

# Maitland Valley Climate Trends Analysis

April, 2009



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# Introduction

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- 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



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# MVCA Climate Change Project

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Available Data includes:

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



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# Climate Change Questions

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- 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?

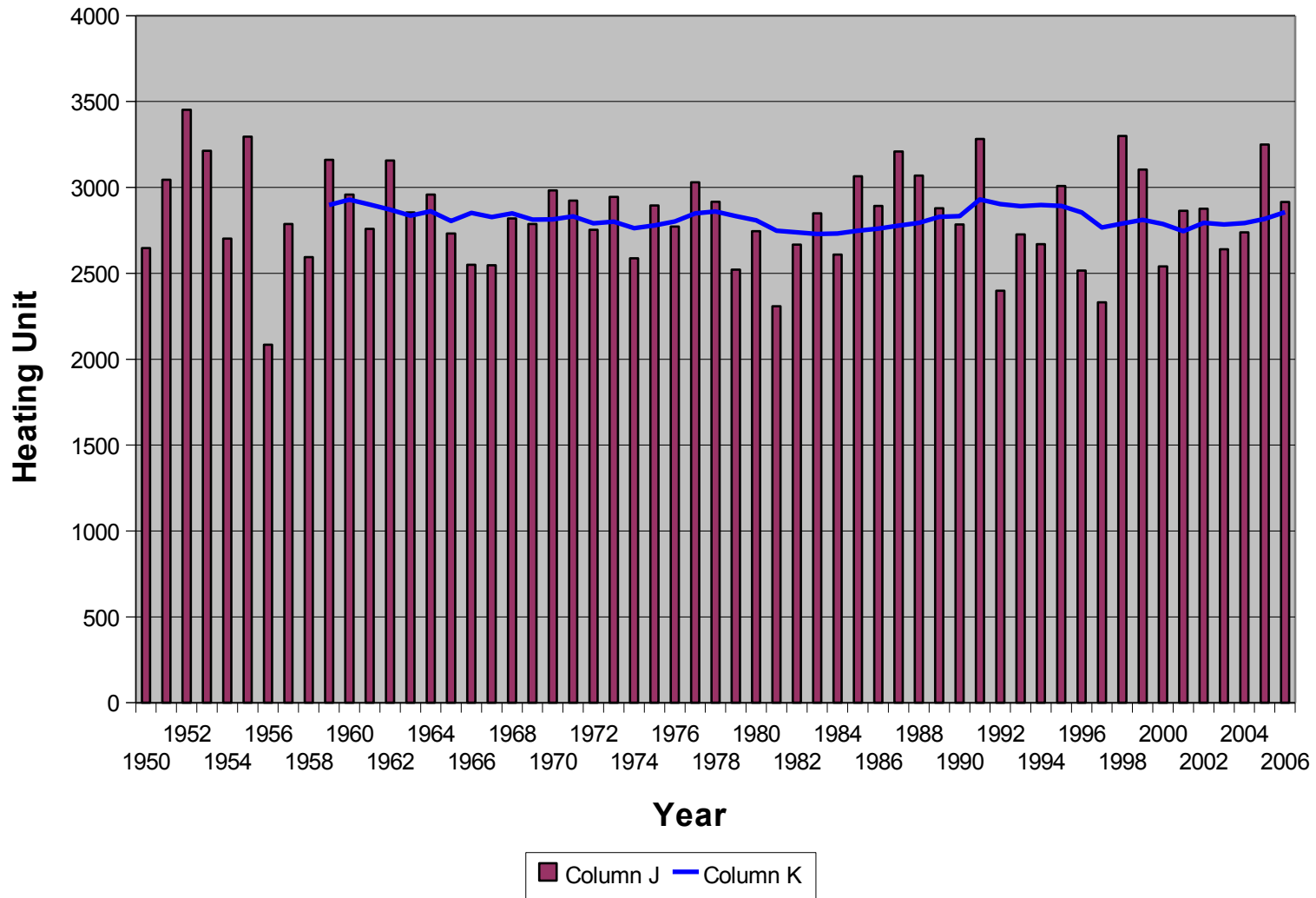


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# Temperatures – Heat Units

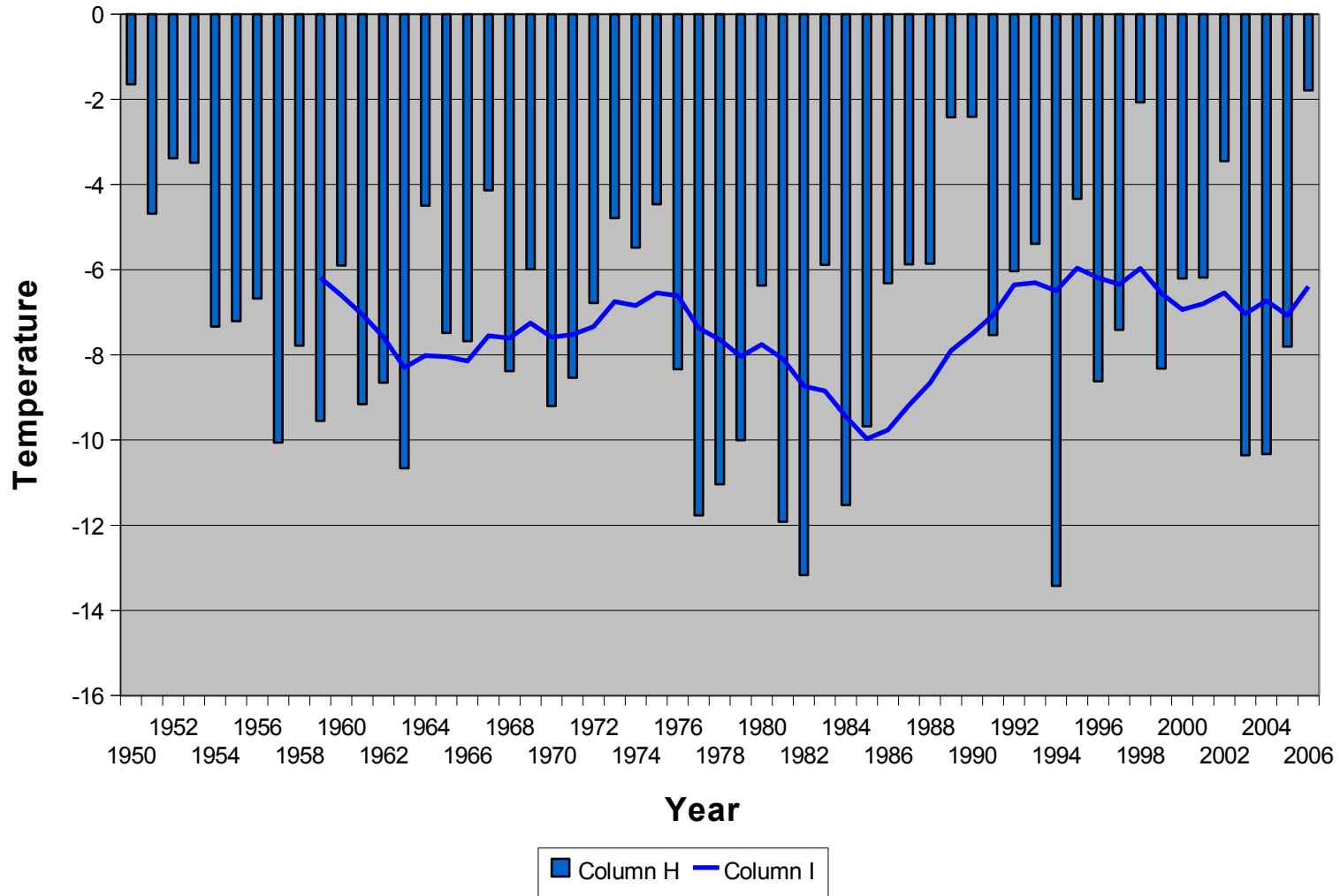
Wroxeter : Annual Heating Unit



# Temperatures – Winter Median Temp

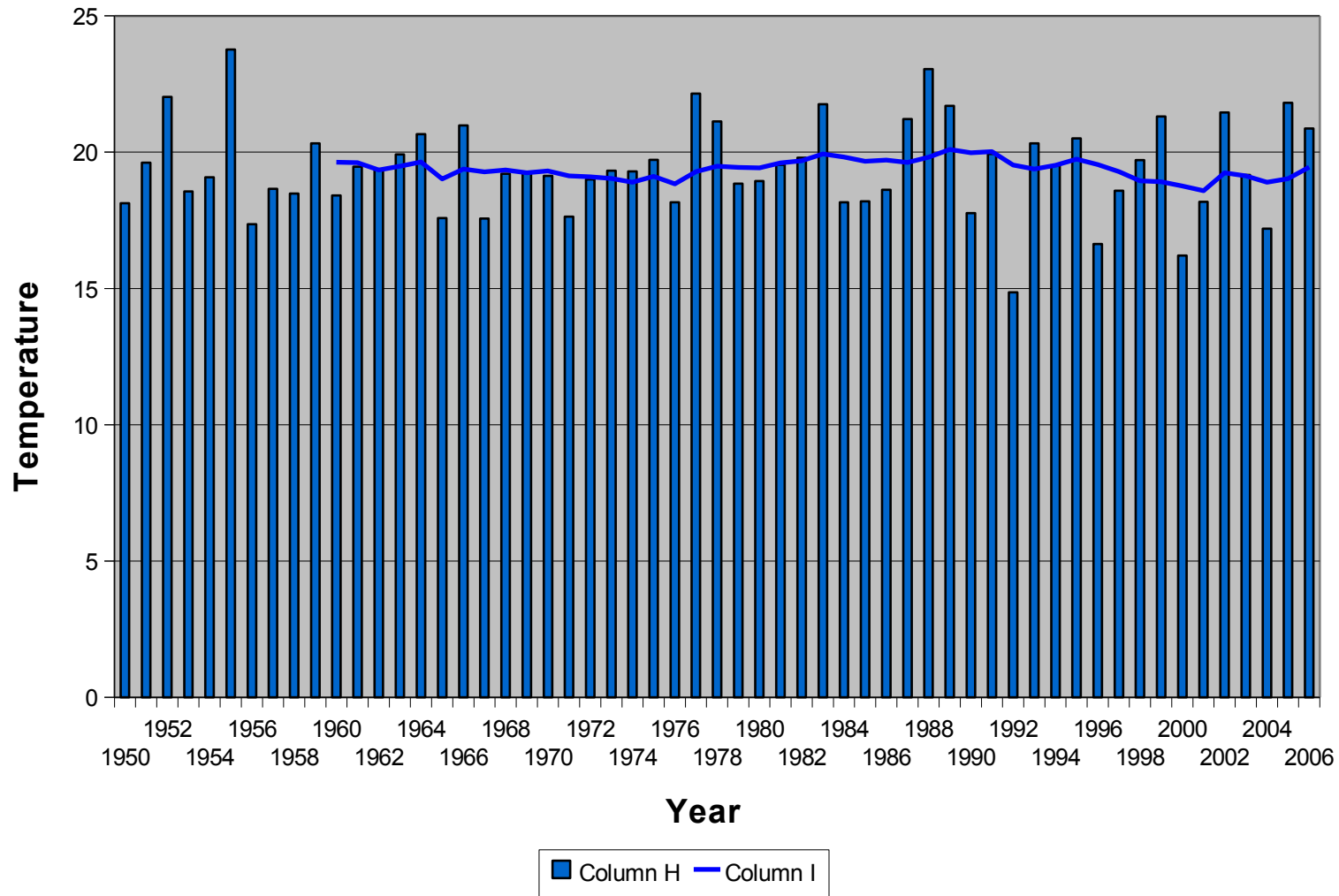
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## Wroxeter : January Median Temperature



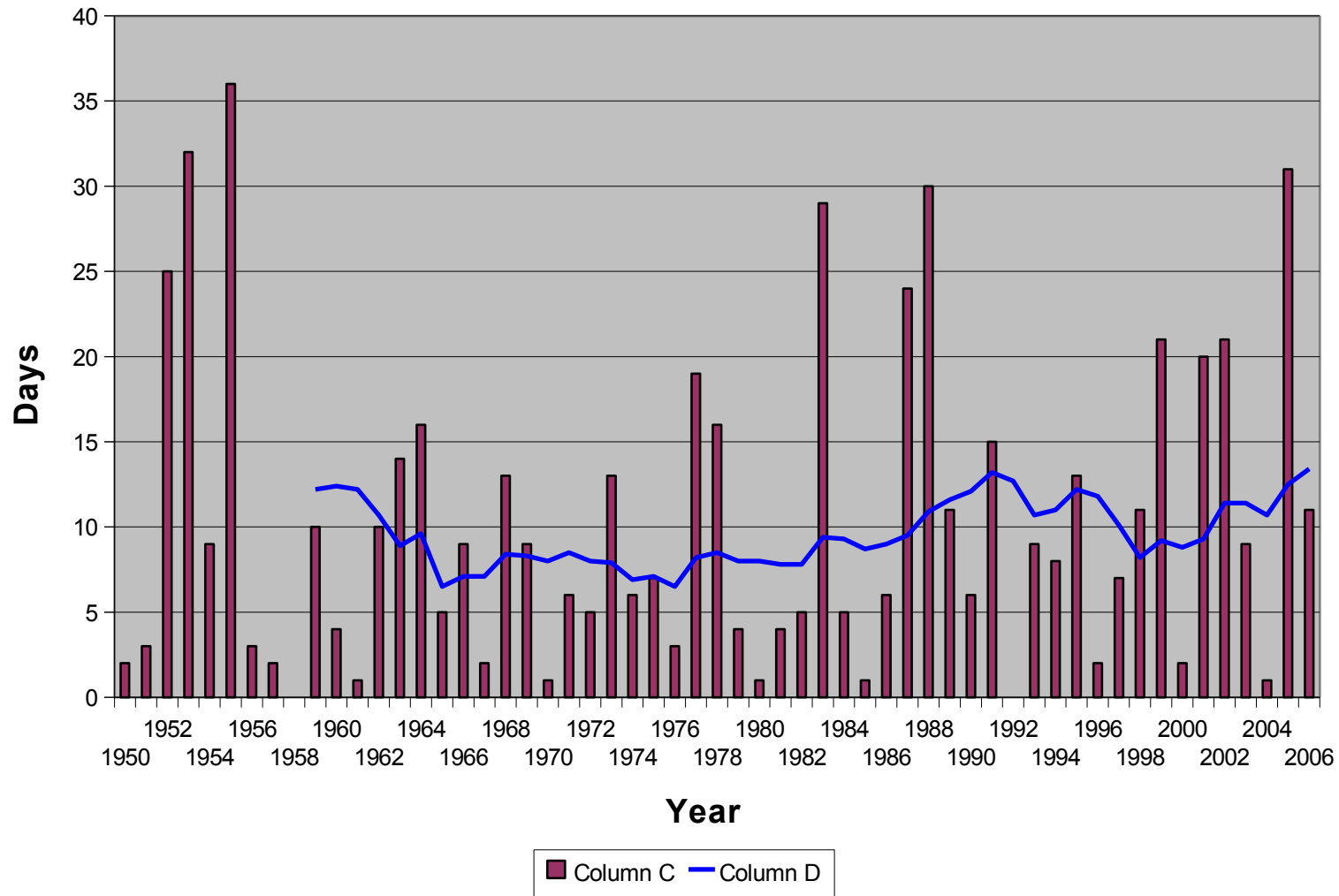
# Temperatures – Summer Median Temp

**Wroxeter : July Median Temperature**



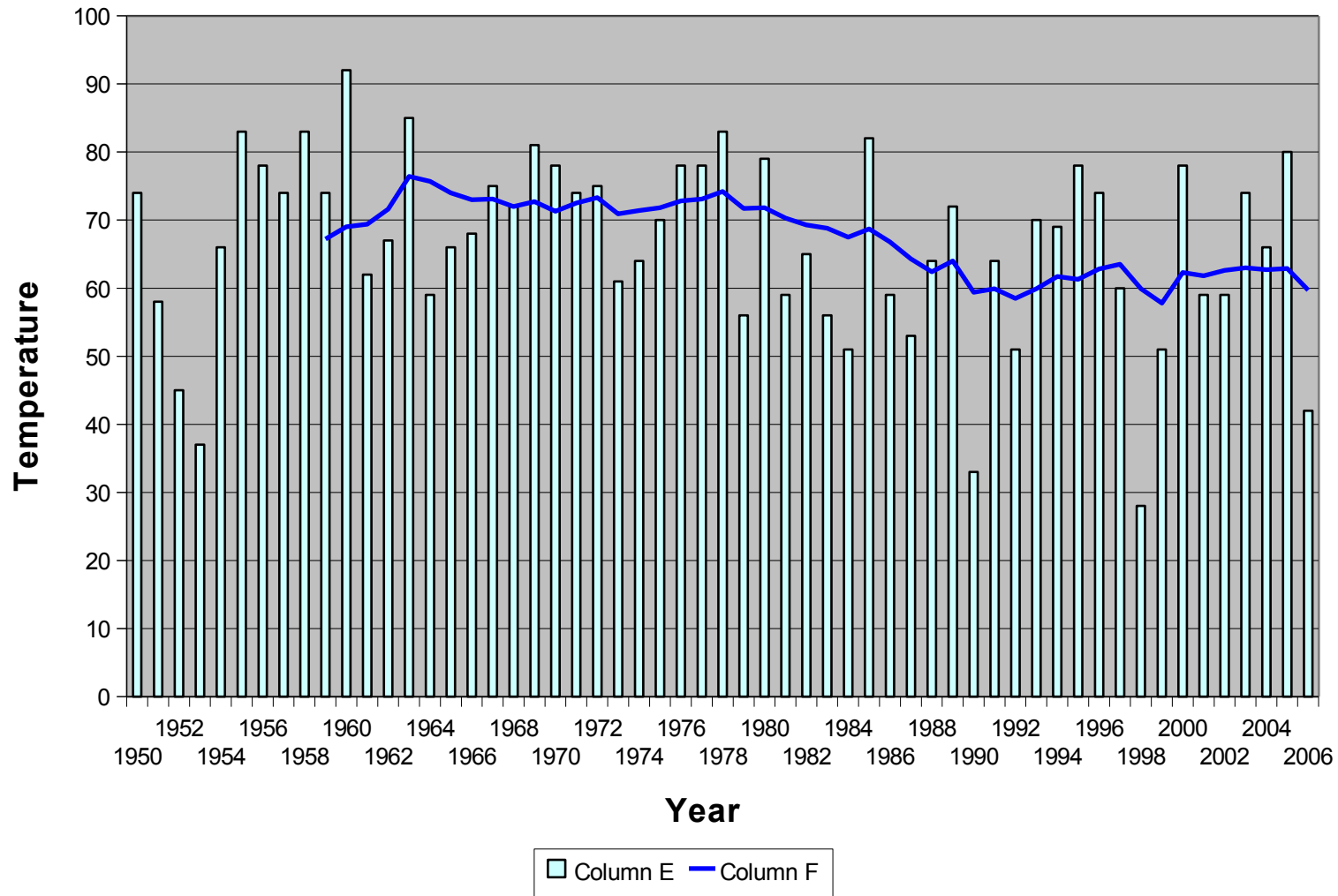
# Temperatures – Summer Extreme Temp

**Wroxeter : Days of Maximum Temperature > 30**



# Temperatures – Winter Temperatures V2

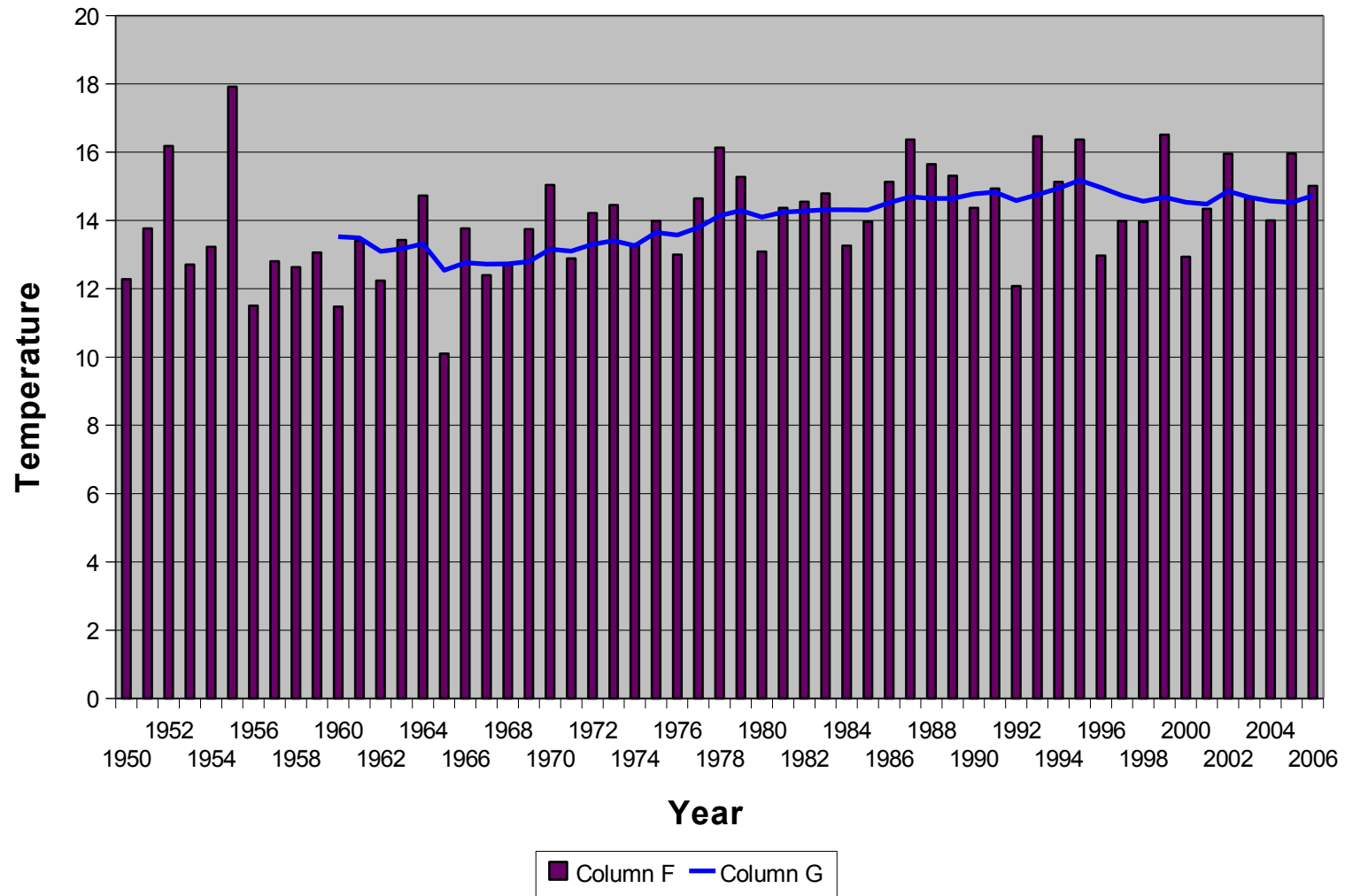
Wroxeter : Days of Maximun Temperature < 0



# Temperatures –Summer Minimums

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**Blyth : July Minimum Temperature**



# Temperature

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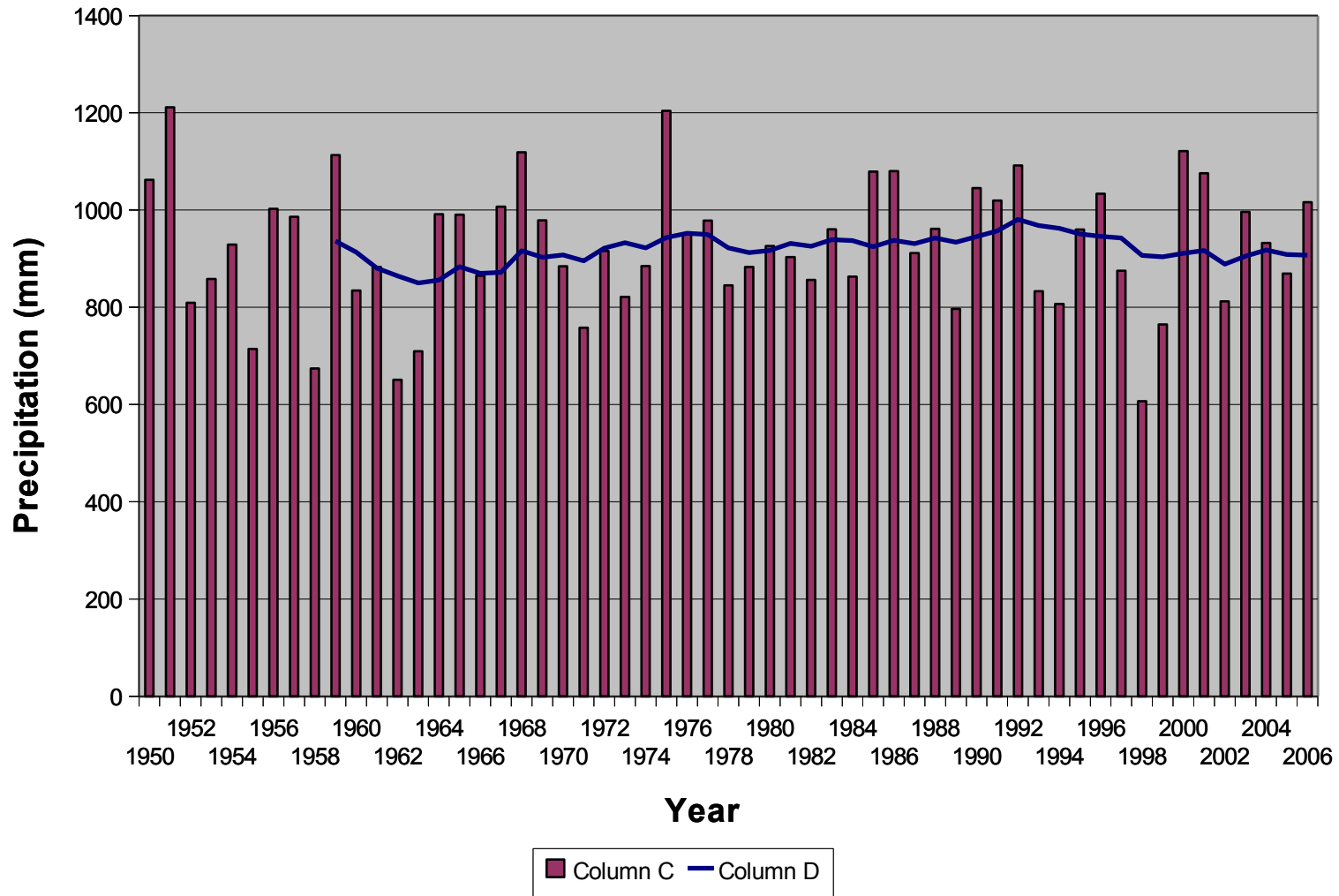
- Average Temperatures – little to no trend, may be increasing in some areas
- Night time temperatures staying warmer
- More days above 30C
  - Longer, warmer heat waves
- Fewer days below freezing
  - More frequent thaws
  - Shorter Frozen Period



# Precipitation – Total Annual

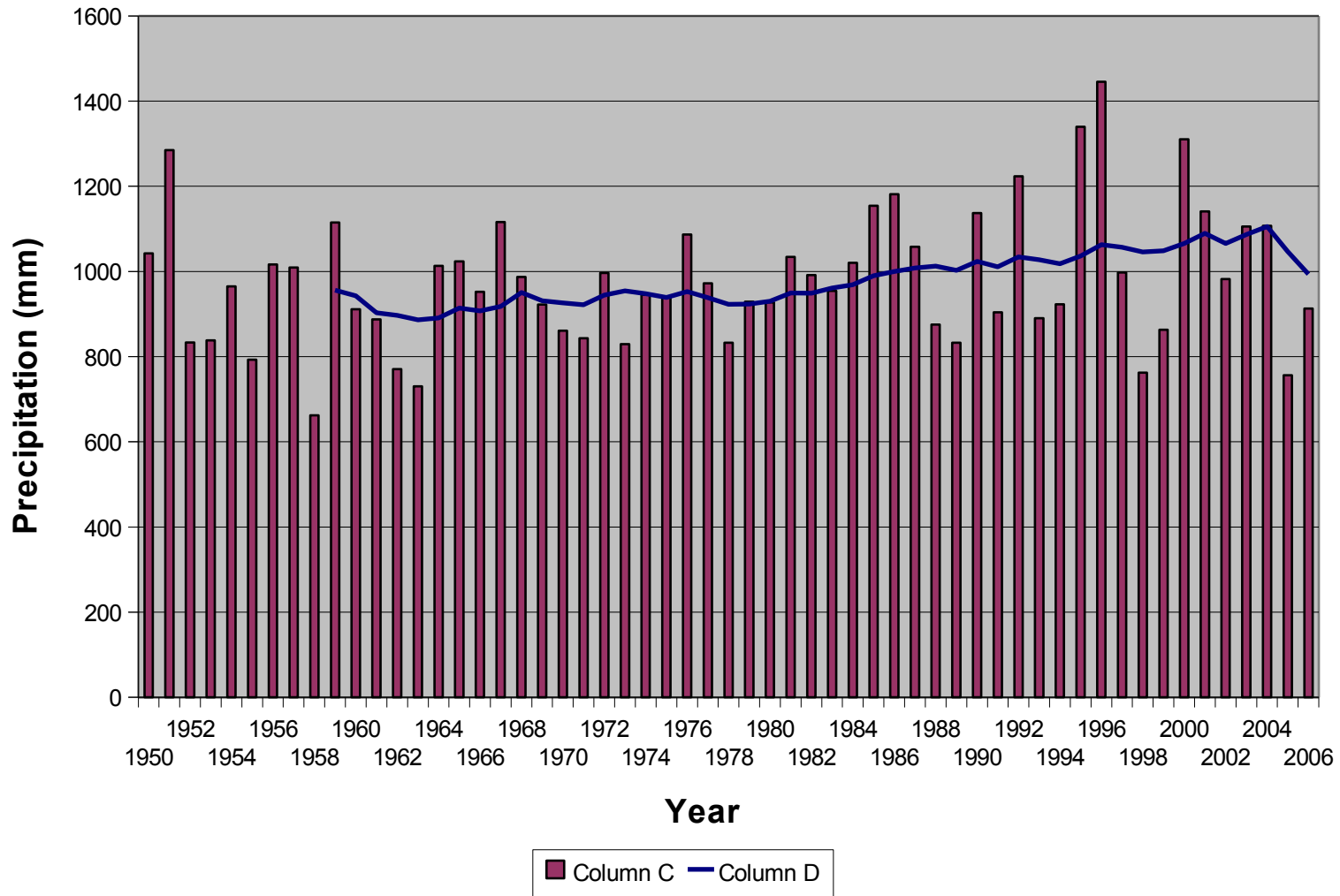
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## Wroxeter : Total Annual Precipitation



# Precipitation – Total Annual

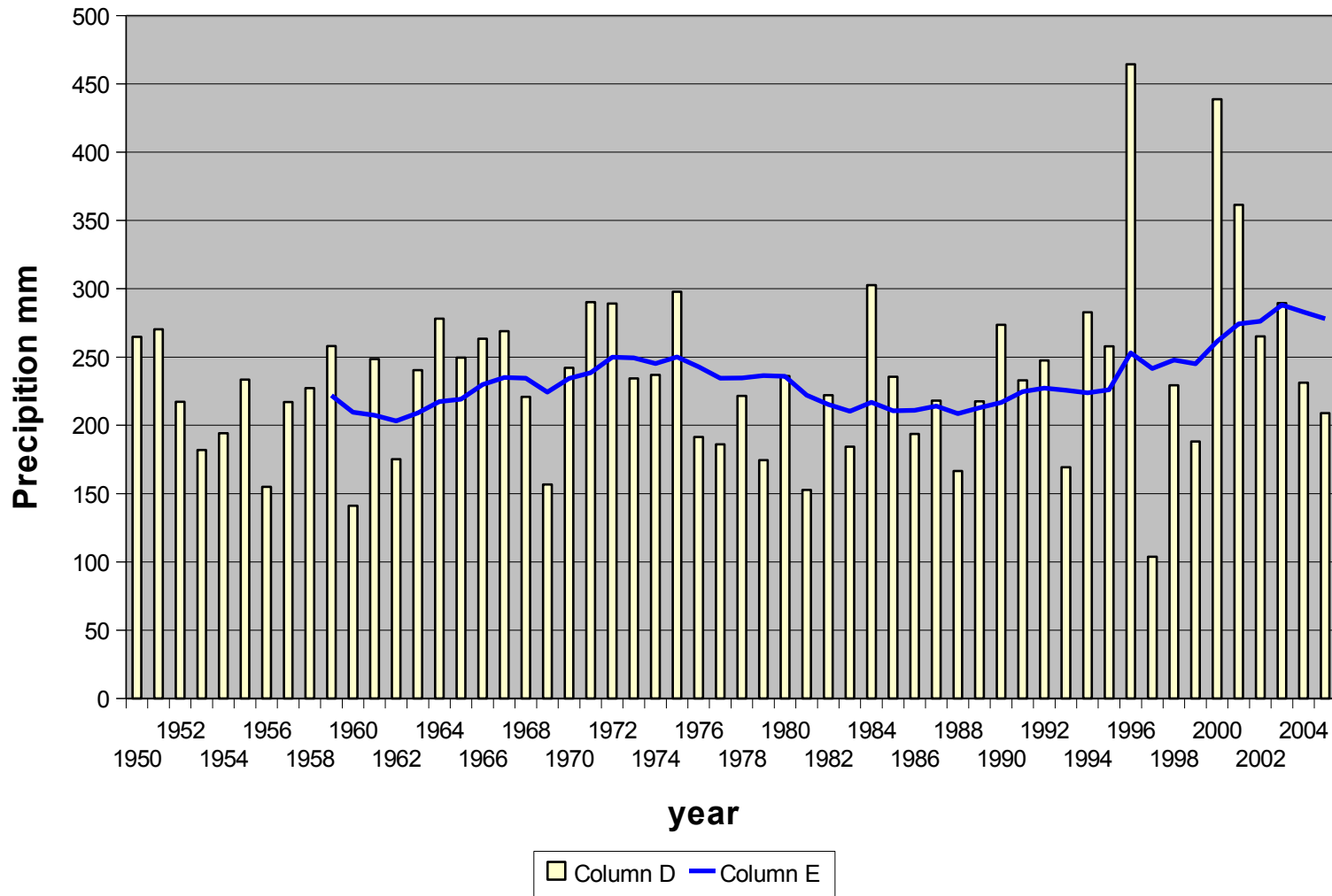
## Goderich : Total Annual Precipitation



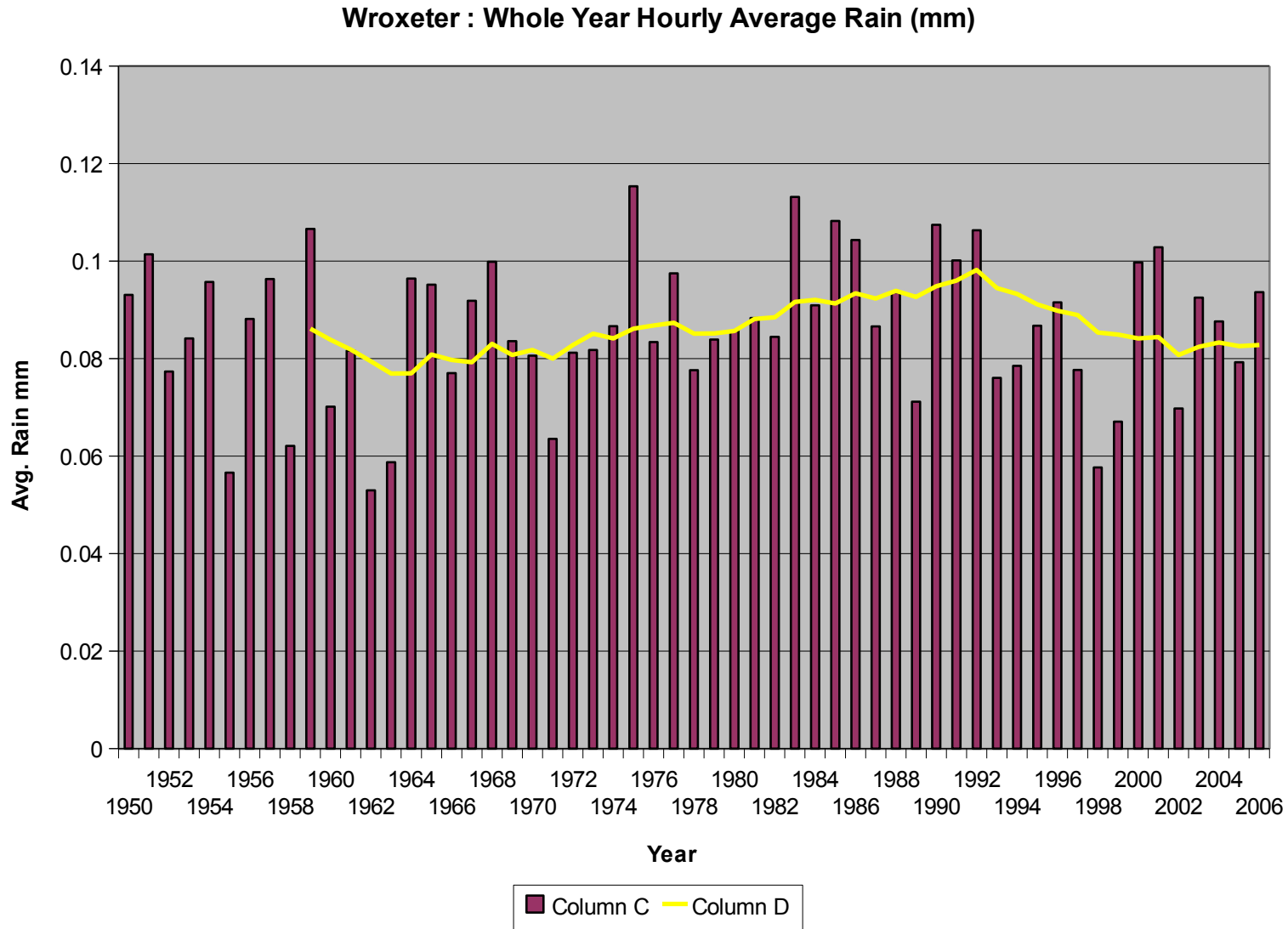
# Precipitation – Seasonal Changes?

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**Goderich : Winter Dec-Feb Totally Precipitation**

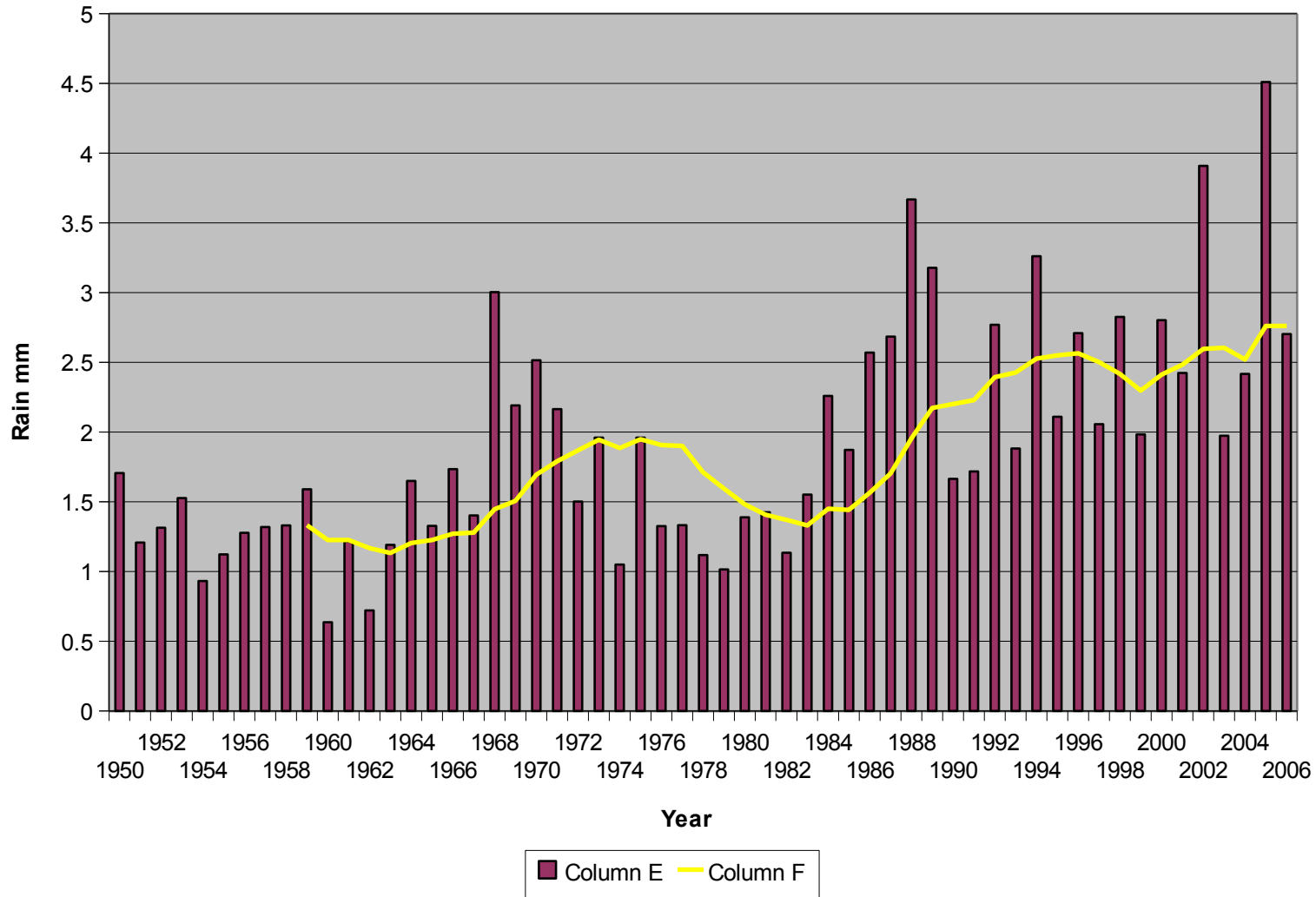


# Precipitation – Intensity Changes?



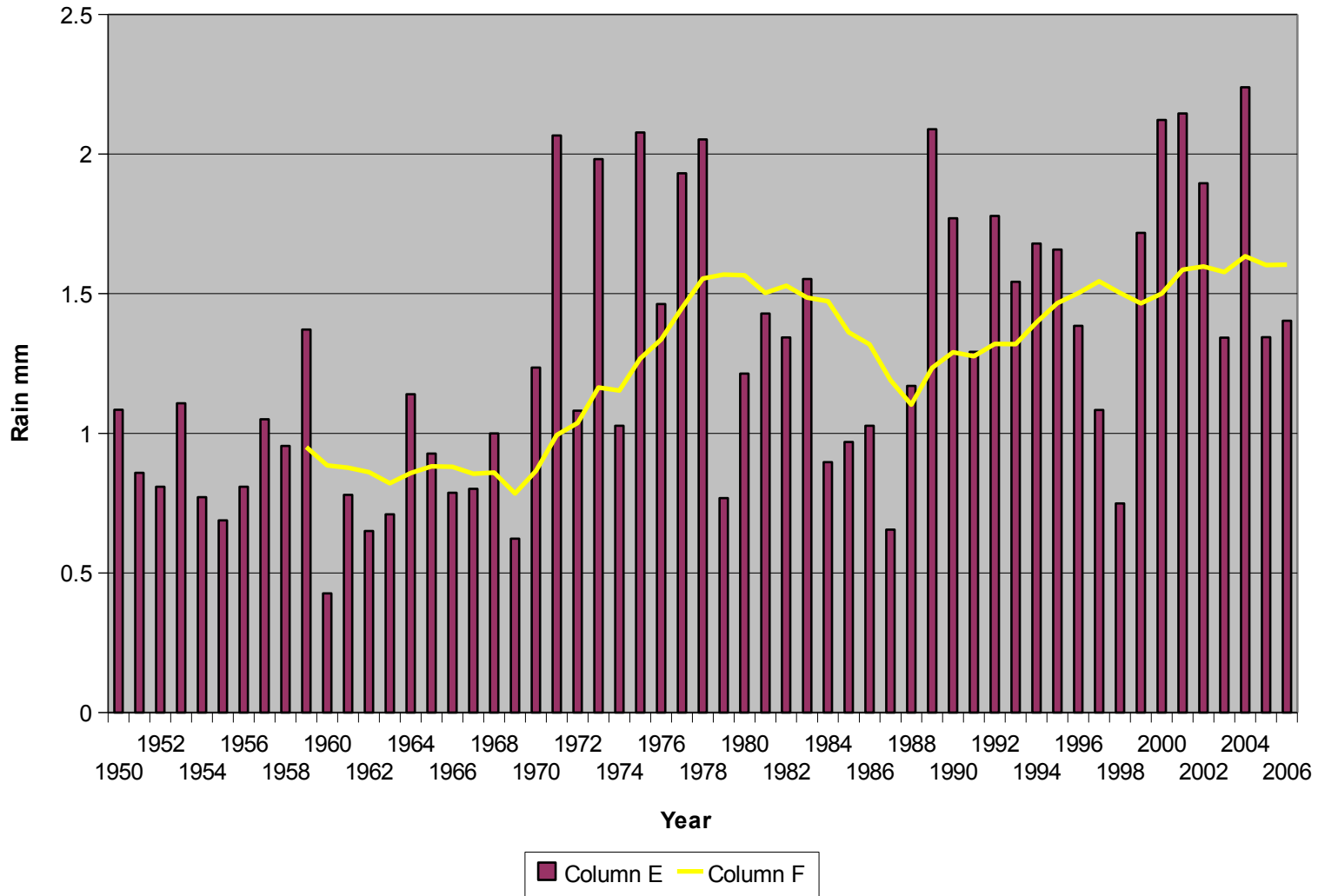
# Precipitation – Summer Rain Intensity

Wroxeter : Summer July - Sep Hourly Rain (mm)



# Precipitation – Summer Rain Intensity

Goderich : Summer July - Sep Hourly Rain (mm)



# Precipitation

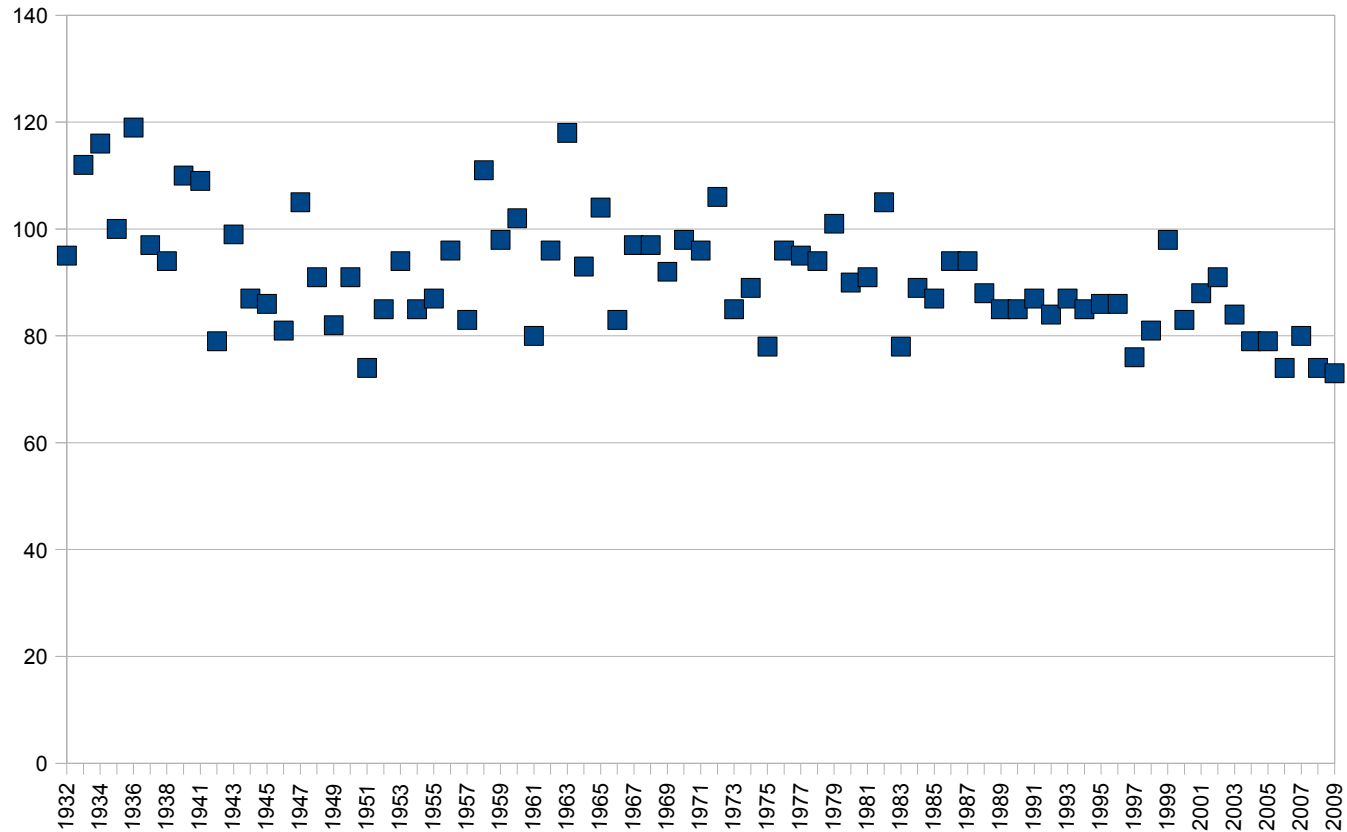
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- Average Annual values show increasing trend notably near Lake Huron – Lake-effect PPT?
- More Precipitation as rain (fewer days below 0C)
- Seasonal distribution of rainfall seems relatively static
- More intense, shorter duration rainfall events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



# Ice Cover on Lake Huron

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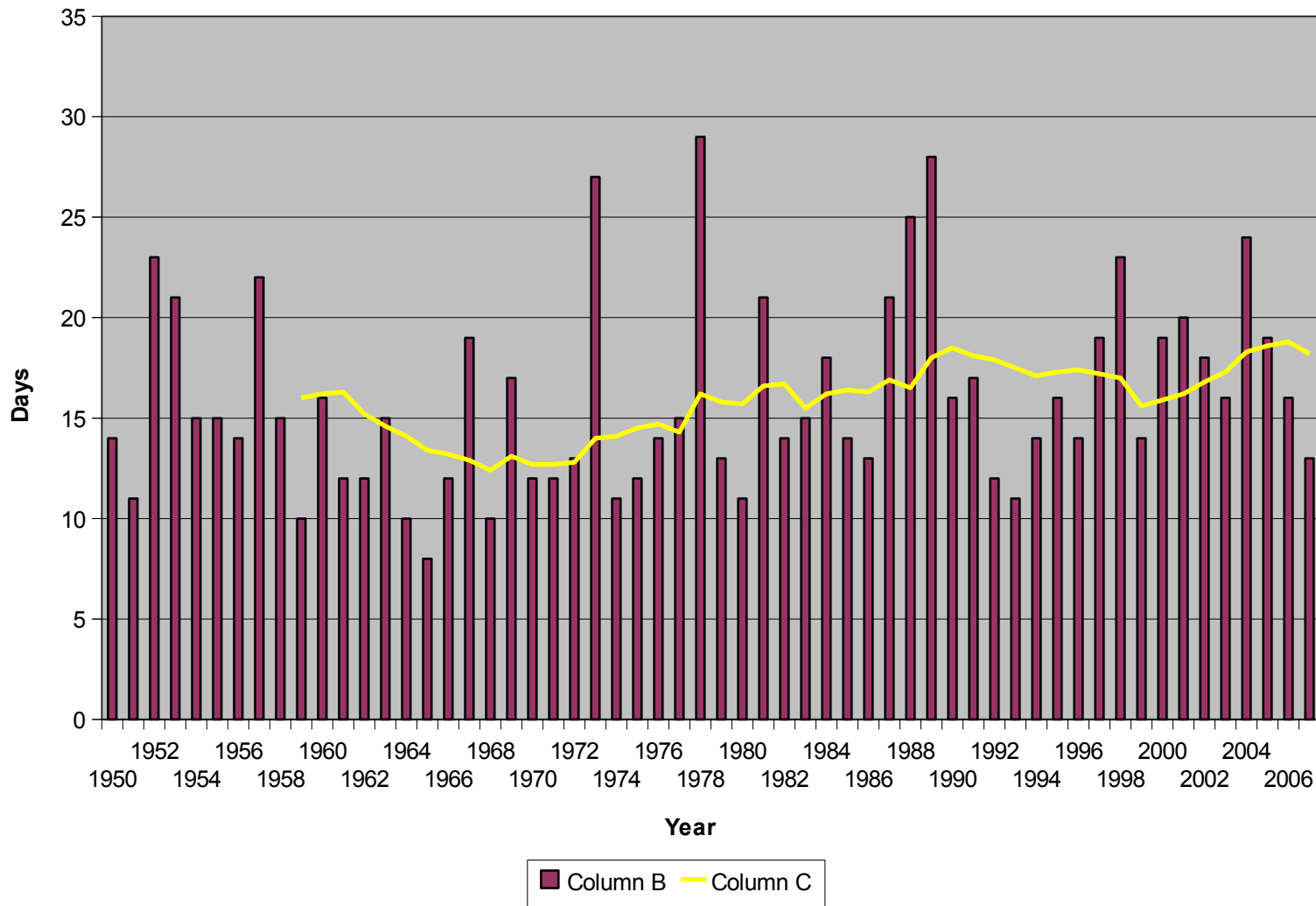


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# Drought

Harriston Annual Maximum Precipitation Free Days

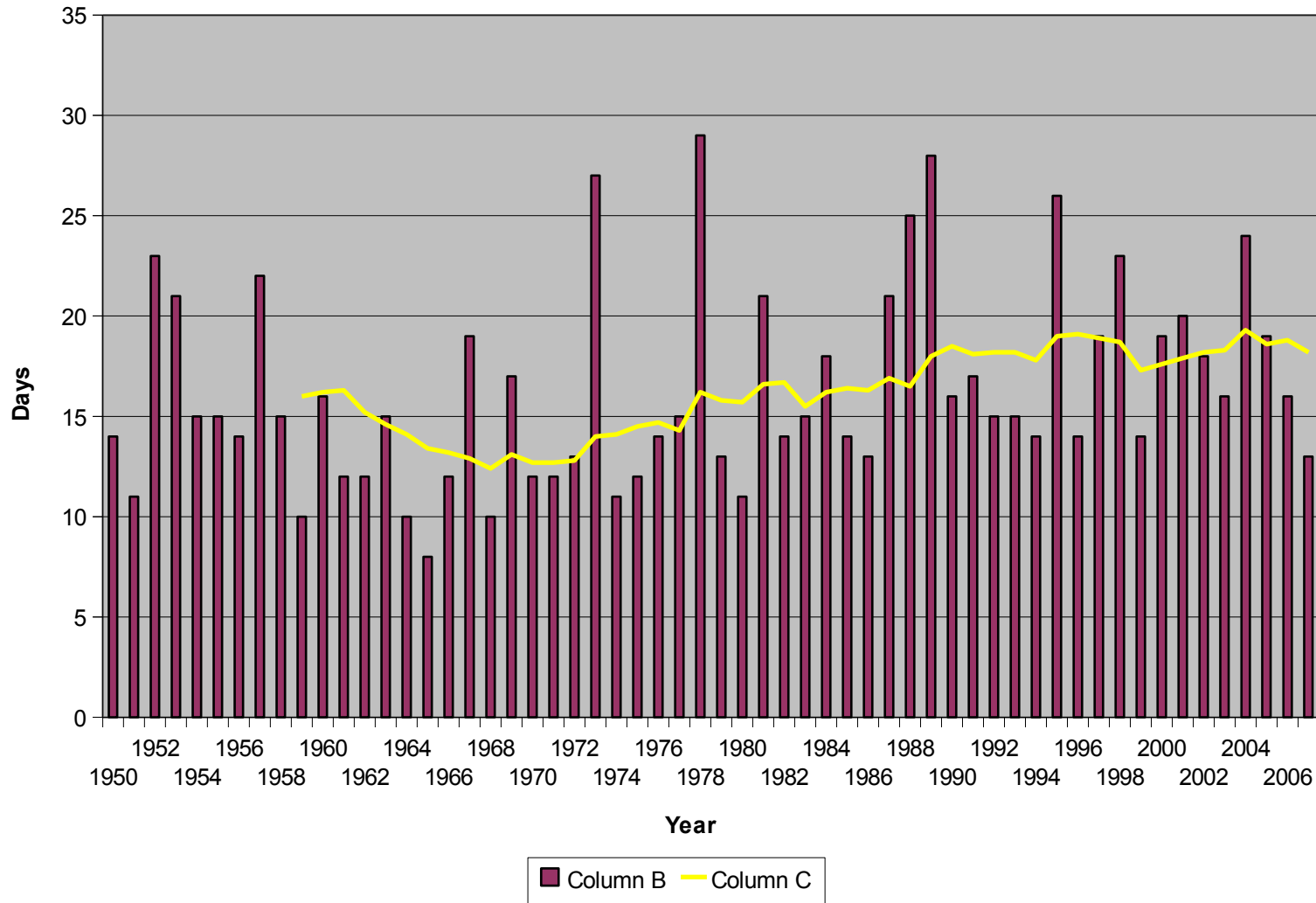


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# Drought

Wroxeter Annual Maximum Precipitation Free Days

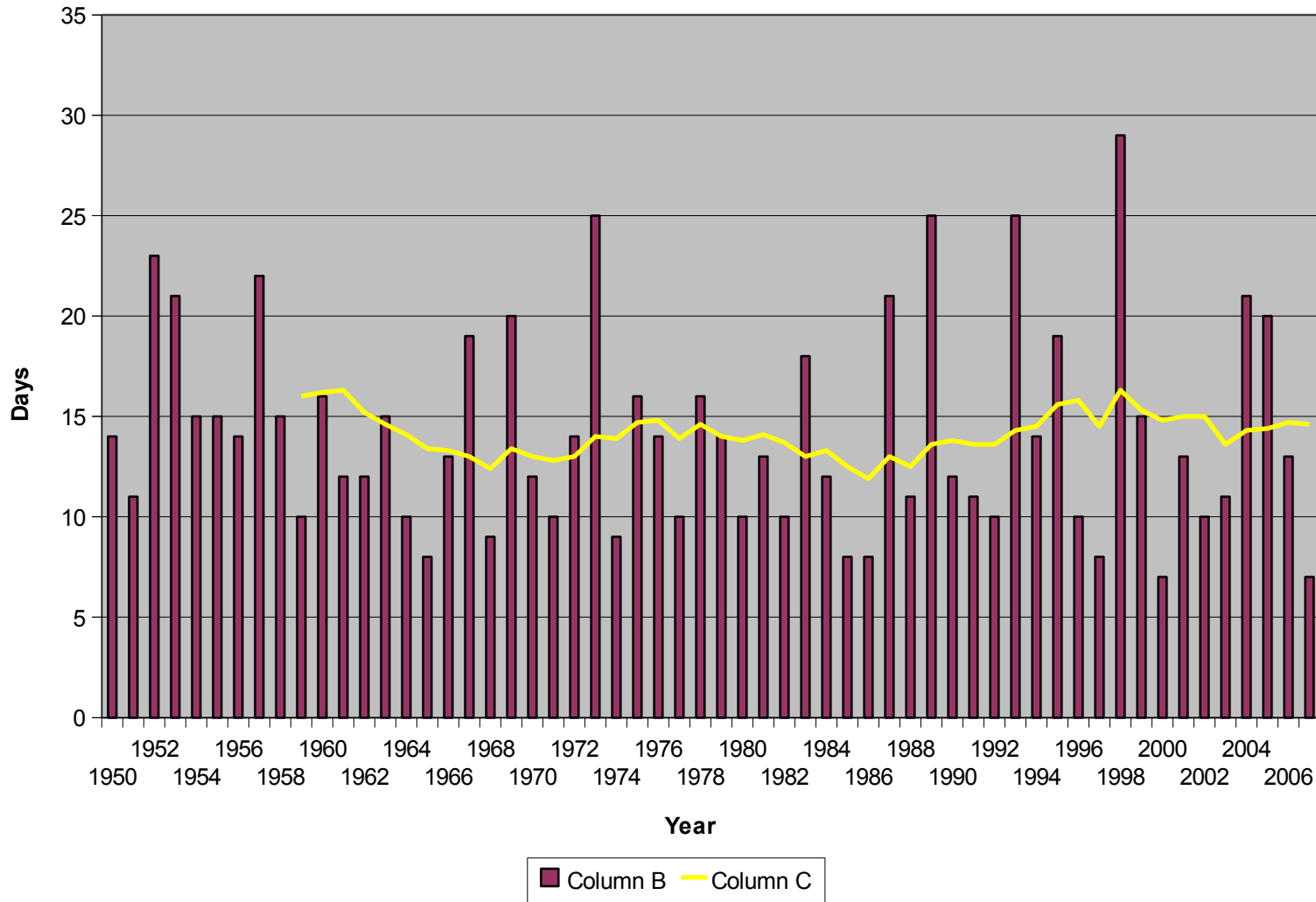


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# Drought

Goderich Annual Maximum Precipitation Free Days

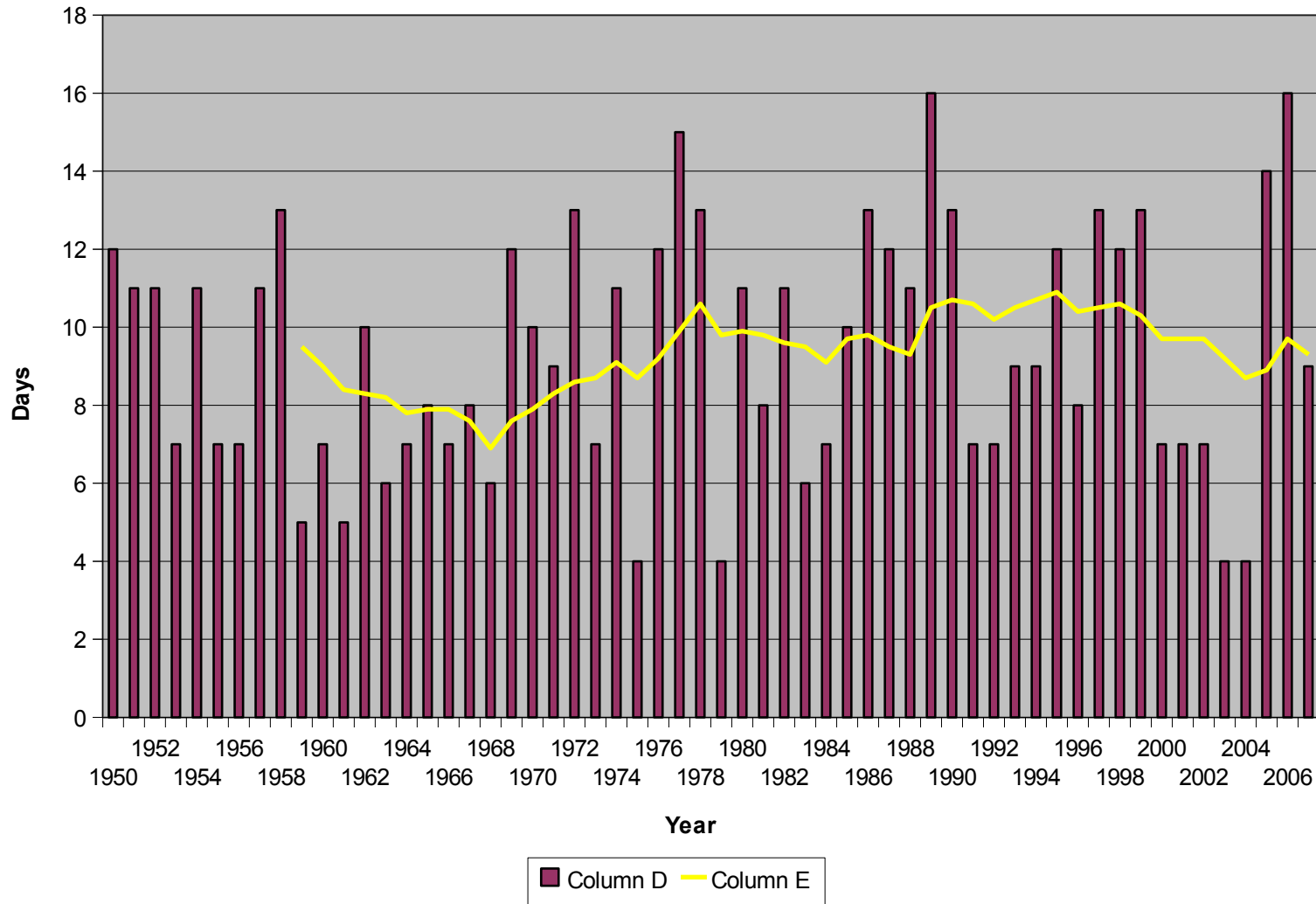


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# Drought

Wroxeter May Maximum Precipitation Free Days

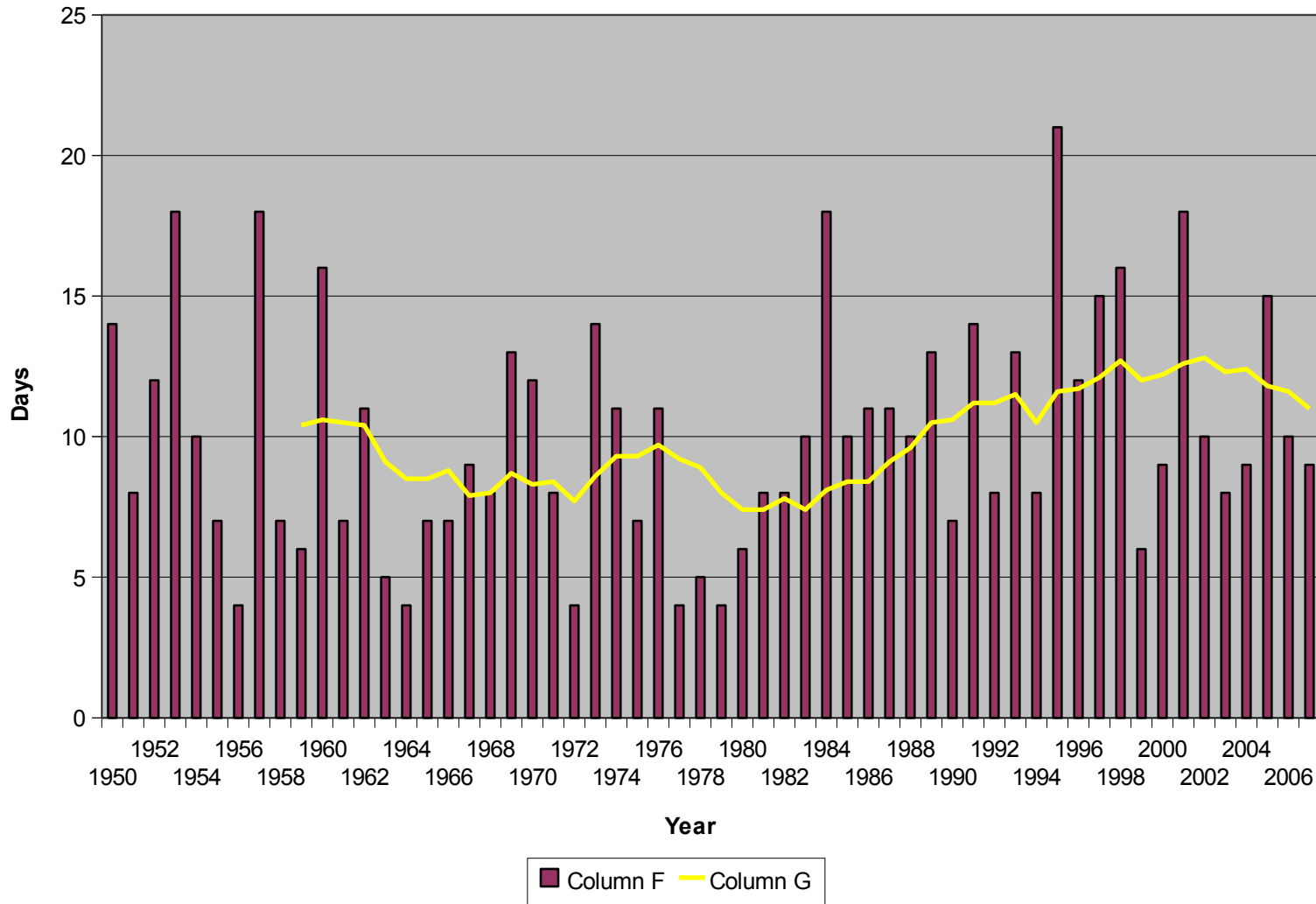


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# Drought

Wroxeter August Maximum Precipitation Free Days



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# Drought – Days without rain

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- Inland areas experiencing longer periods without rain
- Spring, early planting season shows most change



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# Summary - Climate

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



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# Physiographic Regions of the MVCA

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- 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

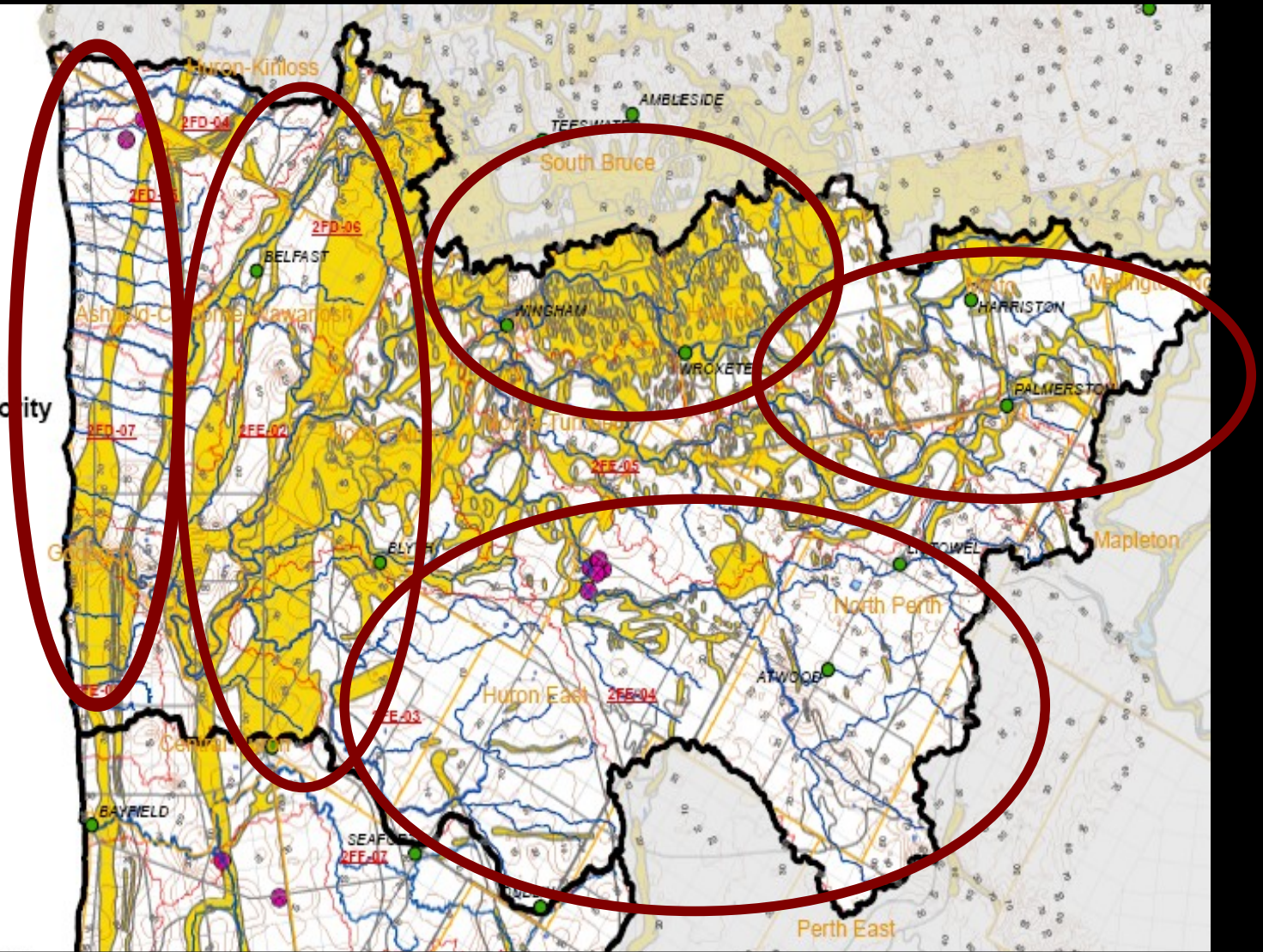


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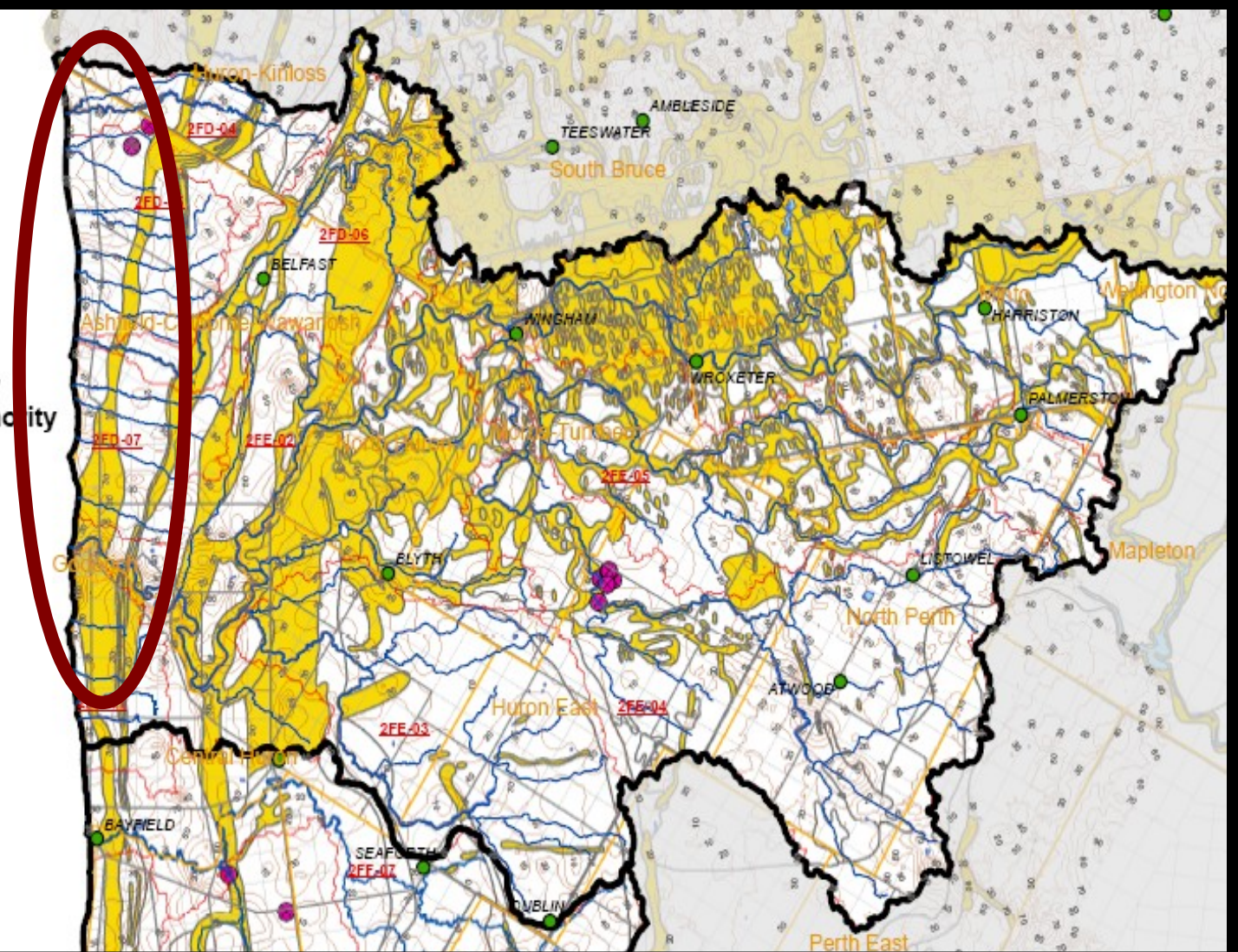
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Conservation Authority

Ausable Bayfield



Maitland Valley  
Conservation Authority

Ausable Bayfield



# Huron Slope Physiographic Region

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- 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

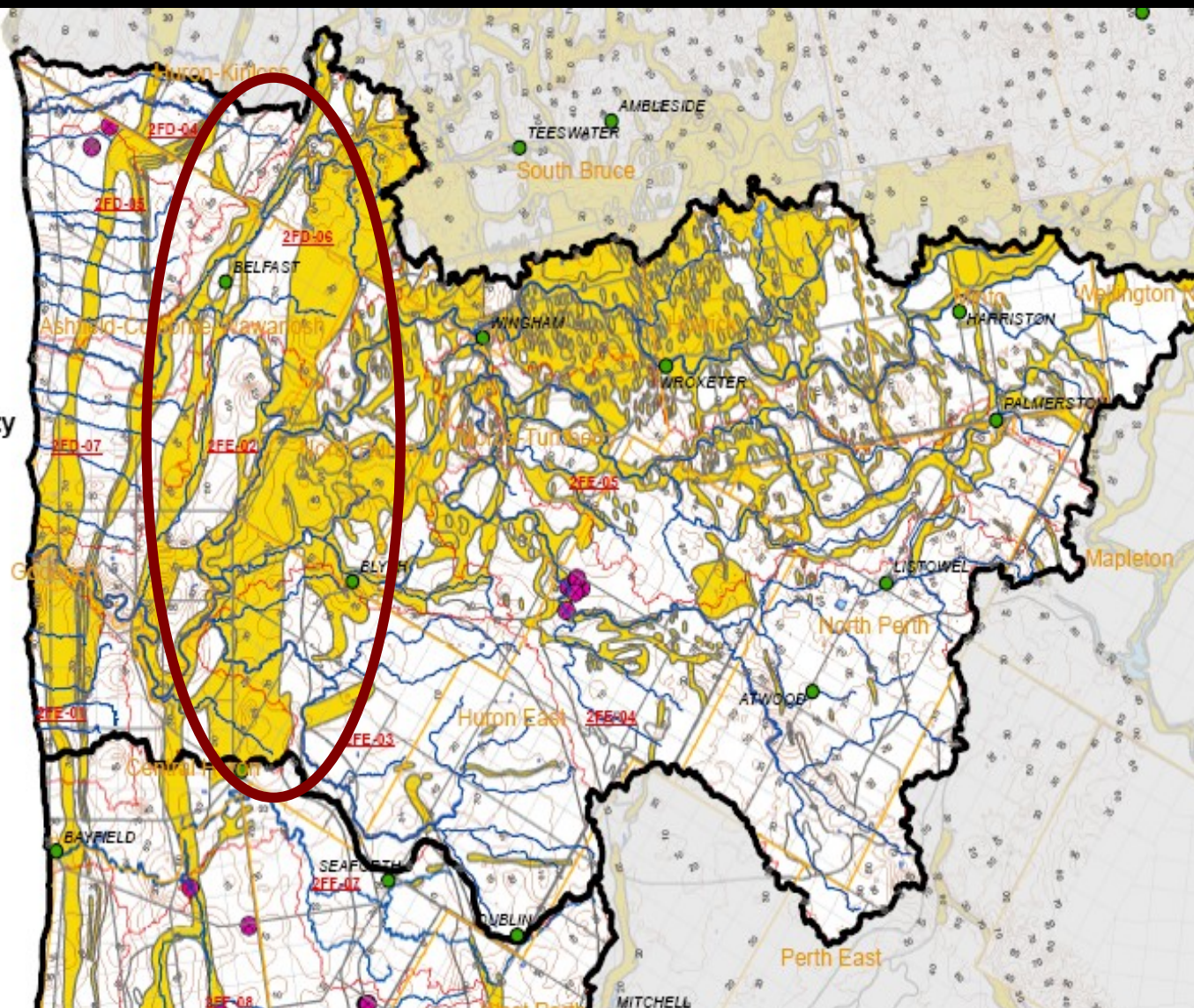
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- Increased Winter (Lake Effect) Precipitation
- Higher intensity rainfall – increased erosion of gullies near lakeshore
- Higher intensity rainfall – increased soil erosion, deterioration of surface water quality
- Drought resiliency – no reliable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



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# Horseshoe Moraines Physiographic Region

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- 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



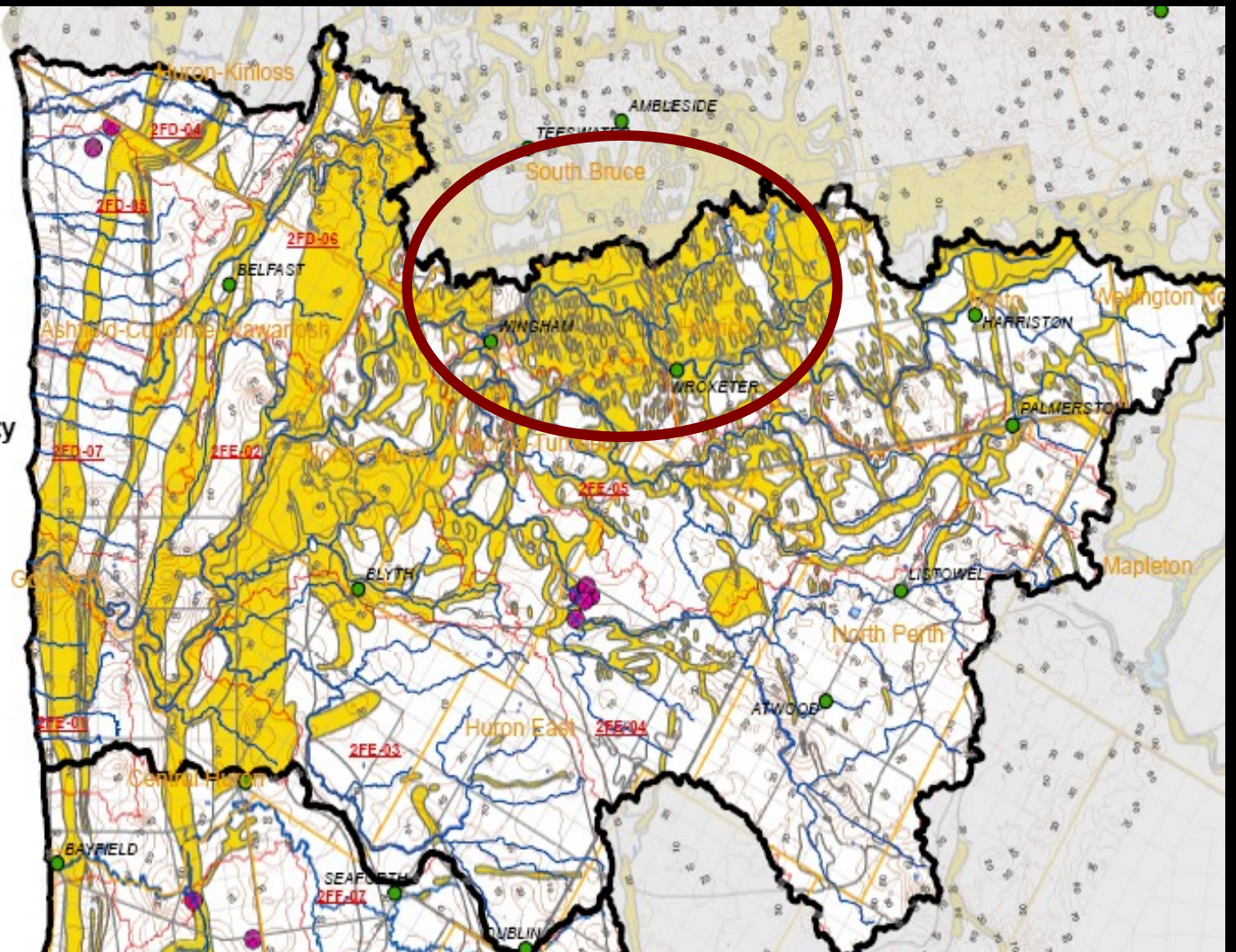
# Horseshoe Moraines

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- 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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# Teeswater Drumlin Field Physiographic Region

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- 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



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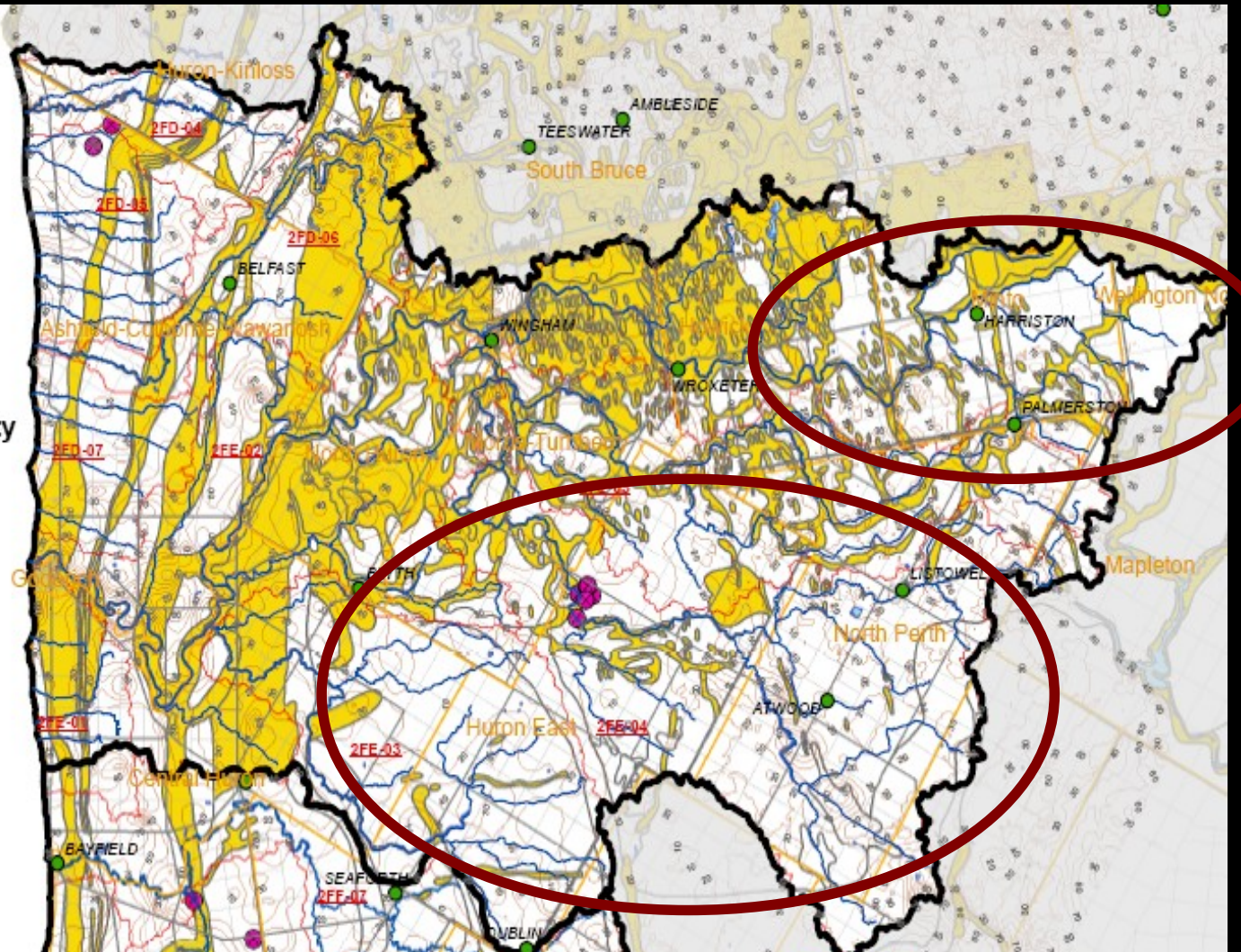
# Teeswater Drumlin Field

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- 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

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- 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

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- 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

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



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