

Freedom To Create. Spirit To Achieve.

Water Quality Model Development and Application

Modelling Plan and Priorities

Southern Region – South Saskatchewan and Milk River Basins

South Saskatchewan River Basin

- Bow River sub-basin including Highwood River
- Oldman River sub-basin
- South Saskatchewan River sub-basin
- Red Deer River sub-basin (TBD)

Milk River Basin





Modelling Focus

Model Development

Phase 1 - Data Scoping Study

Phase 2 – Data Collection

(Climate, Water Quality, Hydrometric, Bathymetric/Hydraulic, Sediment and Vegetation)

Phase 3 - Water Quality Models

- •Non-point Source Watershed Model: characterize non-point sources
- •In-stream Flow and Water Quality Model: characterize the fates of point and non-point sources in main water body

Model Applications



Data Scoping Study



Oldman/S. Sask., Milk, Highwood/L. Bow, Red Deer (Central Region)

SSRP Land Use Land Cover (LULC) Data and Model Scoping

Potential Impact of Climate Change on Water Availability and LULC (Novus Environmental) LULC Mapping for SSRP (U. of Calgary)



Address Data & Knowledge Gaps

Bathymetry topographic floodplain hydrologic hydrologic Vyfpa 2*Dbkf bankfull elevation

Lack of data at rural reaches for the 600 Km long of River



Ice development and its impact on water quality, sediment transport...



Sediment



Nutrients and organic matters; DO demands; Erosition/deposition

Macrophyte

Image: Constraint of the second second

Lack scientific knowledge: kinetic rates, stoichiometry, community composition...

Address Data & Knowledge Gaps (cont'd)

Bow River Biosonic Vegetation/Sediment Study (4 phases)

- Joint Project (ESRD, City of Calgary and Golder Associates)
- Selected river reaches within the City of Calgary





Bow River Sub-Basin



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Bow River Water Quality Model (BRWQM)



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Highwood/Little Bow System





Water Quality Models (cont'd) Highwood/Little Bow System (2013 and beyond)

• Major Tributary and Non-point Source contribution to the Bow River





Model Applications

BRWQM Application (Bearspaw Dam to Bassano)

LUF/Region Planning: SSRP – coupled WRMM with BRWQM

Regional Approval (Carseland effluent to the Bow River) - Wheatland County application (in progress)

Water Management Operations - Bow-Carseland Headworks (Travers Reservoir Enlargement EIA; and Bow-Carseland Canal Enlargement DFO approval)

Bow River Phosphorous Management Plan (P Plan) – model data update/extension to 2011, and model re-calibration (in progress)



Other Initiatives and Information

WRMM-CA Model Interface (Geomatic Journal) – in conjunction with U. of Calgary

SSRP Scenario Modelling Report – Modelling Team

Climate Change Impact Analysis (Research) – U. of Alberta; U. of Saskatchewan;

Bow River Biosonic Study on Sediment and Vegetation (CWRA National Conference) – in conjunction with Golder Associates and City of Calgary

Other Jurisdictions – Saskatchewan Water Security Agency etc

