### Global Water Futures 2021 Operations Team Meeting - Project Reporting Template

Instructions: All GWF projects are asked to provide a summary update on their activities and accomplishments in preparation for the upcoming Operations Team meeting. Please submit these by email to <a href="mailto:chris.debeer@usask.ca">chris.debeer@usask.ca</a> by no later than December 2. These will be used to help guide discussions and breakout synthesis activities and will be made generally accessible on our website in advance of the meeting.

**Project Name:** Core - Water Resources Management Modelling

# Our major accomplishments to date are:

 Mizuroute vector-based routing model complete with reservoirs, withdrawals and lakes (S Gharai).

Publication: <a href="https://doi.org/10.1029/2020MS002434">https://doi.org/10.1029/2020MS002434</a>

- Adoption of Mizuroute model into the Community Earth System Model community of practice repository (https://github.com/ESCOMP/mizuRoute)
- Development of generic reservoir/irrigation models for hydrologic models (A Tefs, F Yassin)
  Publications: <a href="https://doi.org/10.1016/j.envsoft.2021.105025">https://doi.org/10.5194/hess-2019-7</a>
- Renaturalized scenarios produced in HYPE and MESH for IWRM
- IWRM scenarios using economic and agricultural scenarios (developed by Pat Gober and Hayley Carlson) complete (L Eamen)
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## Our current activities are:

- Integration of HYPE and mizuroute (A Tefs, S Gharai)
- Integration of MESH and mizuroute (F Yassin, S Gharai)
- Finalizing climate change scenarios from HYPE and MESH (A Tefs, F Yassin)
- Integration of HYPE and MESH scenarios into IWRM (L Eamen)
- Climate change + renaturalization scenarios in IWRM (L Eamen)
- Manuscript for MESH vector based routing
- Commentary paper for IWRM models vs. other model types to look at scenarios
- Ice-affected rating curve development for IWRM framework
- Integration of Manitoba and Saskatchewan river IWRM models.
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## The main accomplishments expected by the end of the project are:

- Integration of lakes, reservoirs, irrigation and withdrawals in land surface and hydrologic models
- Comparison of technologies for modelling water resource management:
  - Network routing products, hydrologic models and IWRM models
- Production of climate change and renaturalized scenarios of hydrology to assess with/without regulation and climate change impacts
- Adaptation of IWRM platform specifically for cold regions (i.e., ice affected stage-discharge)
- Visualization of water resource management scenarios/outputs

Here is a key visual from the project (figure, photo, table, graph, etc.)

# Water Resources Management Modelling

### **Primary Goals**

- (i) Application of existing integrated water management modelling frameworks
- (ii) Integrate water management rules in land & hydrology models.

### WRMM Work Packages focus on the following initiatives:

- 1. Embed lakes & reservoirs into land models
- 2. Include water management in hydrologic models
- 3. Integrated WRMM and decision scenarios
- 4. Adapt WRMM for cold regions

Model agnostic Continental-scale, Computationally efficient FAIR practices Bench marked

### **Achievements**

- (i) Global network routing product (MIZUROUTE)
- (ii) Two code frameworks to account for reservoirs in continental scale hydrologic models (DTZR, RAT)
- (iii) WRMM for Nelson River basin with stress test scenarios for agricultural withdrawals and regulation
- (iv) Seasonal ice-affected rating curves for WRMM

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