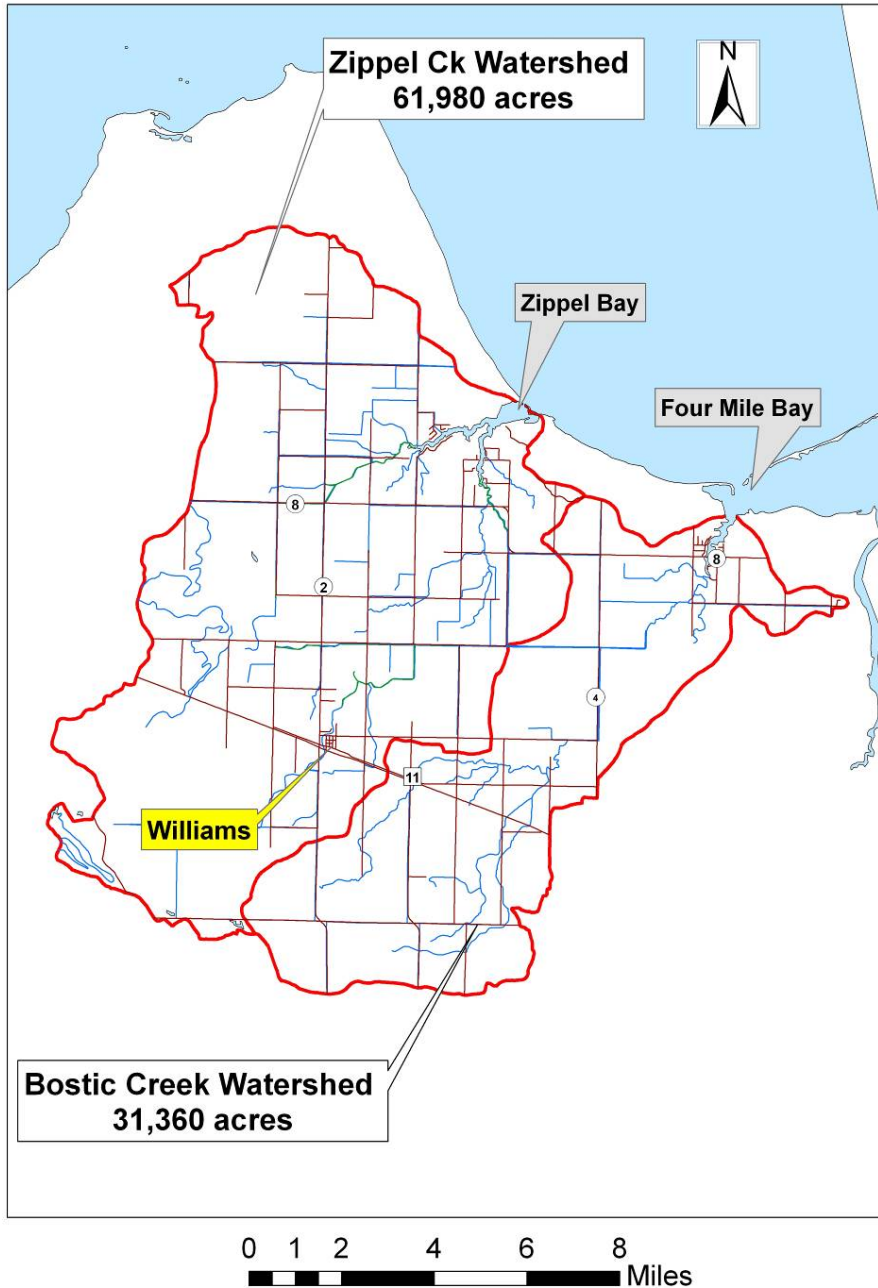


Watersheds and Known Watershed Issues

Josh Stromlund – Land and Planning Office

Zippel & Bostic Creek Watersheds



Watersheds

Watershed Facts

Bostic Watershed

- 31,500 acres
- 25% agricultural land
- 50-60% wooded wetlands
- 134 miles of drainage ditches
- Approx. fall within watershed = 128'

Zippel Watershed

- 62,000 acres
- 30% agricultural land
- 50-60% wooded wetlands
- 192 miles of drainage ditches
- Approx. fall within watershed = 164'

Resource concerns

- Excessive sediment in Bostic and Zippel Bays
 - Zippel core samples show sedimentation is occurring at 7 times the presettlement rate
 - Decreased access to lake/increased dredging costs
 - Degraded spawning habitat
 - Lake of the Woods listed by MPCA as an impaired water for nutrients
- Water level fluctuations
 - High flow events and flooding in watersheds seems to be increasing

Evidence of excessive sediment

Bostic Bay



1940-41 aerial photo



1999 aerial photo

Zippel Bay

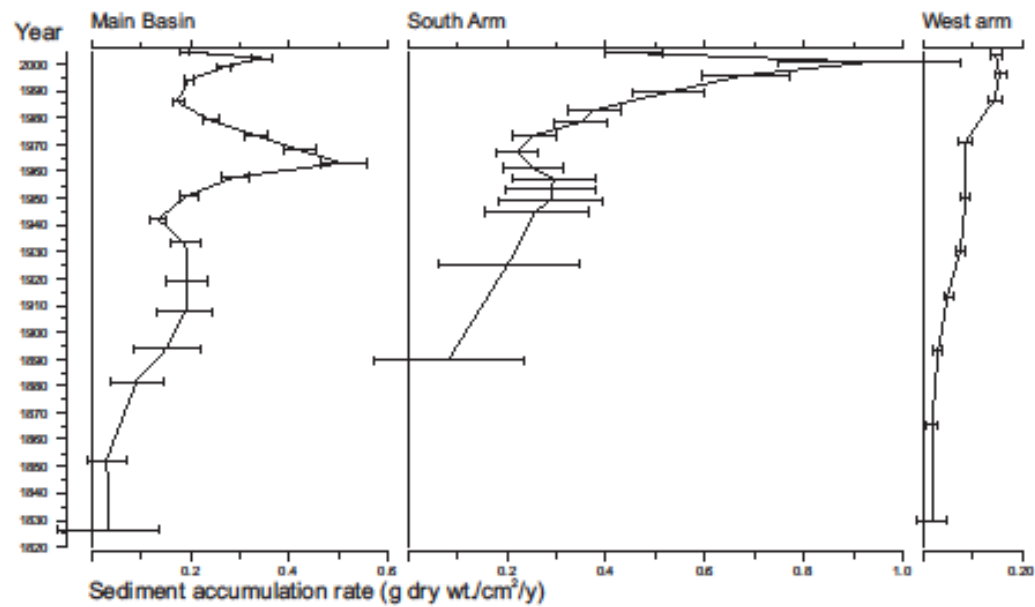


1941 aerial photo



2006 aerial photo

Core sample data



From Zippel Bay Multi-core Study, Reavie, 2007

Water sampling site in Bostic Watershed

June 19th, 2006
photo

Over 1/2" rain 2
days prior



Same site in 2008, two weeks earlier in the season

June 4th, 2008
photo

Over 1/2" rain 6
days prior



Known sources of excess sediment

- Within ditch segments
 - Ditch side slopes too steep
 - Subsurface water seepage through ditch banks causing slumping
 - Natural soil instability
 - Ditch bank and ditch bottom scouring occurring with high velocity flows
 - Maintenance activities

Ditch bank slumping



Another source of excess sediment

- Agriculture
 - sediment from field drainage
 - Sheet and rill erosion



Sediment plume

Other possible contributing factors

- High lake levels creating backwater flow into bays
- Additional (new) drainage

Evidence of peaking or
flooding

Evidence is mostly subjective and needs to be quantified

Spring 2004



Summer 04



High velocity flows and peaking events





Spring 2009

Possible sources of excess water

- Increasing drainage on the landscape
- Changing weather patterns
- High lake levels creating backwater flow in the bays

In summary...