

Hydrotechnical Considerations

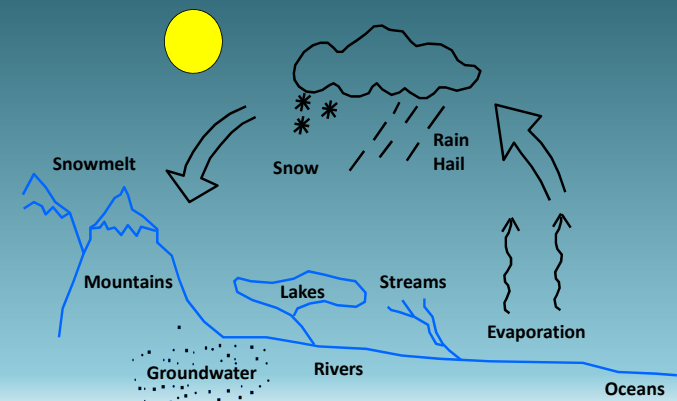


Overview

- Hydrotechnical Design
- River Issues
 - Lateral Stability
 - Vertical Stability
 - Blockage - ice, drift
- River Protection Works

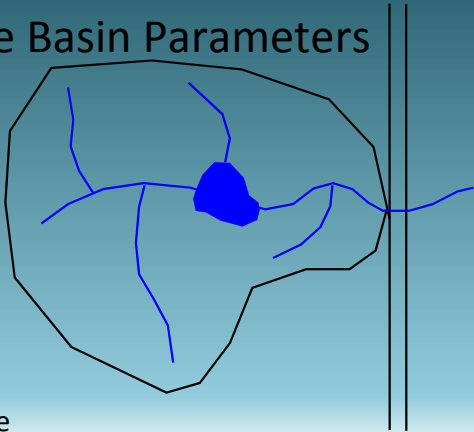
Hydrotechnical Design

The Hydrologic Cycle

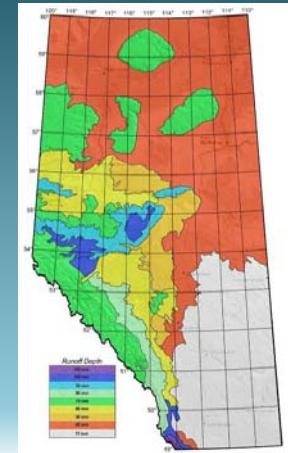


Drainage Basin Parameters

- Area
- Shape
- Slope
- Storage
- Density
- Vegetation
- Soil Type
- Initial Moisture



Runoff Response Variation Across Alberta



Hydrotechnical Design Guidelines

Channel Capacity

- channel size result of long-term runoff
- channel size affects routing of runoff
- typical channel
- activate overbank storage

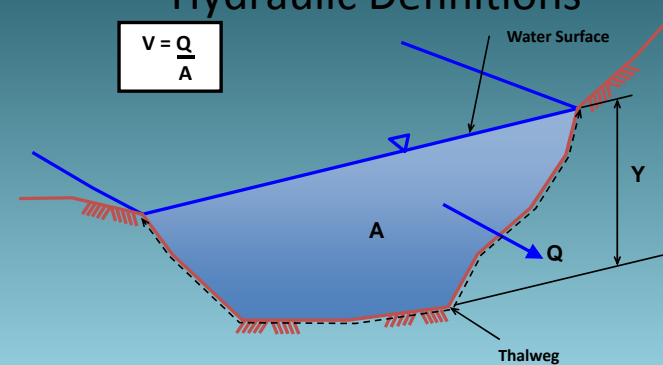
Historic Highwater Data

- HWM – AT, AE, WSC, site, airphoto, news
- Location, description

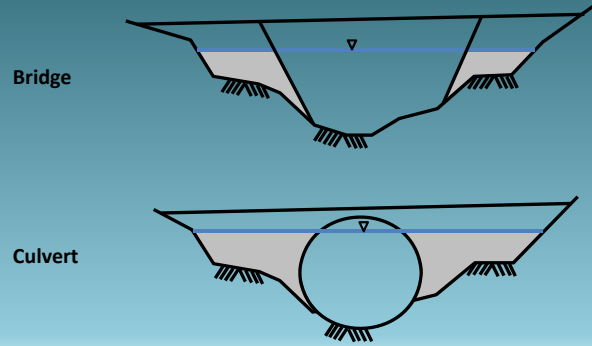
Runoff Potential

- Limit on supply of runoff
- Unit discharge

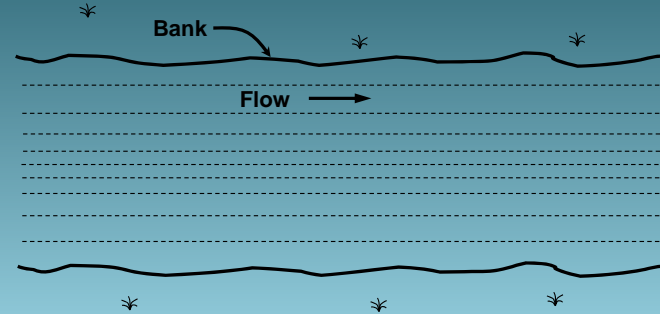
Hydraulic Definitions



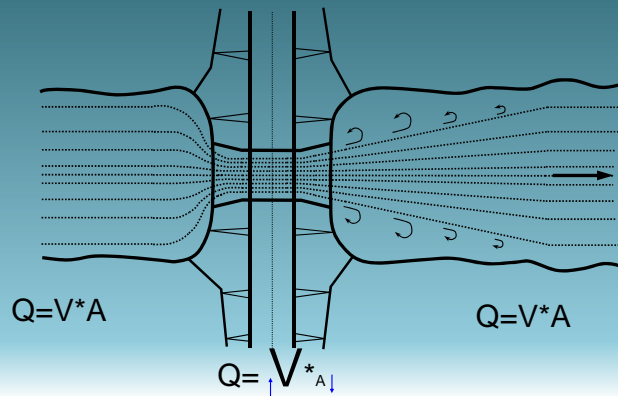
Flow Constriction - Stream Crossing



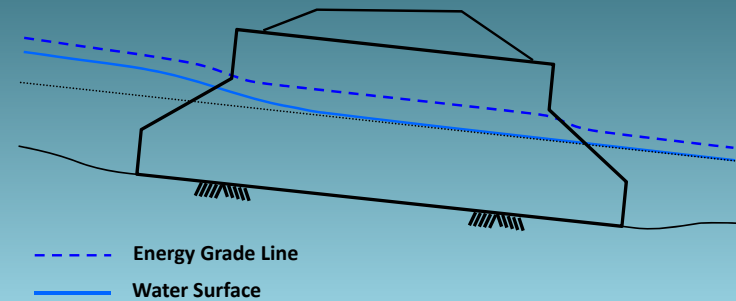
Flowlines - Before Constriction



Flowlines - After Constriction



Flow Profile - After Constriction



File 00278 - Battle River



File 00278 - Battle River



File 00278 - Battle River



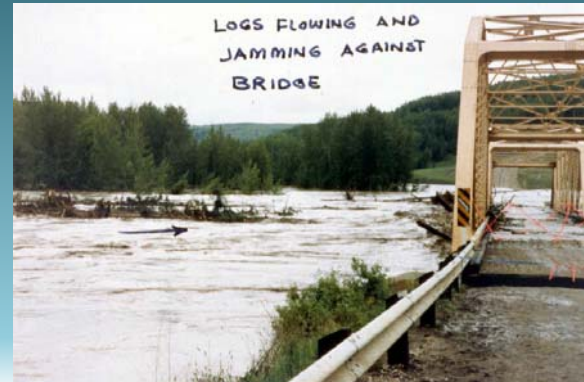
File 75194 - Simonette River



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File 75194 - Simonette River



File 75194 - Simonette River



File 75194 - Simonette River



File 07107 - Iron Creek



BF76474 – Smoky River at Grande Cache



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File 80827 - Nelson Creek



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File 80827 - Nelson Creek



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File 79475 - Bald Mountain Creek



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File 01324 - Pigeon Creek



File 01324 - Pigeon Creek



File 78230 - Brewster Creek



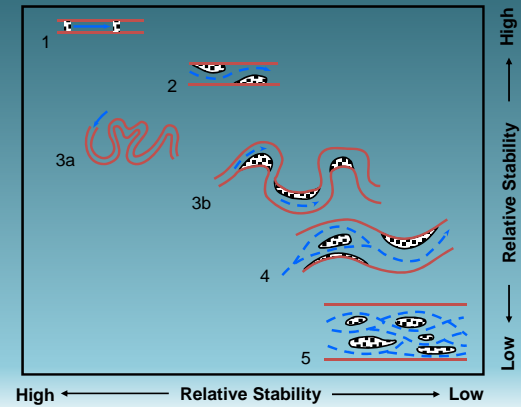
File 81653 - Watercourse



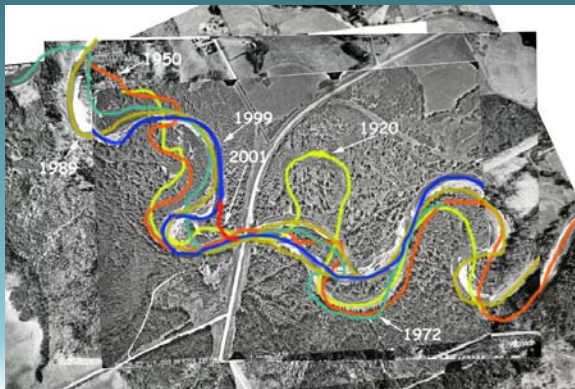
River Issues

Lateral Stream Stability

Stability of Stream Types



BF9259 – Freeman River



BF8036 – Redwillow River



BF13078 – Little Red Deer River



File 81113 - Marten Creek



File 75904 - Island Creek



File 75904 - Island Creek



File 75904 - Island Creek



File 73204 - Whitehorse Creek



File 73204 - Whitehorse Creek



File 73204 - Whitehorse Creek



File 73204 - Whitehorse Creek



File 73204 - Whitehorse Creek



Blockage - Drift, ice ...

File 78889 - Whitecourt Creek



File 71979 - Heart River



File 72964 – Howard Ck



Drift accumulation
can increase
velocities around
piers



BF 6754 Bow River at Cluny



Ice scarring on trees



Ice impact damage and abrasion on piers

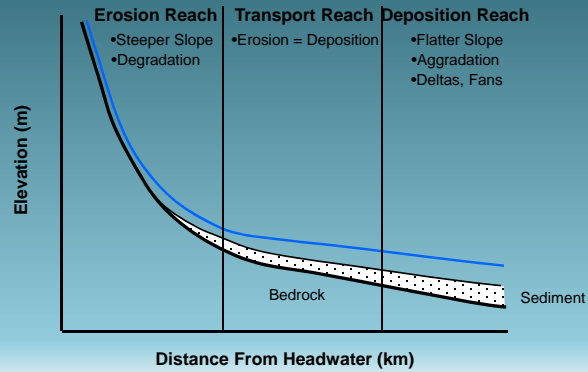


Other debris?



Vertical Stream Stability

Typical Stream Profile



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File 76995 - Malcolm Creek



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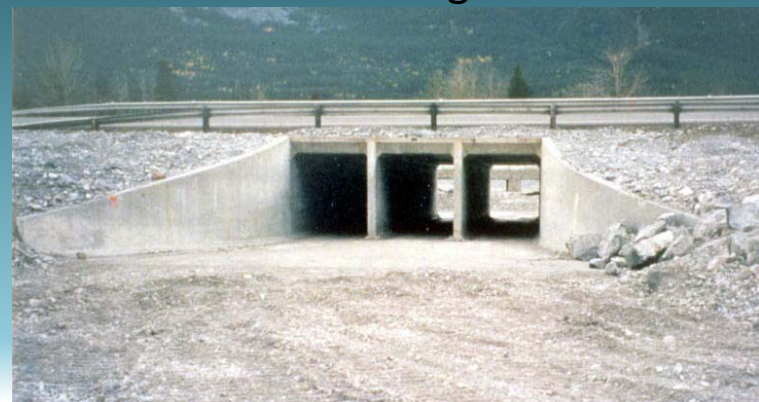
File 76617 - Cougar Creek



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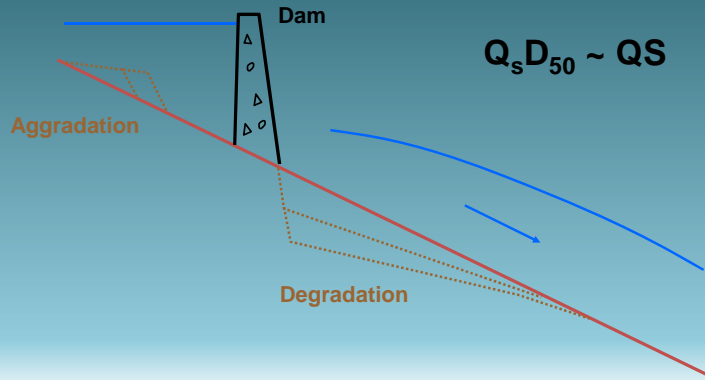
File 76617 - Cougar Creek



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River Response



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BF74852 – Bear River



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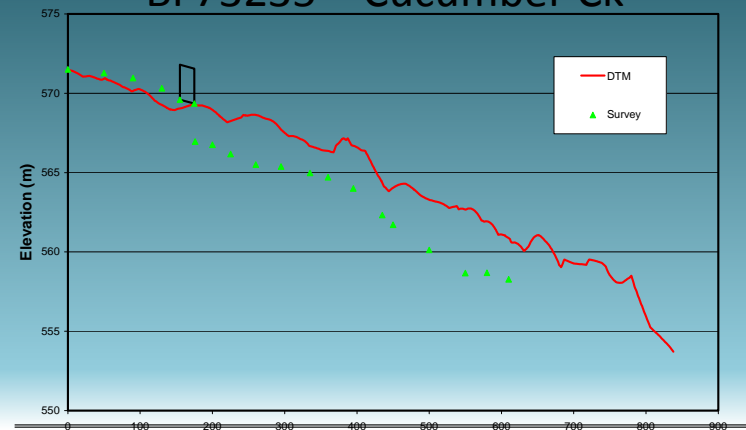
BF74852 – Bear River



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BF73235 – Cucumber Ck



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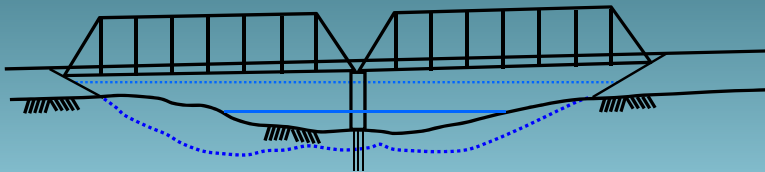
BF73235 – Cucumber Ck



BF73235 – Cucumber Ck



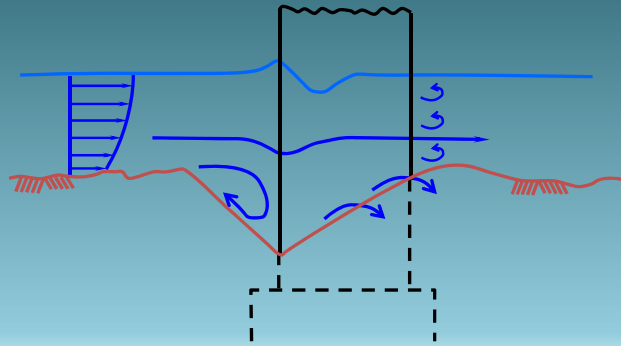
General Scour



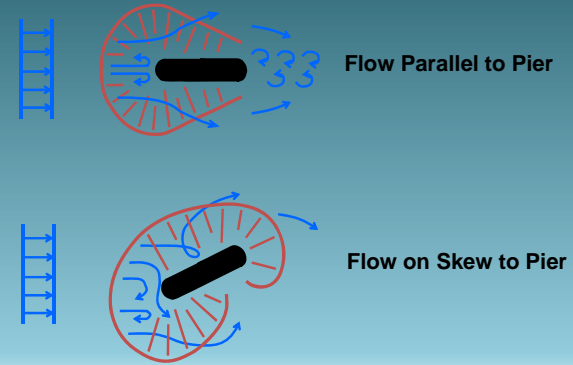
BF74710 – Berland River



Local Scour Profile



Local Scour in Plan View



Smoky River CanFor Bridge

Failure of a pier on spread footing due to general scour



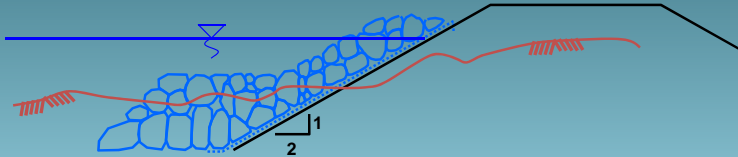
BF 78104 McLeod River near Peers - alignment problem



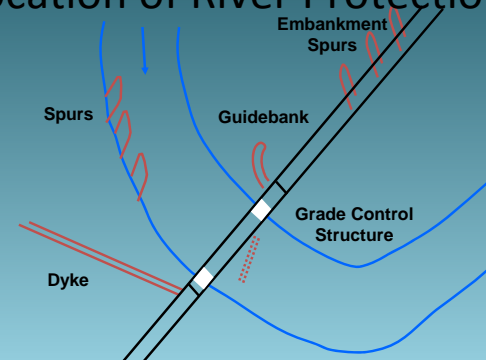


River Protection Works

Typical Rock Riprap Section



Location of River Protection Works



Oldman River at Monarch



Hydrotechnical Considerations

File 81795B - Red Deer River (1992)



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Hydrotechnical Considerations

File 81795B - Red Deer River



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File 81795B - Red Deer River



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File 81795B - Red Deer River



File 81795B - Red Deer River



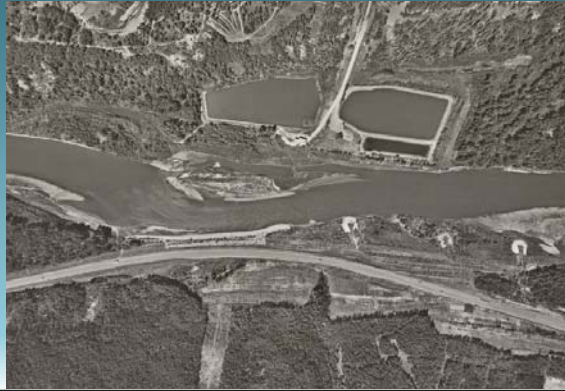
File 81795B - Red Deer River (1999)



File 81778B - Wapiti River



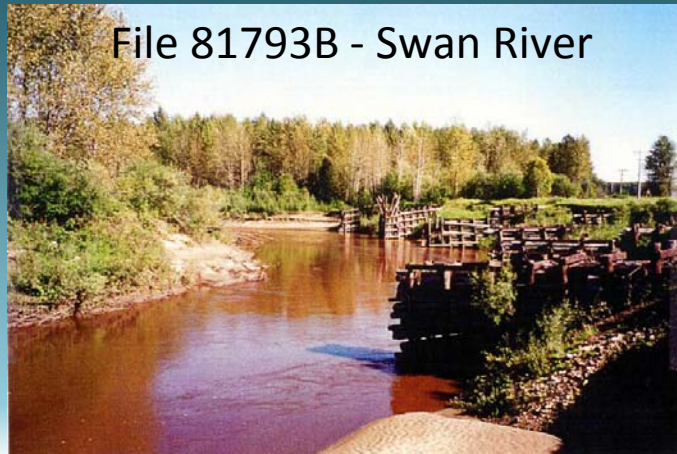
File 81778B - Wapiti River



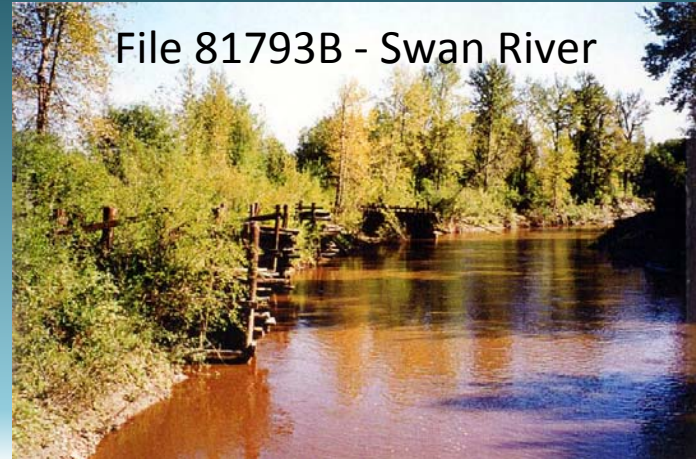
File 81793B - Swan River



File 81793B - Swan River



File 81793B - Swan River



...Questions?



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