Testing Wetland Hydrology Criteria Modeling with Long Term Water Table

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Wetlands Hydrology Criteria must occur in 50% of years

- Surface Inundation 7 consecutive days in growing season.
- Soil Saturation for 14 consecutive days in growing season.
- Assume soil saturation if water table depth is within 6” for sands and 12” all other soil textures.
- Growing season- 50% of years air temp over 28° F
- Georgetown SC March 12- Nov 22 (1950-2010 data NOAA)
Problem to solve by threshold method: shallow water table variability

Depth (cm) Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec

-200 -150 -100 -50 0 50

Mean Depth
Upper 99% CI Observation
Lower 99% CI Observation
Upper CI Mean
Lower 99% CI Mean

Actual Weekly Data
Assumption of threshold method

- Spatial variability of water table depth is independent of absolute depth (valid for shallow water tables)
- Depth well A at time t = dA(t)
- Depth well B at time t = dB(t)
- If dA(t) = dB(t) +x and dA(t+1) = dA(t) +y
- Then dB(t+1) = dA(t) +x+y
- If dA = wetland threshold
- then dB wetland character is determined by sign of x
Study site
Test data collection

Georgetown 2E
Weather station
<table>
<thead>
<tr>
<th>Soil Series</th>
<th>Taxonomy</th>
<th>Drainage Class</th>
<th>Well numbers</th>
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<tbody>
<tr>
<td>Centenary</td>
<td>Entic Grossarenic Alorthods</td>
<td>well drained</td>
<td>36</td>
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<tr>
<td>Chipley</td>
<td>Aquic Quartzipsamments</td>
<td>somewhat poorly drained</td>
<td>16, 38, 39, 43</td>
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<td>Echaw</td>
<td>Oxyaquic Alorthods</td>
<td>moderately well drained</td>
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<tr>
<td>Hobcaw</td>
<td>Typic Umbraquults</td>
<td>very poorly drained</td>
<td>2*, 10, 22, 40*</td>
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<tr>
<td>Lakeland</td>
<td>Typic Quartzipsamments</td>
<td>excessively well drained</td>
<td>1, 17, 20, 24, 26*</td>
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<tr>
<td>Leon</td>
<td>Aeric Alaquods</td>
<td>poorly drained</td>
<td>3, 4, 6, 8, 11, 13, 14, 19, 21, 23, 27, 33, 34, 37, 41, 44, 45</td>
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<tr>
<td>Lynn Haven</td>
<td>Typic Alaquods</td>
<td>poorly to very poorly drained</td>
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<td>Witherbee</td>
<td>Aeric Alaquods</td>
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<td>28*, 35*</td>
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<tr>
<td>Yauhannah</td>
<td>Aquic Hapludults</td>
<td>moderately well drained</td>
<td>9, 25, 31, 32*</td>
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Well 4 approximately same as threshold wetland in dry year with tropical storm
In 1984 well 4 is similar to threshold in early but slightly drier in during the heavy rains of late summer and fall.
Well 8 is clearly drier
Well 11 clearly wetter than threshold

Well 11, 1981

Day of Year, 1981

Water Table depth, cm

- Observed, Weekly, Well 11
- Threshold, DM Simulated, 15 cm Criterion
- Growing Season
Well 14 drier in wettest year
Daily data for 1976 shows suggests similar relation to threshold methods.
Example wetland determination for wells 14 and 19 in 1985
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Results of actual 14 year data collection confirm results
Conclusion

- For shallow depths, relative depth differences between wells were the same for periods of 60 days to 14 years.
- Threshold method produced valid evaluation of wetland hydrologic criterion that was confirmed long term water table measures.

Test was done on Leon sand and within 10 km of weather station.