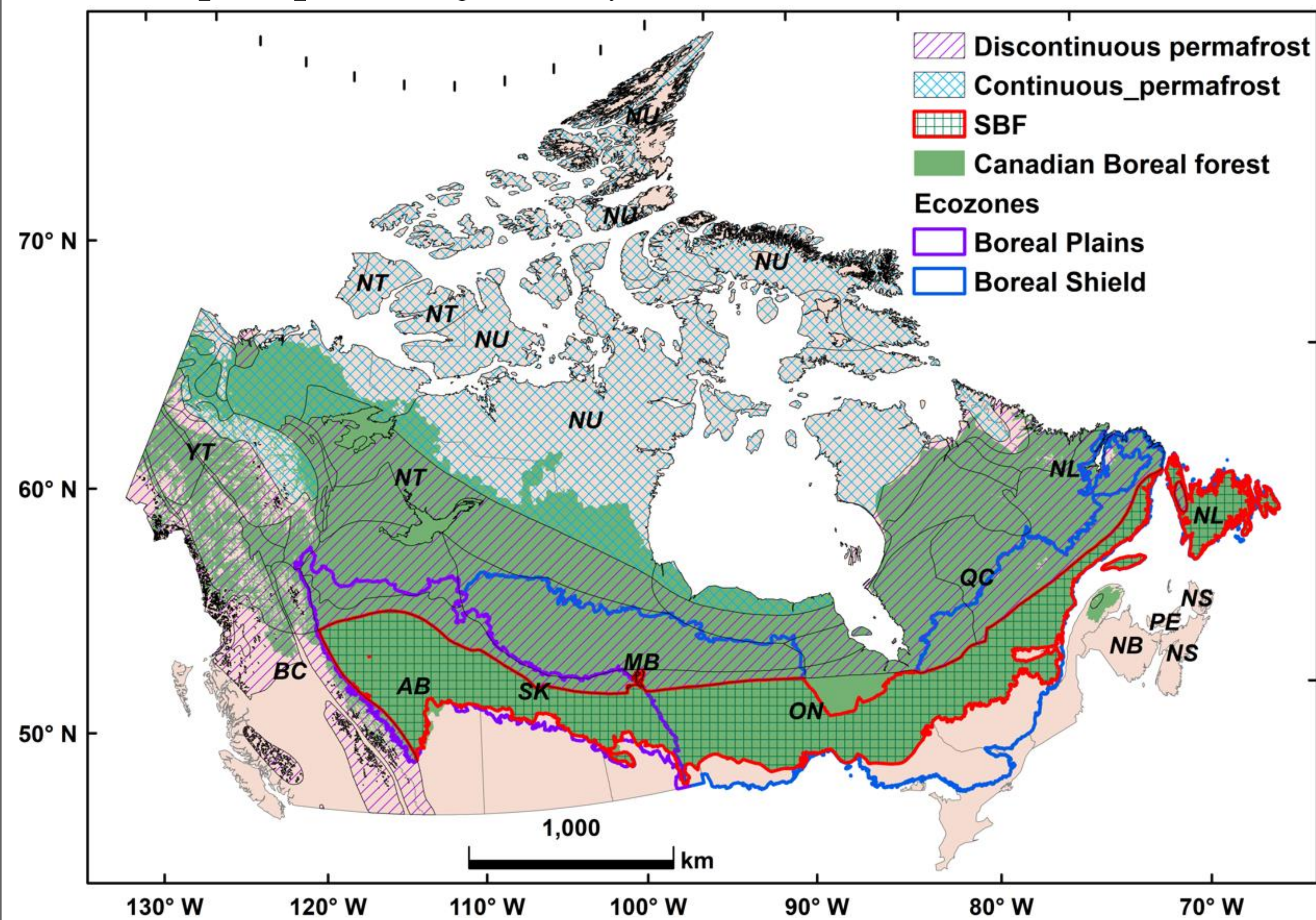
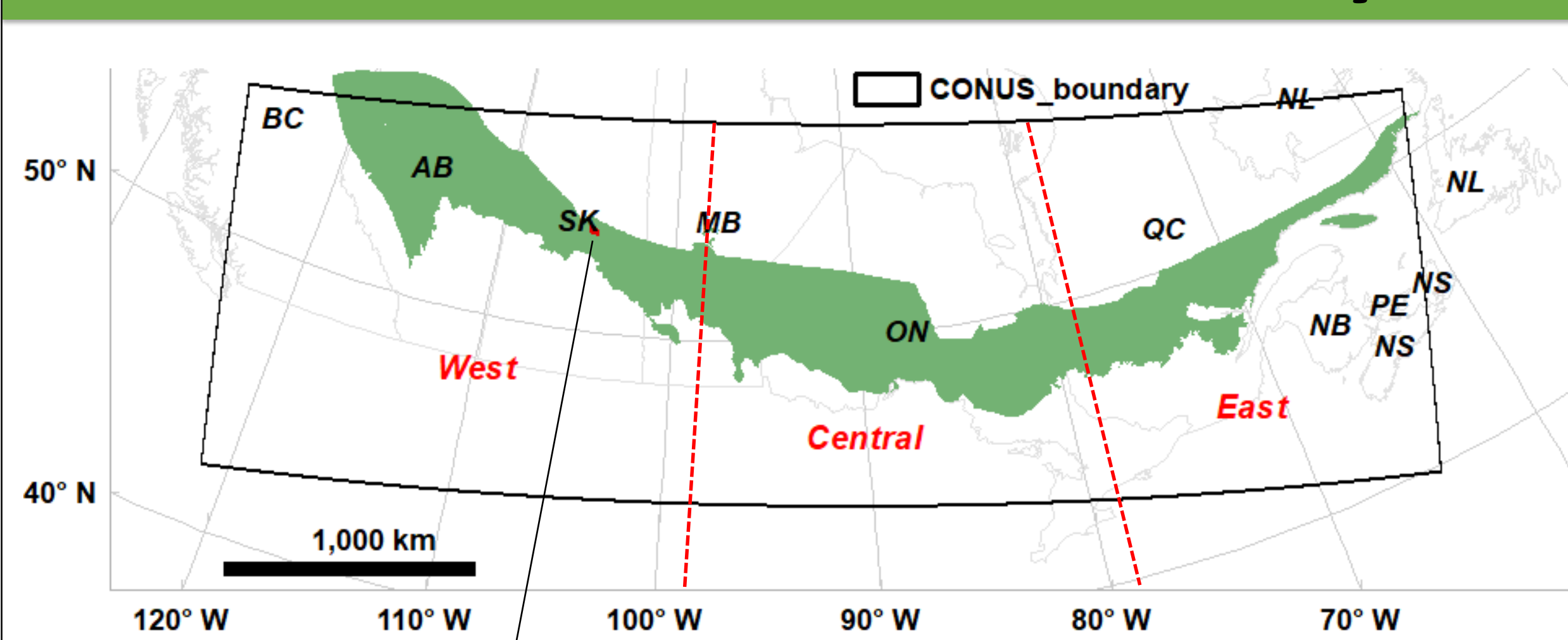


Southern Boreal Forest

- The Canadian Southern Boreal Forest (SBF) covers ~1.4 million km²
- The SBF is featured by seasonally frozen soils but little permafrost
- It is located within the Boreal Plains and Boreal Shield ecozones
- Annual precipitation generally increases from west to east



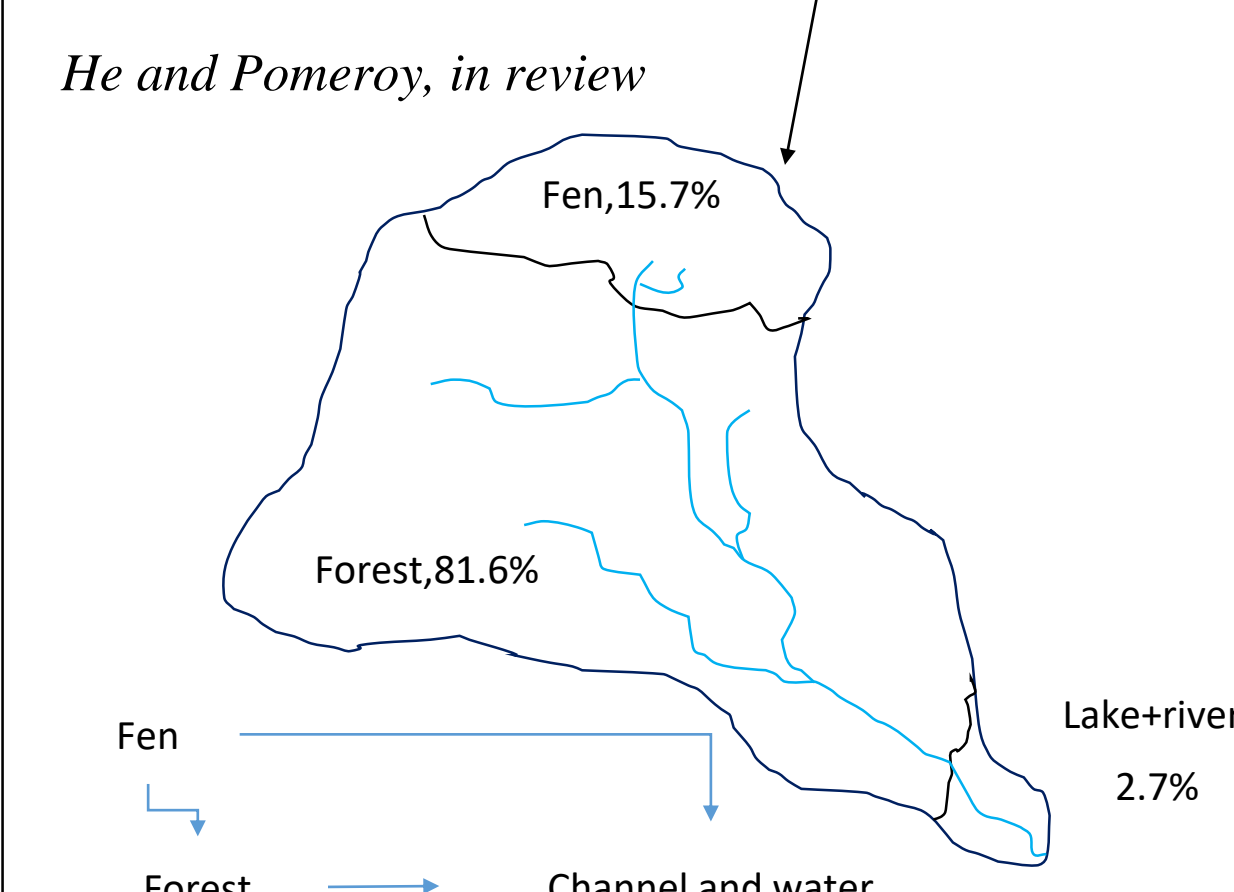
CRHM-based virtual basin hydrological model



WRF-CONUS outputs:
ctrl, 2001-2013;
pgw: 2087-2100 (RCP 8.5)

White Gull Creek (WGC) is used as an exemplar to set up and validate the virtual basin models (In total 2243 virtual basins)

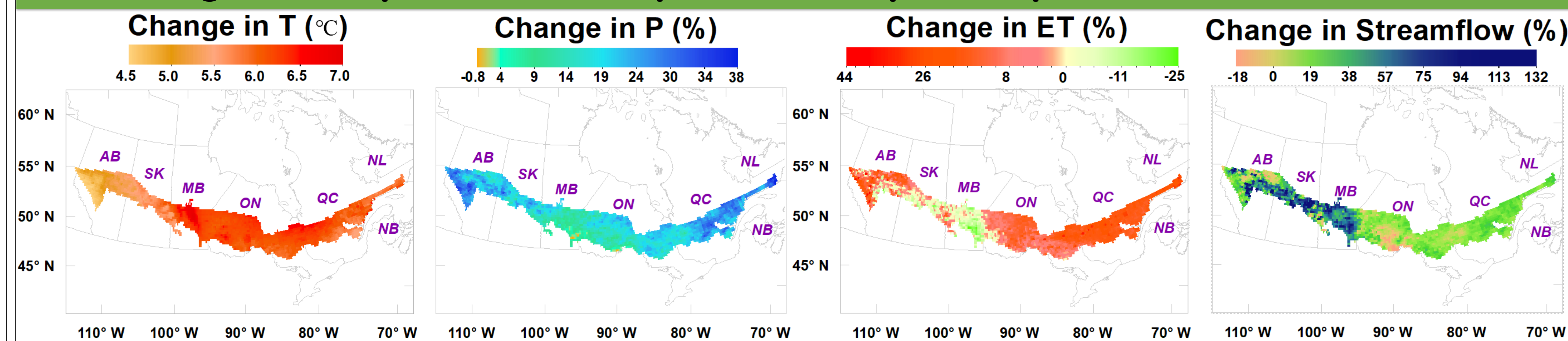
Cold Regions Hydrological Modelling platform (CRHM), using modules for canopy snow interception, sublimation, and unloading, snowmelt, frozen soil infiltration and thawing, ET, and hillslope runoff routing



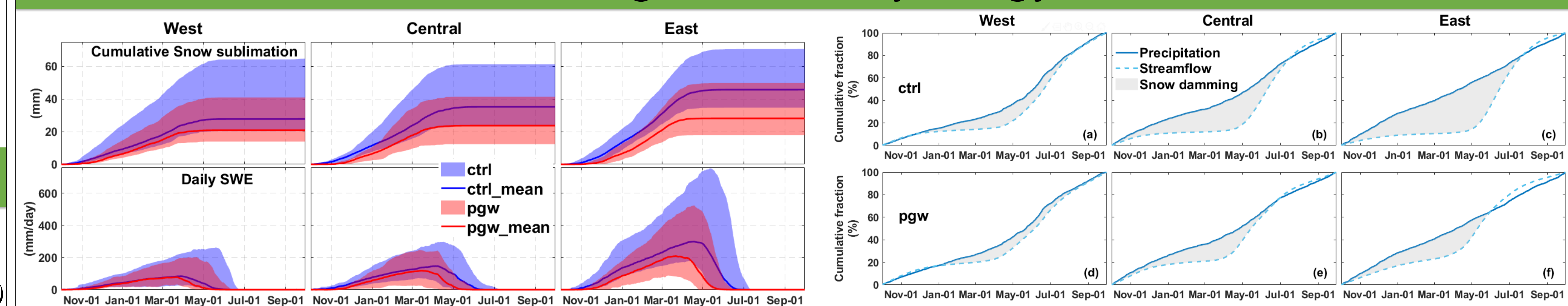
Conclusions

- Snow sublimation and snowcover duration will decline throughout the SBF. Snow processes in the eastern SBF are more sensitive to future climate change than in the west and central;
- Future warming will reduce snowpacks, soil freezing and enhance thawing and effective permeability, causing soil moisture to decrease by up to 27%, whilst subsurface runoff will be strongly enhanced.
- The SBF will switch to a higher water yield, higher ET region which is dominated by a more variable, less seasonal, rainfall-runoff fed streamflow.

Change in Temperature, Precipitation, Evapotranspiration and Streamflow



Changes in Snow Hydrology



Changes in Soil Hydrology

