

Coldwater Science Collaborative

a support network for Water Users, Water
Managers and Researchers

John Pomeroy and Robert Sandford

Centre for Hydrology

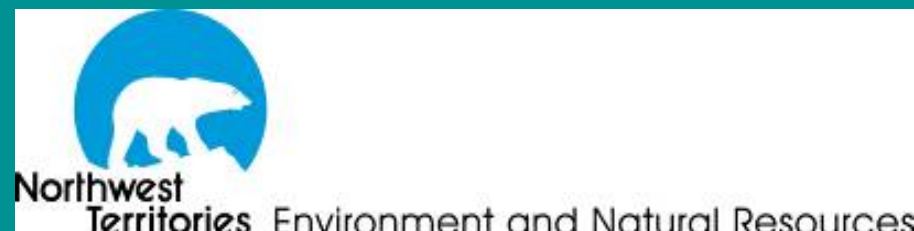
University of Saskatchewan

&

Coldwater Science Collaborative, Canmore

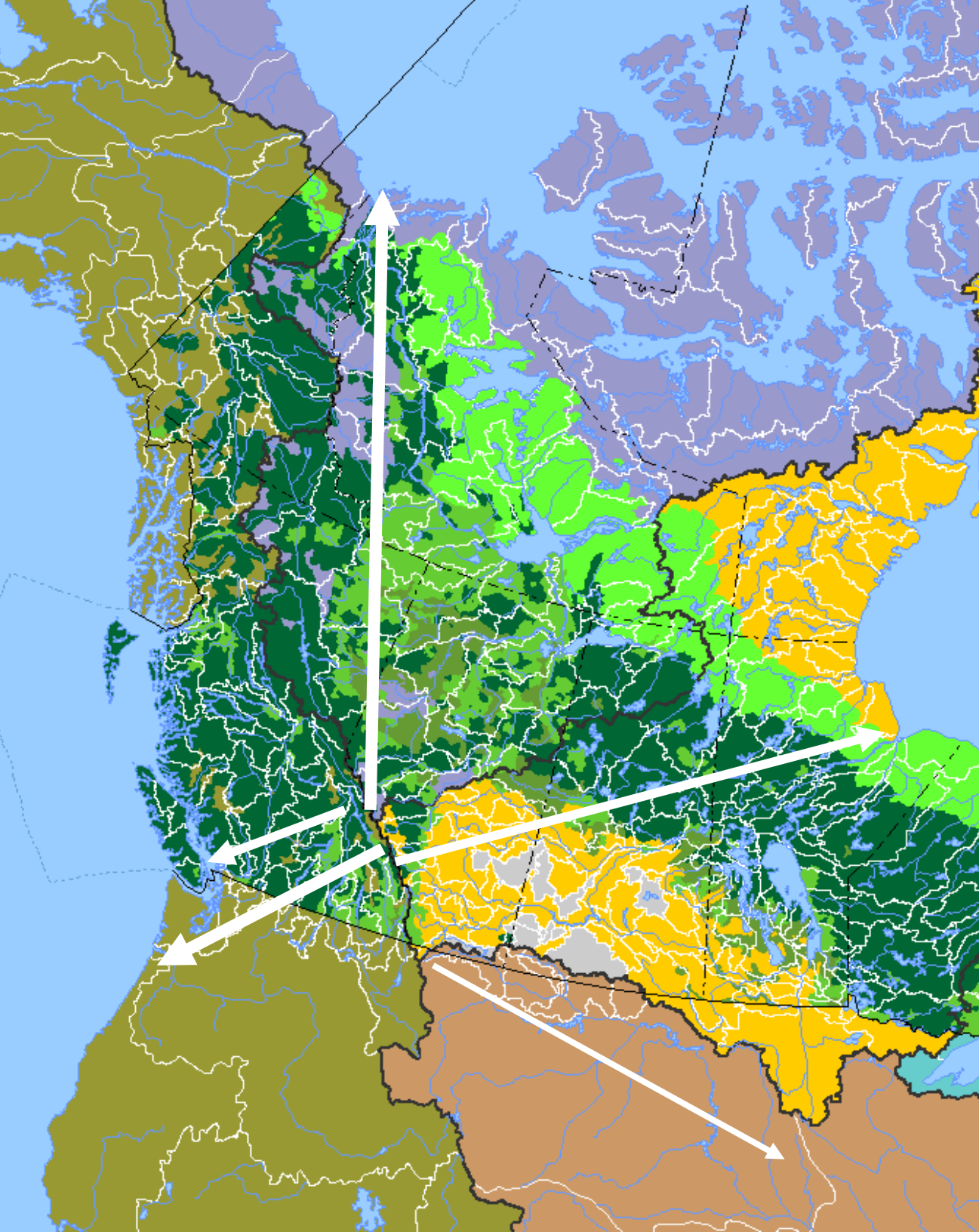
Improving Water Security through Integrated Observation and Prediction Methods

Canmore, Alberta December 2008



Canmore Outcomes

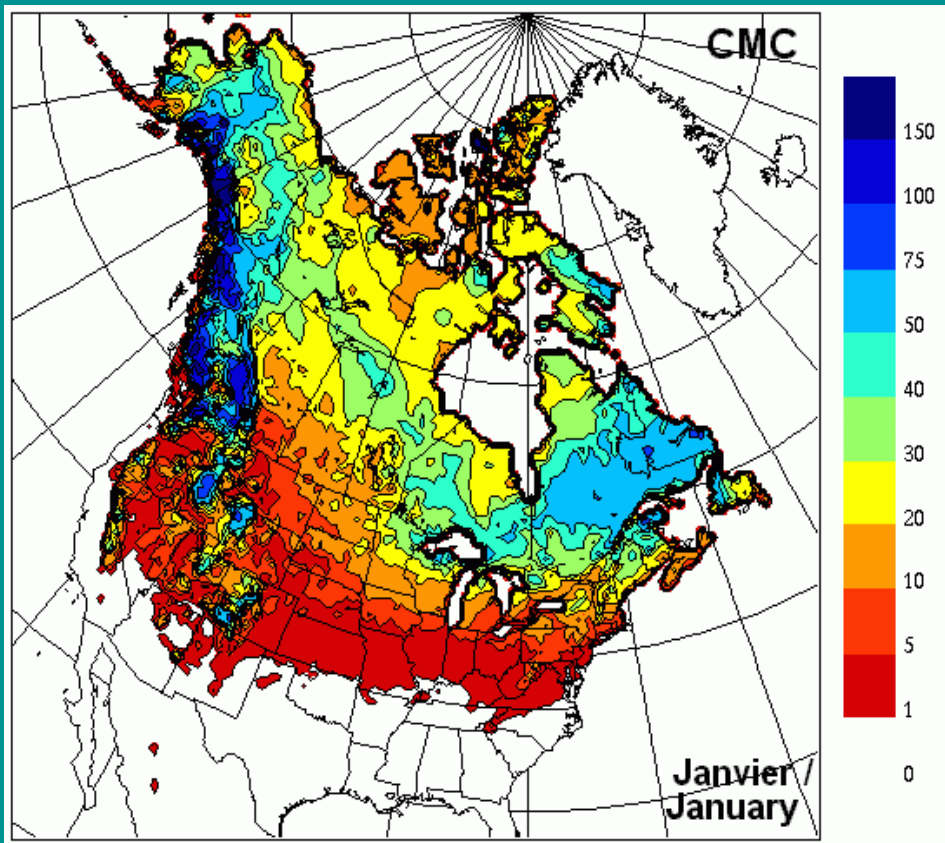
- Coldwater Science Collaborative
 - Formation of Steering Group Dec 2008
 - Letter of Support from Western Water Stewardship Council of western premiers, March 2009
 - Endorsement by US-Canada GEO as a testbed for cold climate hydrology and climate, June 2009
- Univ of Calgary Biogeoscience Institute provides building for Coldwater Collaborative, June 2009
- Pomeroy and U of S IP3 Secretariat move to Kananaskis to get Collaborative started, July 2009
- Western Watershed Climate Research Collaborative suggested as a non-profit corporate vehicle for Coldwater Science Collaborative, Sept 2009
- Concept of Rocky Mountain Observing System explored, developed
 - Discussions amongst Env Can, NRCan, provinces, universities on station needs, data assimilation and sharing
 - Informing Columbia River Basin Treaty discussions
 - AWRI discussions



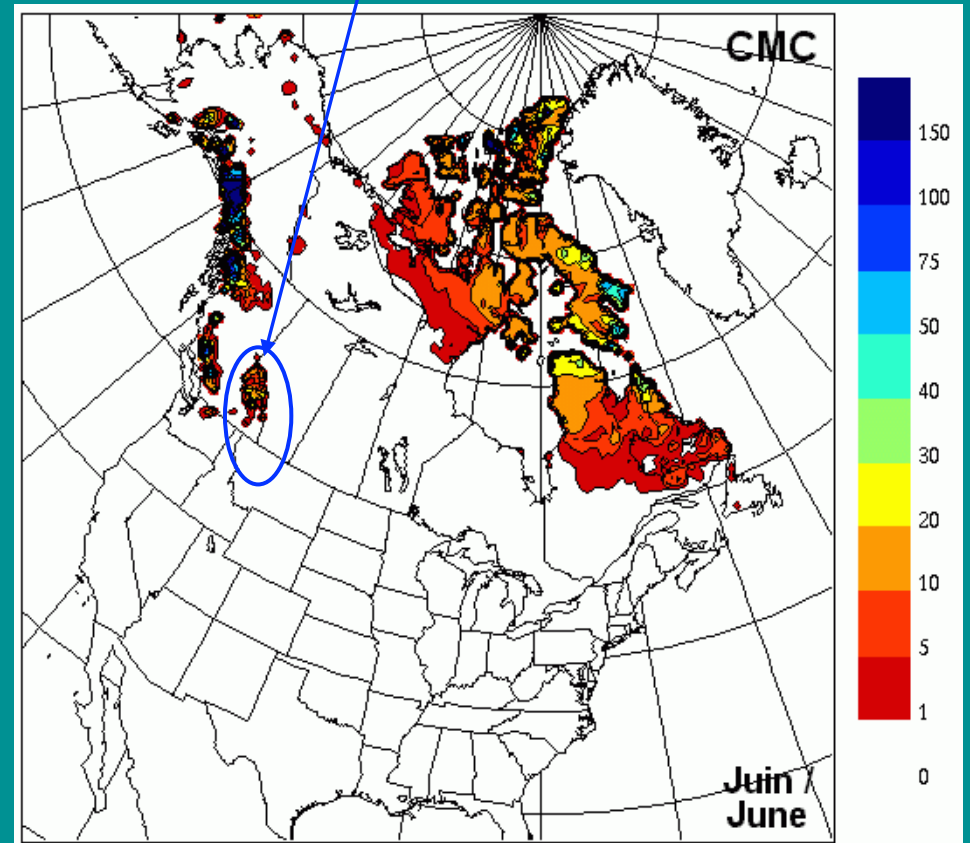
Canadian
Rockies are
the
Hydrological
Apex of
North
America

Rocky Mountain Snow and Ice

southernmost, interior
summer snow water reserves

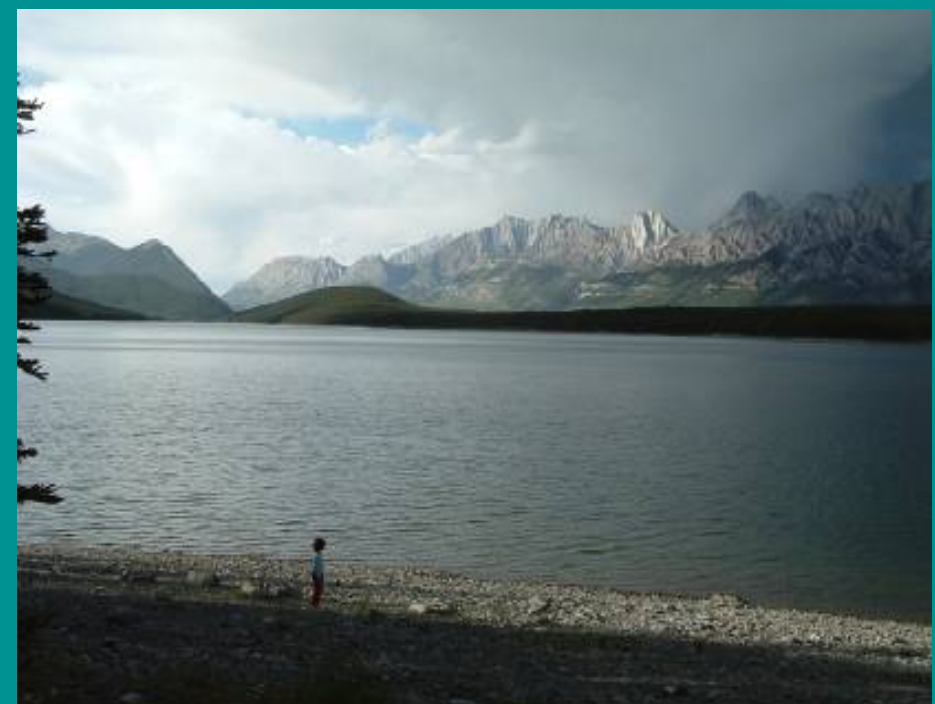


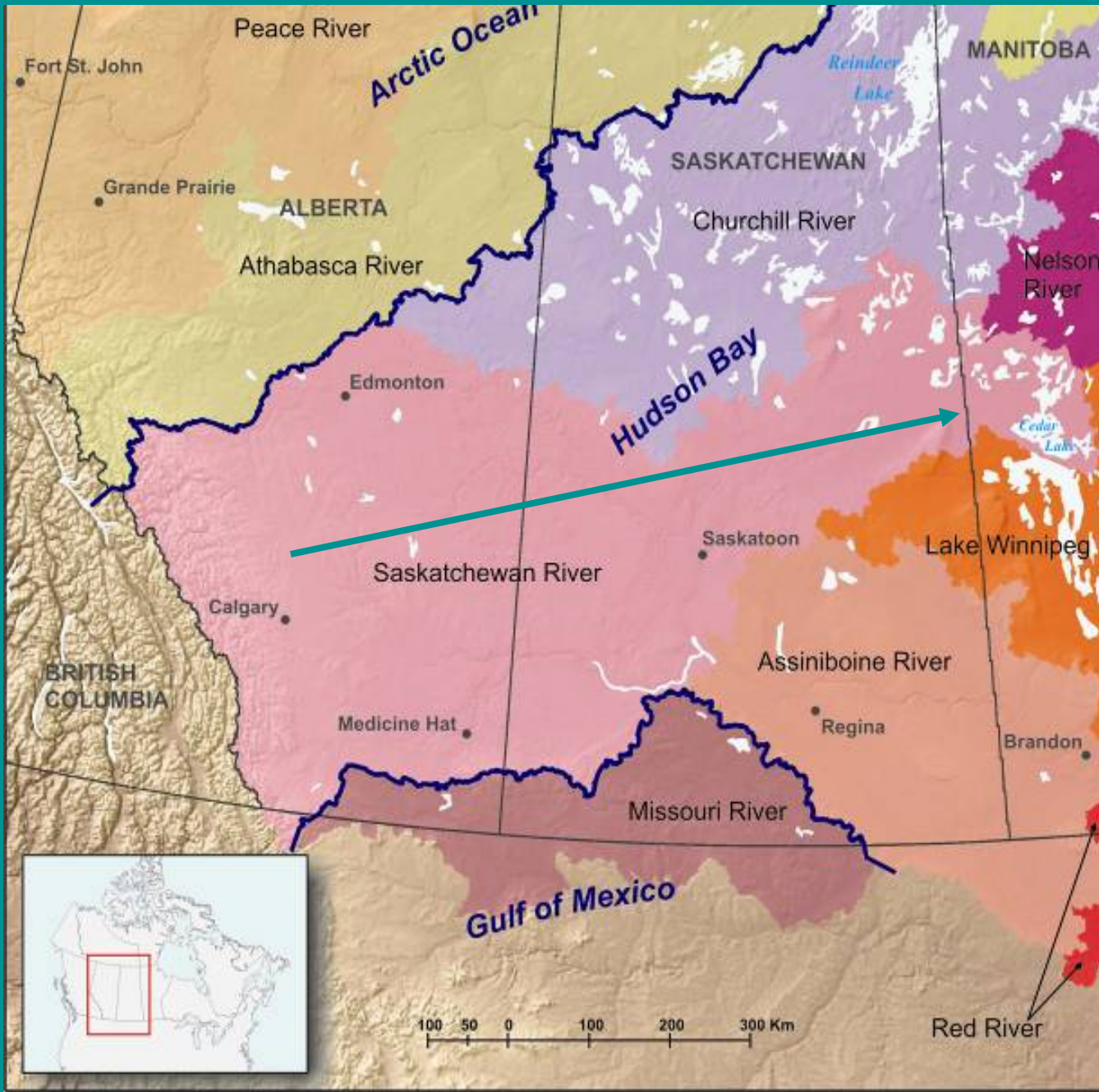
Snow depth in January



Snow depth in June

Canadian Rocky Mountains

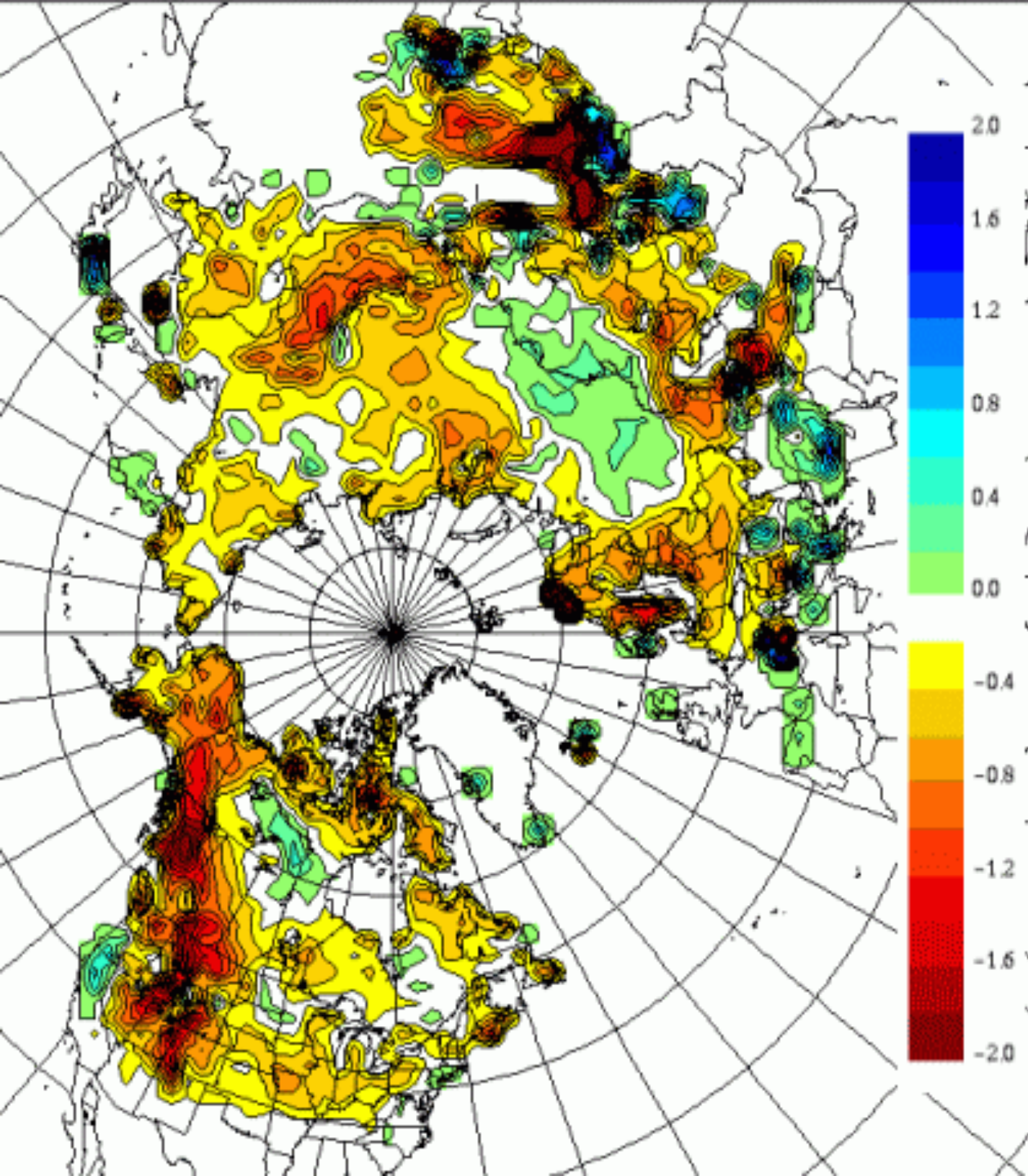




Saskatchewan
-Nelson River
Basin Drains
Rocky
Mountain and
flows East
across Alberta,
Saskatchewan
and Manitoba
to Hudson Bay

Prairie Agriculture & Drought





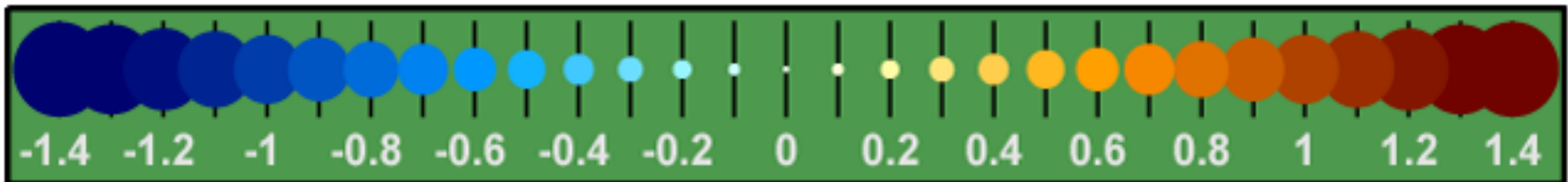
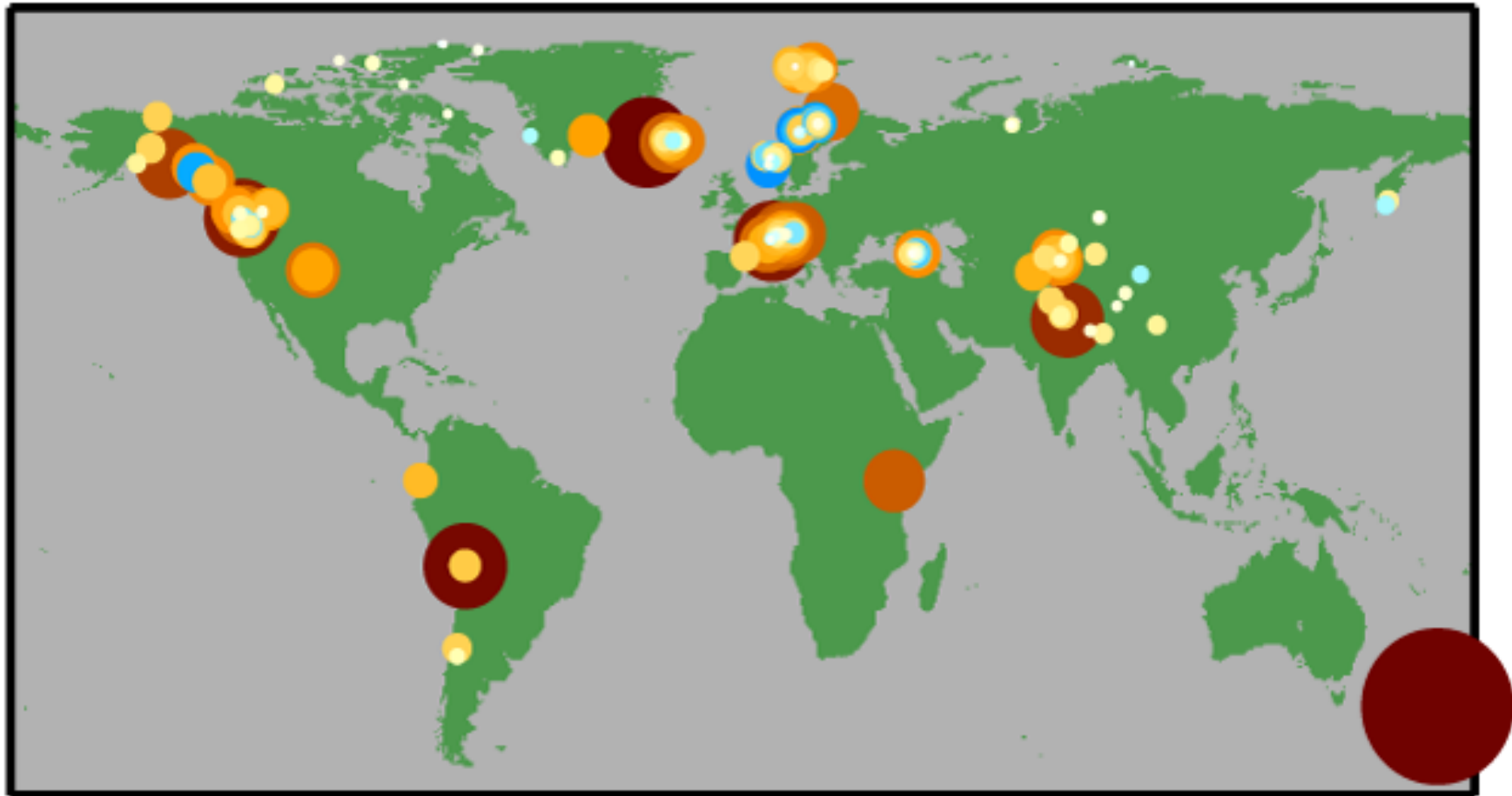
Snow-covered Period is Declining in Rockies

Average change (days/yr) in snow cover duration in the second half (Feb.-Jul.) of the snow year over the period 1972-2000.

Derived from the NOAA weekly satellite snow cover dataset

Glacial Decline Rapid in Rockies

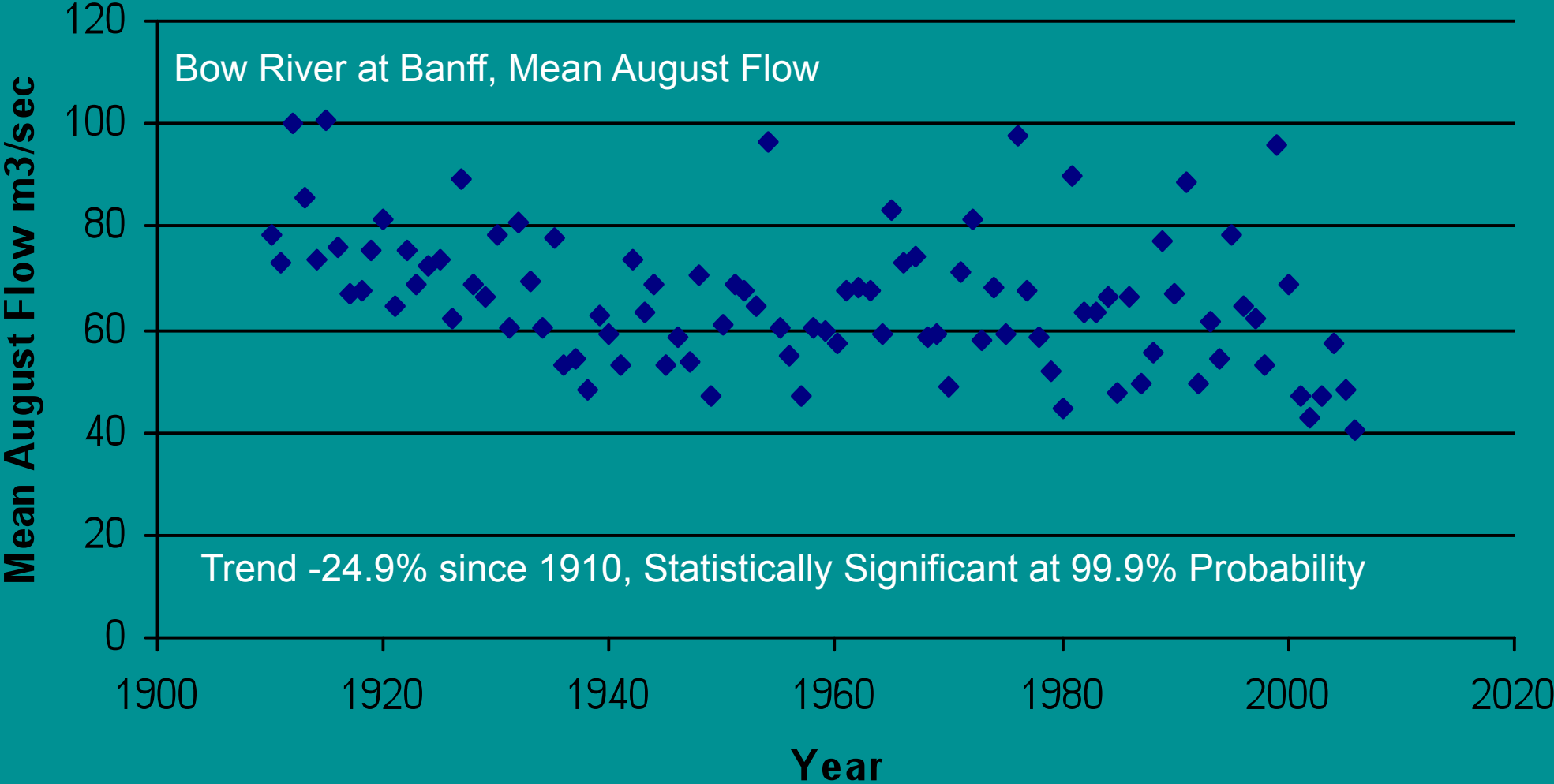
Mountain Glacier Changes Since 1970



Effective Glacier Thinning (m / yr)

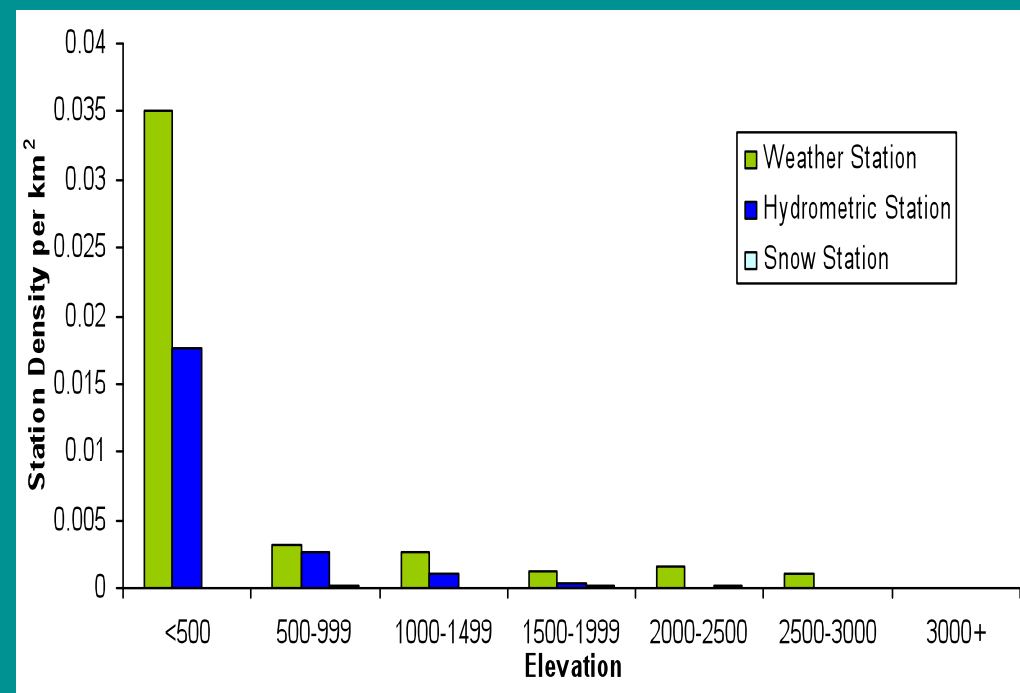
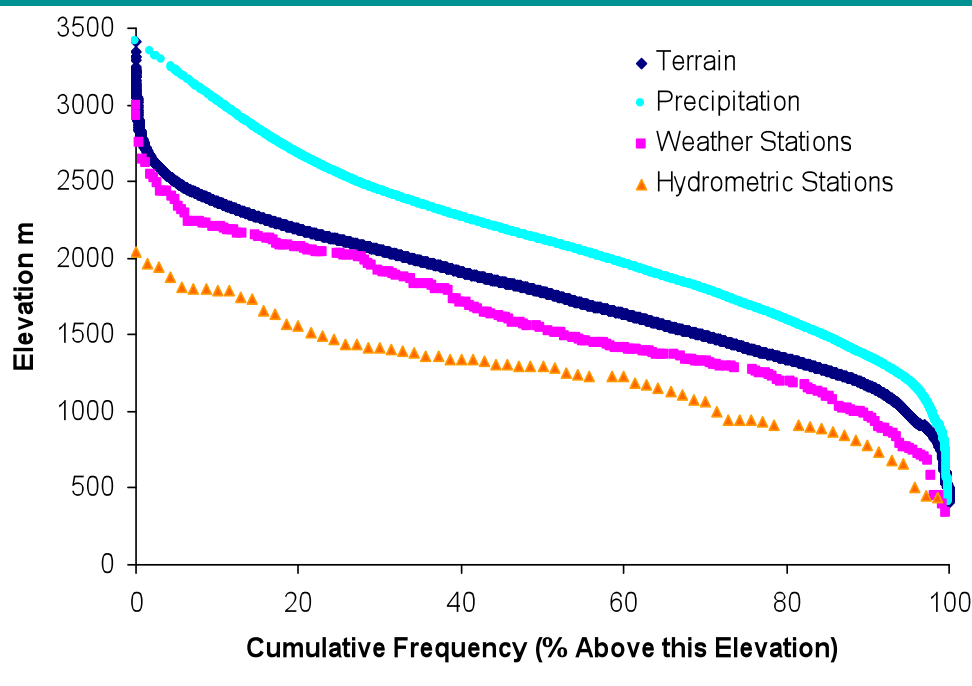
Summer Flows Declining Rapidly

Late summer flows large and dropping rapidly



New Observations Needed

- Station density is too low. To meet WMO standards for mountain regions
 - 450% increase in hydrometric stations
 - 2250% increase in precipitation stations
- Stations are not located where precipitation volumes are found
 - Stations are at lower elevations but water resources are at higher elevations
- Clearly an alternative strategy is needed that takes advantage of earth observations and innovative station designs and operation



Coldwater Science Collaborative

The Coldwater Science Collaborative will aid in the development of enhanced, integrated observations and predictions to couple key issues relating to:

- Dynamics of snow, glaciers, groundwater, permafrost, wetlands and streams in upland watersheds,
- Downstream flooding, drought and water supply
- Long term water supply change
- Transboundary Waters

Coldwater Strategic Goals

- i) *determine where new monitoring capacity should be established at high latitudes and altitudes.*
- ii) *assess the long term sustainability of western and northern Canadian water resources and those that flow into the United States.*
- iii) *improve, understand and share information to help prepare for water supply changes.*
- iv) *providing new information on water resources that can underpin decision-making and policy development in western and northern Canada.*

Coldwater Overall Science Goals

- Advance our understanding and prediction of water and energy cycles in the western mountains and adjacent cold regions of Canada
- Improve our ability to assess change and predictive uncertainty in mountain and cold regions headwaters that arise from changing climate and land use
- *Ultimately* – contribute to the assessment of the long term sustainability of western and northern water resources

How to Move Forward

- US-Canada GEO testbed in Rockies
 - CGEO wants this to move forward but no funds....
 - NOAA NOHRSC running Snodas in region now.
- Mobilise resources, techniques, data management of water resources components of 3 current CFCAS-supported university-government research networks (45 investigators, IP3, DRI, WC2N) to a new integrated water resources sustainability initiative
 - Rocky Mountain Water Observation and Prediction System?
 - Ecohydrology and climate change initiative?