Maitland Valley Climate Trends Analysis

April, 2009

Luinstra Earth Sciences
Soils • Water • Environment

Introduction

- Climate Change Data Project initiated in 2008
- Climatic data gaps filled as part of SWP water budget process for all MVCA gauges
- Allowed for a complete data set for gauges for the period of 1950-2006
- Attempt to discern trends (if any) in the data

MVCA Climate Change Project

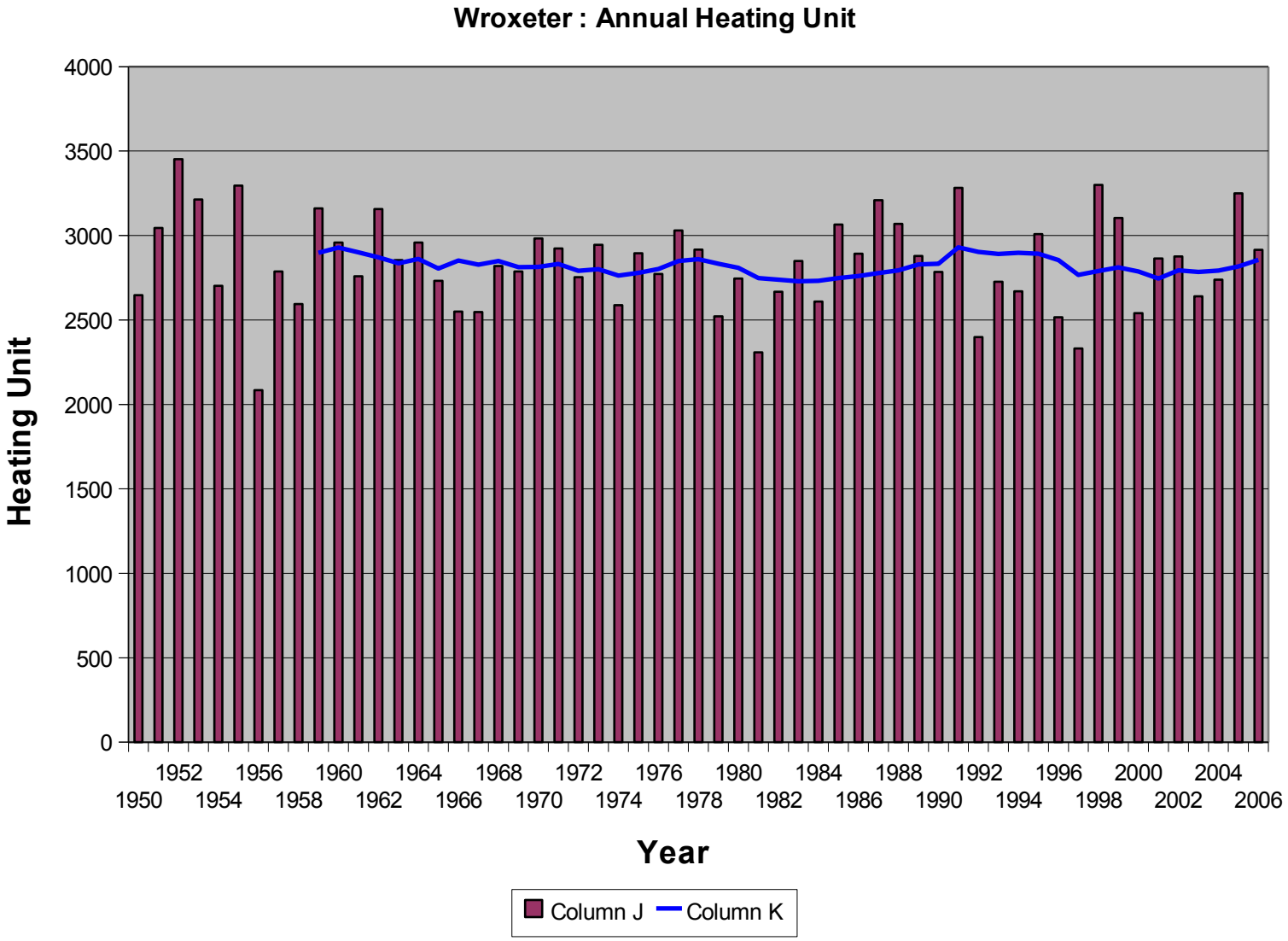
Available Data includes:

- Hourly, Daily Precipitation
- Hourly, Daily Temperature
- 9 locations in MVCA Watershed

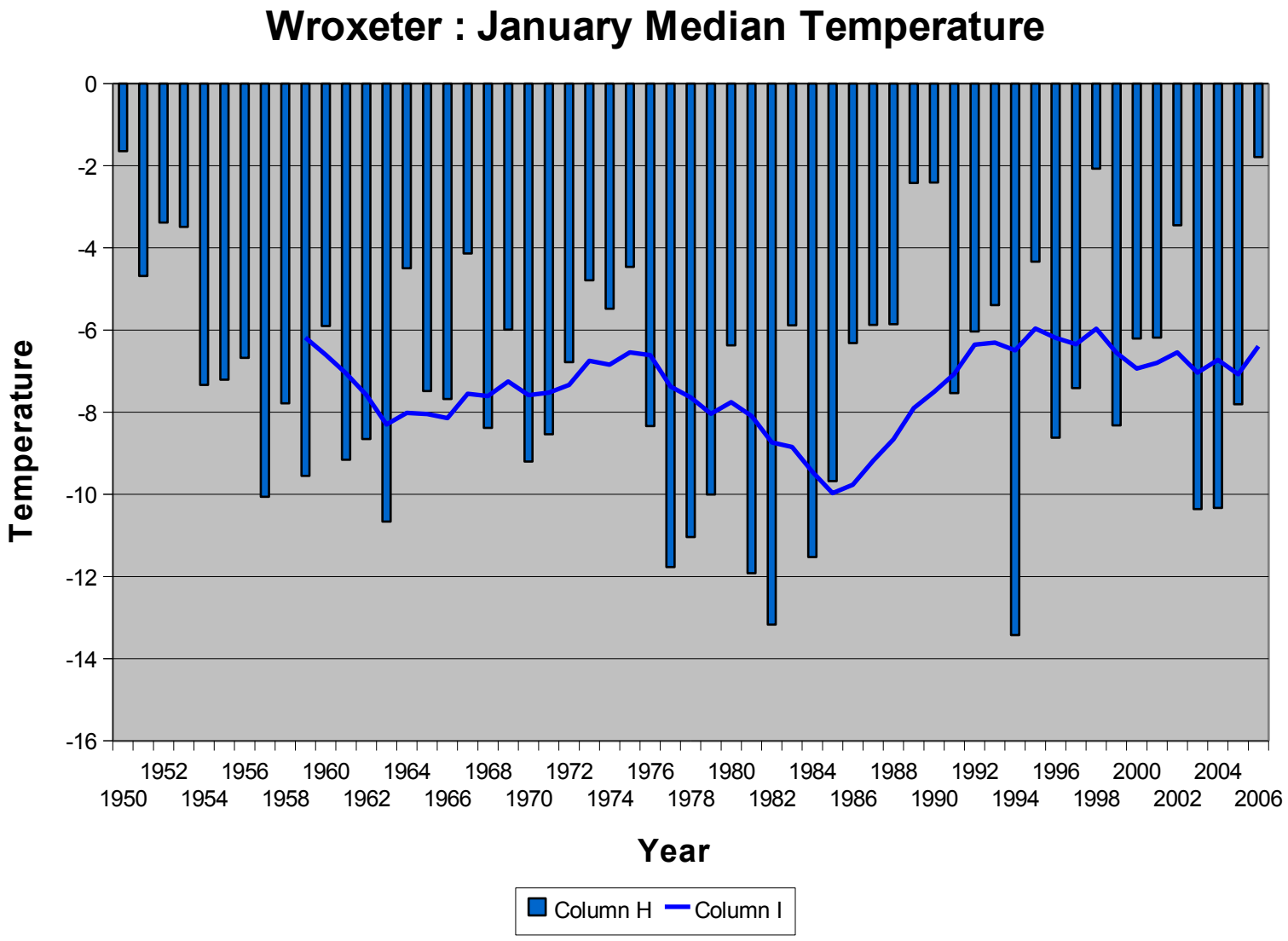
Climate Change Questions

- Are Temperatures increasing/decreasing?
- Are we getting more/less PPT?
- Is the intensity of PPT events changing?
- Are there Watershed-Scale differences?
- What are the implications for the Maitland Watershed?

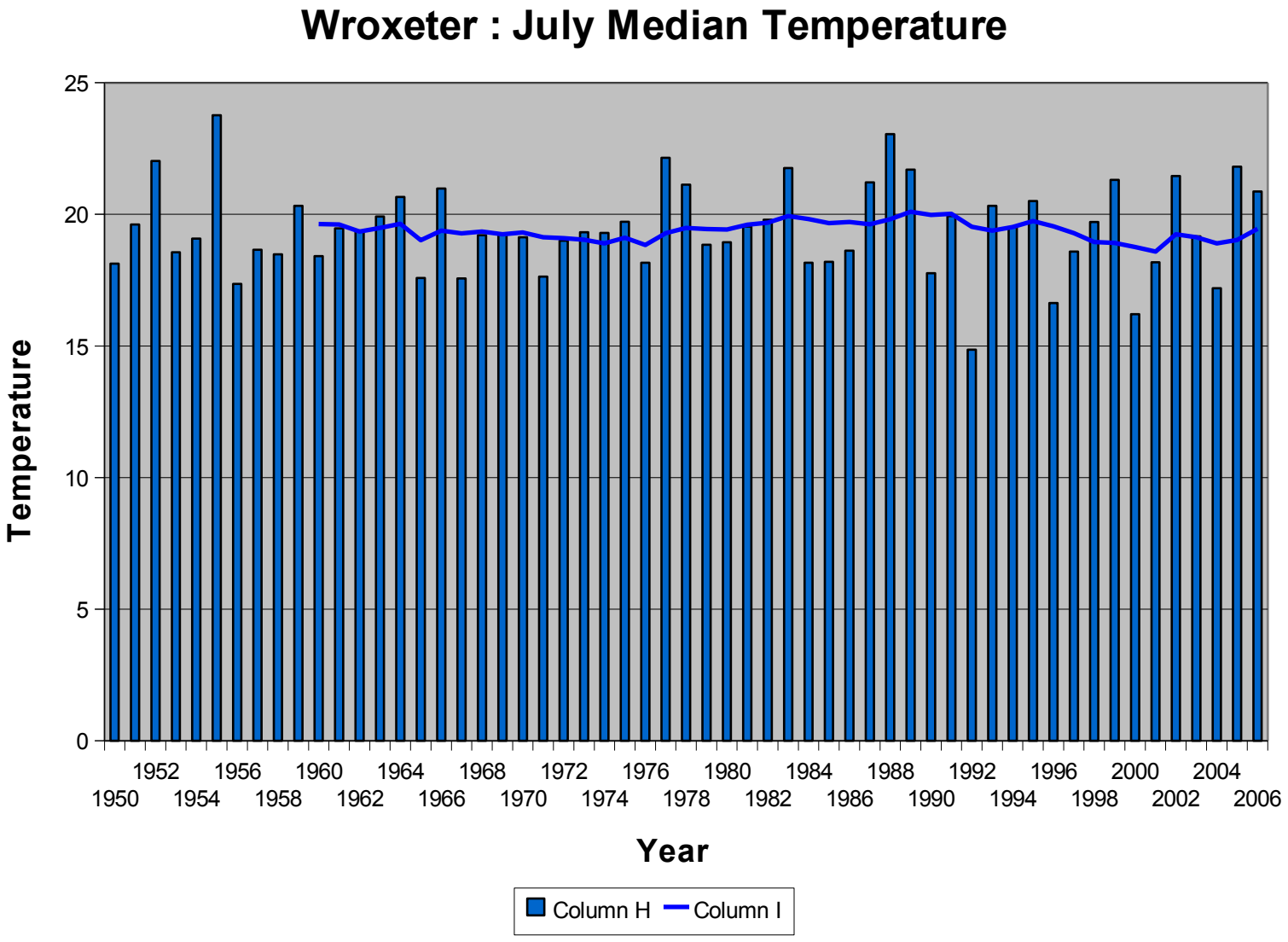
Temperatures – Heat Units



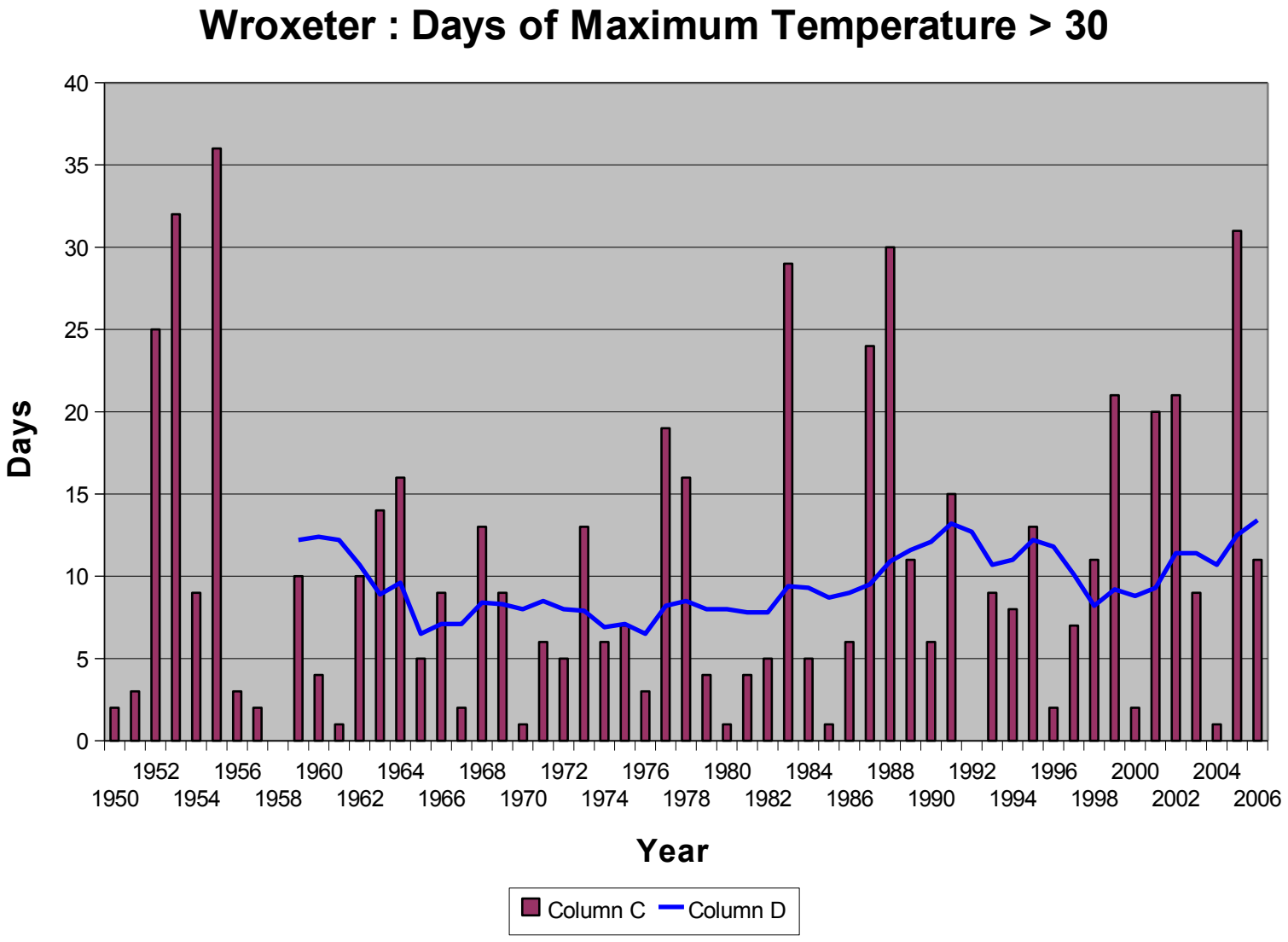
Temperatures – Winter Median Temp



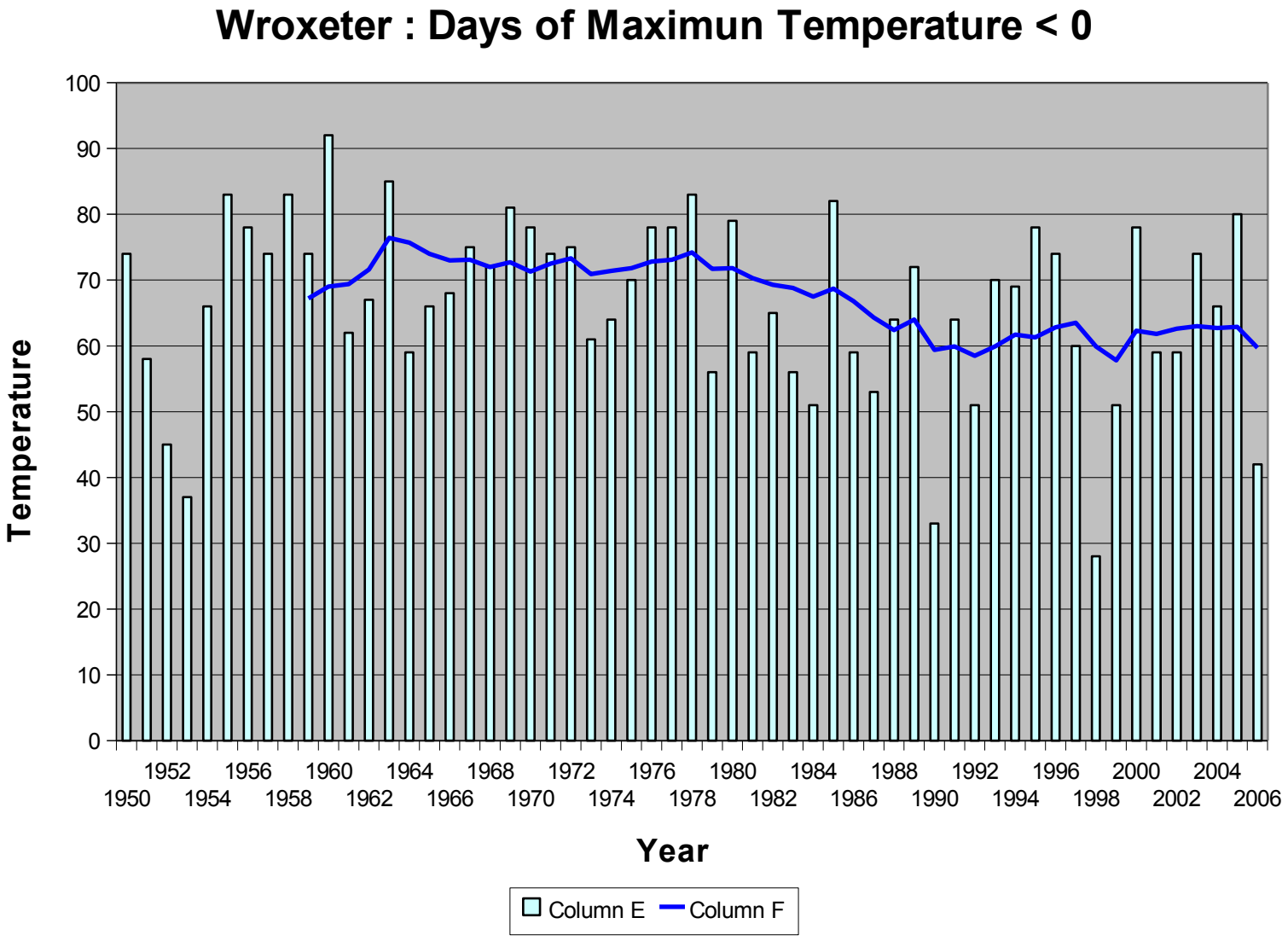
Temperatures – Summer Median Temp



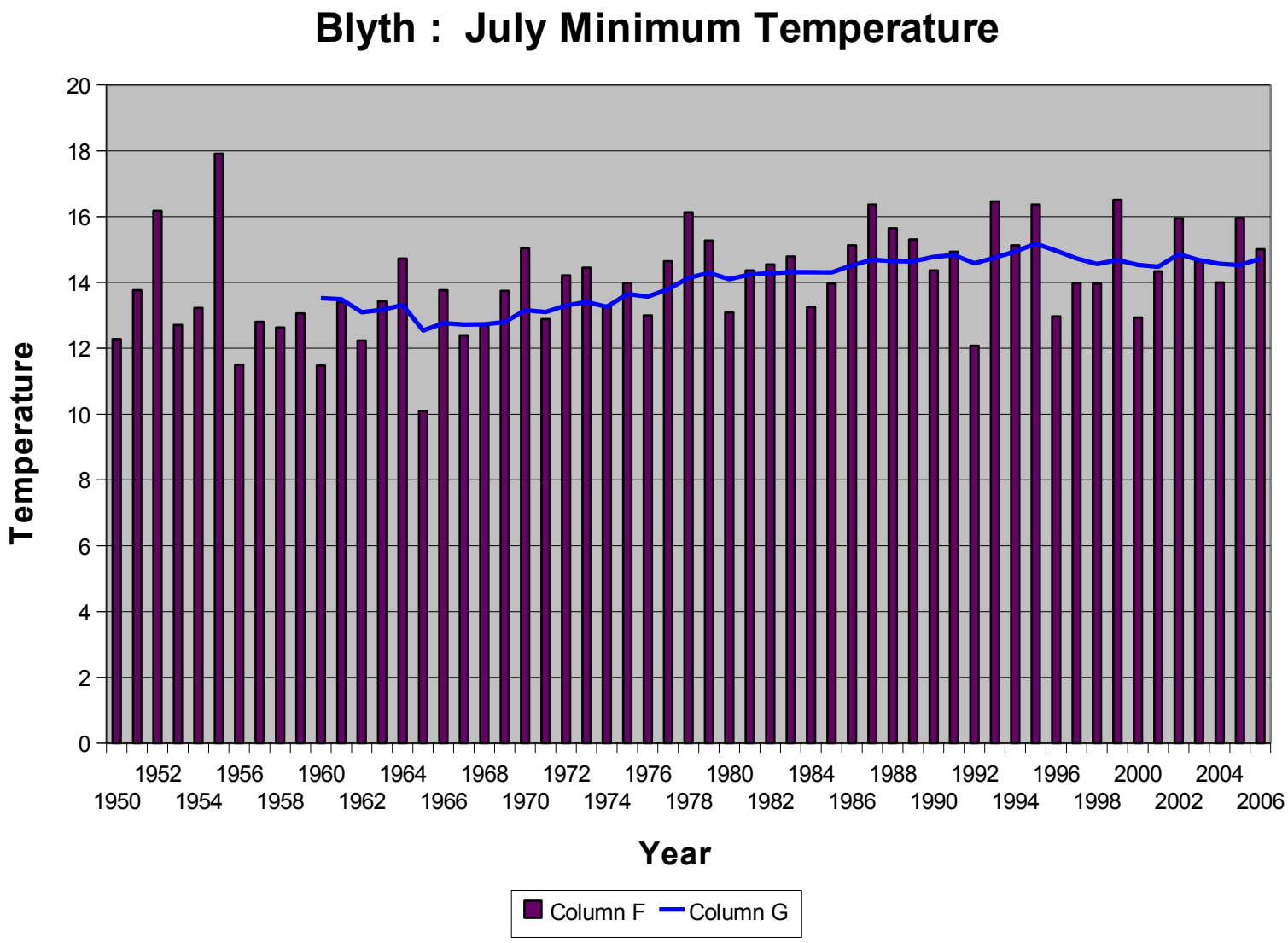
Temperatures – Summer Extreme Temp



Temperatures –Winter Temperatures V2



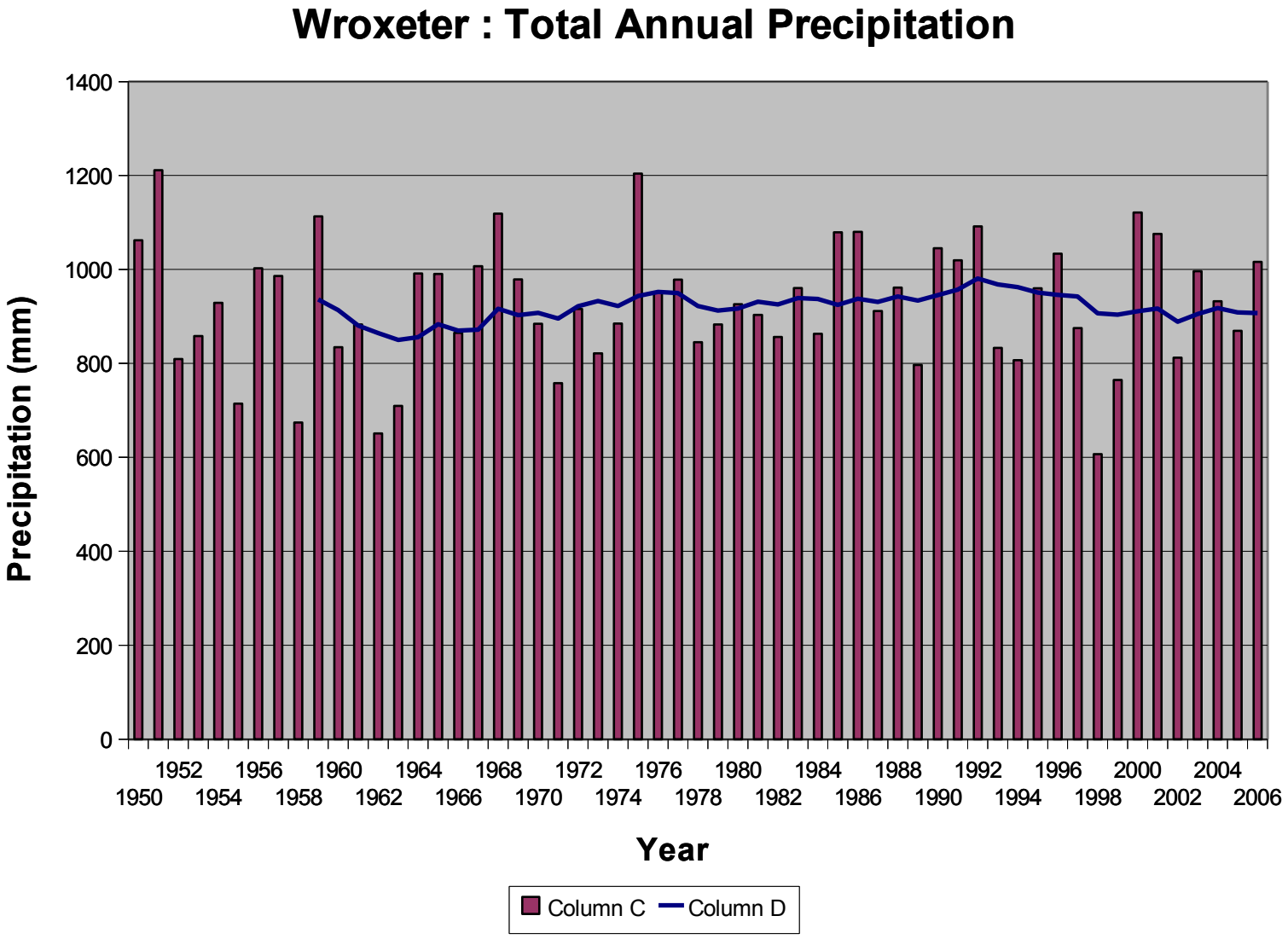
Temperatures –Summer Minimums



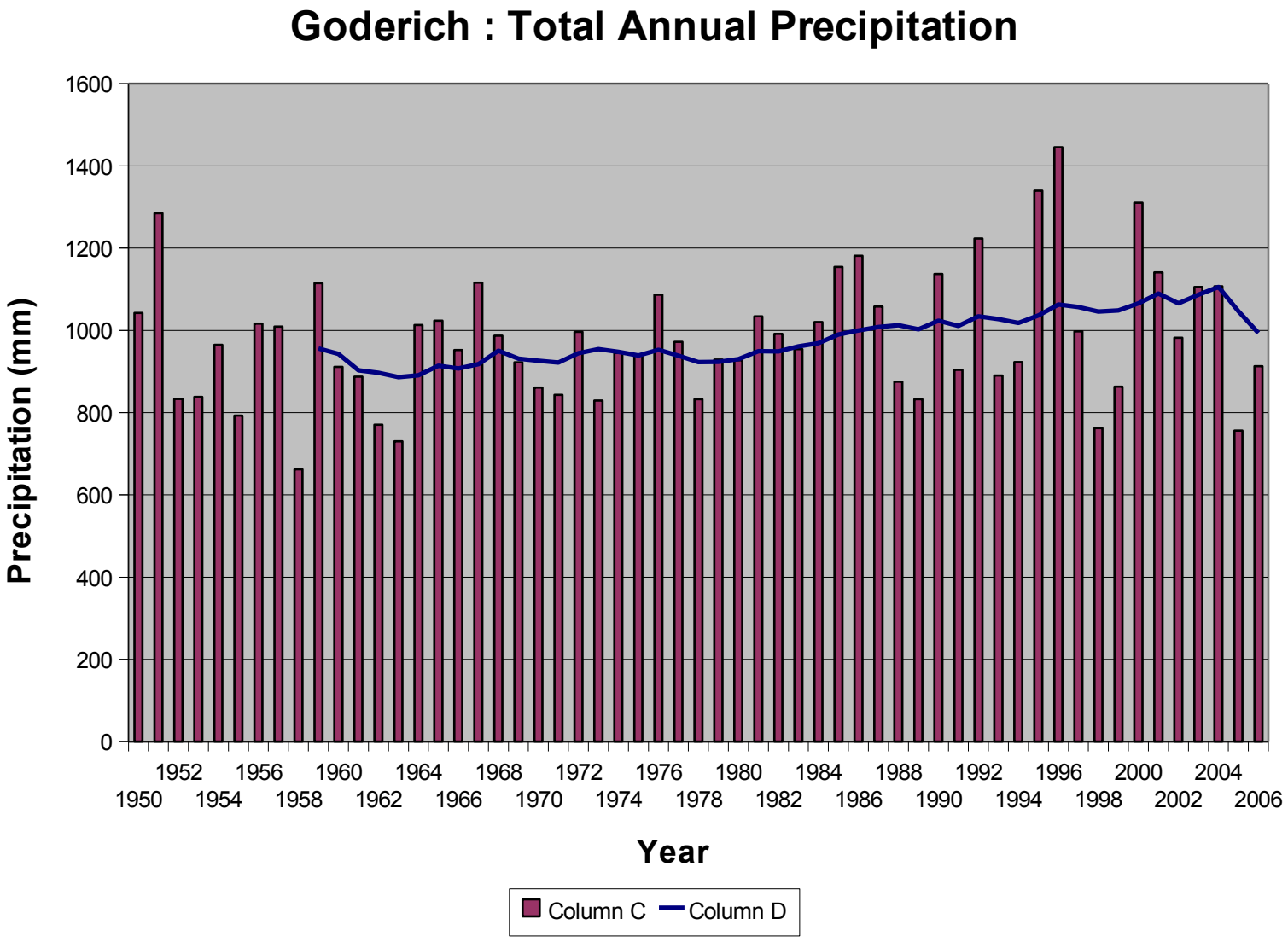
Temperature

- Average Temperatures – little to no trend, may be increasing in some areas
- Night time temperatures staying warmer
- More days above 30C
    - Longer, warmer heat waves
- Fewer days below freezing
    - More frequent thaws
    - Shorter Frozen Period

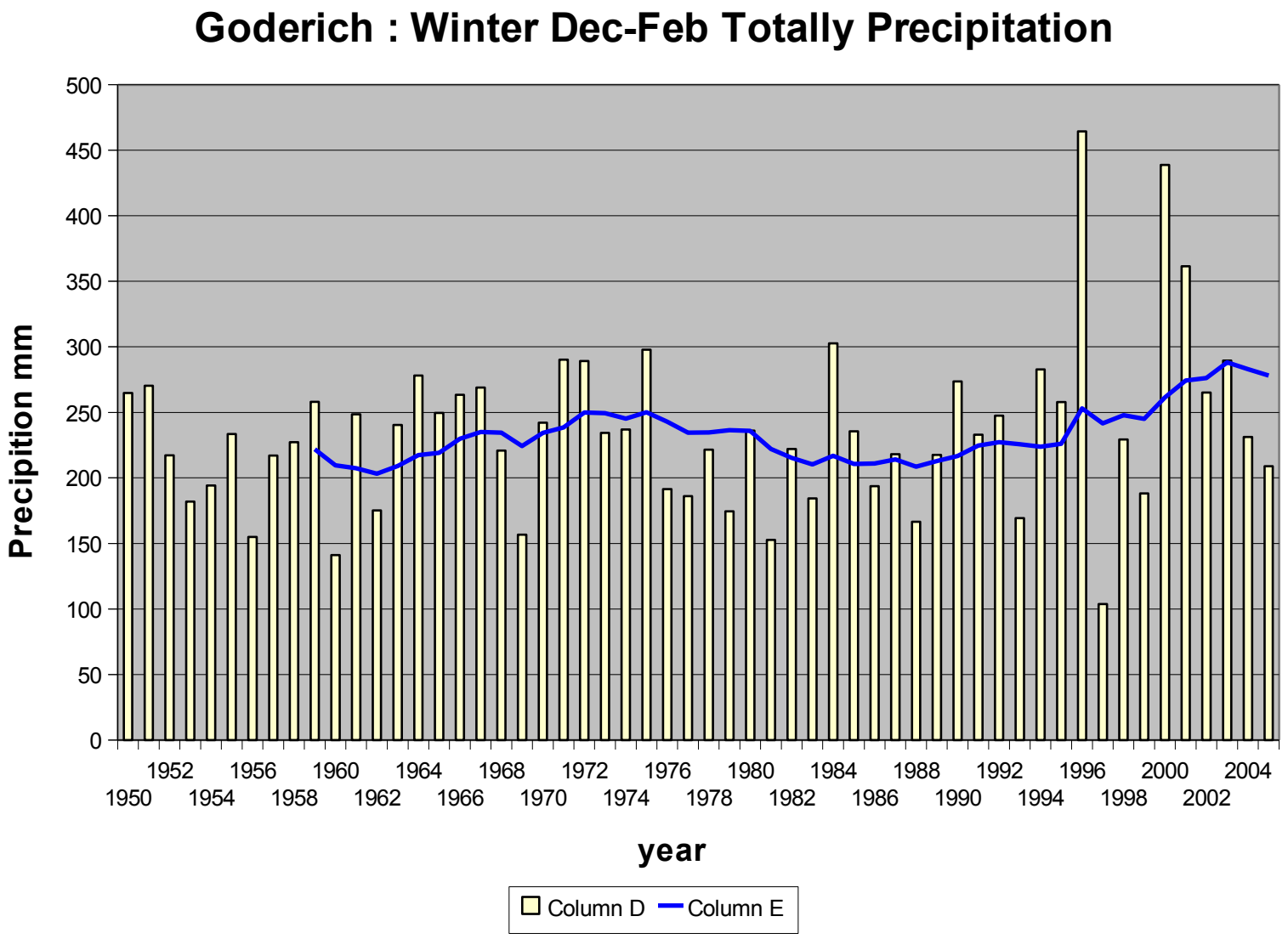
Precipitation – Total Annual



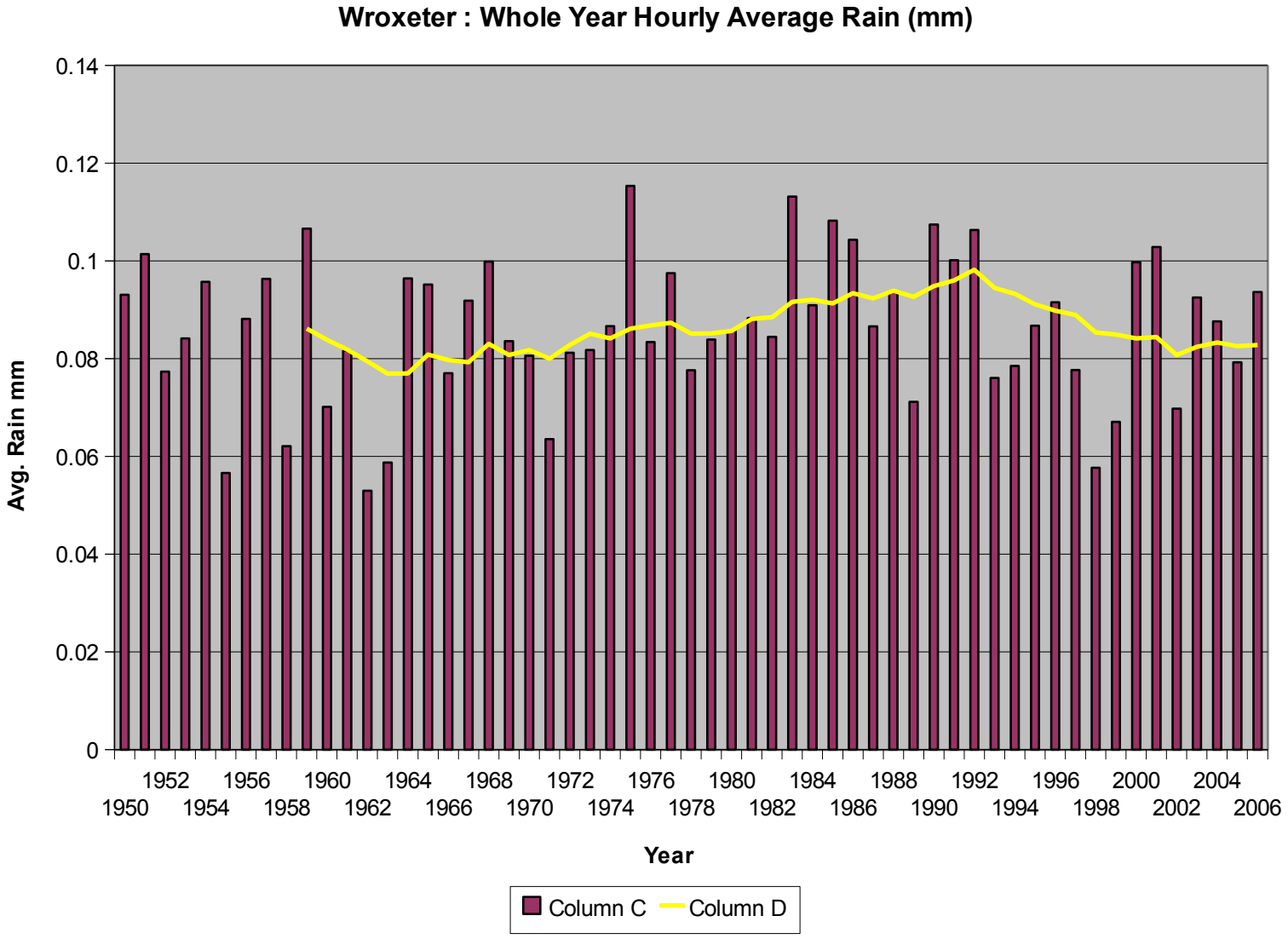
Precipitation – Total Annual



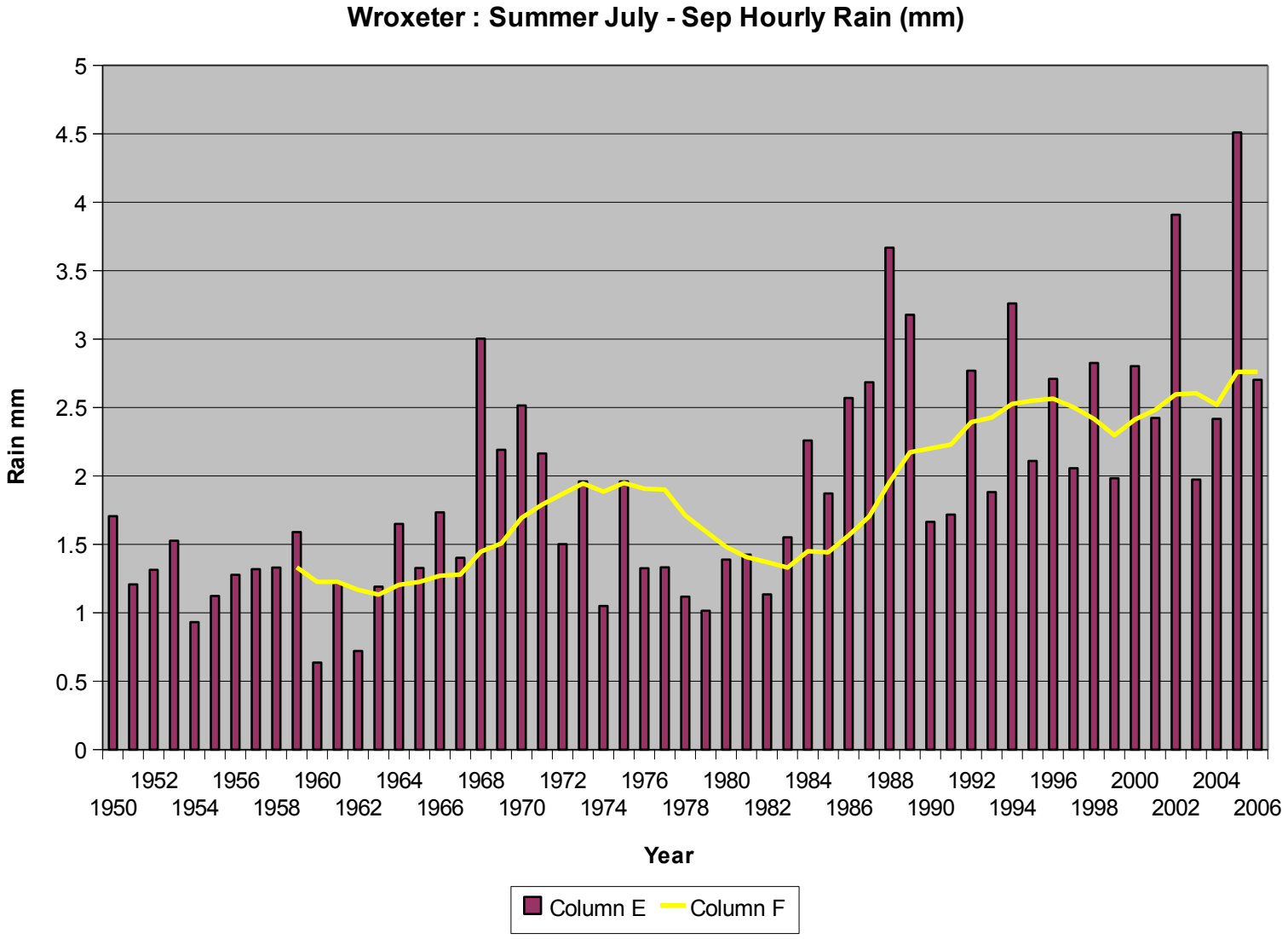
Precipitation – Seasonal Changes?



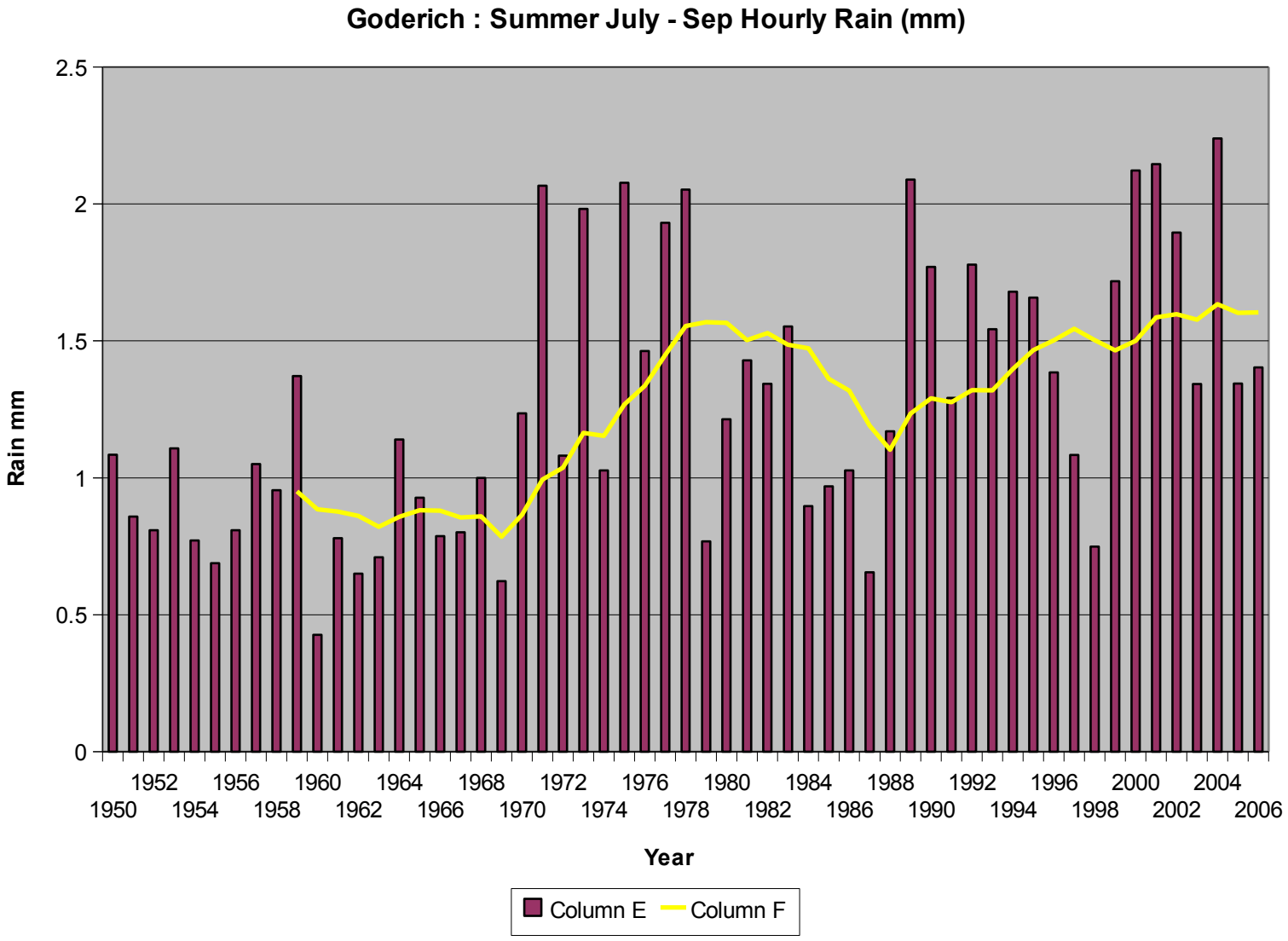
Precipitation – Intensity Changes?



Precipitation – Summer Rain Intensity



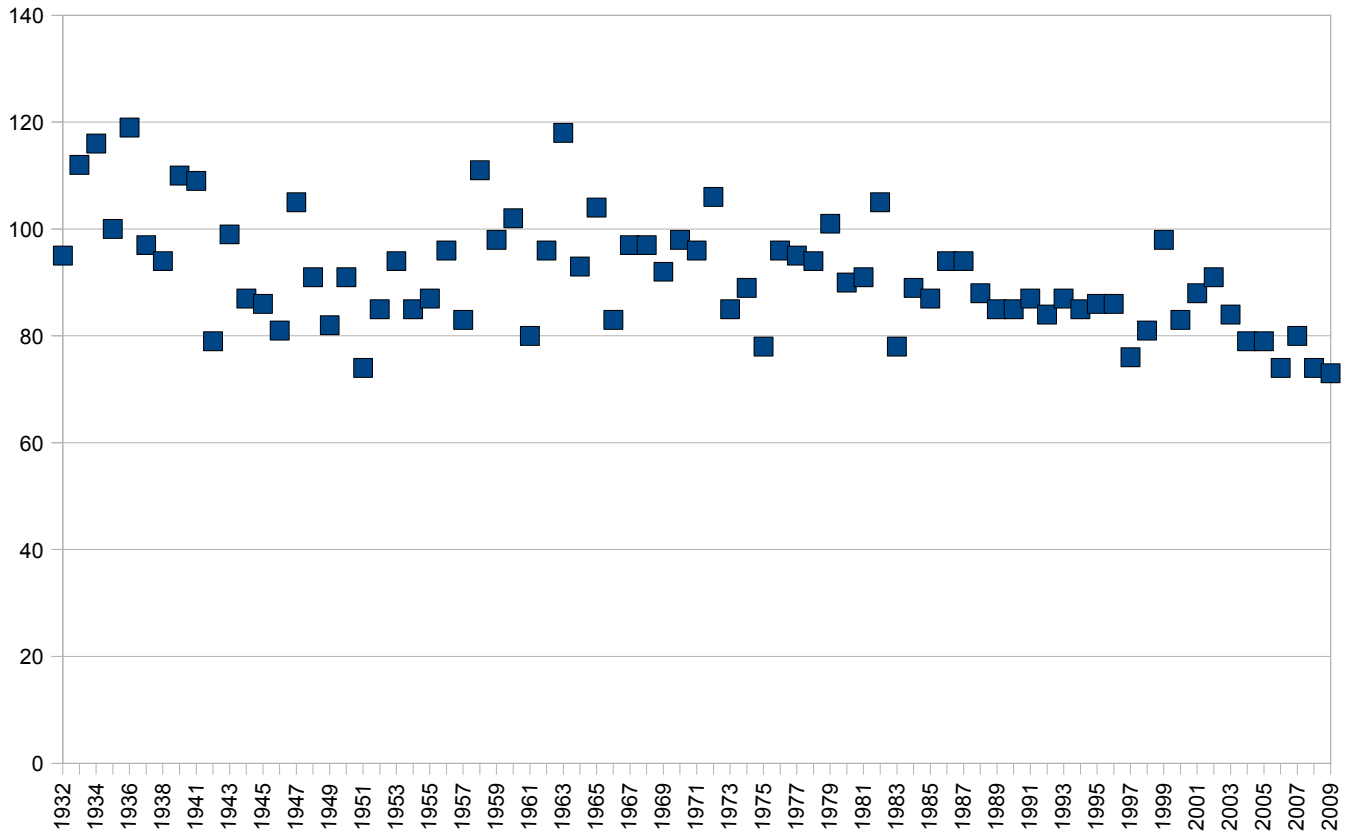
Precipitation – Summer Rain Intensity



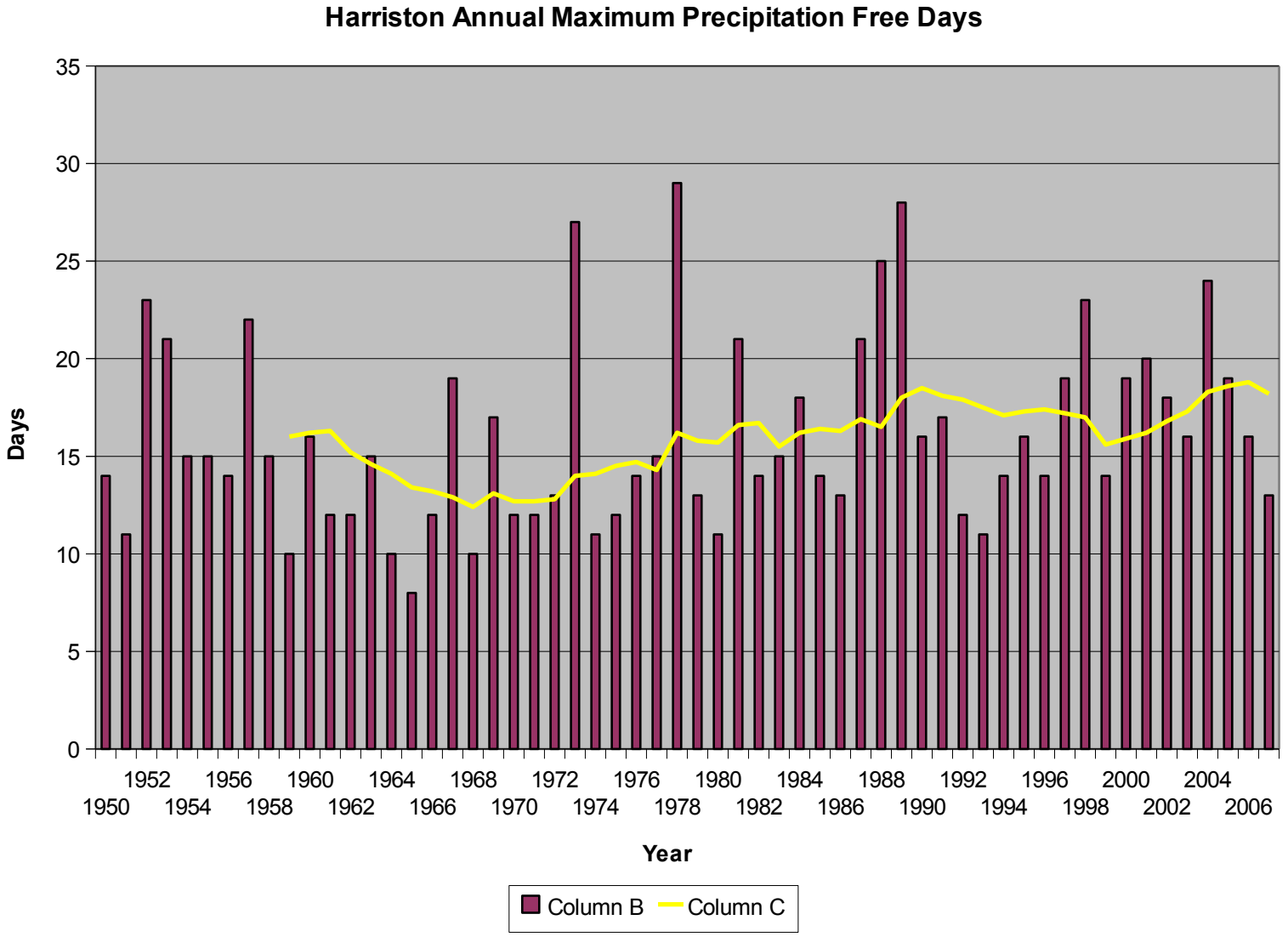
Precipitation

- Average Annual values show increasing trend notably near Lake Huron – Lake-effect PPT?
- More Precipitation as rain (fewer days below 0C)
- Seasonal distribution of rainfall seems relatively static
- More intense, shorter duration rainfall events in the growing season

Ice Cover on Lake Huron



Drought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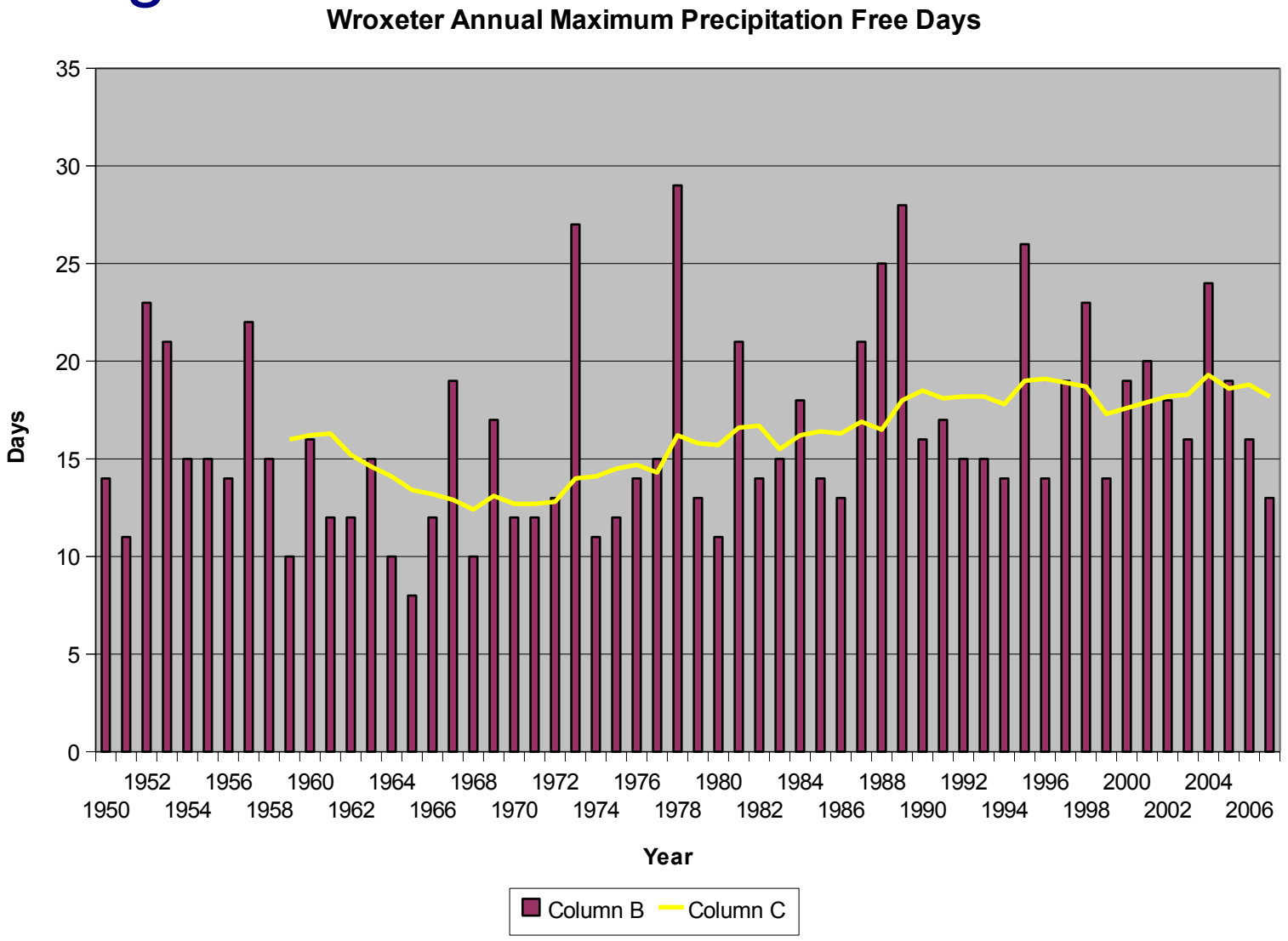
Column B
Column C

Drought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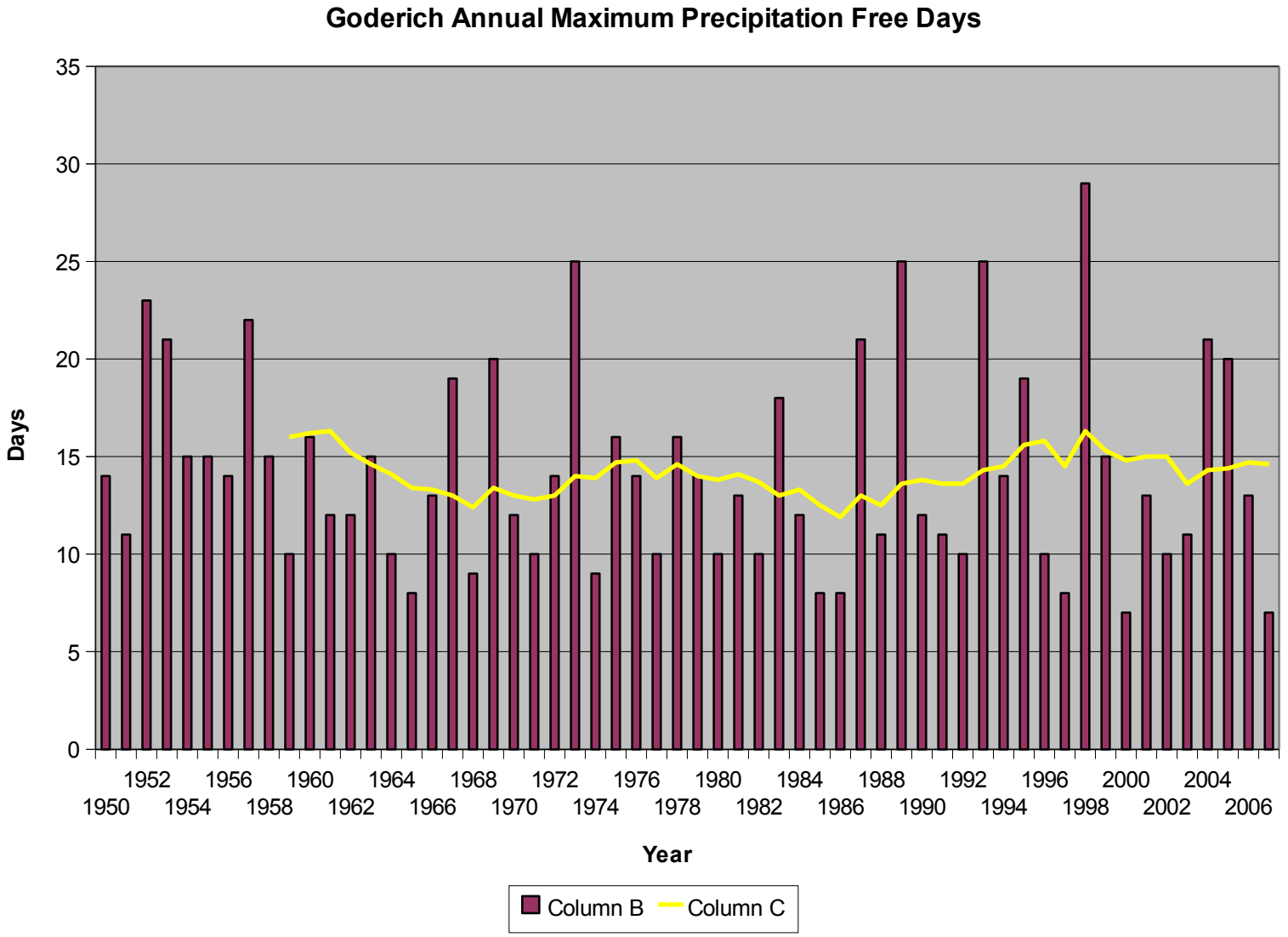
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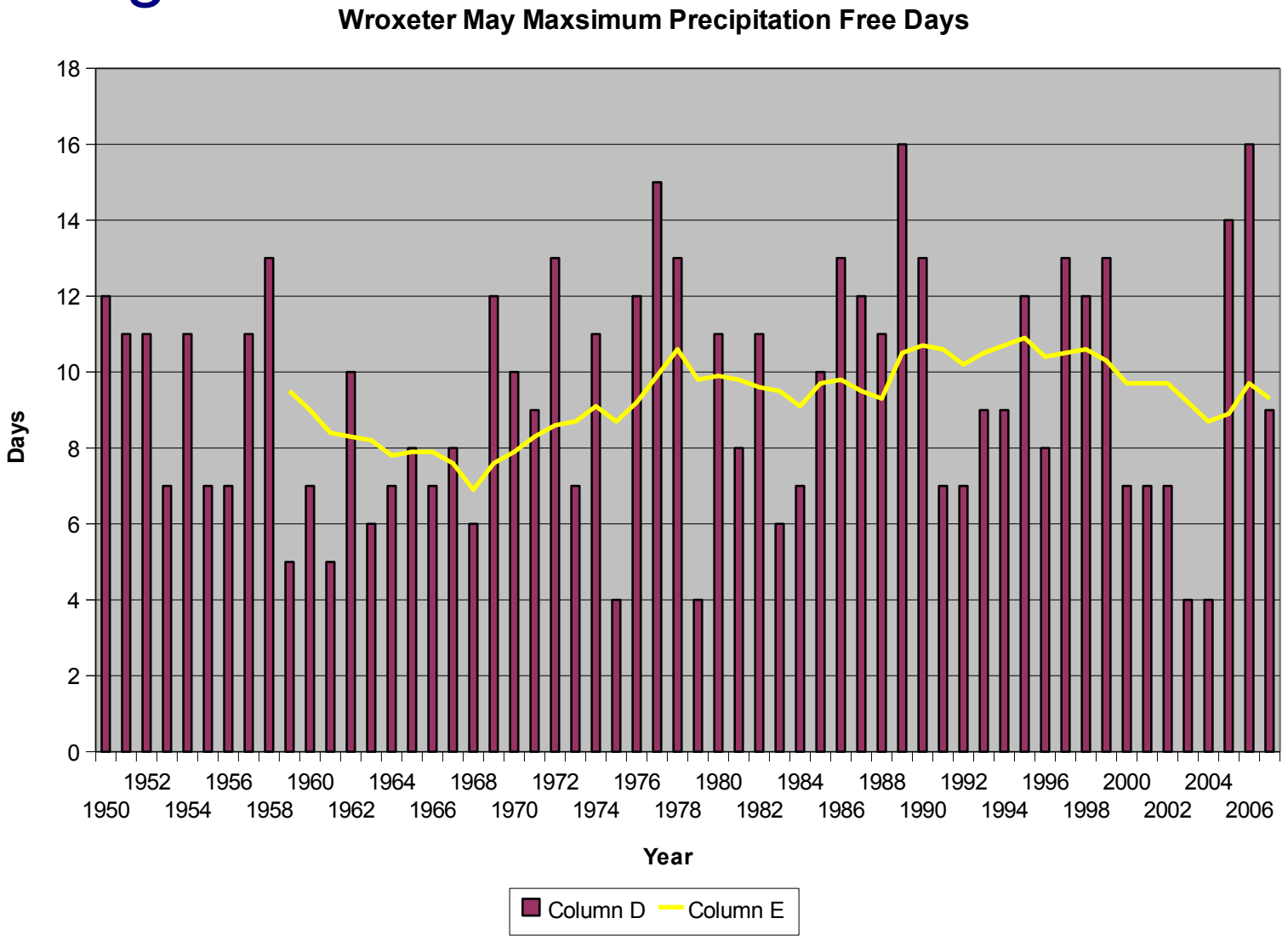
Drought


Wroxeter May Maxsimum Precipitation Free Days
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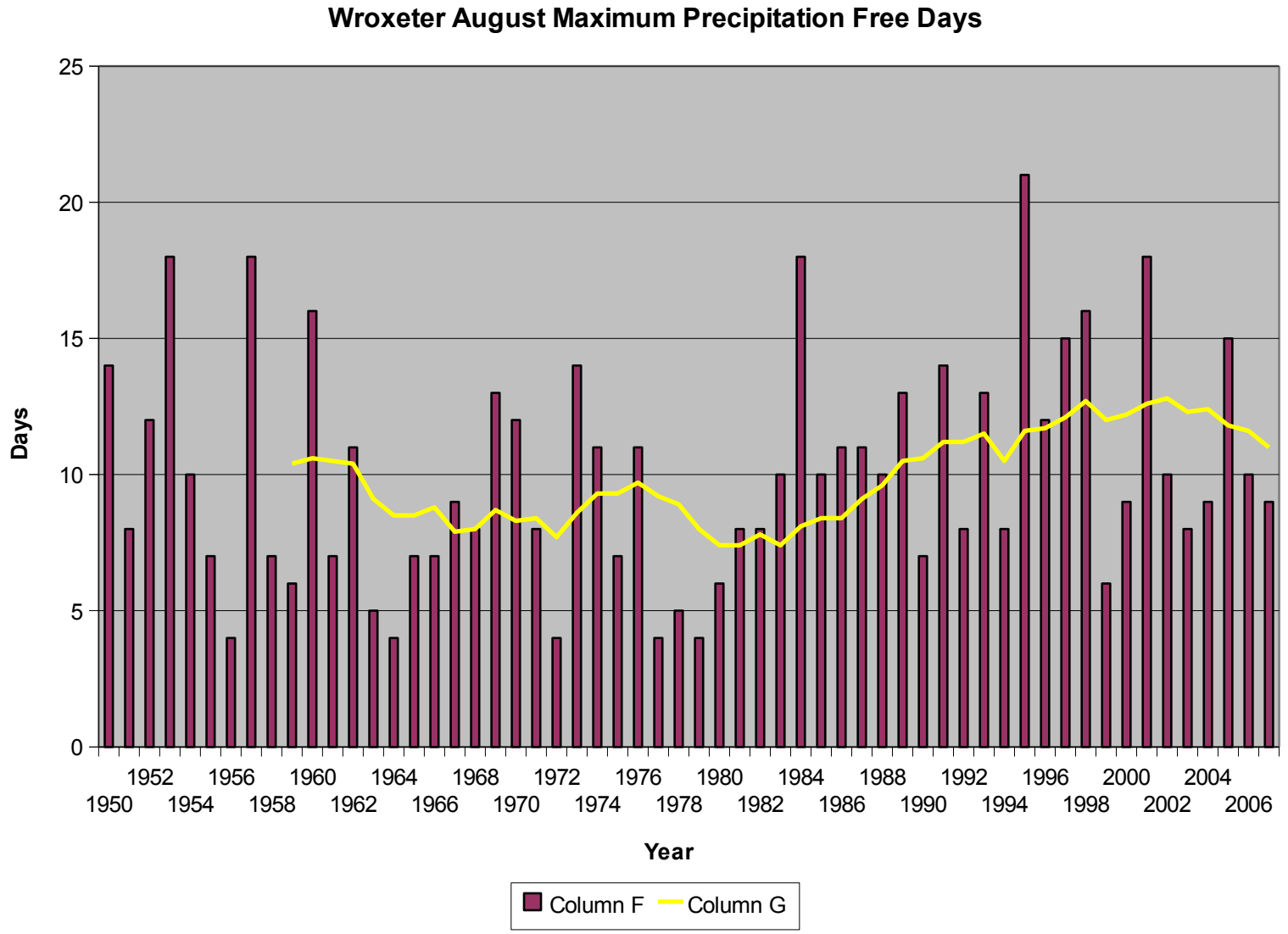
Drought


Wroxeter August Maximum Precipitation Free Days
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Drought – Days without rain

- Inland areas experiencing longer periods without rain

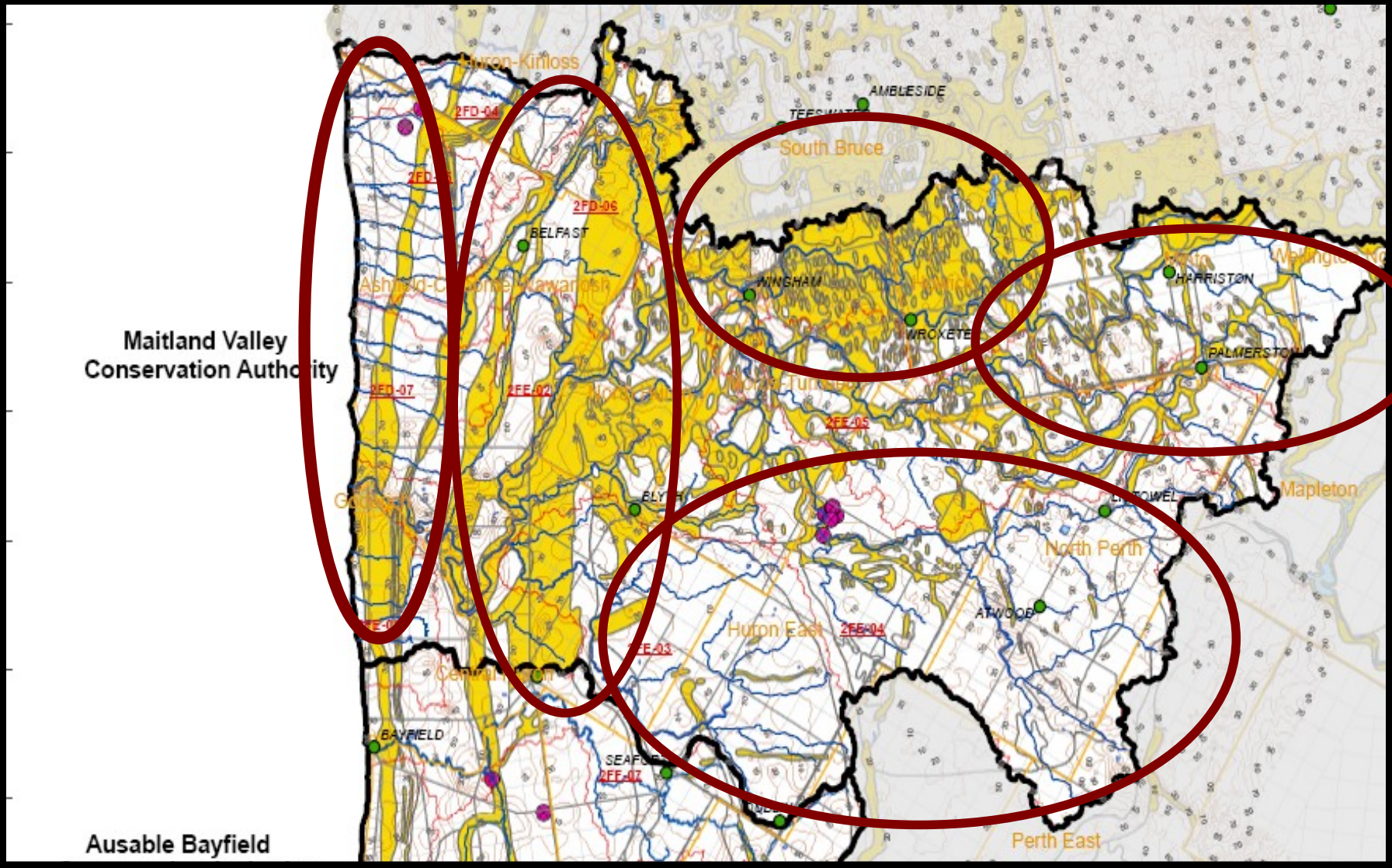
- Spring, early planting season shows most change

Summary - Climate

- Increased Lake Effect Snow for Lakeshore Areas
- More frequent winter melts, shorter snow covered season
- More frequent/long drought events
- Higher Intensity Precipitation events

Physiographic Regions of the MVCA

- Regions defined by common geology, soils, vegetation and drainage patterns
- Impacts of changes will be different for the Regions
- Adaptation strategies will need to focus on local issues


Maitland Valley
Conservation Authority
Ausable Bayfield
South Bruce
North Perth
Huron East
Perth East
Mapleton
AMBLESIDE
BELFAST
WINGHAM
WROXETER
HARRISTON
PALMERSTON
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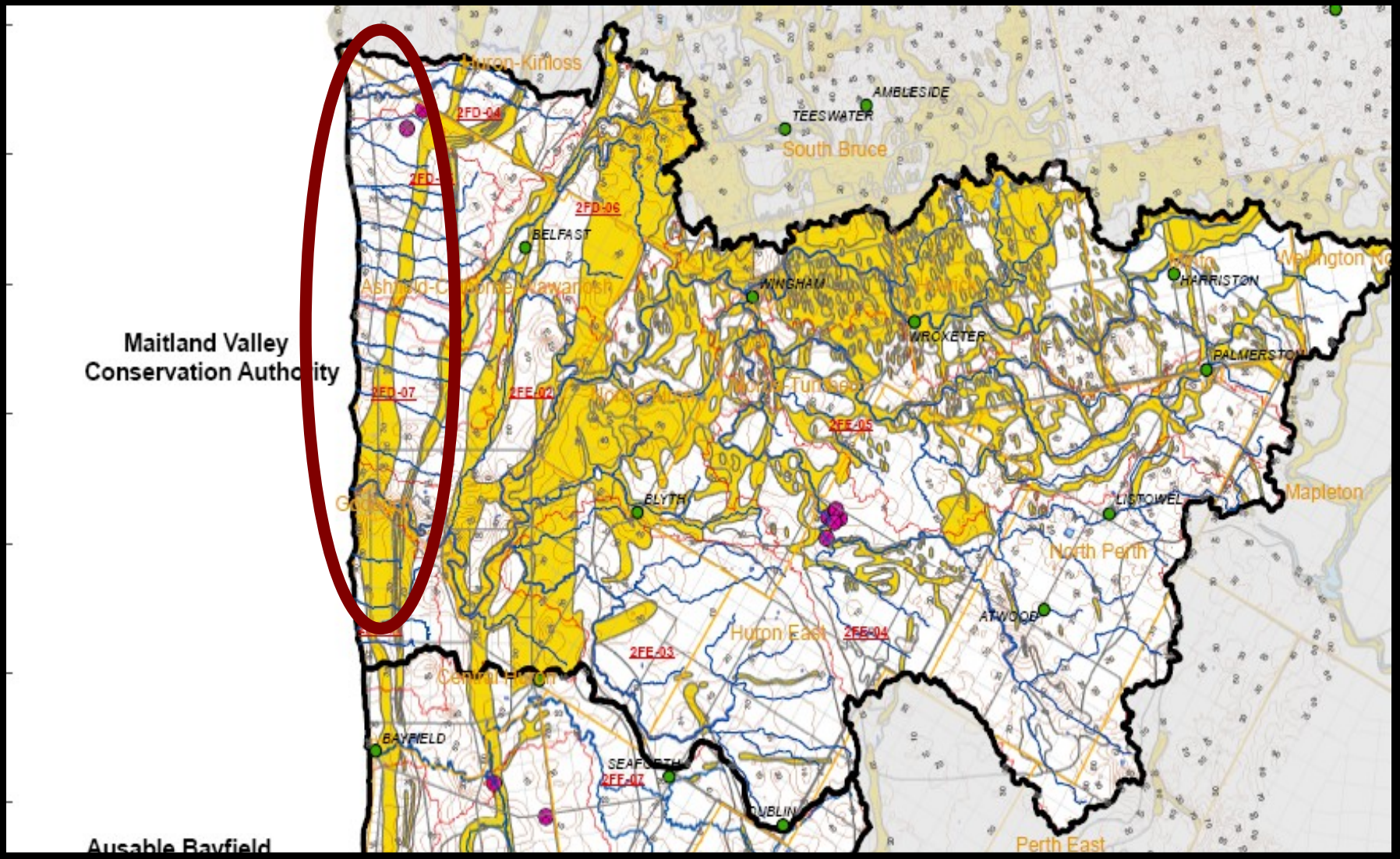
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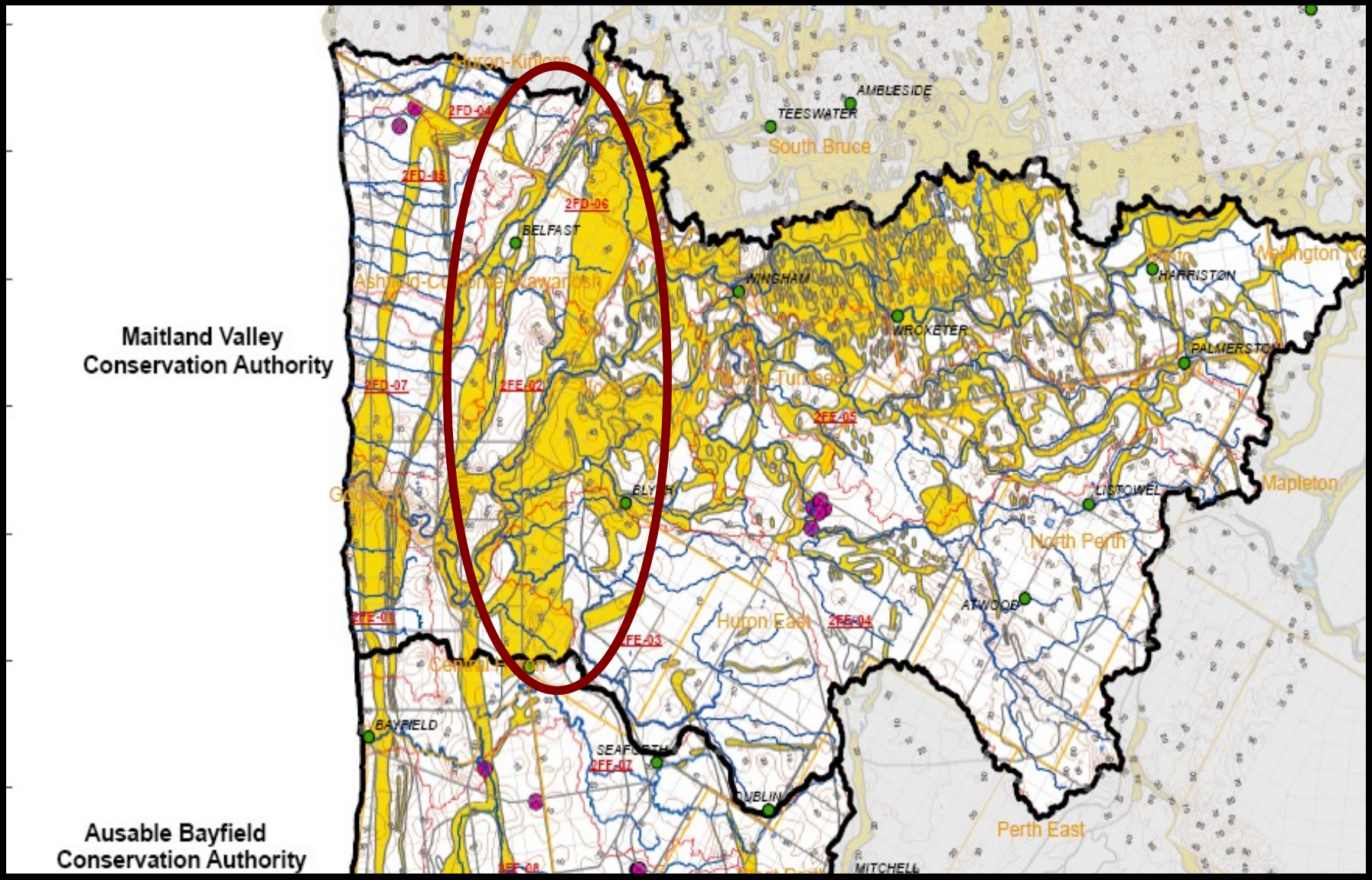
Huron Slope Physiographic Region

- Clay Plain Situated between the Wyoming Moraine and former L. Algonquin Bluff
- Poorly drained, heavy clay soils overlying clayey St Joseph's Till
- Generally flat topography except near shoreline gullies – high erosion potential
- Intensive cropping and high density of tile drainage

Huron Slope

- Increased Winter (Lake Effect) Precipitation
- Higher intensity rainfall – increased erosion of gullies near lakeshore
- Higher intensity rainfall – increased soil erosion, deterioration of surface water quality
- Drought resiliency – no reliable surface water or shallow groundwater as sources for irrigation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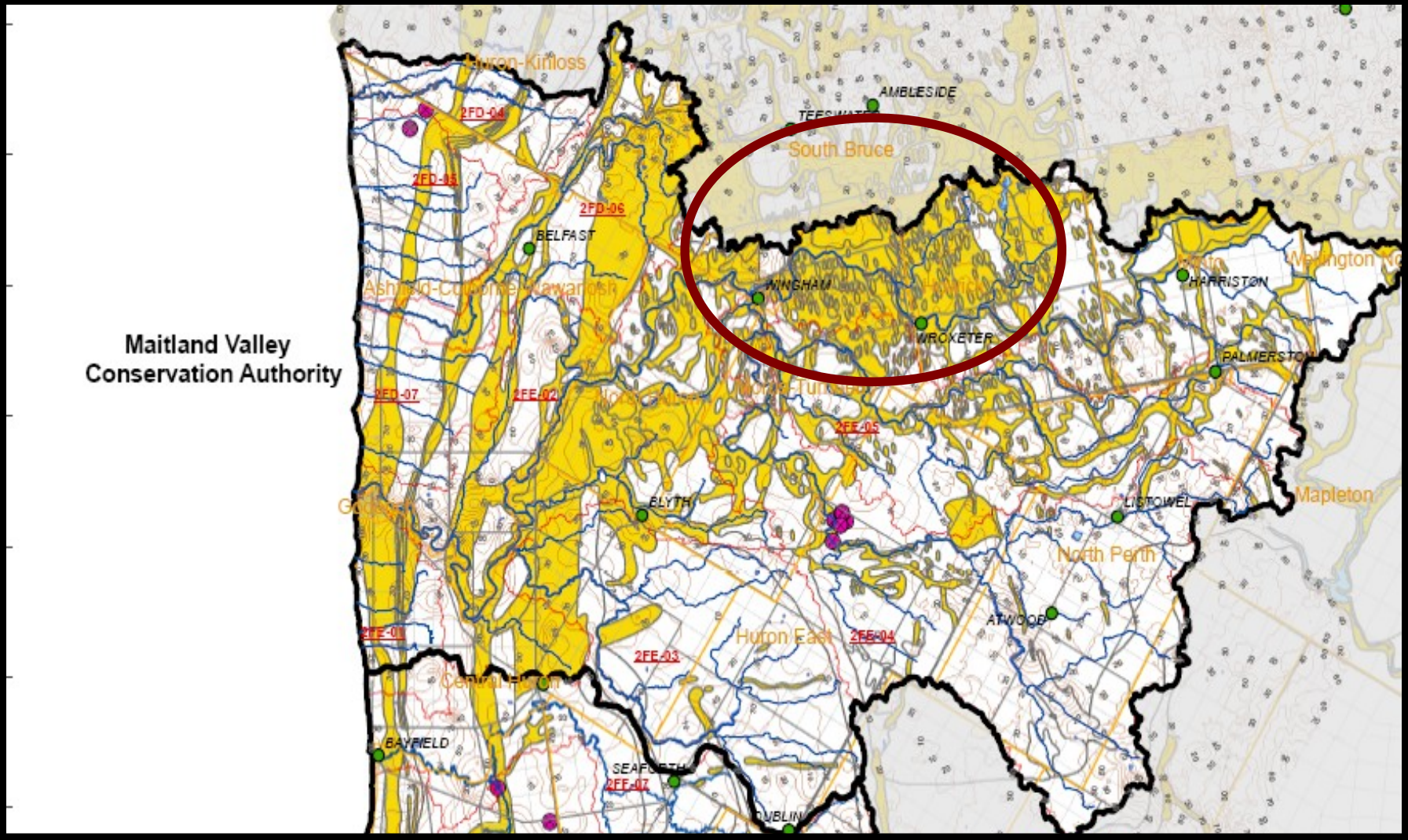
Horseshoe Moraines Physiographic Region

- Large Moraine Complex – Wyoming moraine
- Former L. Warren shore deposits along western fringe – Eastern fringe large meltwater deposits
- Local source of sand and gravel
- Rolling topography
- Highly variable geology and soils
- Important source of water for wetlands, cold-water streams
- Less intensive agriculture, more forest cover

Horseshoe Moraines

- Increased Winter (Lake Effect) Precipitation
- Higher intensity rainfall – increased soil erosion, deterioration of surface water quality
- Increase in winter runoff events – reduced recharge to shallow aquifers – reduced flows for wetlands, coldwater streams
- Drought resiliency – lots of available surface water/shallow groundwater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BAYFIELD
SEAFORTH
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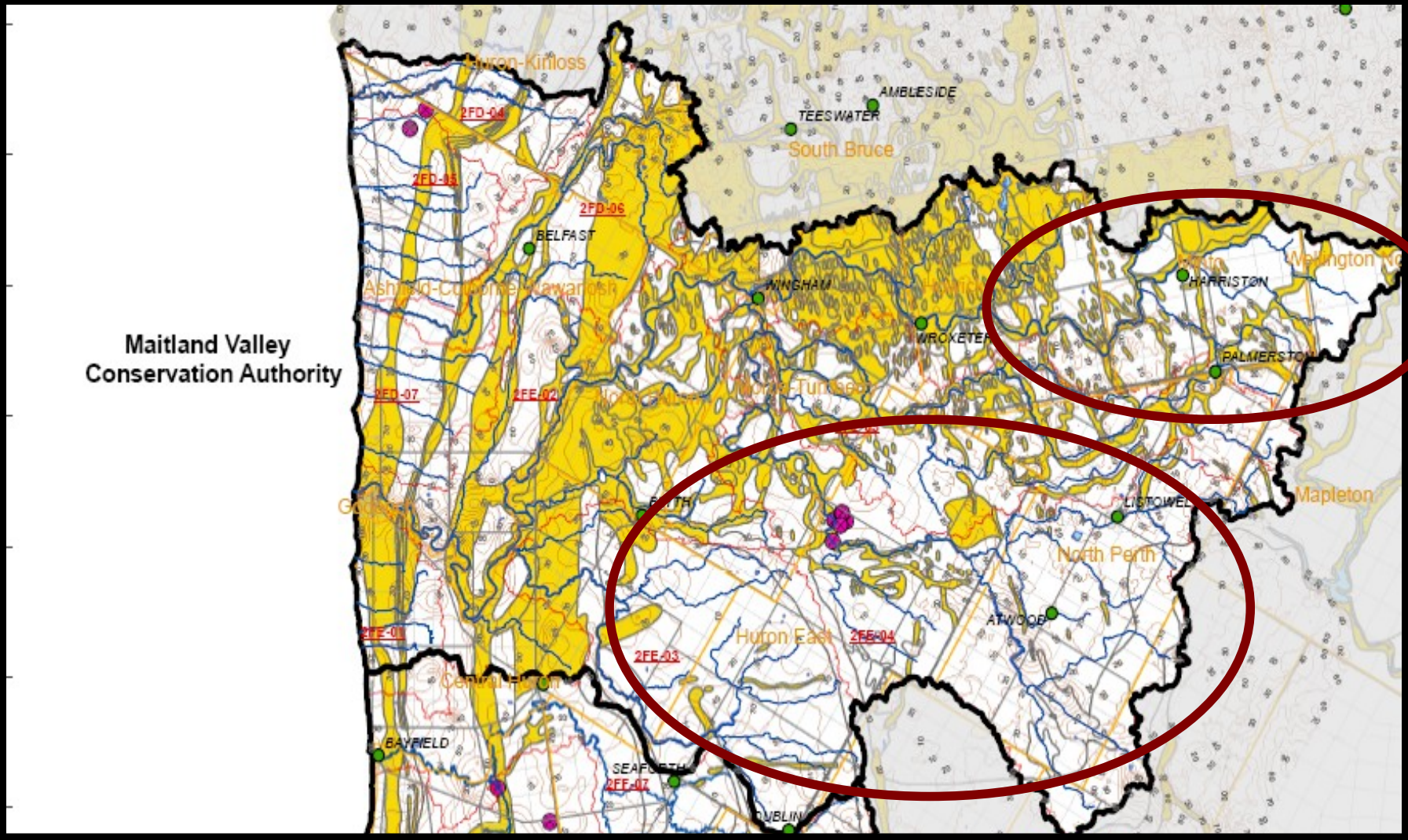
Teeswater Drumlin Field Physiographic Region

- Large Drumlin Field cut by glacial outwash deposits – Howick Township
- Highly variable topography – very hilly to flat
- Local source of sand and gravel
- Highly variable geology and soils – tills and outwash between drumlins
- Important source of water for wetlands, cold-water streams
- Less intensive agriculture, more forest cover

Teeswater Drumlin Field

- Higher intensity rainfall – increased soil erosion, deterioration of surface water quality
- Increase in winter runoff events – reduced recharge to shallow aquifers – reduced flows for wetlands, coldwater streams
- Drought resiliency – lots of available surface water/shallow groundwater
- Large population reliant on shallow groundwater resources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Stratford and Dundalk Till Plains

- Large ground moraines characterized by flat land and heavy soils
- Some small eskers on top of tills
- Known for poor drainage
- Heavy clay soils
- More intensive agriculture, high density of tile drainage, little forest cover outside wetland areas
- Historic loss of wetland areas

Till Plains

- Higher intensity rainfall – increased soil erosion, deterioration of surface water quality
- Drought resiliency – no reliable surface water or shallow groundwater as sources for irrigation
- Poor natural drainage makes area highly susceptible to flooding

Concerns for entire watershed

- Urban and Agricultural Runoff management
- More variable conditions, less predictability
- Local-scale flooding v. regional-scale flooding
- Deterioration of Surface Water quality