BOREAL WATER FUTURES

TRANSDISCIPLINARY RESEARCH FOR A MORE RESILIENT WILDLAND-SOCIETY INTERFACE

EST. 2017

BWF

Canada's boreal ecosystems are undergoing extraordinary transformative change that is having profound impacts on boreal ecosystem function, water management practices, and source water protection. Urbanization and natural resources development, which are critical to Canada's national economy, are expanding wildland-society interfaces. Concurrently, an intensification in climate-mediated natural disasters, such as wildfire, are placing ever increasing threats and risks to human health, safety, and the economies associated with the Canadian boreal. **Boreal Water Futures has assembled a team of researchers and stakeholders to co-develop a water futures risk assessment framework to create a resilient boreal wildland-society interface.**

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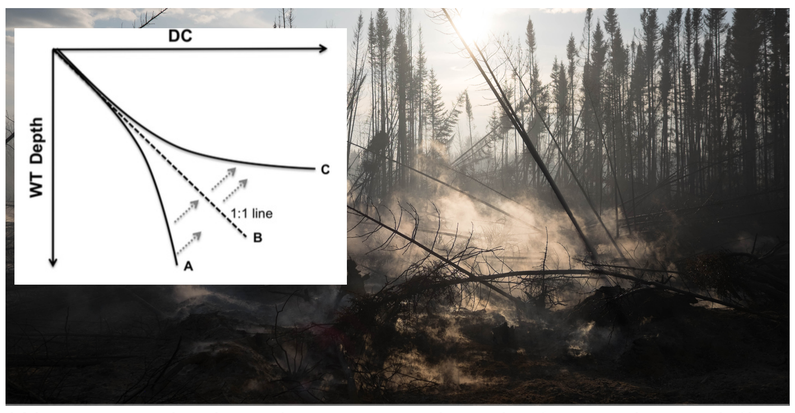
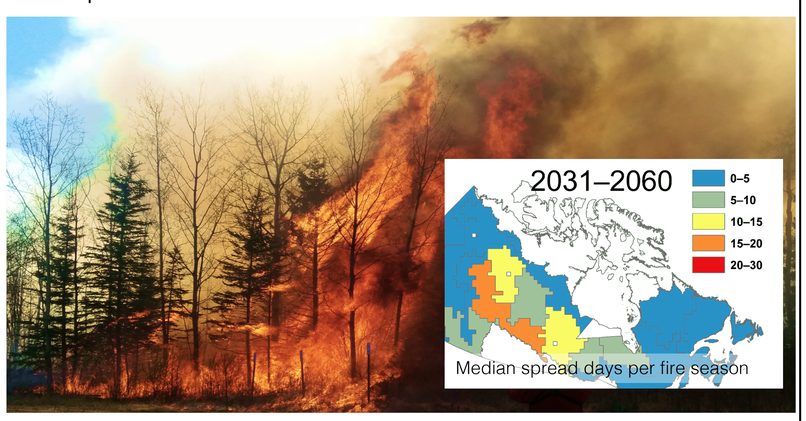
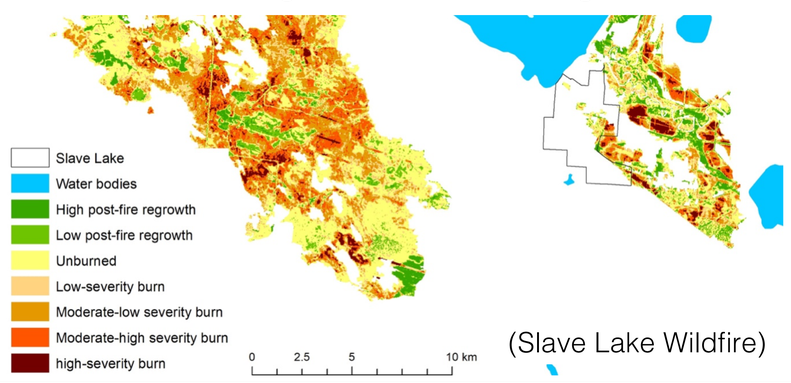
IMPROVING DISASTER WARNING



We are reducing the uncertainty in future boreal fire regimes to improve wildfire disaster warning. The role of 'emerging fuels' such as deep organic soils on wildfire growth and severity are being analyzed using remote sensing and hotspot data with success using a modified drought code. A preliminary climate change assessment of Fire Weather Index System indices has been initiated in in advance of future WRF products.

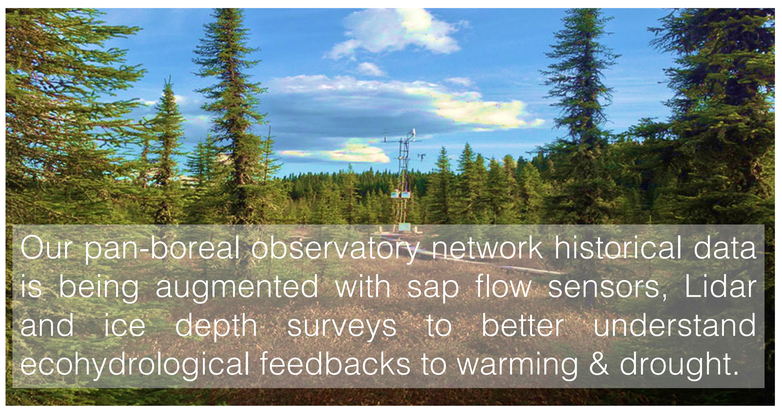


Wildland-urban interface remote sensing analysis reveals post-fire recovery is enhanced adjacent to surface water and groundwater discharge.



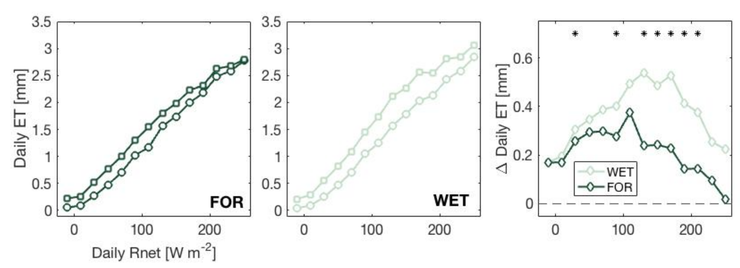
(Slave Lake Wildfire)

PREDICTING WATER FUTURES

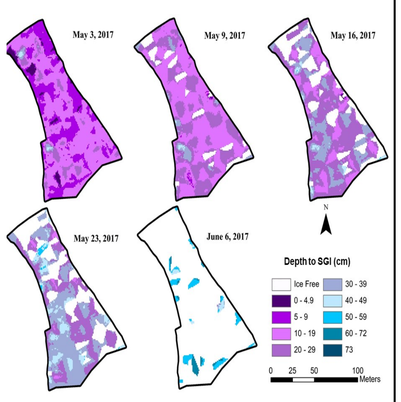


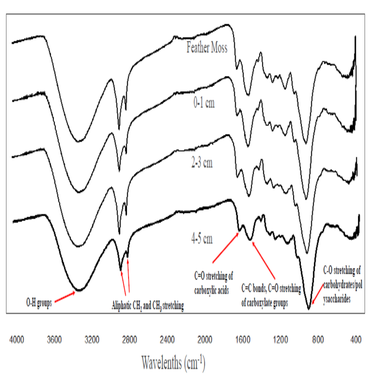
Our pan-boreal observatory network historical data is being augmented with sap flow sensors, Lidar and ice depth surveys to better understand ecohydrological feedbacks to warming & drought.

Boreal forests are more efficient in retaining water under high atmospheric demand and wetlands will lose proportionately more water through evapotranspiration in a warmer climate.



The strength and sign of wetland ecohydrological feedbacks are being assessed for different wetland types including the link between seasonal ground ice and available energy and potential evapotranspiration



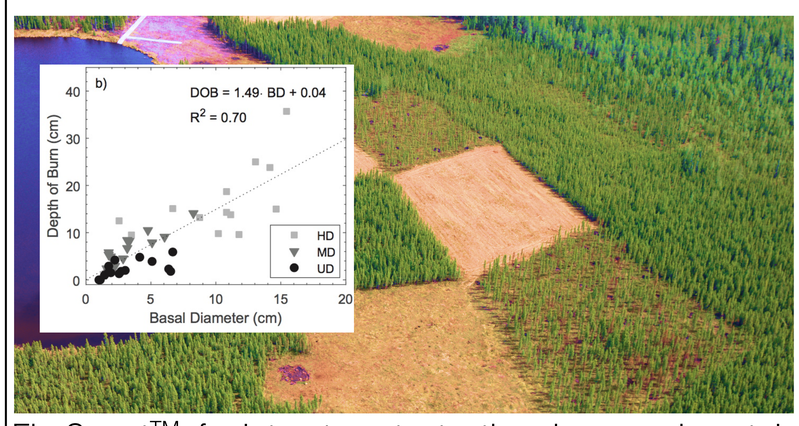


Changes in boreal soil hydrophobicity are being chemically characterized in response to drying and wildfire to assess future changes in runoff and water quality response to rainfall.

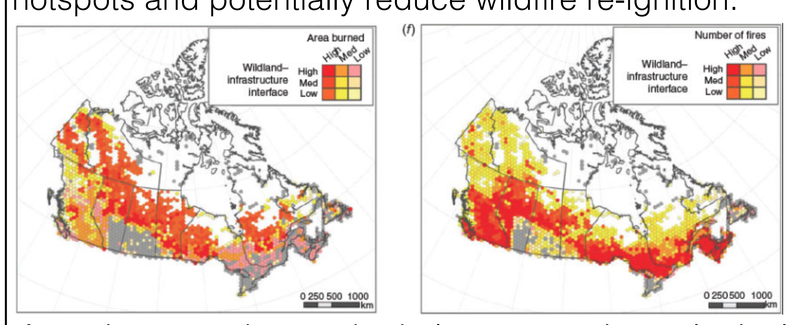
ADAPTING & MANAGING RISK

We have Implemented the CRHM model to understand the viability of future post-mining wetland reclamation practice and the influence of upland-lowland hydrological connections.

A forest ecohydrology study of reclaimed mine sites indicates that current reclamation practices produces ecosystem that have comparable water and carbon dynamics from other disturbed and reference systems.



FireSmart™ fuel treatments testing in experimental fires (black spruce experimental forests) have developed tools to mitigate peat smouldering hotspots and potentially reduce wildfire re-ignition.



An integrated ecohydrology, socio-ecological systems and multi-level polycentric governance risk assessment framework is being tested to create a more resilient wildland-society interface.

CONTRIBUTIONS TO UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

6 CLEAN WATER AND SANITATION — Target 6.3: Develop soil hydrophobicity metrics to predict post-fire water treatment and water quality degradation.

6 CLEAN WATER AND SANITATION — Target 6.6: Quantify ecohydrological resilience to inform ecosystem vulnerability, adaptation, and restoration BMPs.

11 SUSTAINABLE CITIES AND COMMUNITIES — Target 11.5: Improved wildfire danger prediction with integrated SES models and multi-level polycentric governance.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION — Target 12.2: Improved BMPs and understanding of post-mining wetland and forest reclamation and ecosystem response.

13 CLIMATE ACTION — Target 13.1: Develop ecohydrologically-based fuel treatment BMPs to reduce wildfire disaster severity.

15 LIFE ON LAND — Target 15.1: Quantify ecohydrological resilience to inform ecosystem vulnerability, adaptation and restoration BMPs.

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