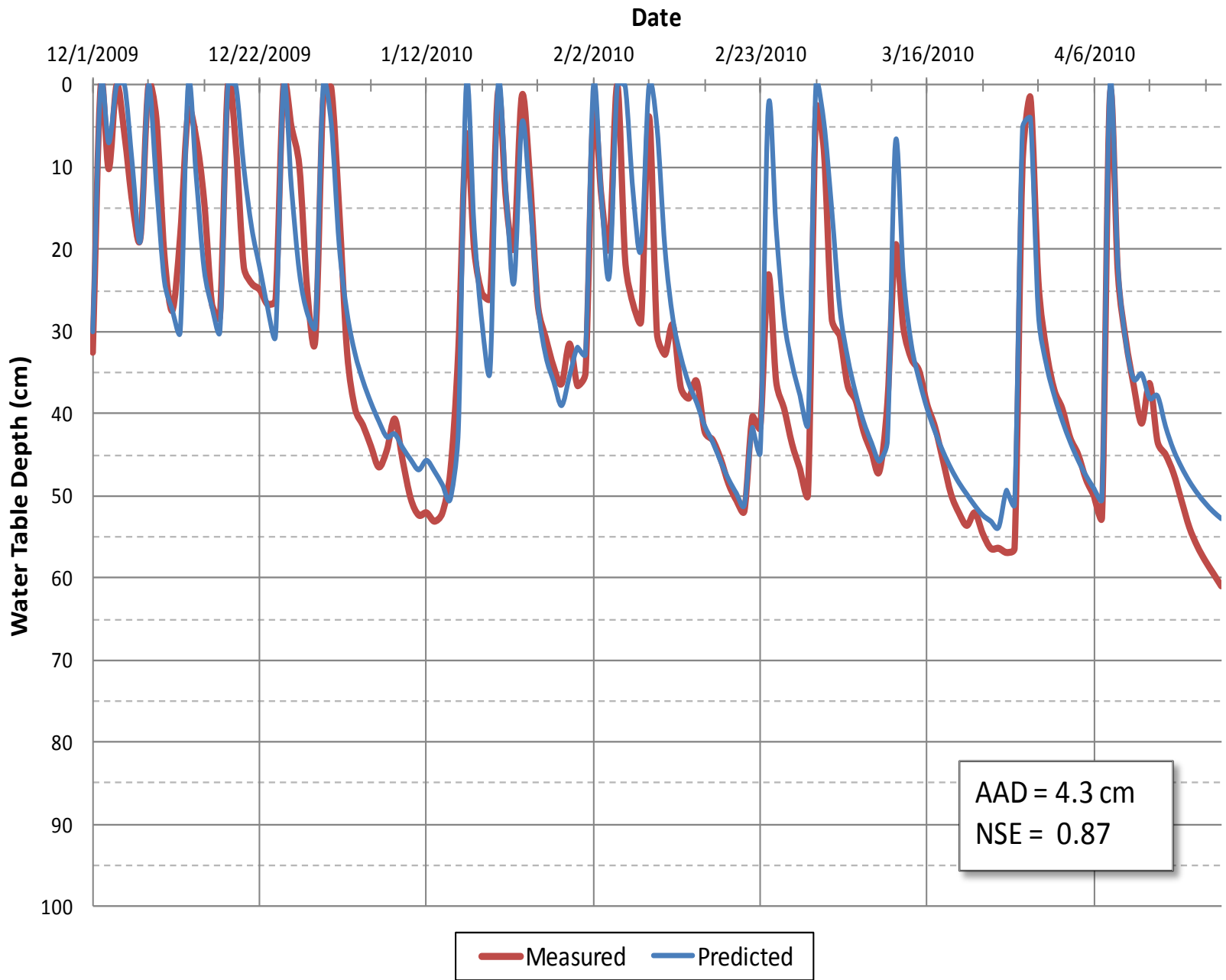
Growing Season (GS)

- The GS has been generally defined as the period between average date of last 28° F in Spring to average first date of 28° F in Fall
- New Definition of GS: 2010 Regional Supplement to COE Wetlands Delineation Manual for Atlantic and Gulf Coastal Plain
- Growing season defined as time when soil temperature at 30 cm depth is above 5°C.
- **365 day** GS for much of the Coastal Plain
- This study was conducted to determine effect of change in methods used to define GS on **Criterion for wetland hydrology**.

Methods

- A simulation study was conducted to determine impact of change in GS on Wetland Hydrologic Criterion
- DRAINMOD (50 year simulations)
- Analyzed 5 Hydric Soils of NC Coastal Plain





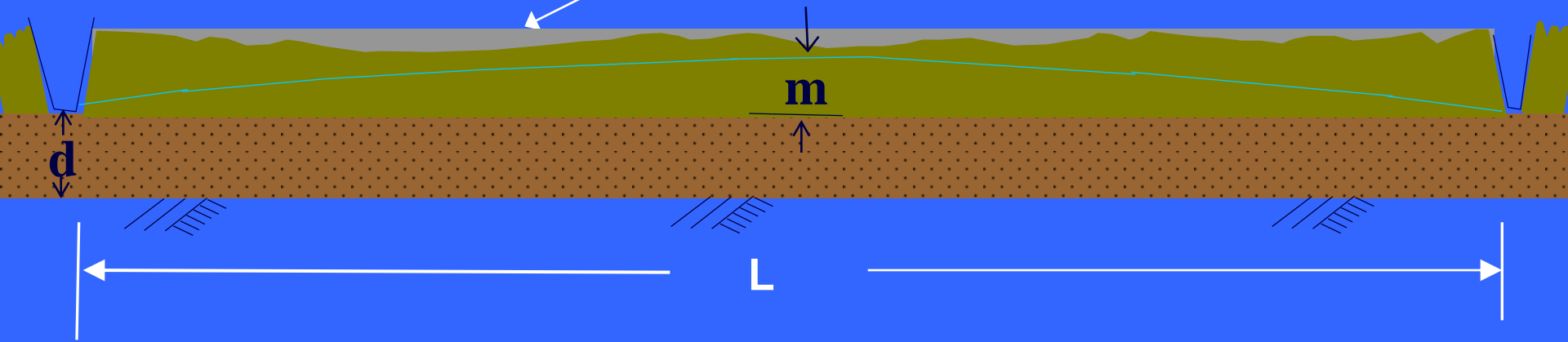
AAAD = 4.3 cm
NSE = 0.87

Measured Predicted

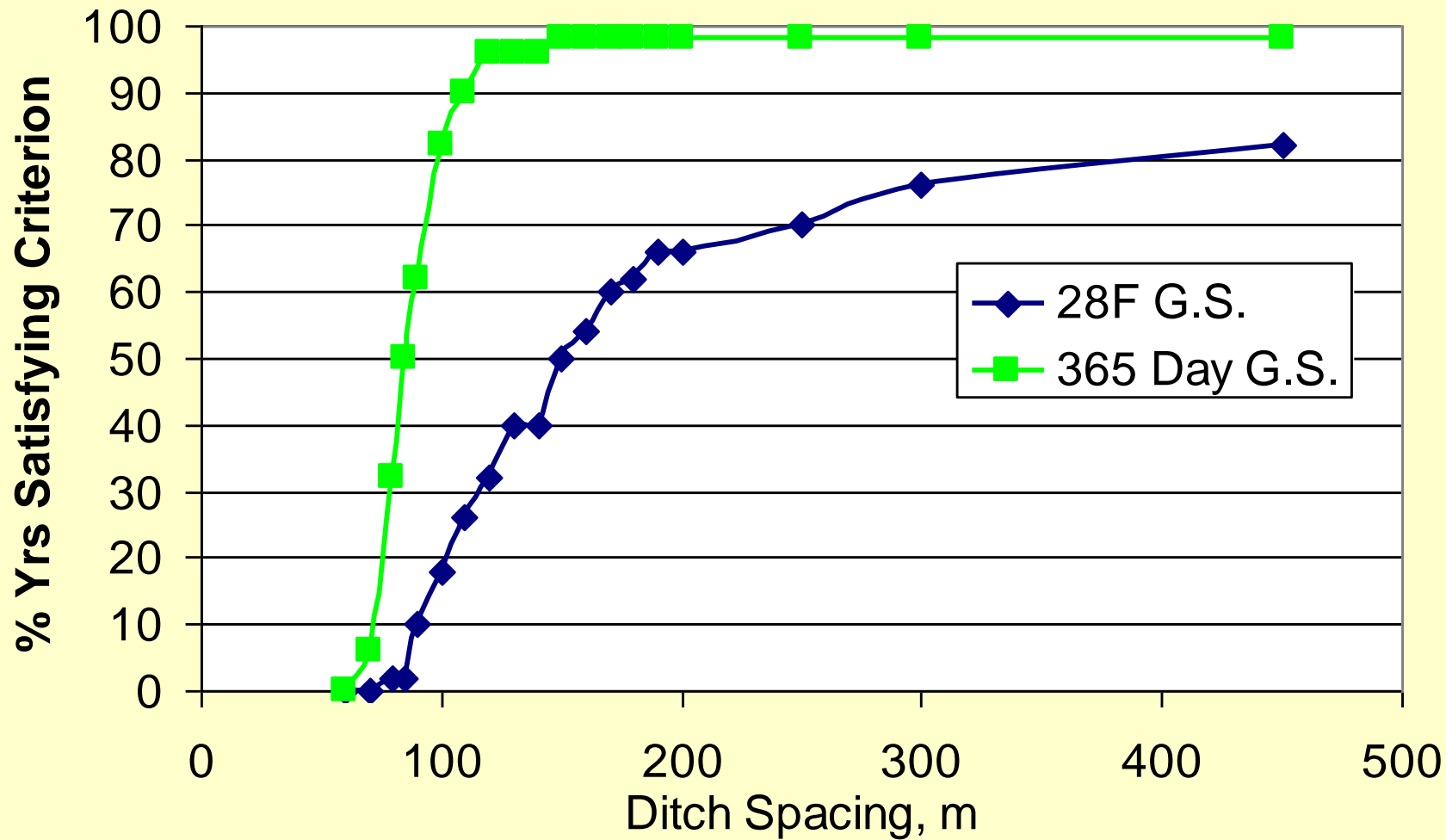
Soils Analyzed

- **Araphoe ls** **13 cm/h**
- **Coxville sl** **1.3**
- **Portsmouth sl** **6.5**
- **Rains sl** **2.5**
- **Wasda muck** **3.7**

Surface Storage = 2.5 cm



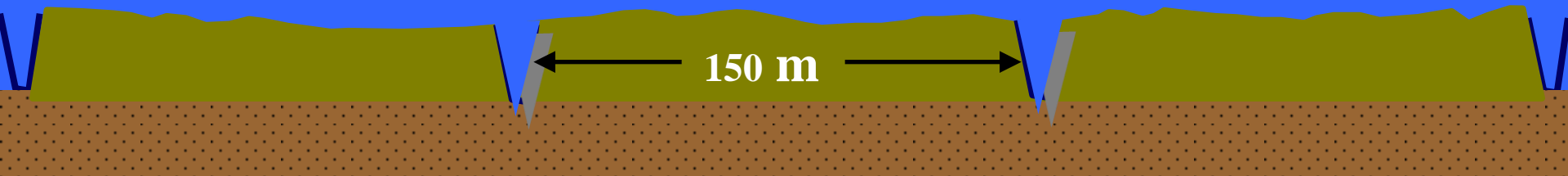
Portsmouth Sandy Loam, Plymouth, NC



Portsmouth S.L., Plymouth, NC

28F14 G.S. Criterion

Surface Storage = 2.5 cm

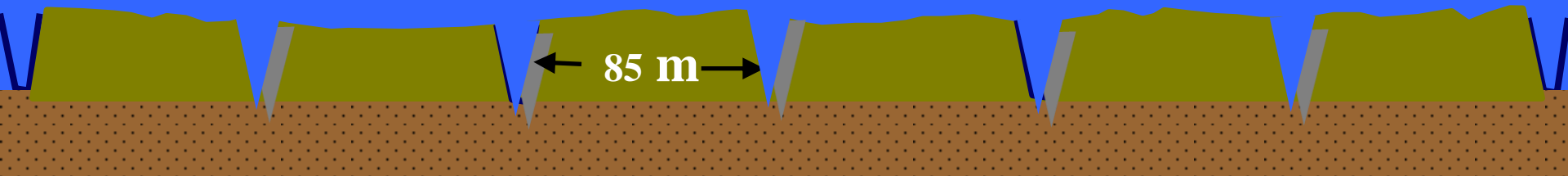


Threshold Ditch Spacing = 150 m for a Portsmouth S.L. for Hydrologic Criterion of W.T. within 30 cm of surface for 14 days during G.S. based on 28° F Air Temperature.

Portsmouth S.L., Plymouth, NC

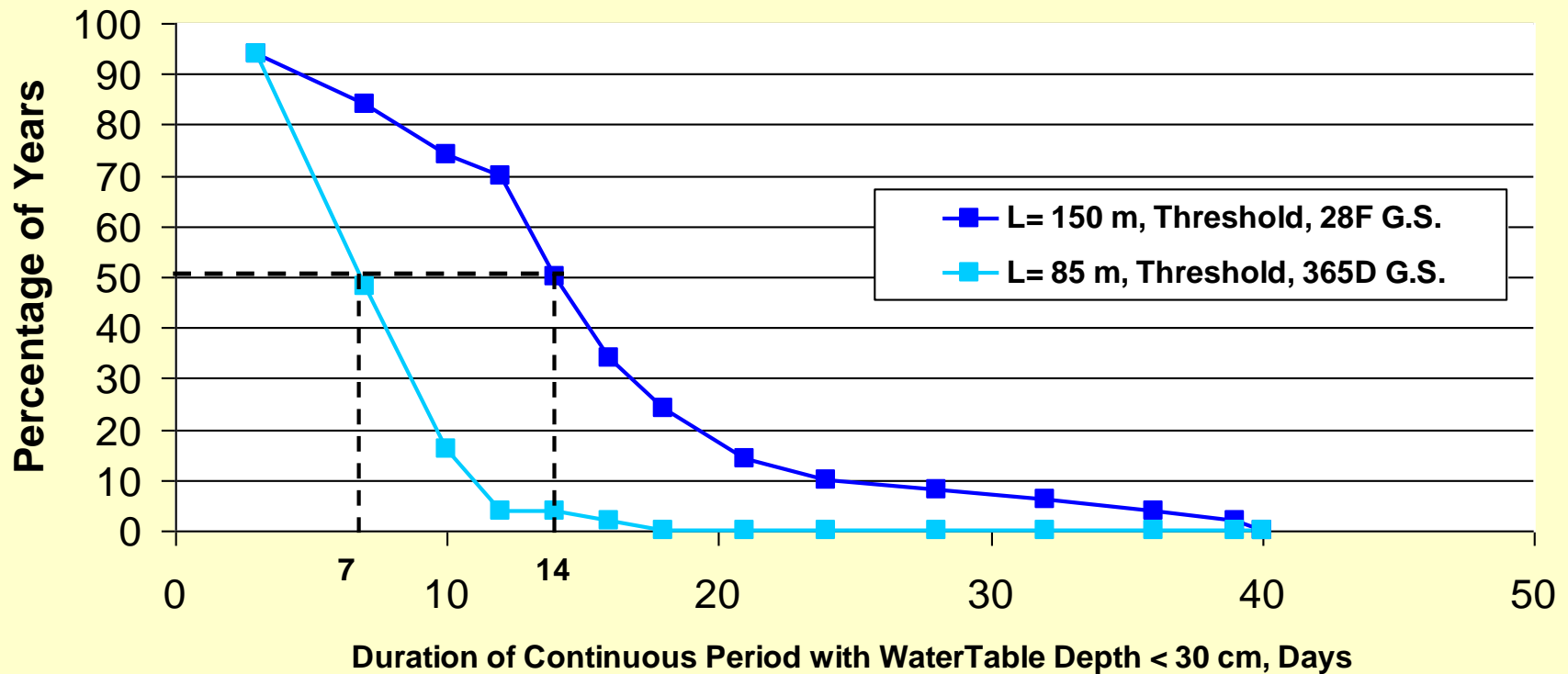
365D G.S. Criterion

Surface Storage = 2.5 cm

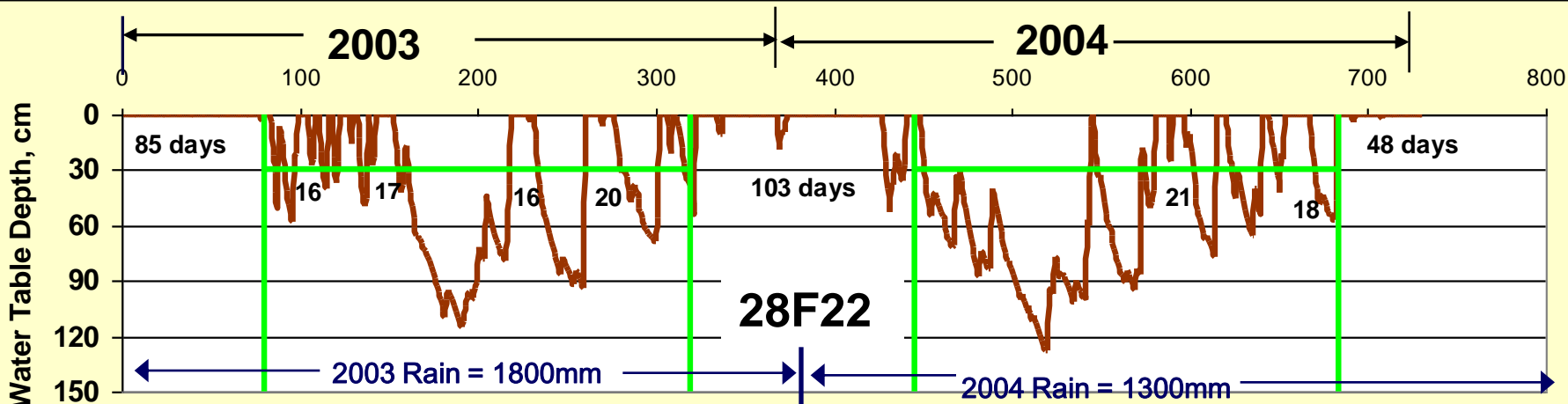
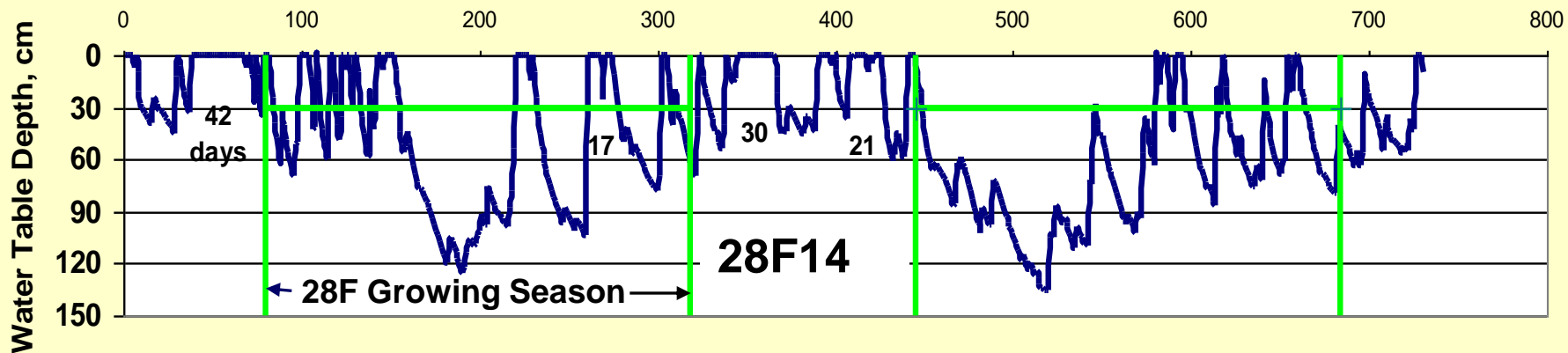
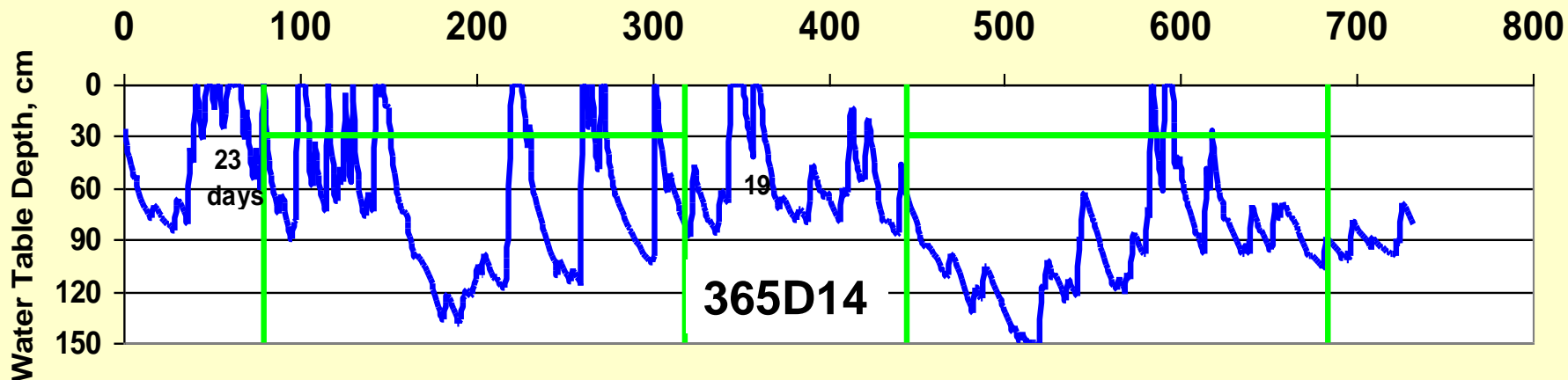


Threshold Ditch Spacing = 85 m for a Portsmouth S.L. for Hydrologic Criterion of W.T. within 30 cm of surface for 14 days during 365 day Growing Season.

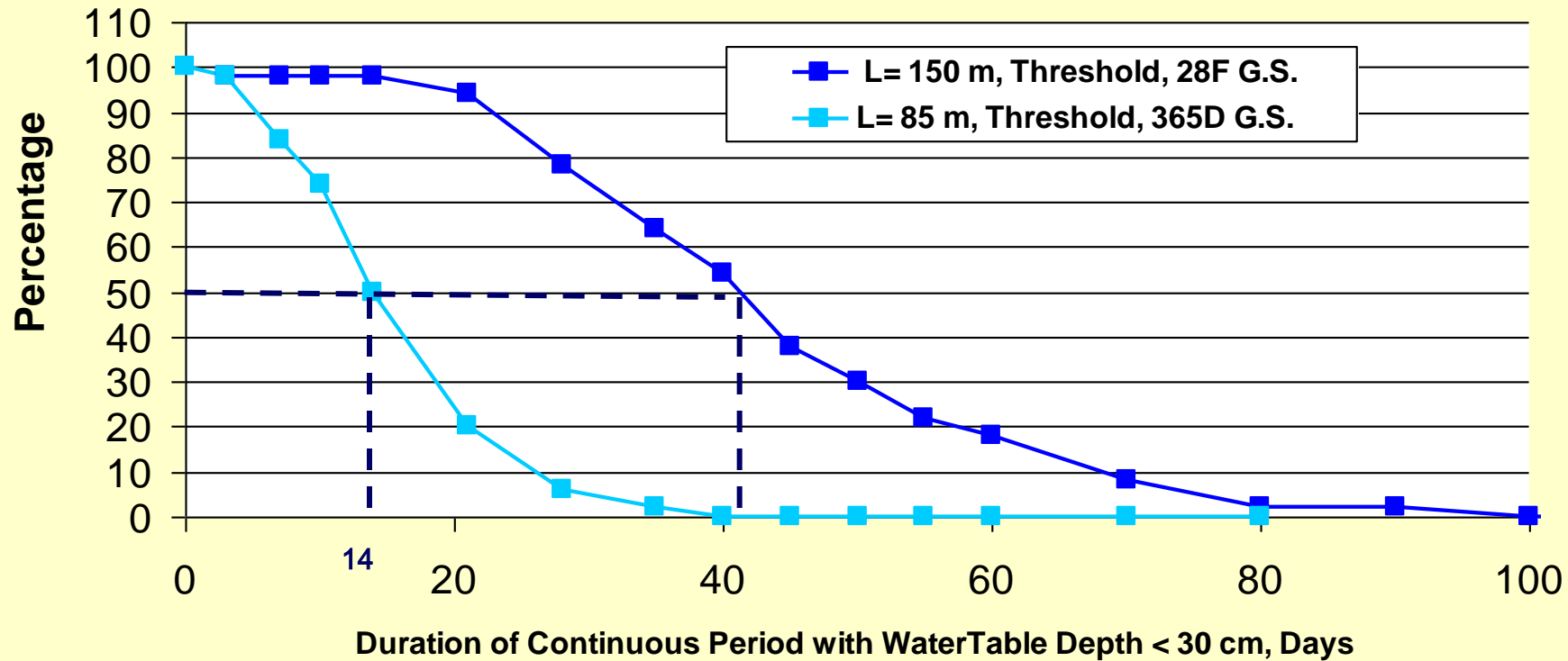
Plymouth, NC, 28F Growing Season (Mar. 21-Nov. 15)



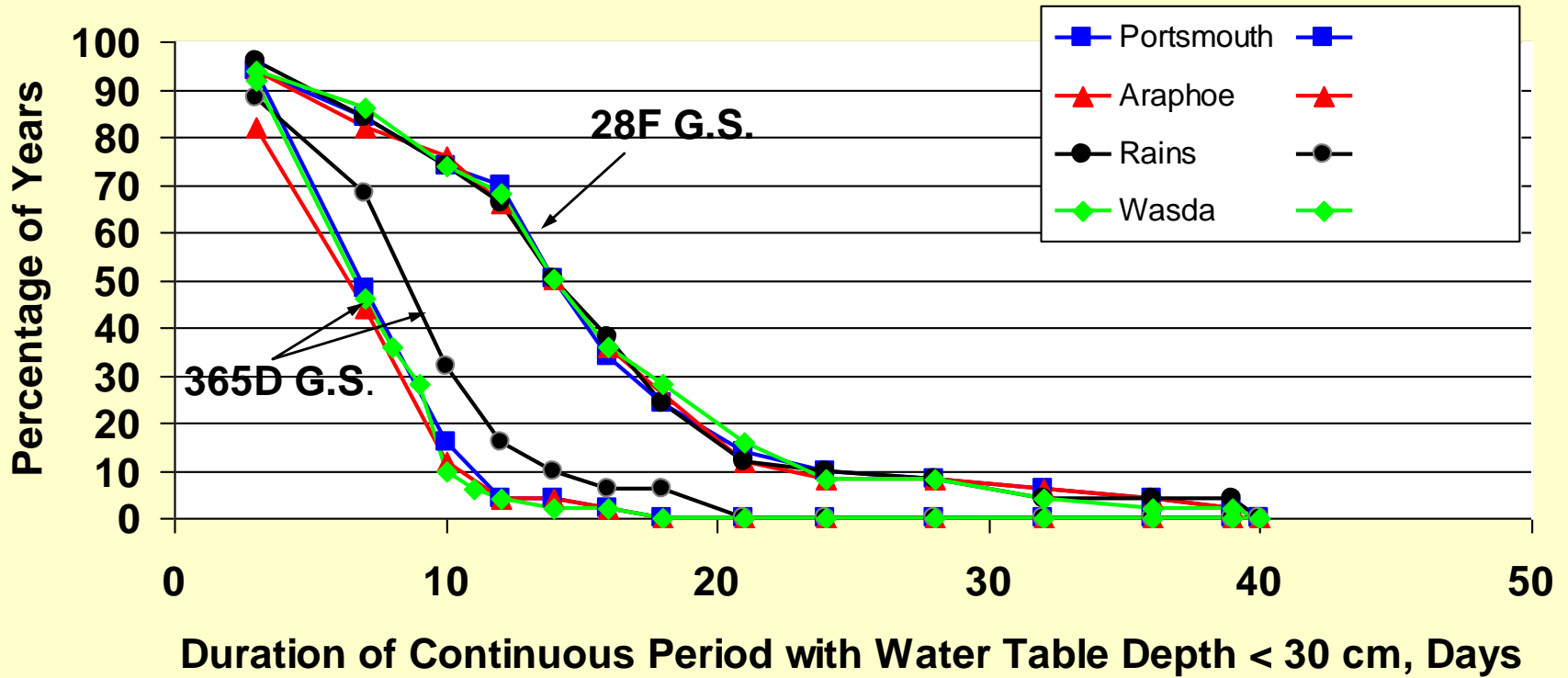
Day, 2003-2004



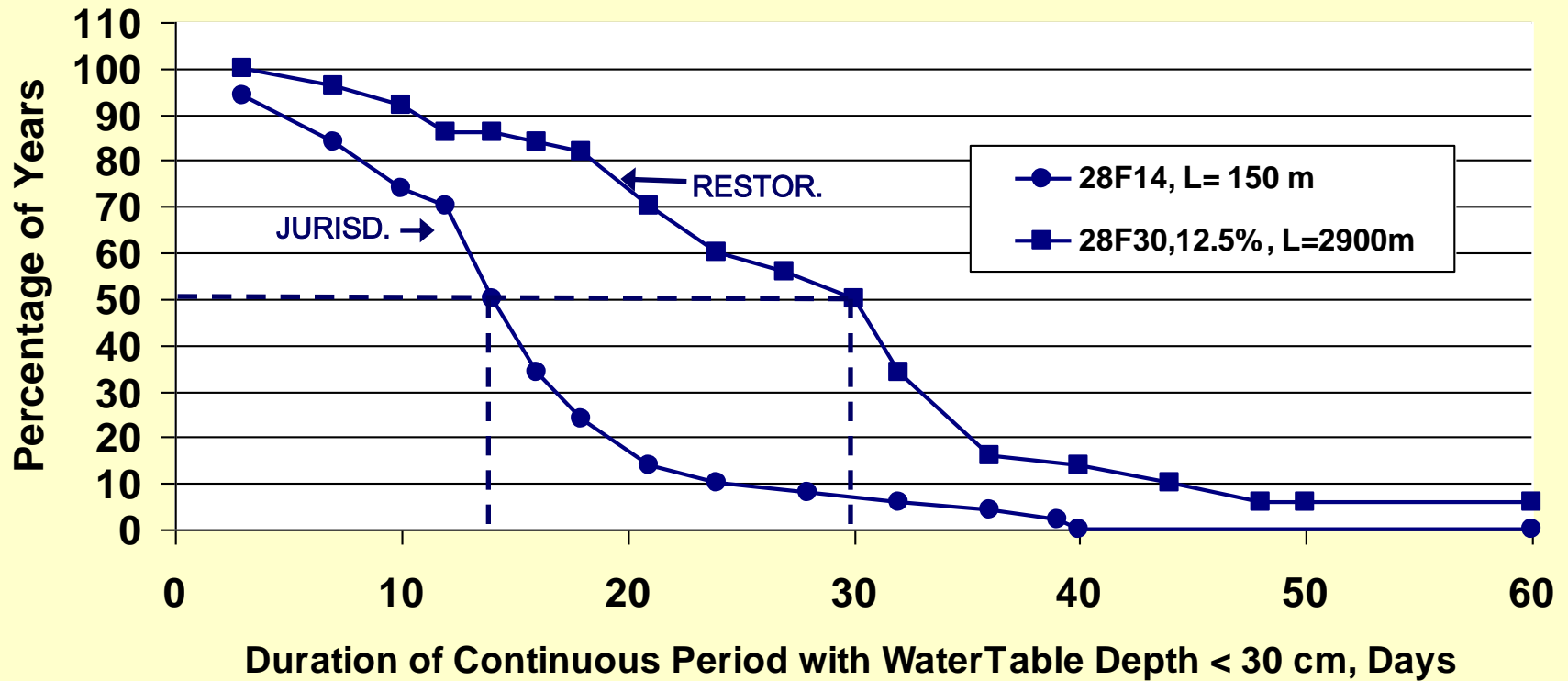
Portsmouth S.L., Plymouth, NC, 365D Growing Season



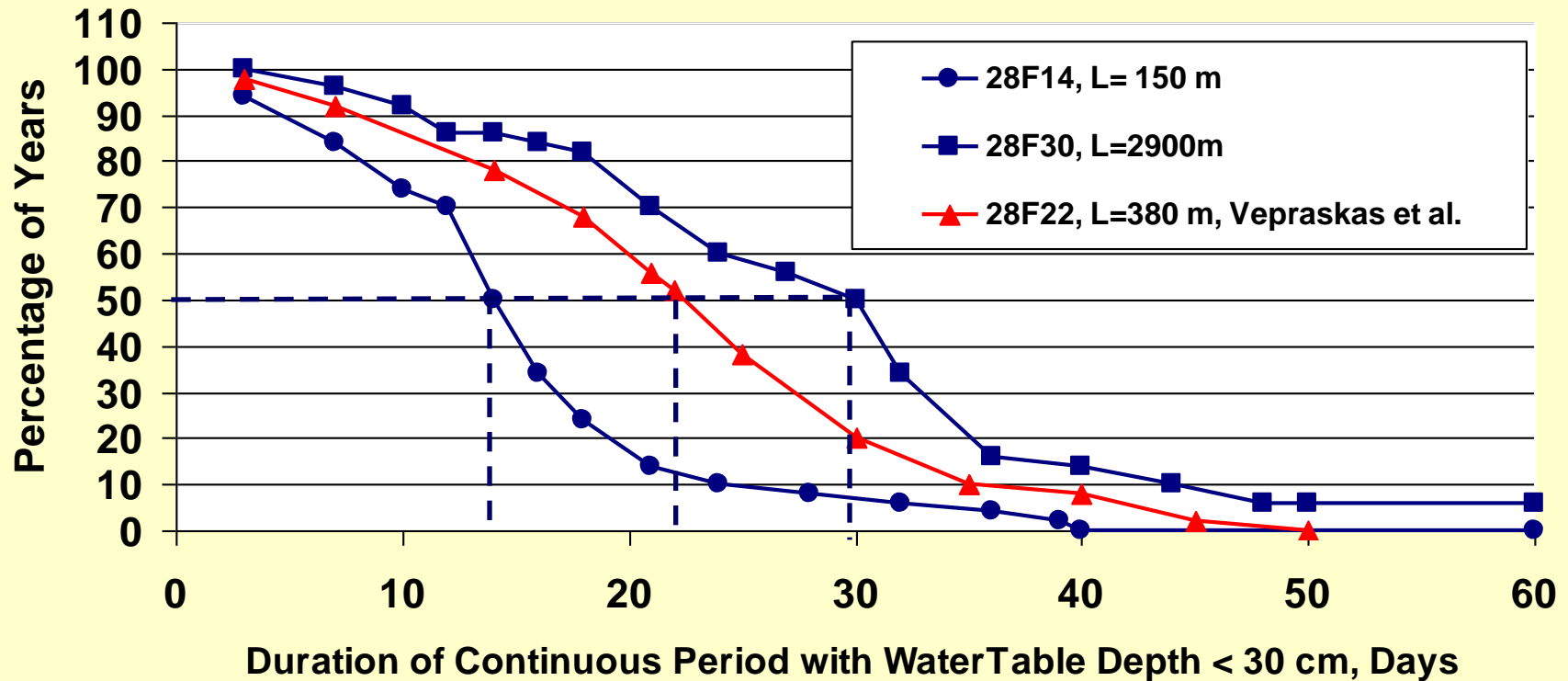
Portsmouth S.L., Plymouth, NC, 28F Growing Season



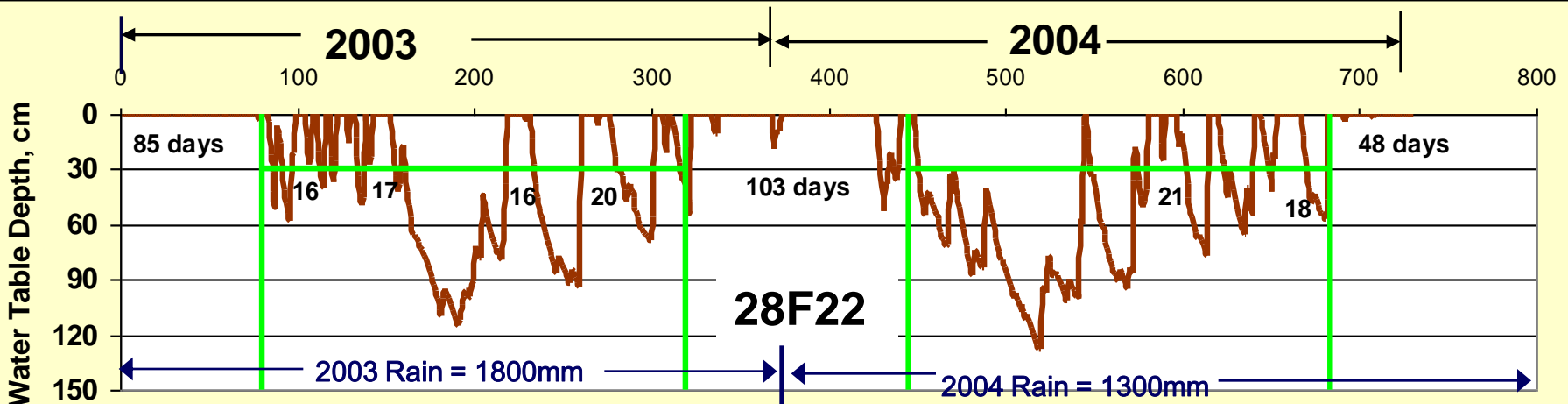
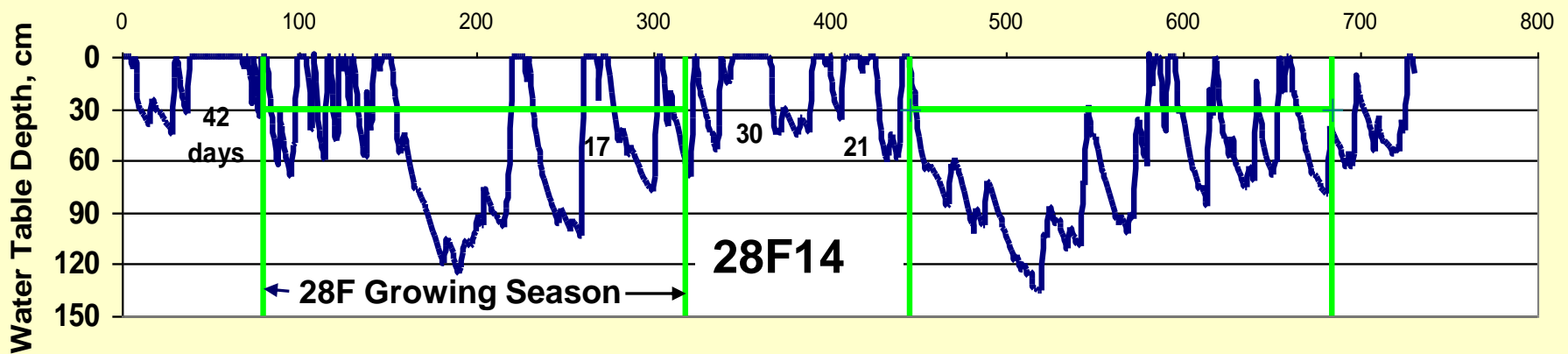
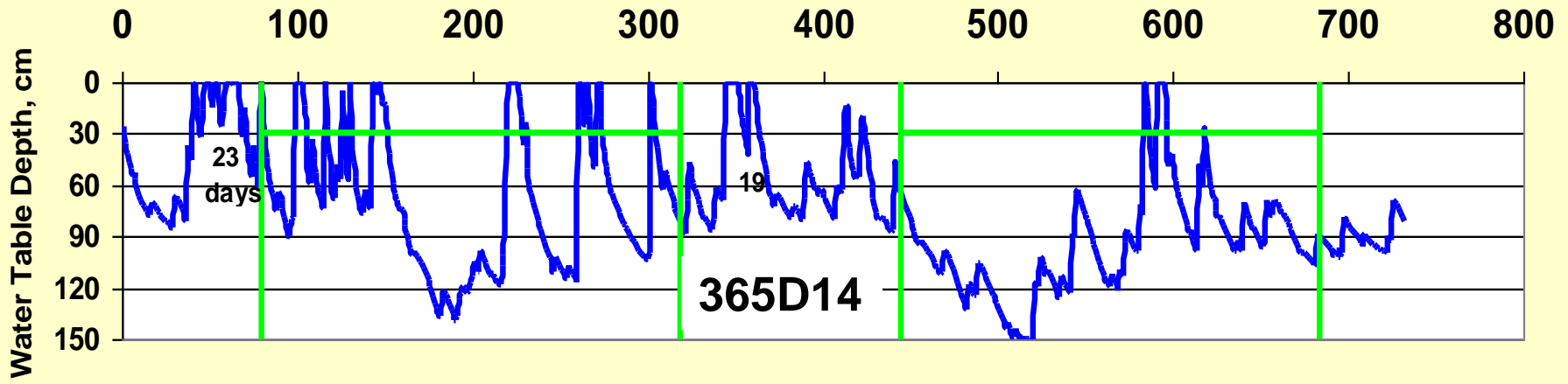
Portsmouth S.L., Plymouth, NC, 28F Growing Season



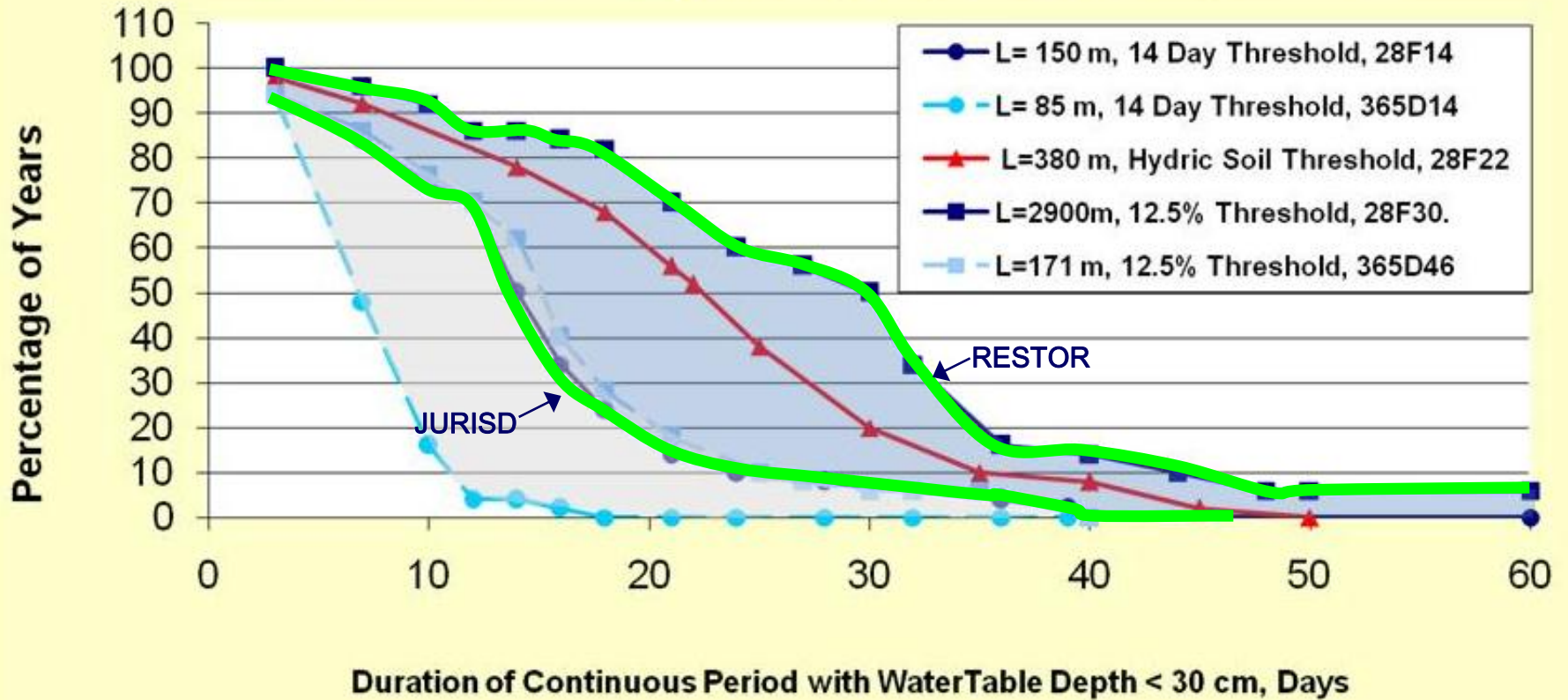
Portsmouth S.L., Plymouth, NC, 28F Growing Season



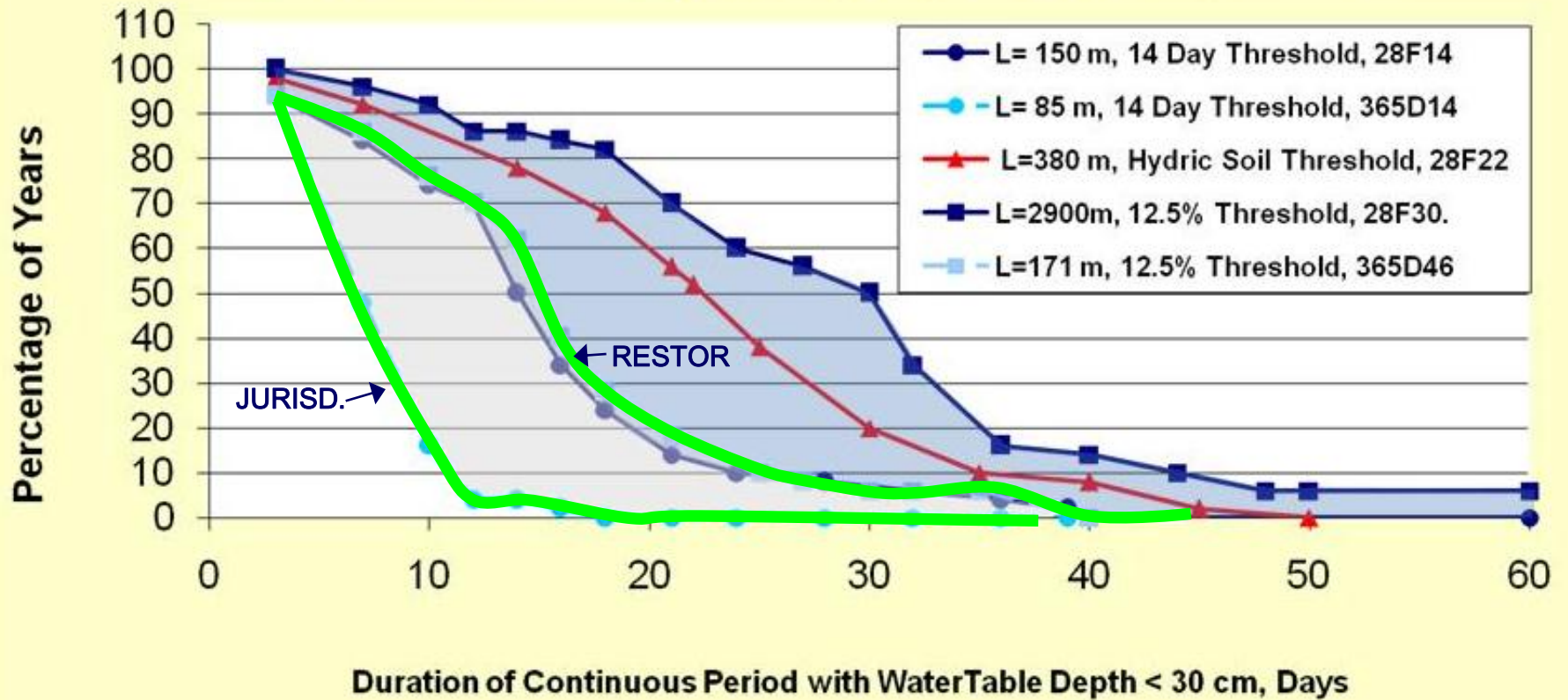
Day, 2003-2004



Portsmouth S.L., Plymouth, NC, 28F Growing Season



Portsmouth S.L., Plymouth, NC, 28F Growing Season



Conclusions

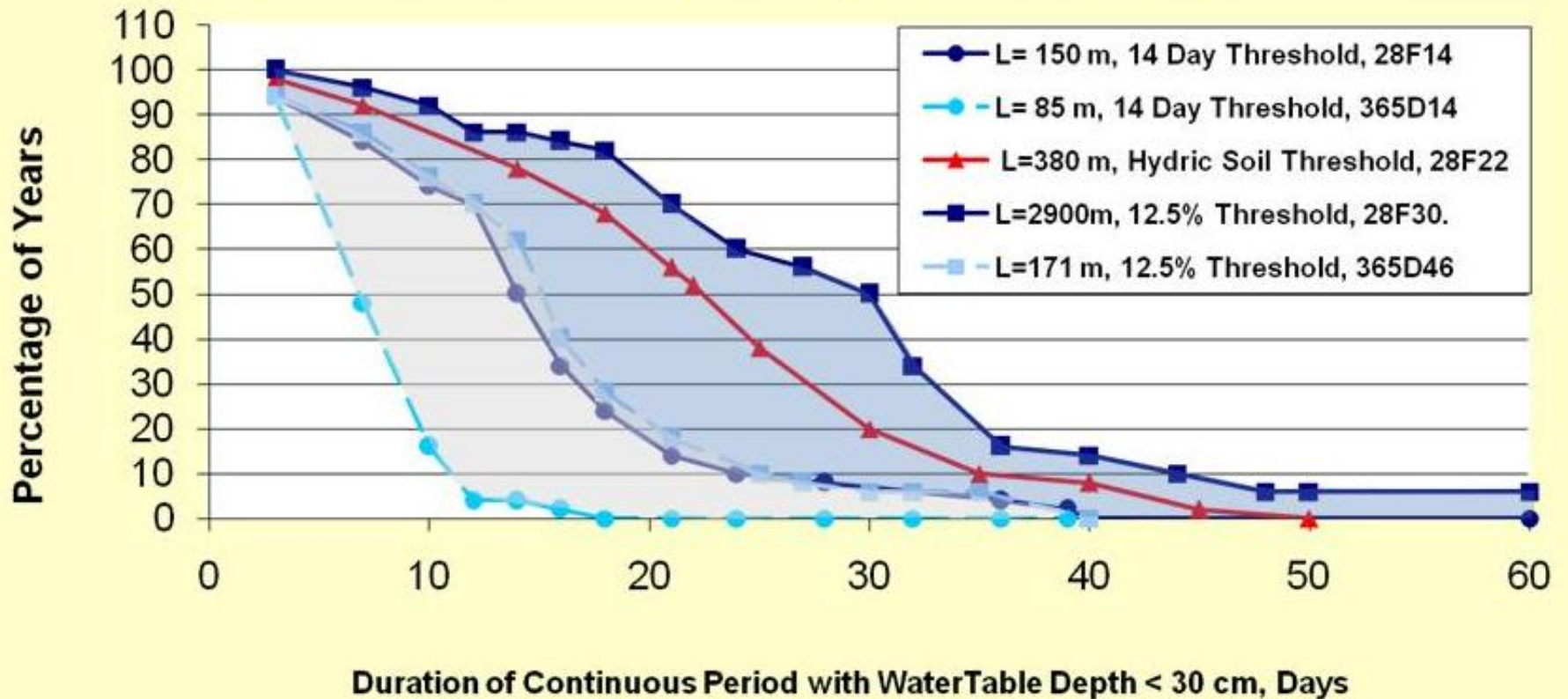
- Extending the growing season to 365 days substantially affects the wetland hydrologic criterion
- For eastern NC this change will have the same effect as reducing the duration requirement for saturation from 14 to 7 days
- The lower threshold for saturation duration in the current wetland hydrologic criterion (5% of GS or 14 days) is much less than that required to produce redoximorphic features of Hydric soils

Conclusions

- Increasing GS to 365 days would substantially reduce saturation requirements at wet end (12.5% of GS), which is typically required for restoration of prior converted wetlands
- Lateral impacts of a drainage ditch would be reduced by 42% by changing the Growing Season to 365 days.
- Additional research is needed to define scientifically valid wetland hydrologic criteria for a wide range of soils and climatological conditions.

END

Portsmouth S.L., Plymouth, NC, 28F Growing Season

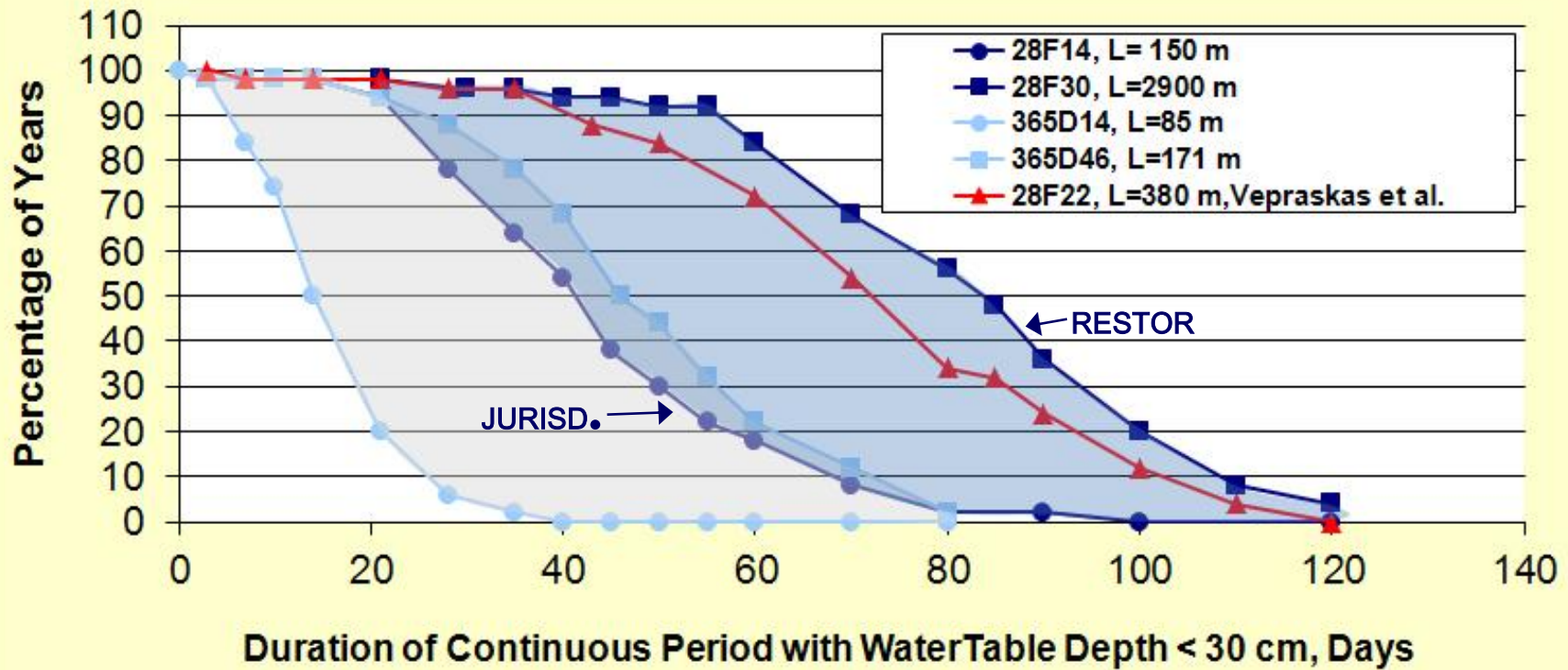


HYDROLOGIC CRITERION

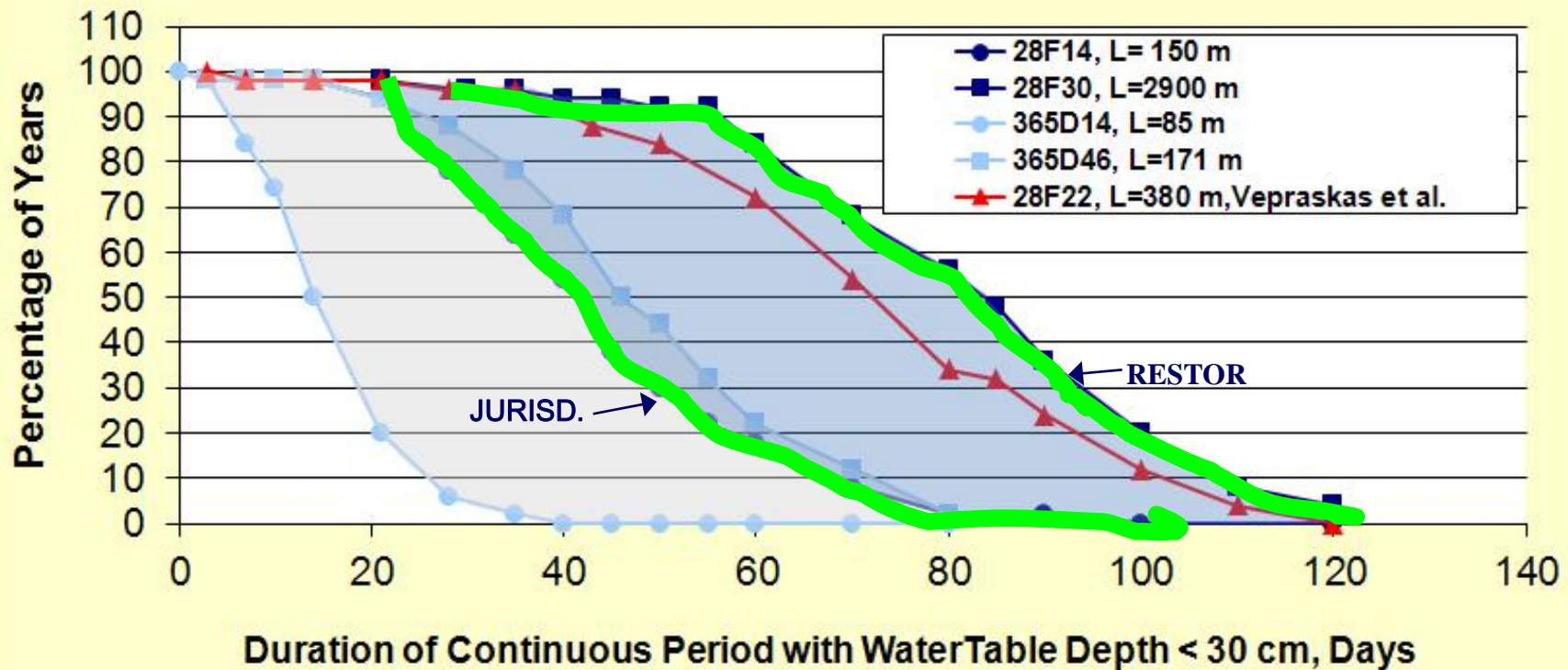
Wetland hydrology exists if, during the growing season, the water table is normally within 30 cm of the surface for a continuous period of 5% to 12.5% of the growing season.

1987 COE Wetlands Delineation Manual

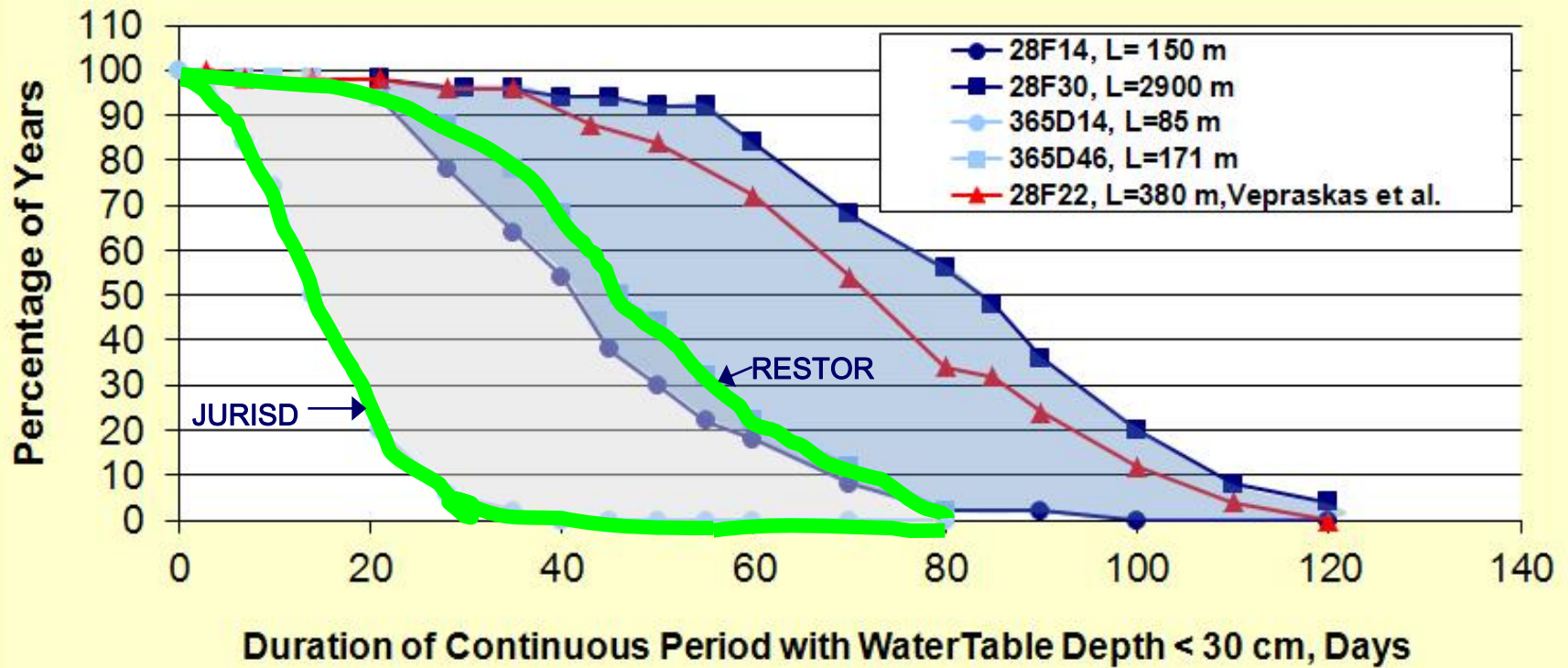
Portsmouth S.L., Plymouth, NC, 365D Growing Season

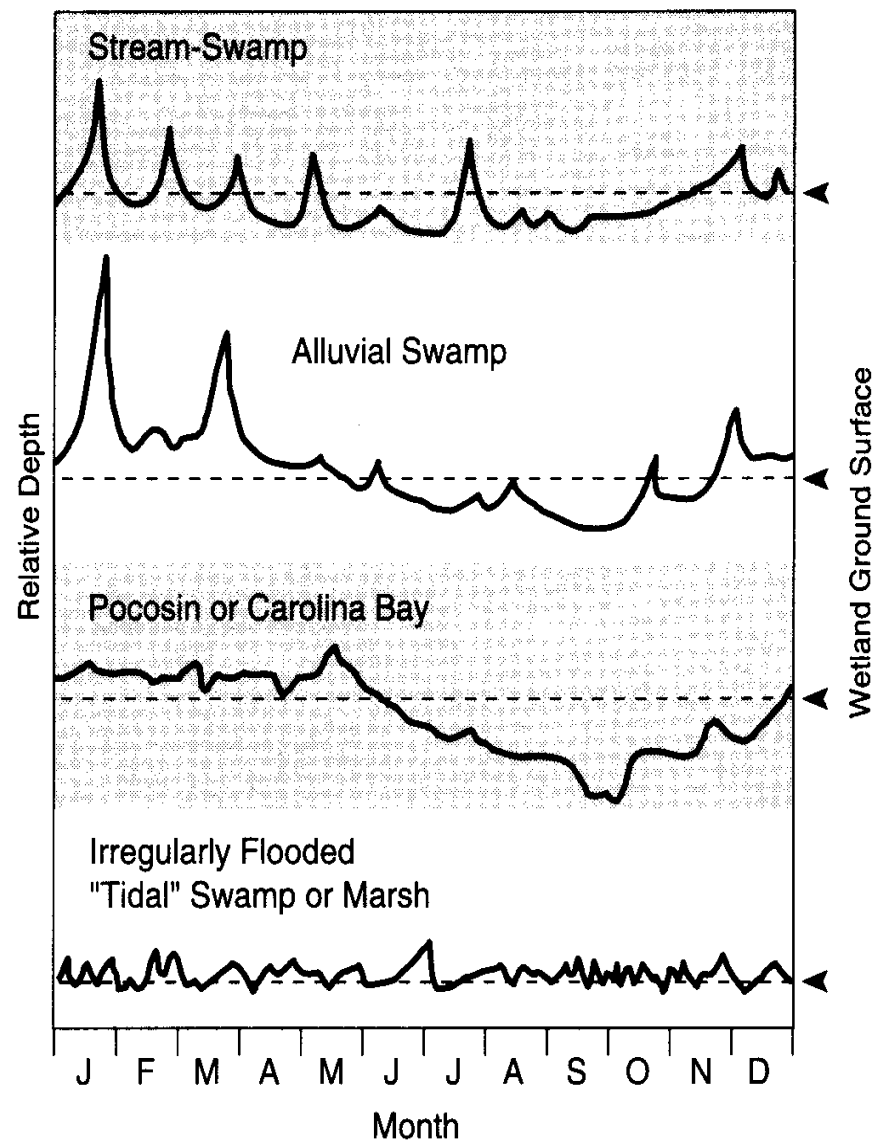
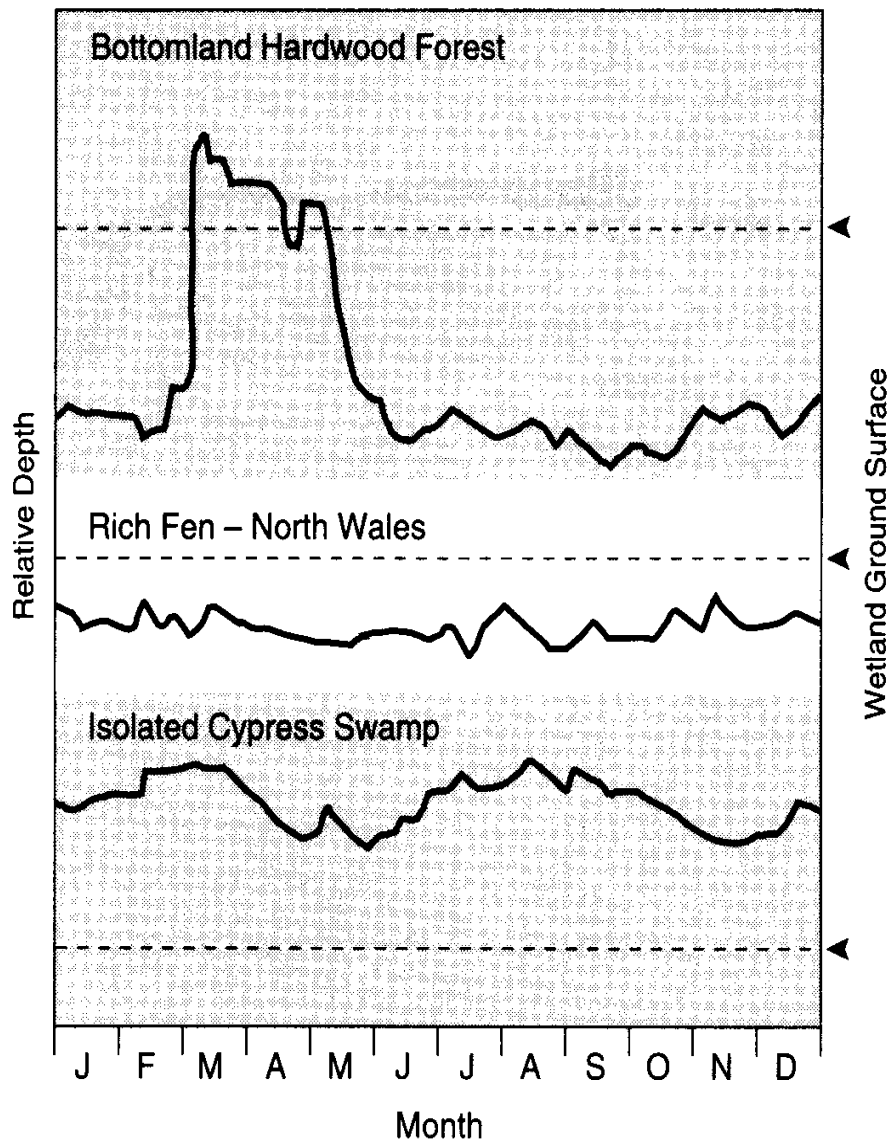


Portsmouth S.L., Plymouth, NC, 365D Growing Season



Portsmouth S.L., Plymouth, NC, 365D Growing Season





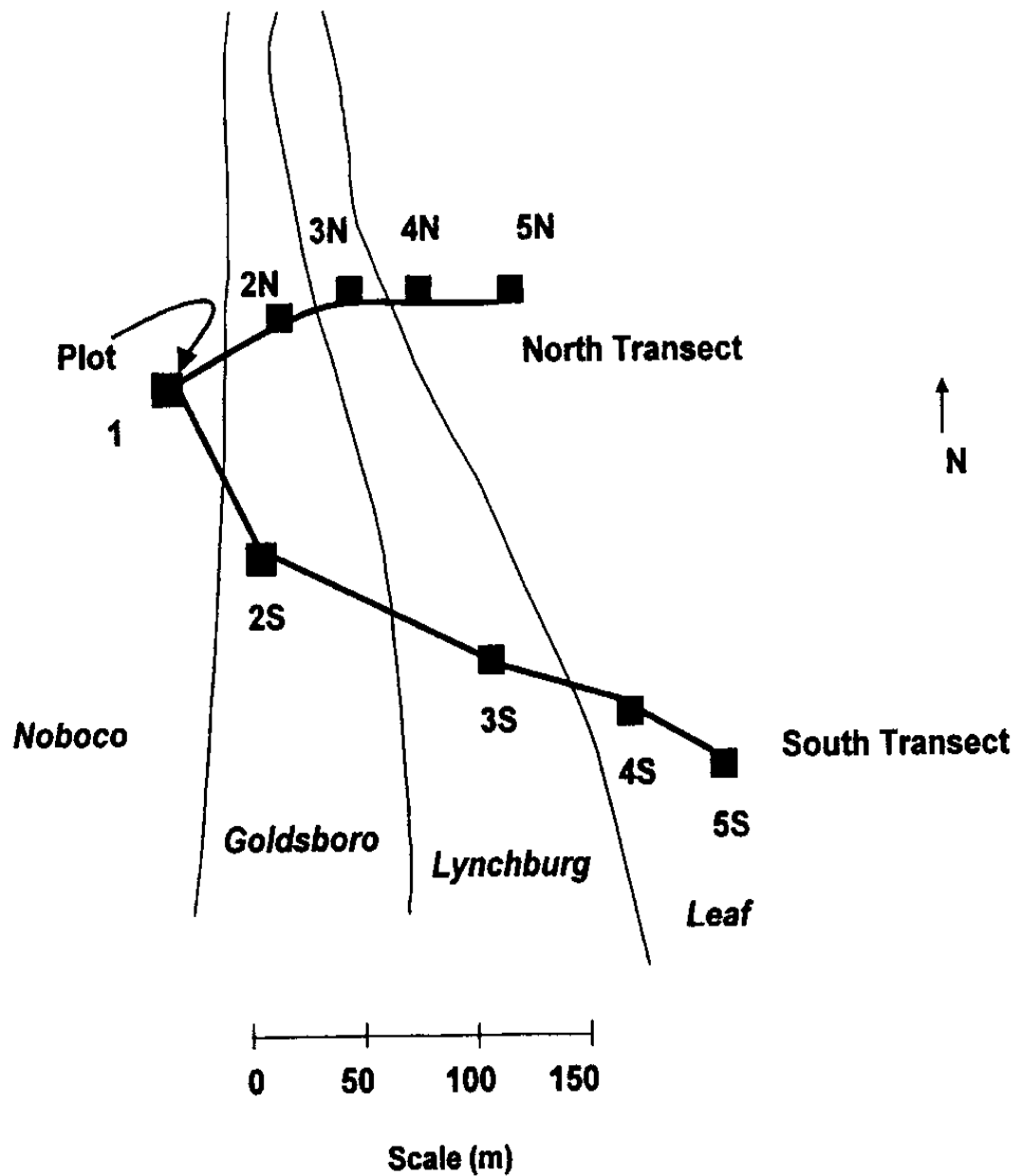
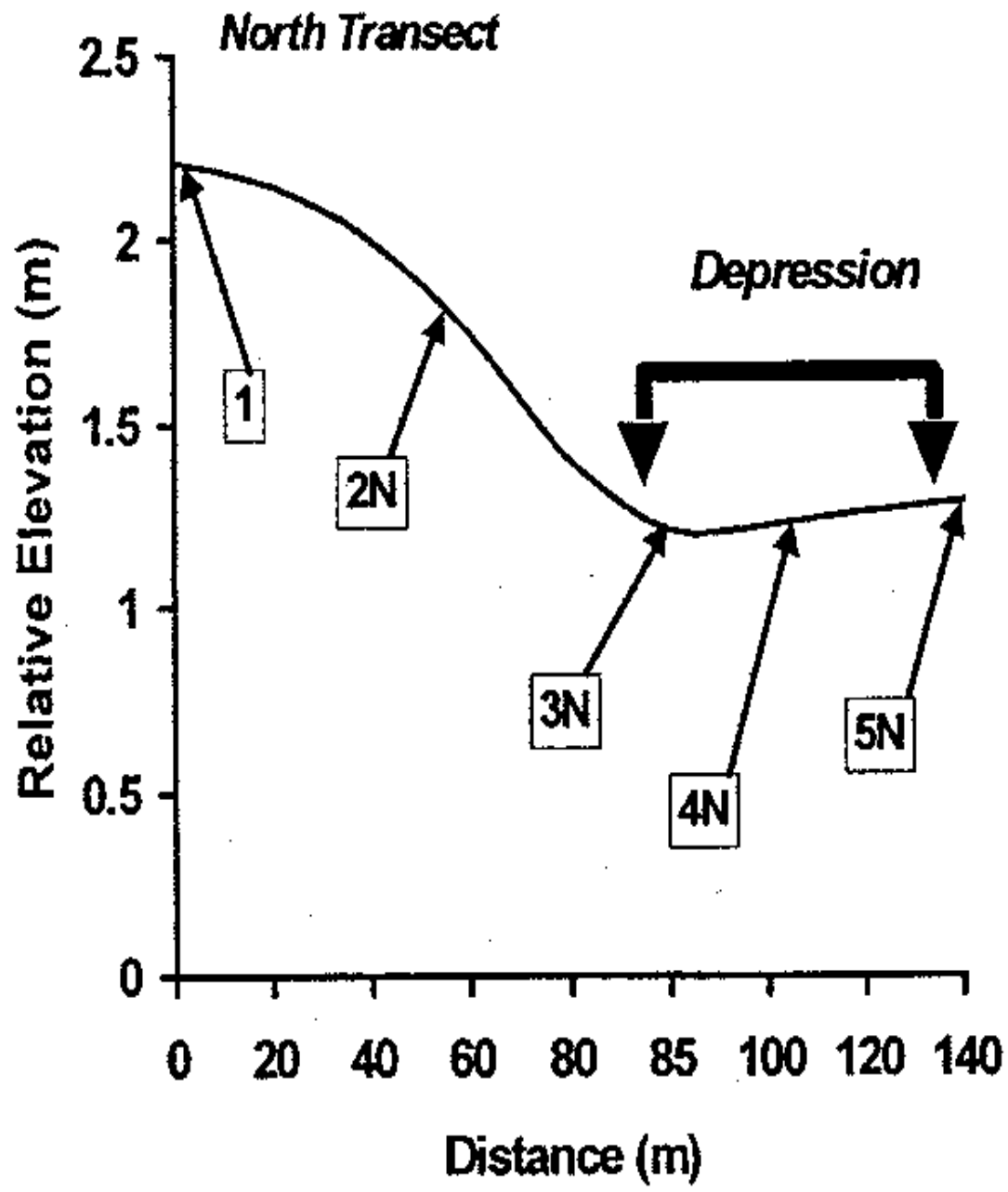


Fig. 1. Plan view of the site showing plot location in relation to soil boundaries.

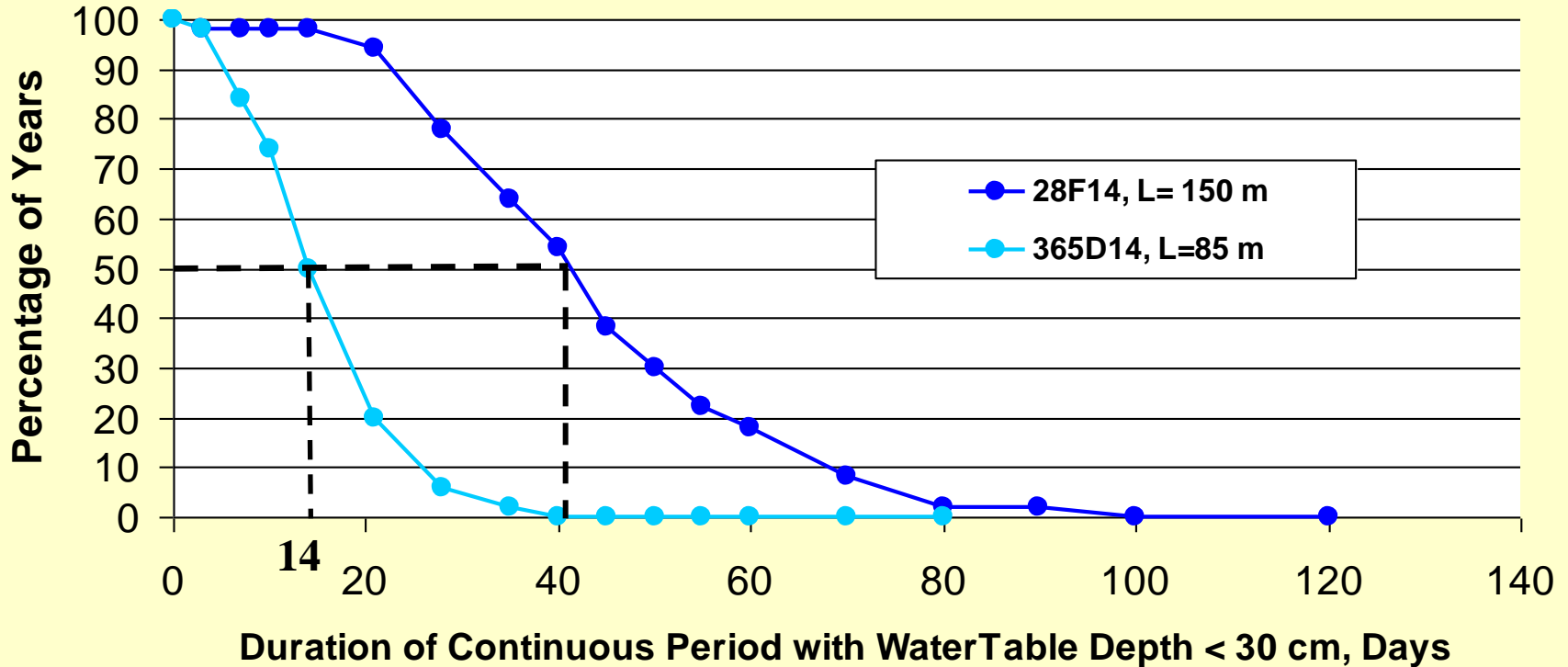


Conclusion

(After Vepraskas et al., 2004)

- Redoximorphic features required to satisfy field indicators for hydric soils were found in soils that were saturated for 21 days in 9 out of 10 years
- This saturation threshold is more than twice as long and nearly twice as frequent as the minimum requirements needed to meet wetland hydrology requirements.

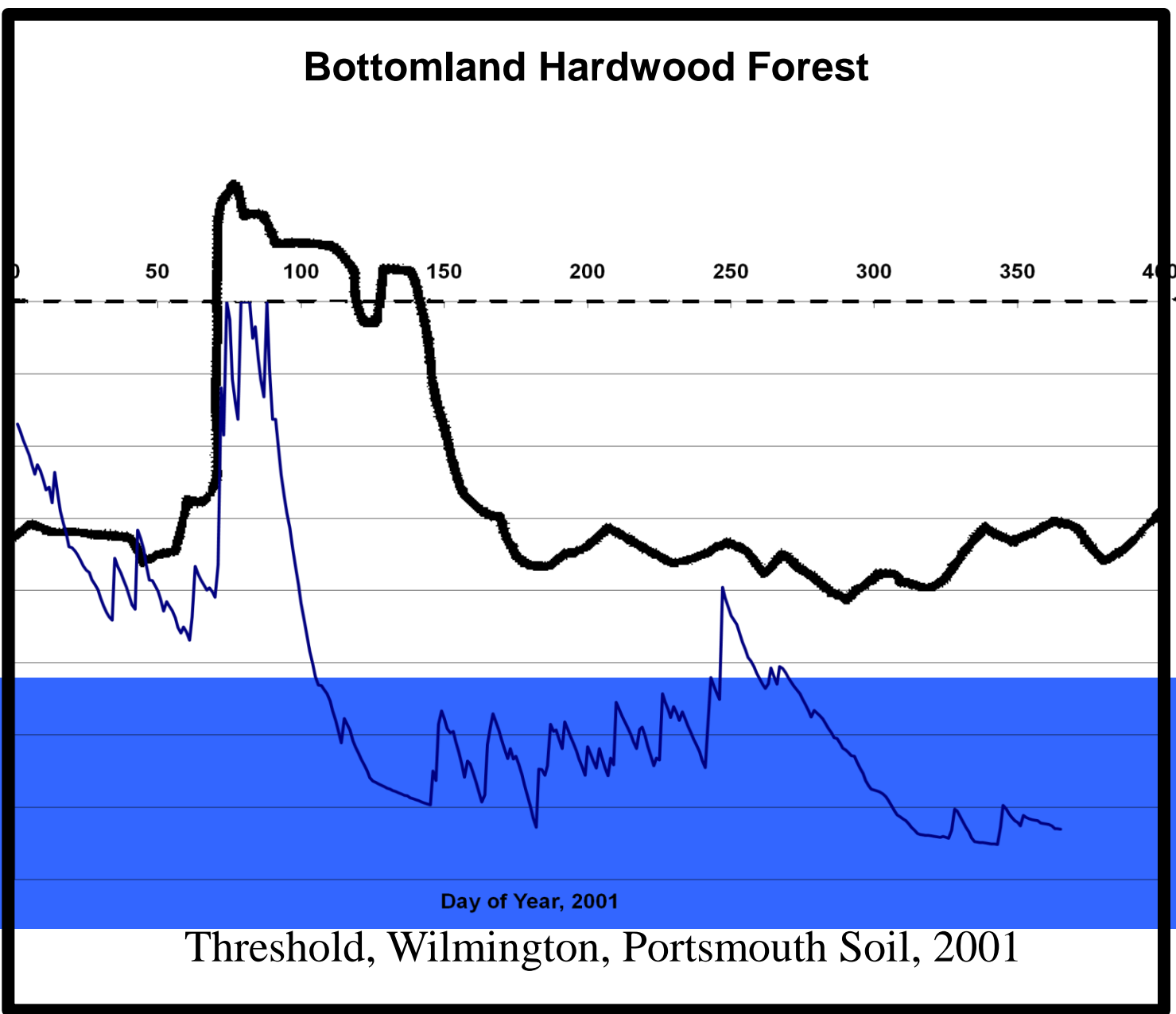
Portsmouth S.L., Plymouth, NC, 365D Growing Season



Bottomland Hardwood Forest

Water Table Depth, cm

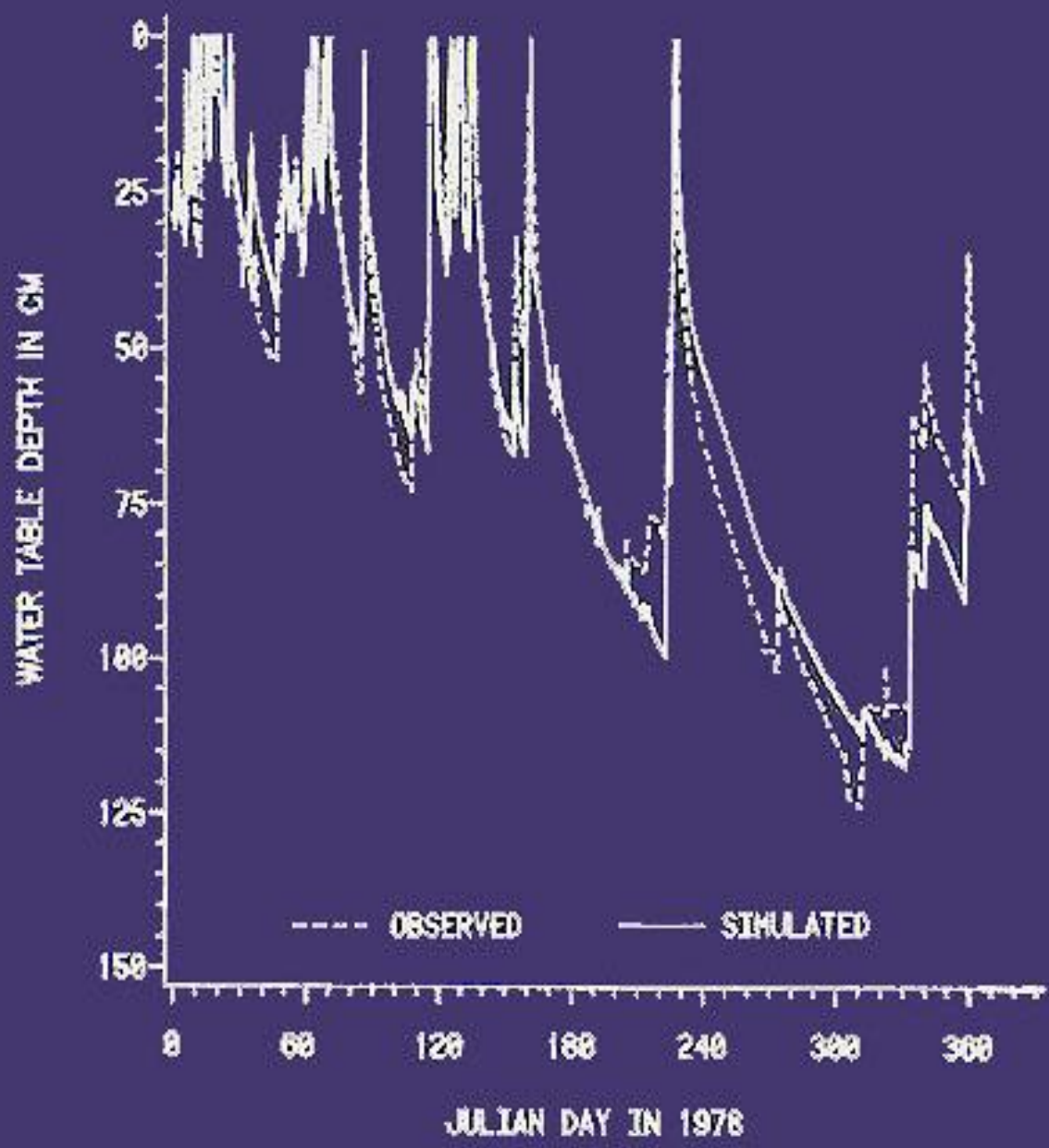
Wetland Ground Surface



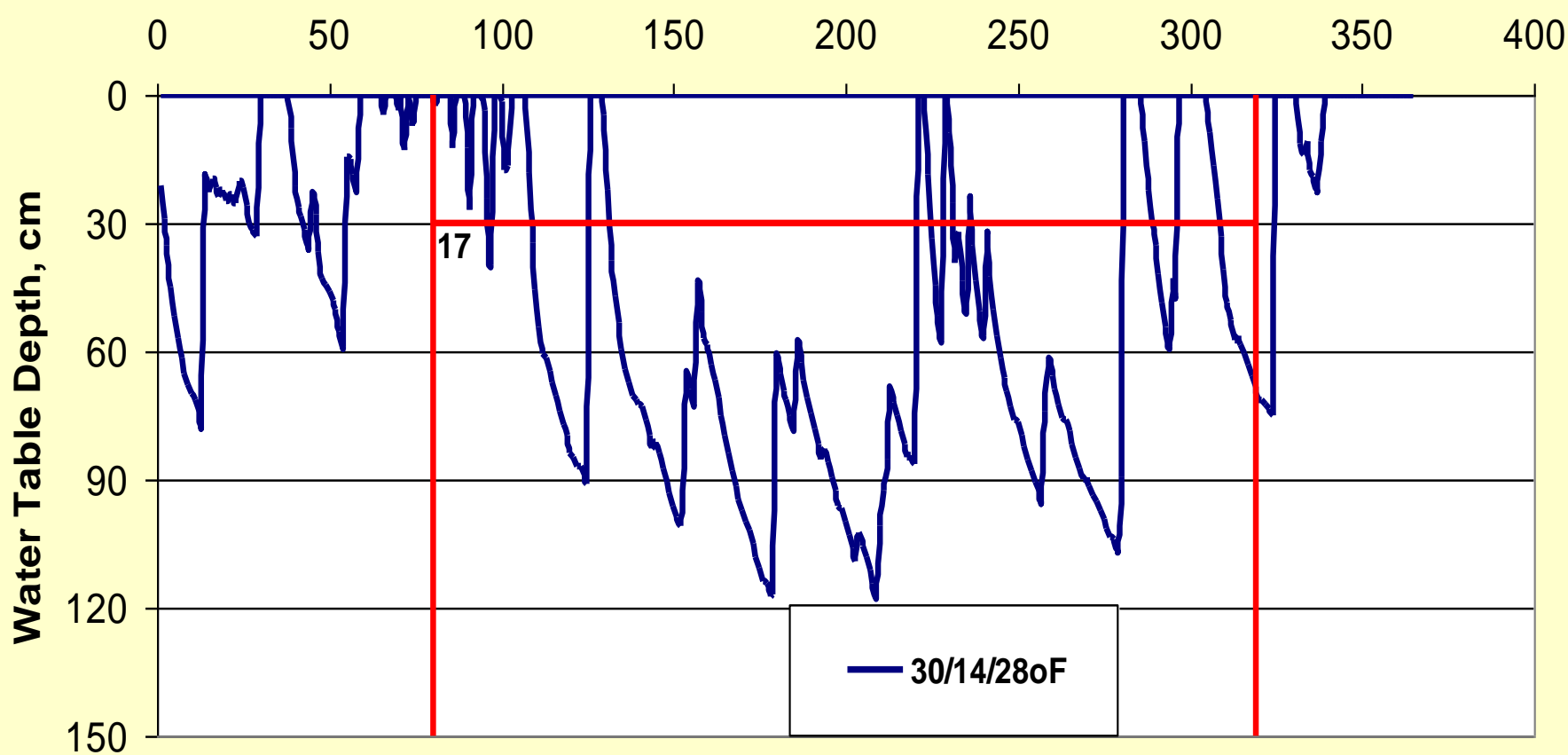
Day of Year, 2001

Threshold, Wilmington, Portsmouth Soil, 2001

J F M A M J J A S O N D
Month

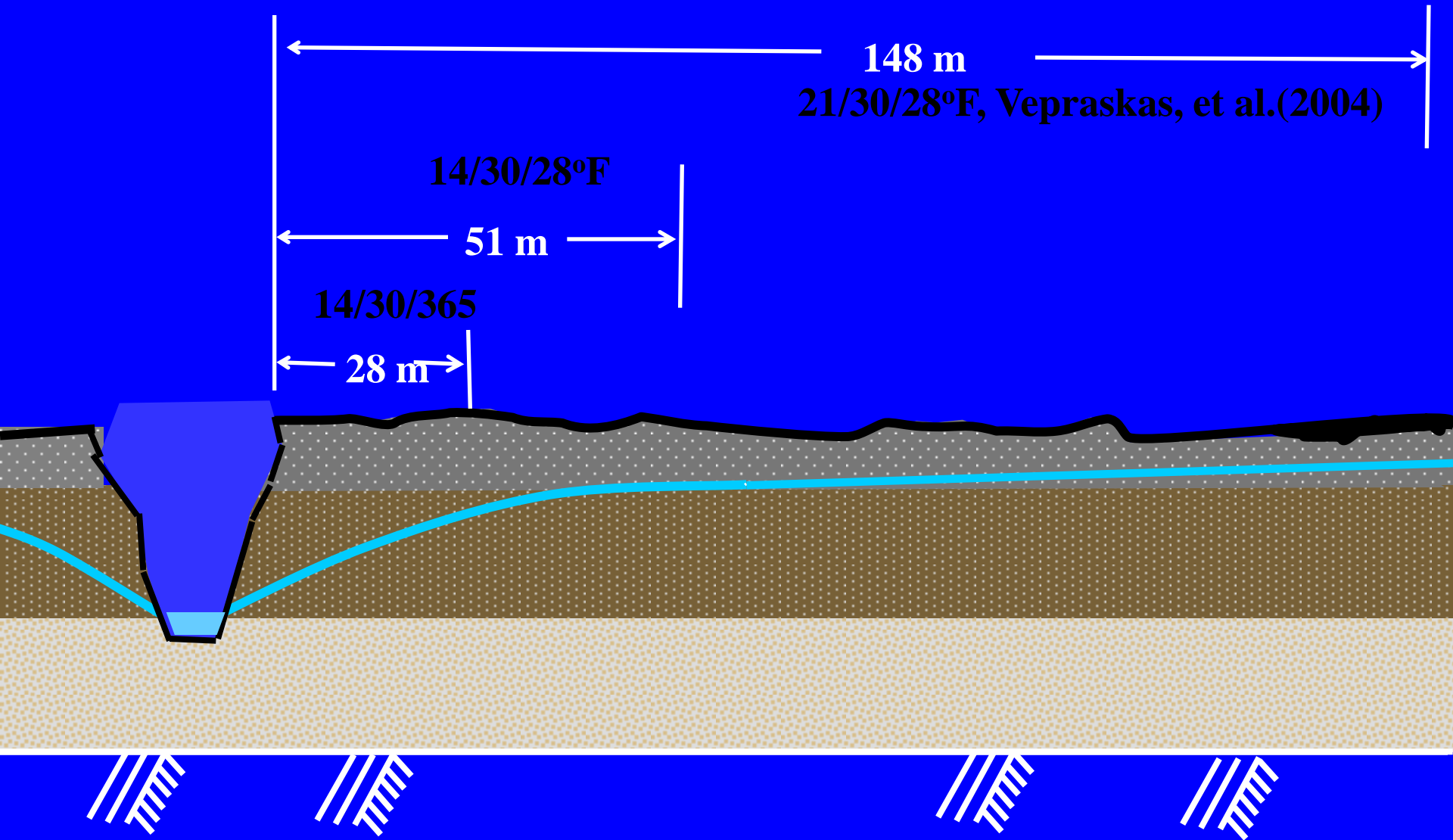


Day Of Year, 2005



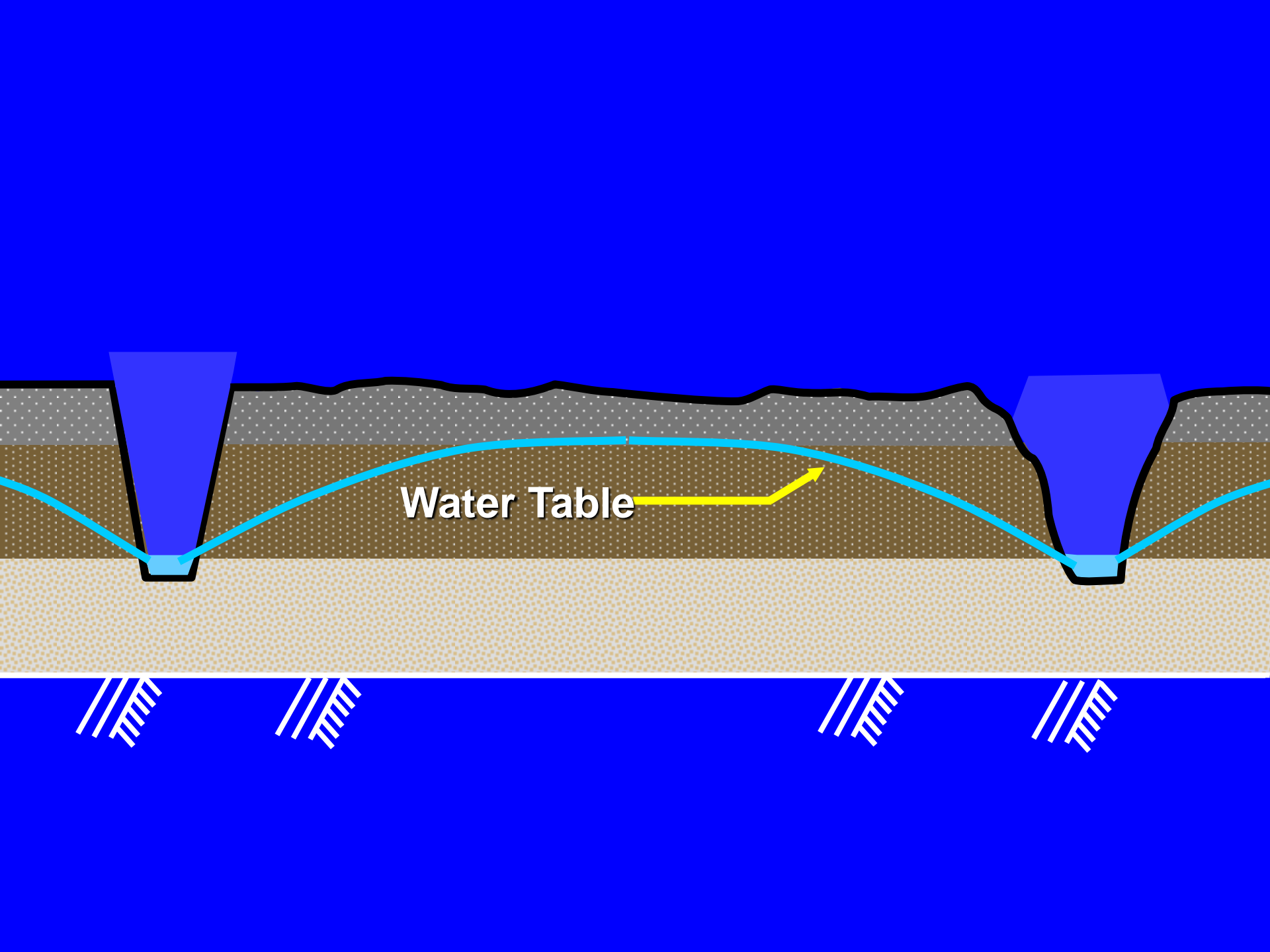
Wetlands Possess Three Essential Characteristics

- **Wetland Hydrology**
- **Hydric Soils**
- **Hydrophytic Vegetation**



Predicted Lateral Effect for 3 Wetland Hydrologic Criterion

Portsmouth S.L., Plymouth, NC, Surface Storage = 2.5 cm

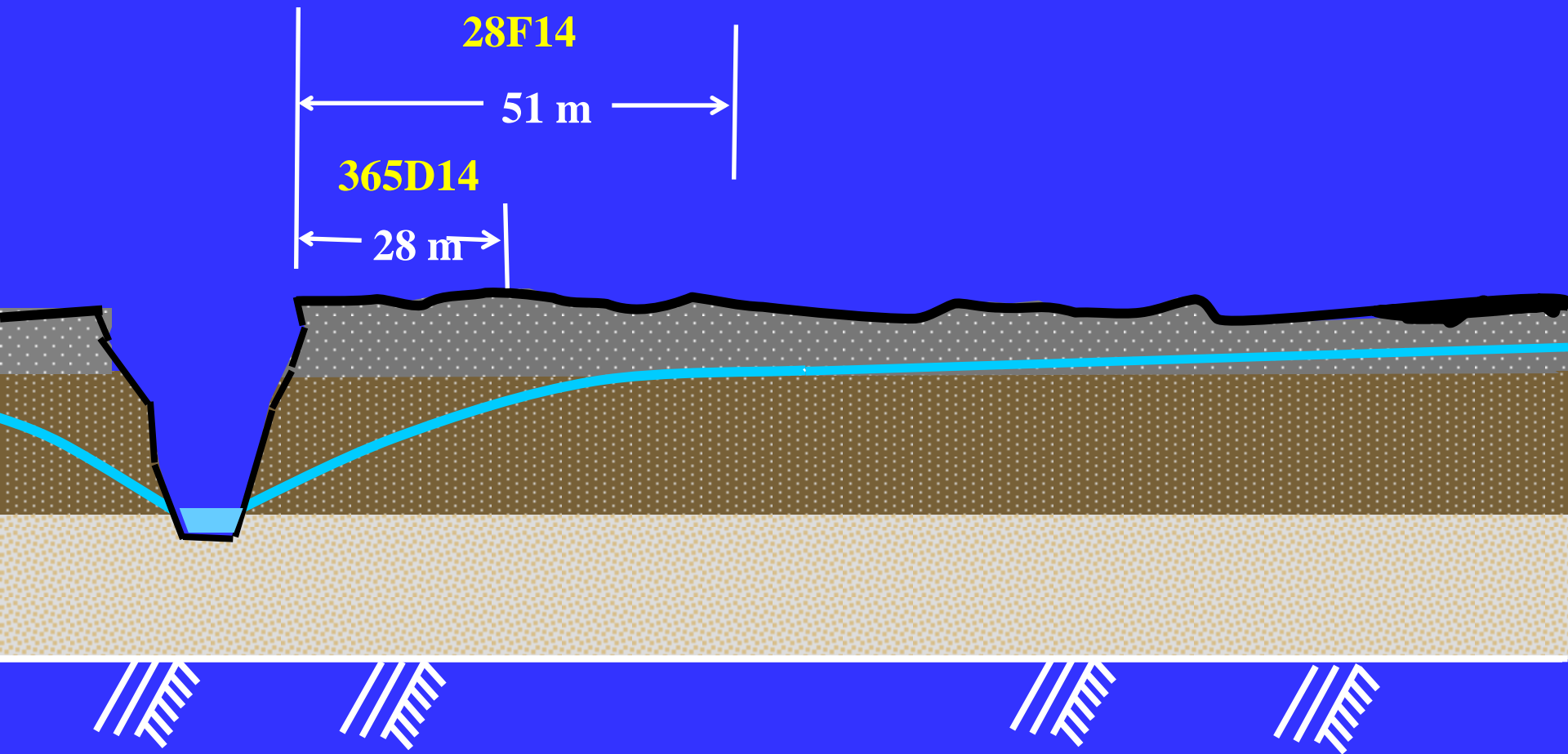


Growing Season (GS)

- The GS has been generally defined as the period between average date of last 28° F in Spring to average first date of 28° F in Fall
- It is recognized that wetland processes take place outside GS (winter months)
- Those processes are slower due to colder temperatures; above definition of GS accepted to simplify the definition (NRC, 1995)

Growing Season (cont.)

- **New Definition of GS: 2010 Regional Supplement to COE Wetlands Delineation Manual for Atlantic and Gulf Coastal Plain**
- Growing season defined as time when soil temperature at 30 cm depth is above 5°C.
- **365 day** GS for much of the Coastal Plain
- This study was conducted to determine effect of change in methods used to define GS on **Criterion for wetland hydrology.**



**Predicted Lateral Effect for 2 Wetland Hydrologic Criterion
Portsmouth S.L., Plymouth, NC, Surface Storage = 2.5 cm**