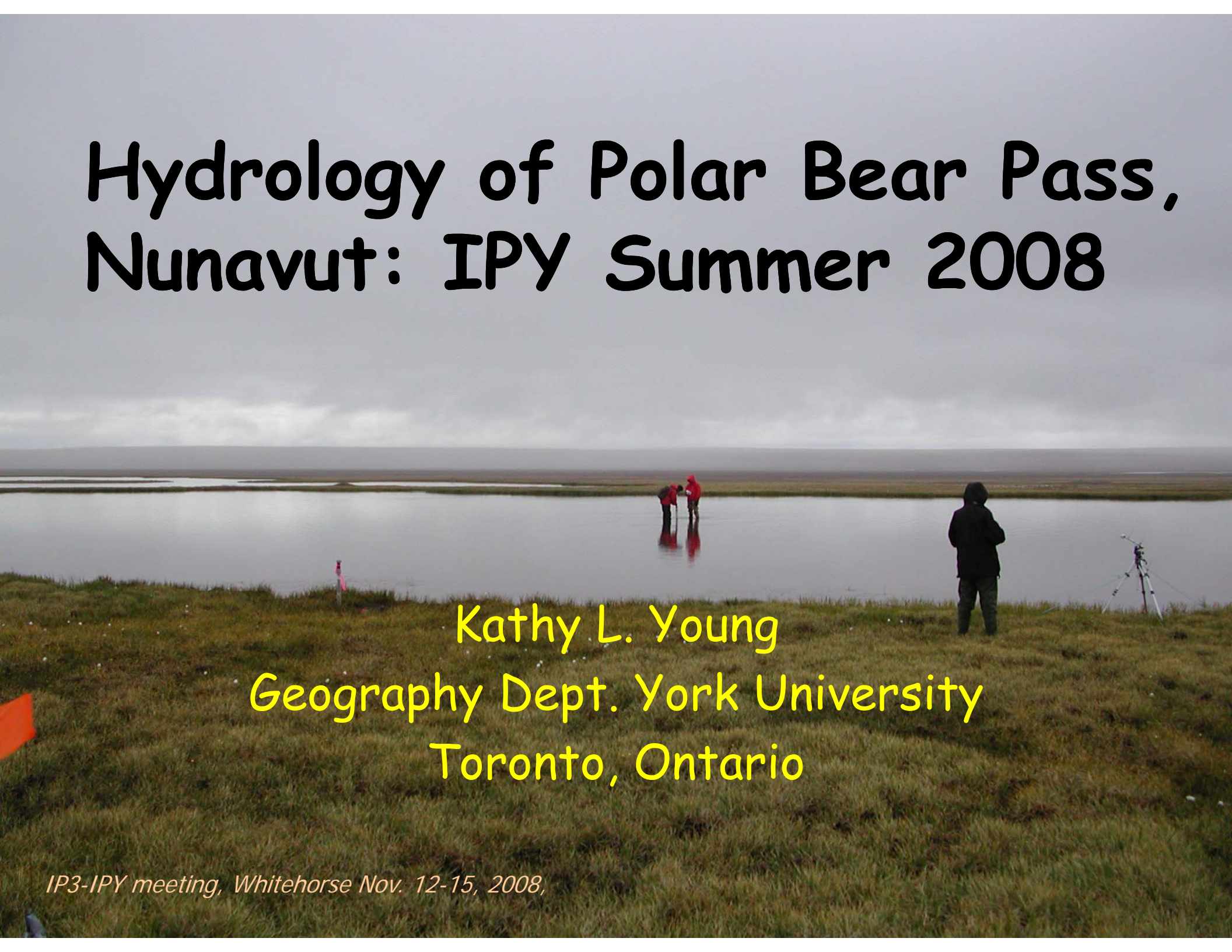
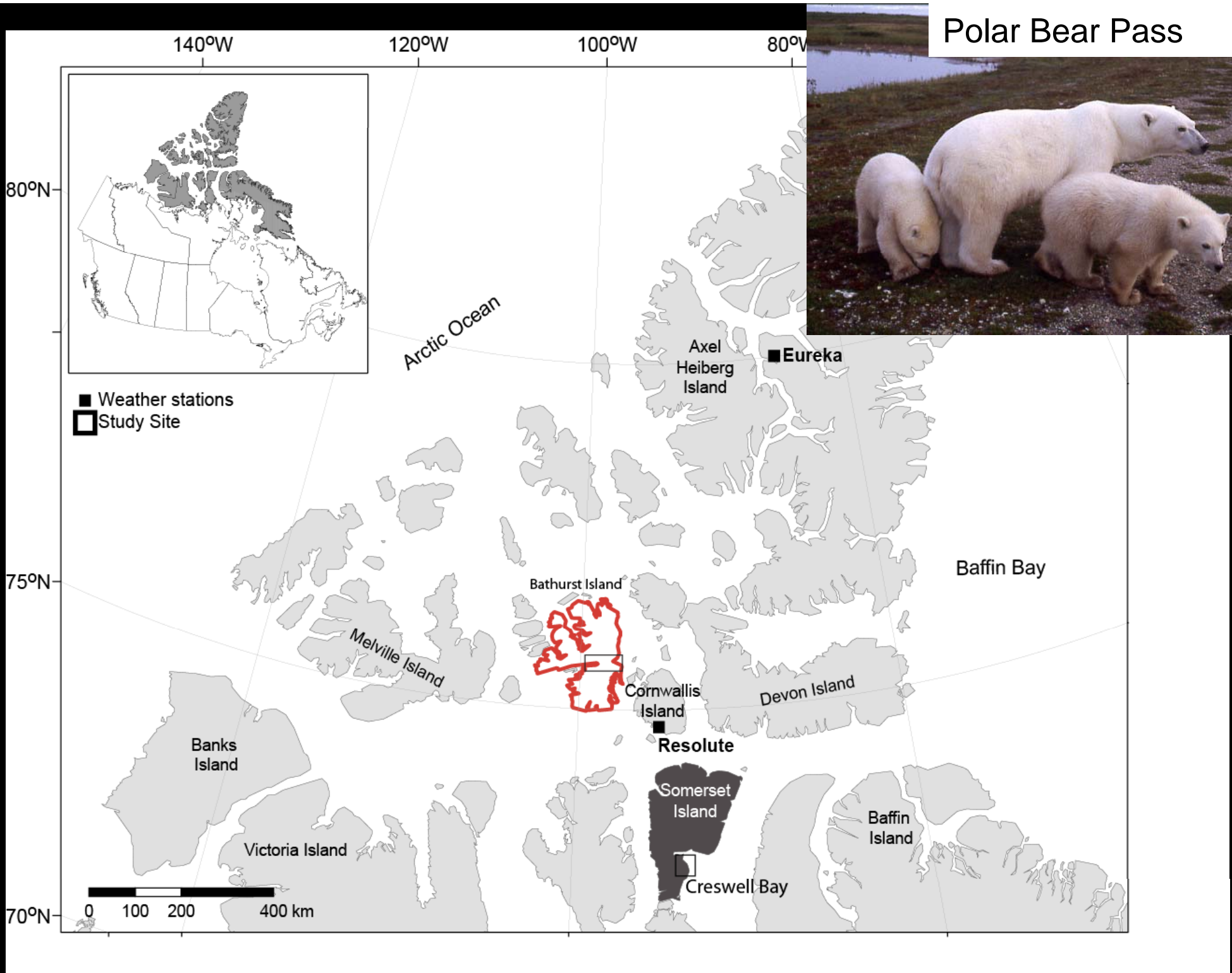


# Hydrology of Polar Bear Pass, Nunavut: IPY Summer 2008



Kathy L. Young  
Geography Dept. York University  
Toronto, Ontario

# Polar Bear Pass



# National Wildlife Area -100 km<sup>2</sup>

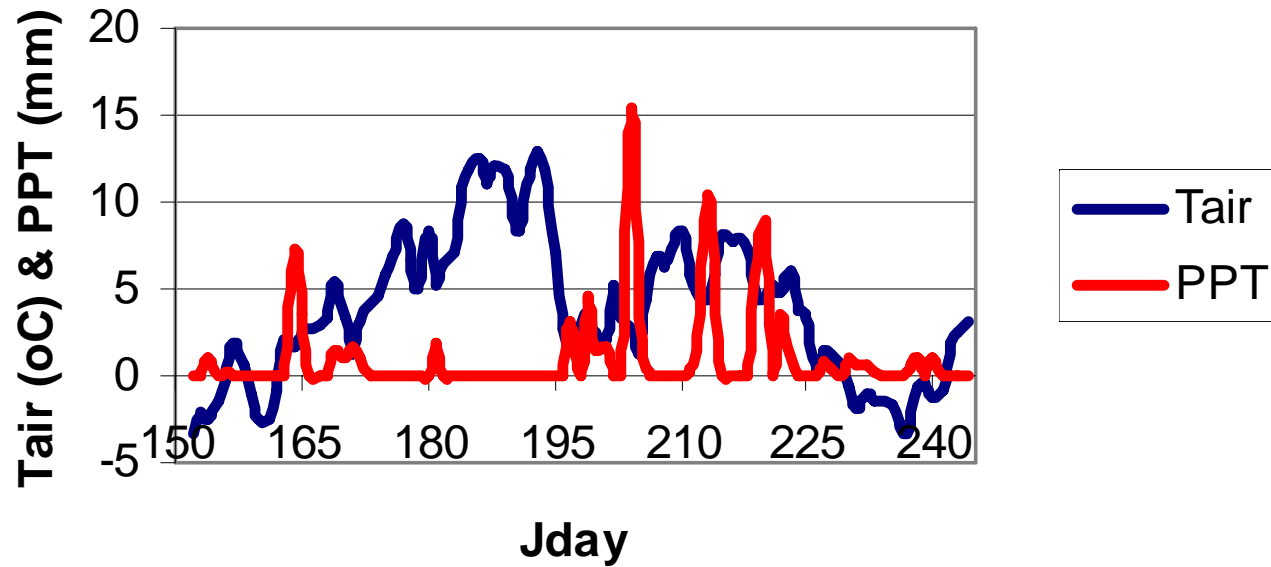


# Objectives

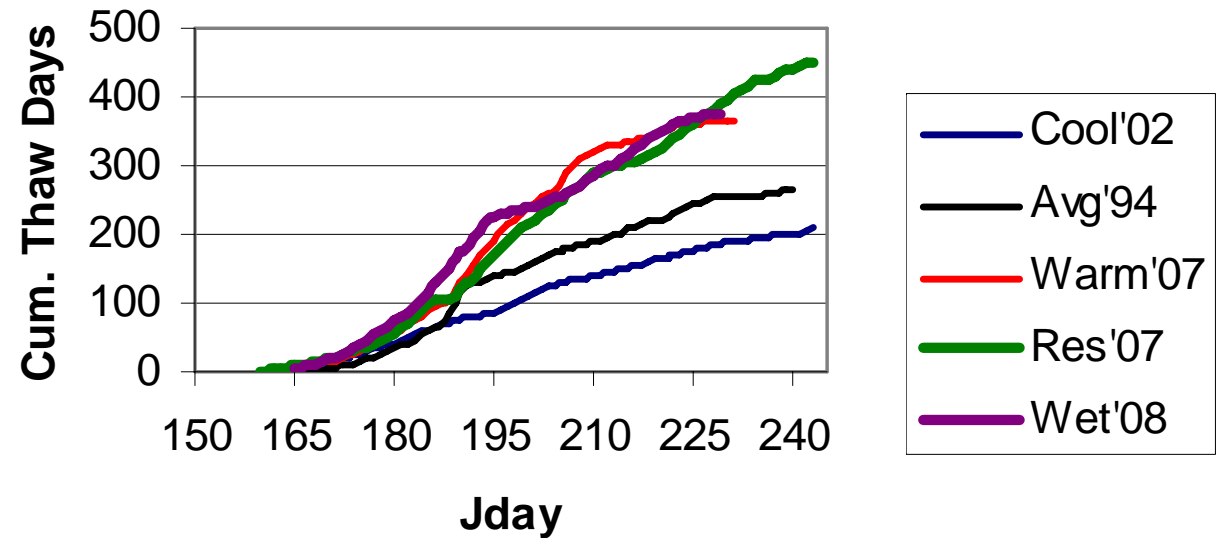
- **Long-term goal:** Improve understanding of the hydrology of low-gradient High Arctic regional wetlands
- **Short-term goals:**
  - Understand the Importance of Hillslope-Wetland linkages: hydrology\*\*, carbon flow
  - Pond Sustainability (linked, isolated, substrate control, ice richness)
  - Soil Moisture & Evaporation (*S. Munster & Julia Boike, Alfred Wegner Institute*)

# Summer Climate: 2008

June 1 to Aug. 31:  
Tair = 3.8°C; PPT > 90 mm  
(July Tair: 6.9°C)



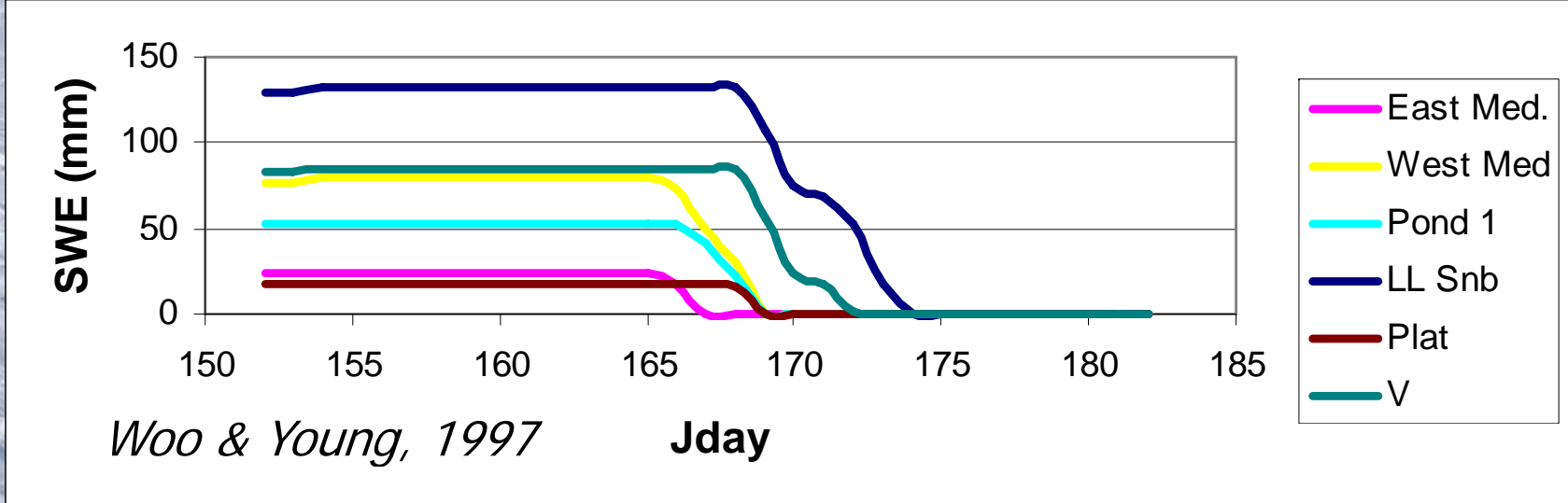
2008 ~ 2007  
ONLY WET



# End-of Winter Snowpack, May 2008



*Woo, 1997*



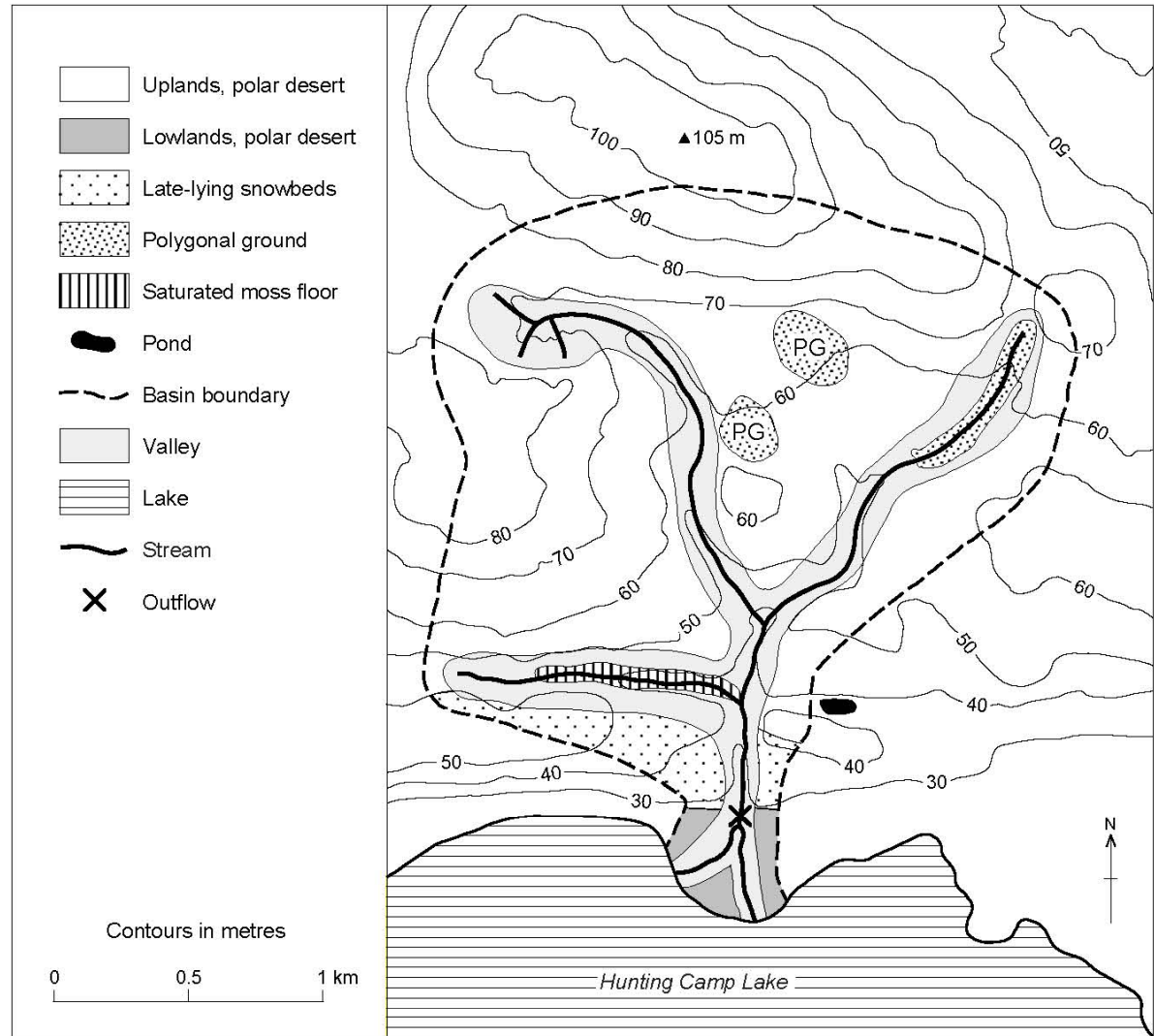
*Woo & Young, 1997*

**Jday**

# Hillslope-Wetland Linkage

## -Hillslope Creeks

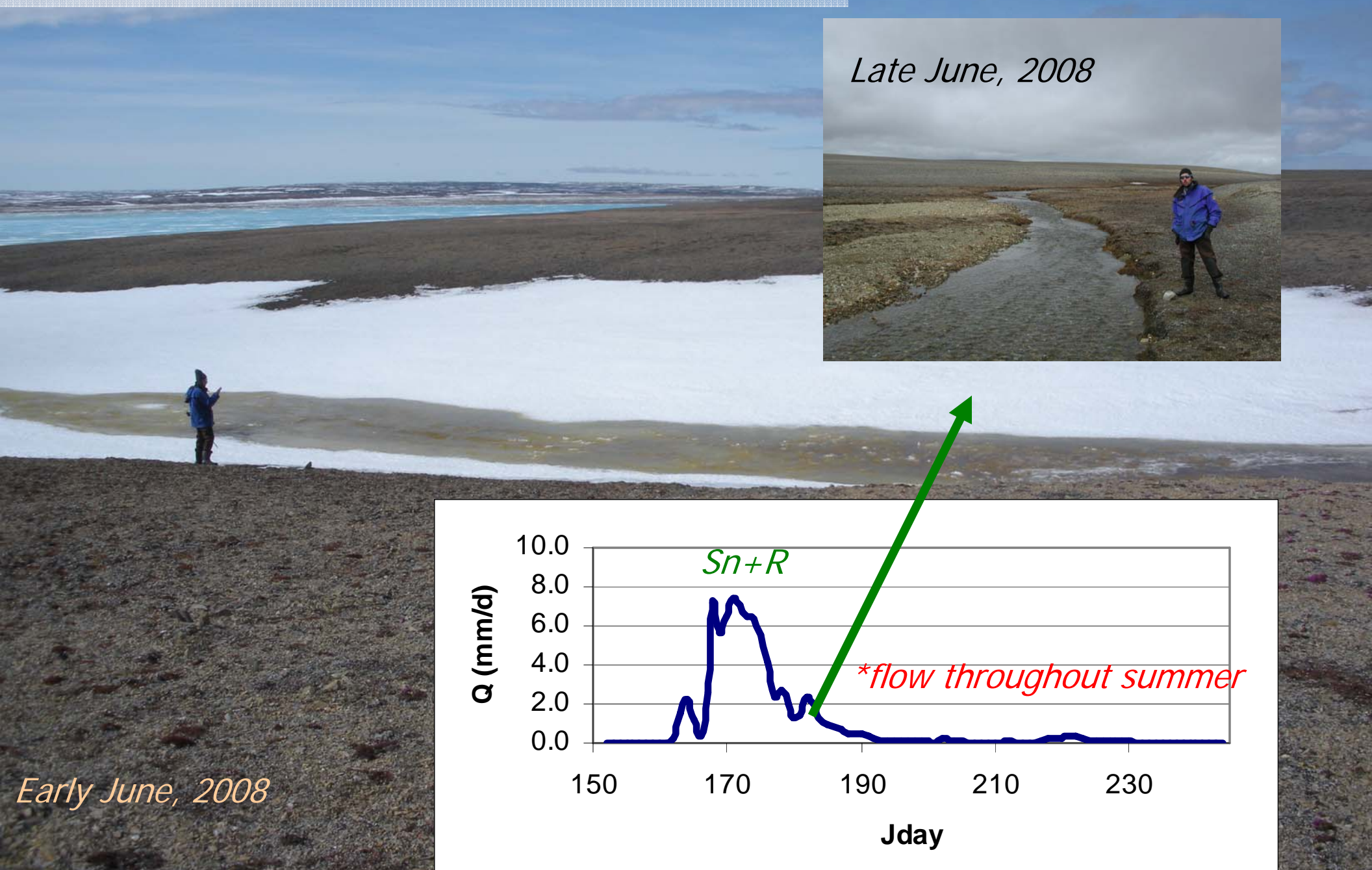
## Windy River



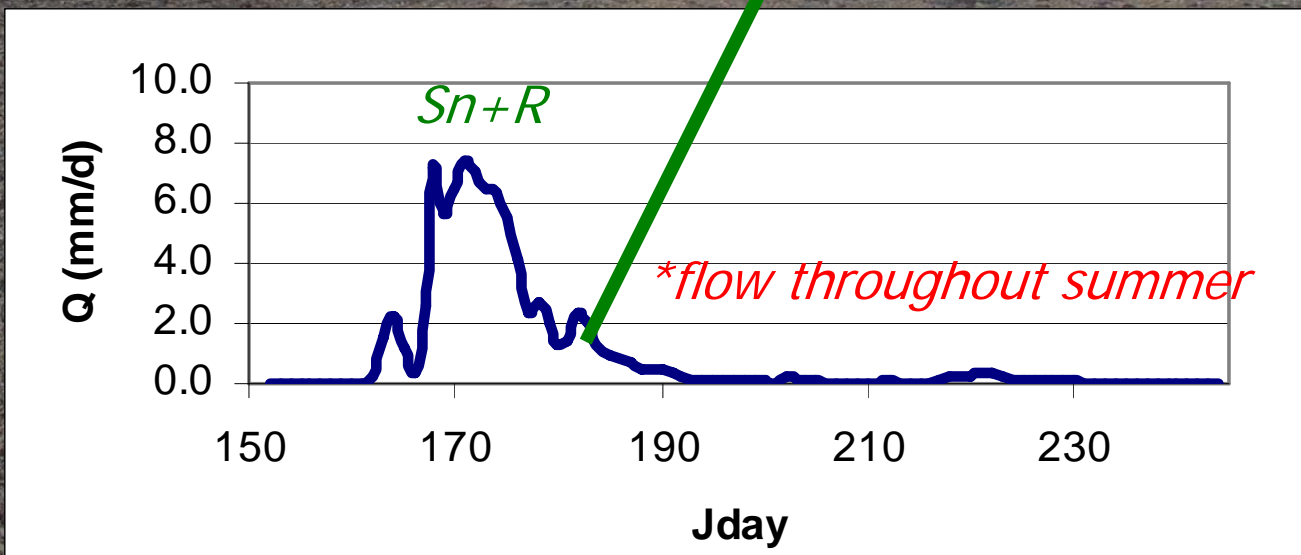
June 15, 2007

# Windy River

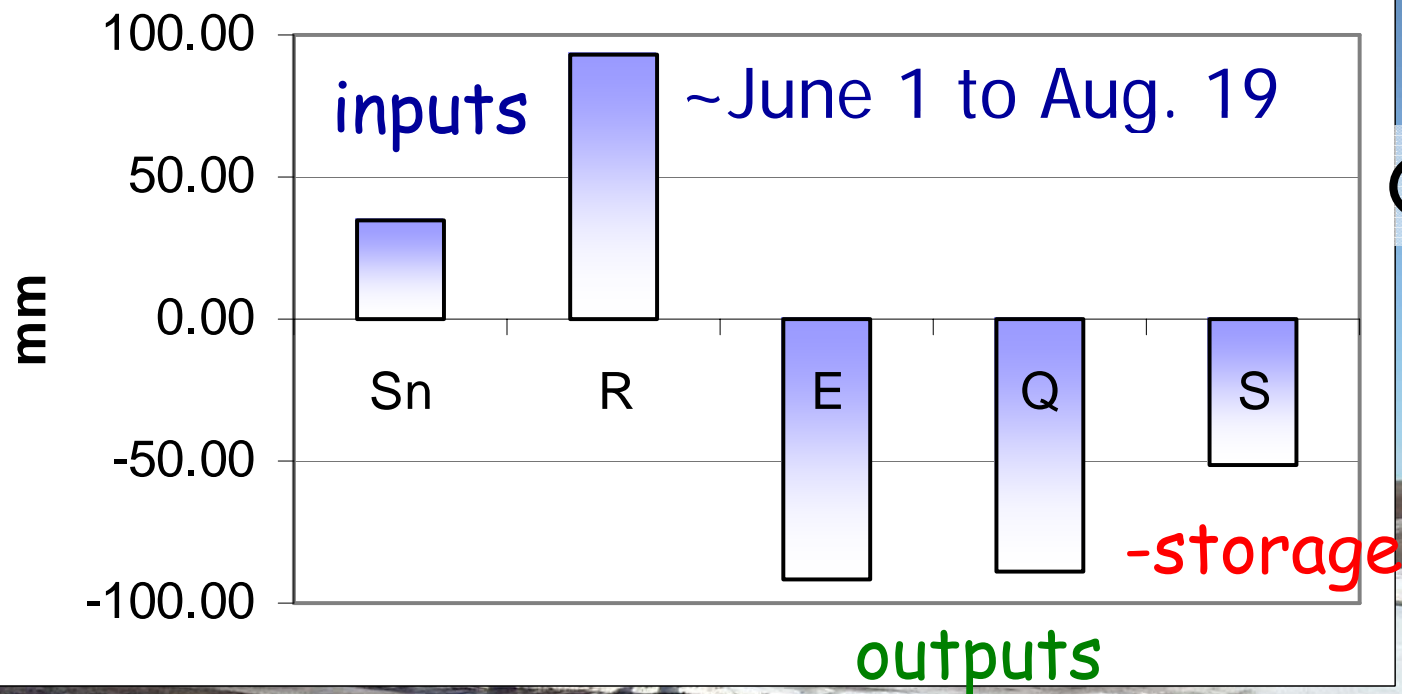
2<sup>nd</sup> order stream, ~4.2 km<sup>2</sup>



Early June, 2008







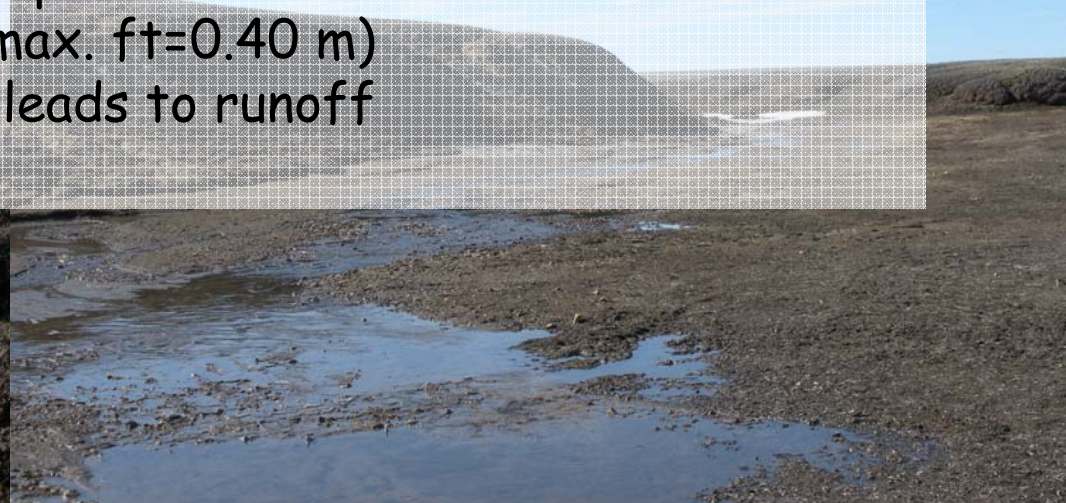
- snow underestimated?-area, shallow snowcover
- evap overestimated? (Rouse & Stewart, 1976)\*
- grnd. ice melt not yet considered?

# Why Continuous Discharge?

- basin size, summer PPT impt. (amount, timing)
- organic grnd. coverage & position in the basin

## Upper Tributary-Polygonal Ground

- effective snow trap?
- limited storage (max. ft=0.40 m)
- pooling of water, leads to runoff
- groundice melt?



## Lower Tributary-Moss Lined

- limited storage
- enhance runoff, prolong flow

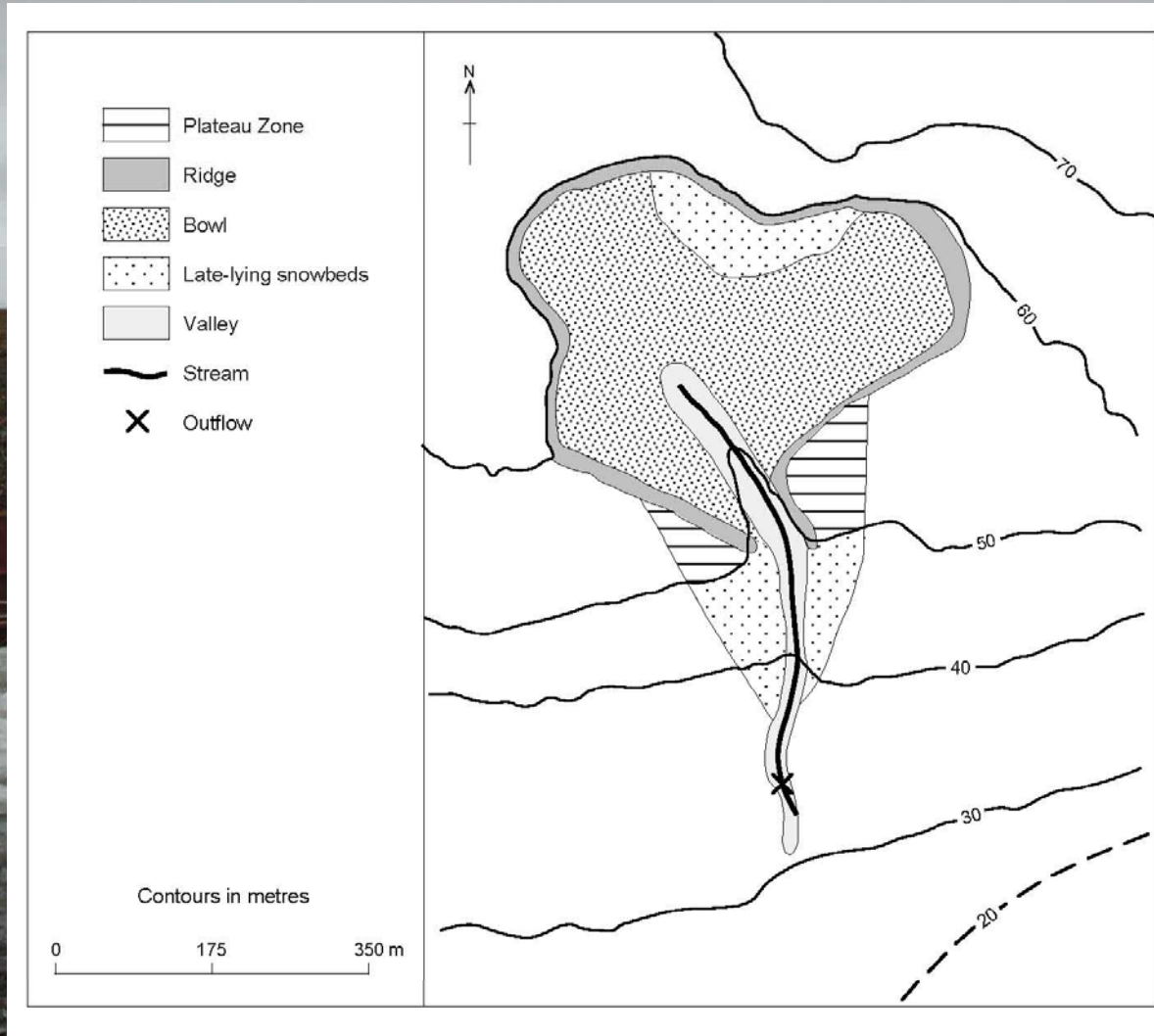


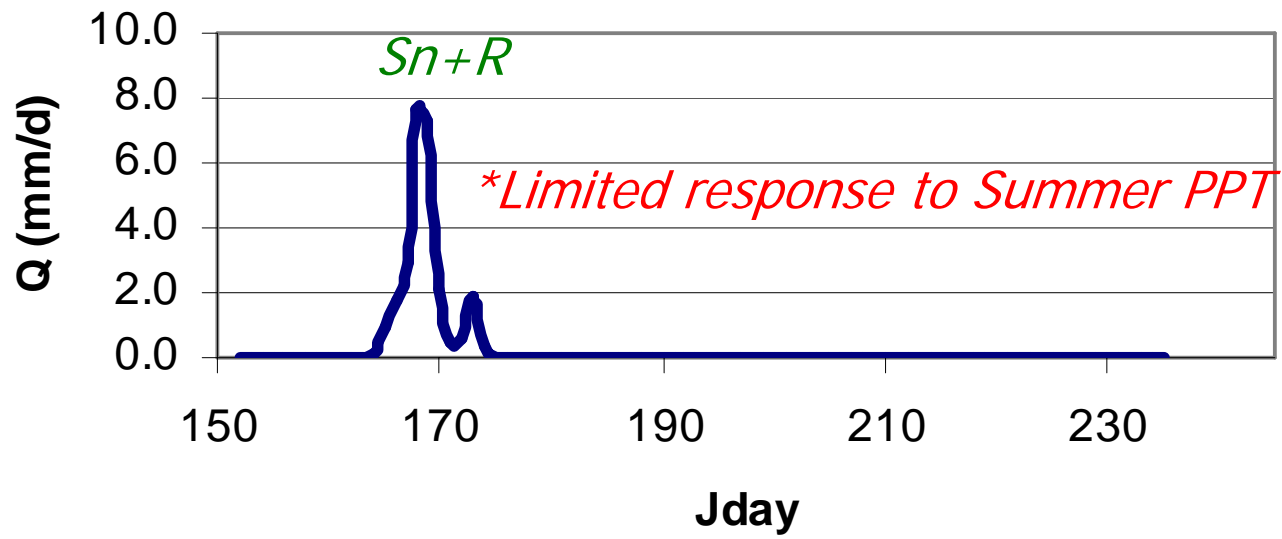
# Landing Strip Creek

1<sup>st</sup> order stream, ~0.2 km<sup>2</sup>

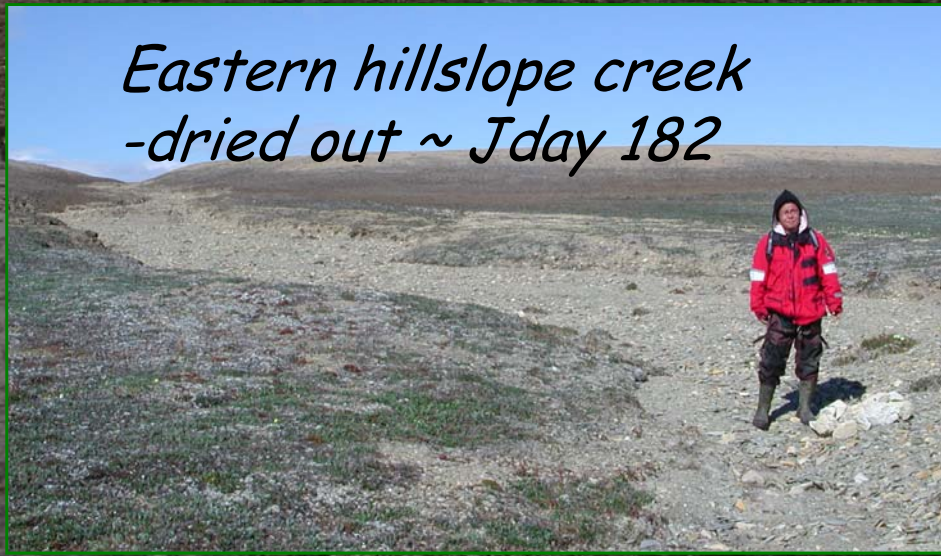


June 2007





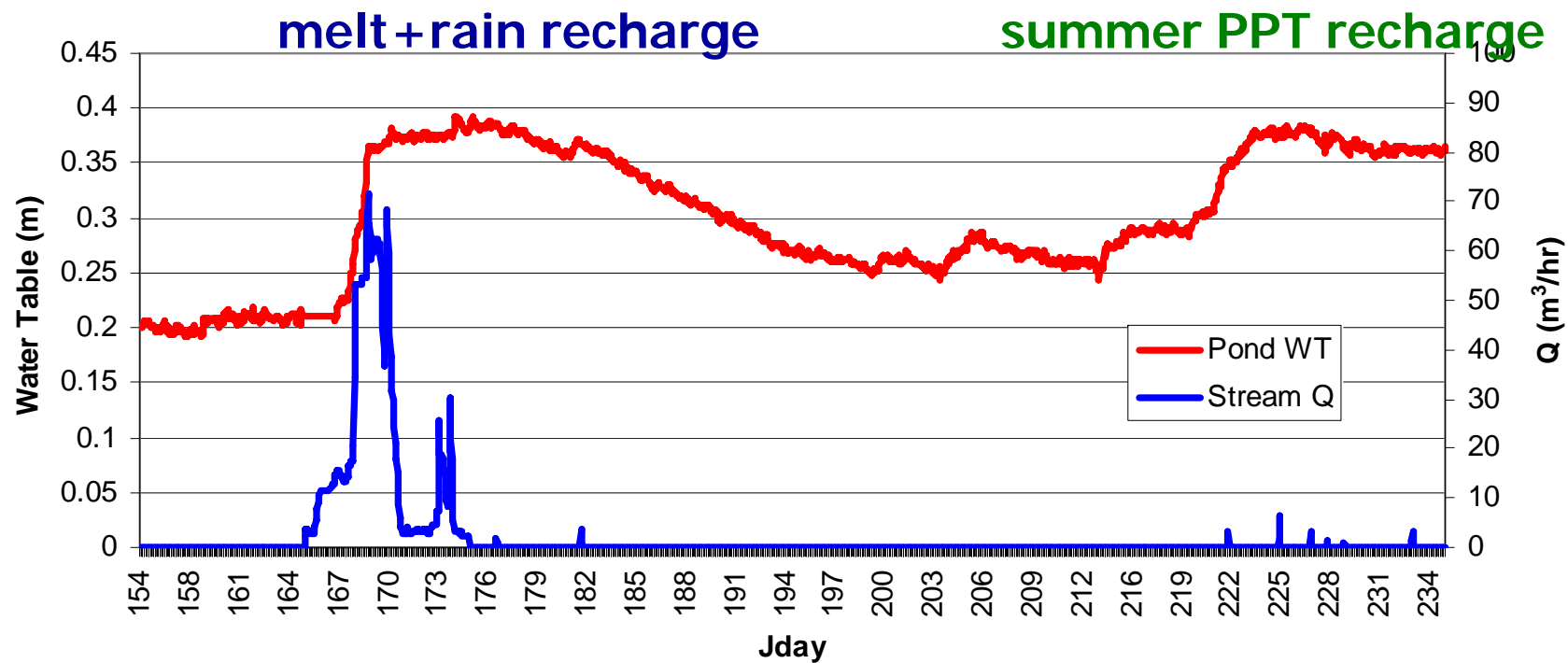
$$Q/(Sn+R) = 0.28$$

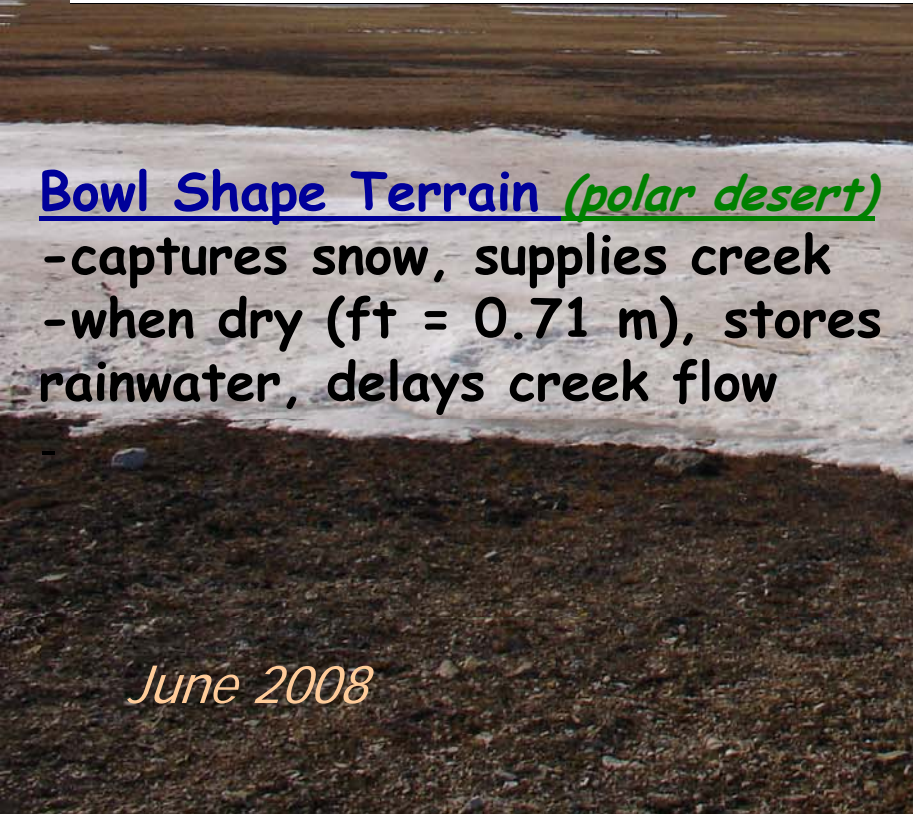
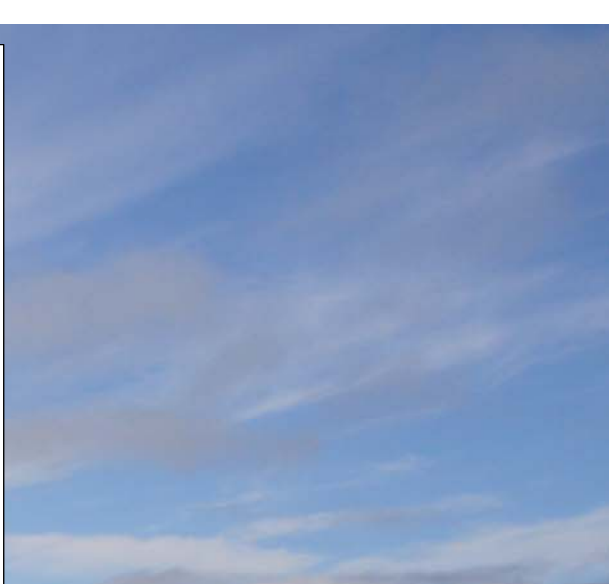
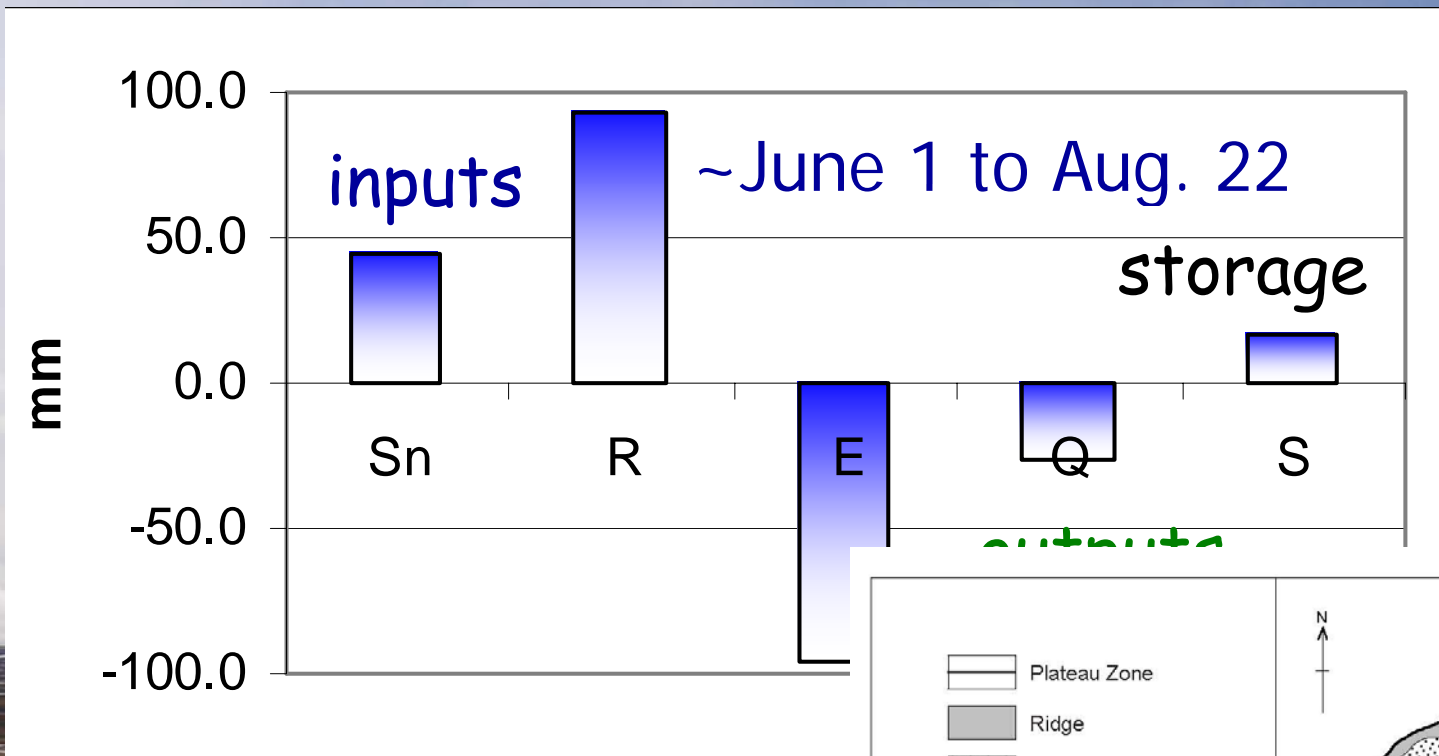


*Eastern hillslope creek  
-dried out ~ Jday 182*

# Linkage of Small Hillslope Creeks to Wetland Ponds is Still Important

Hourly Water Table Response, CR 1 Pond to Landing Strip Creek Discharge, 2008

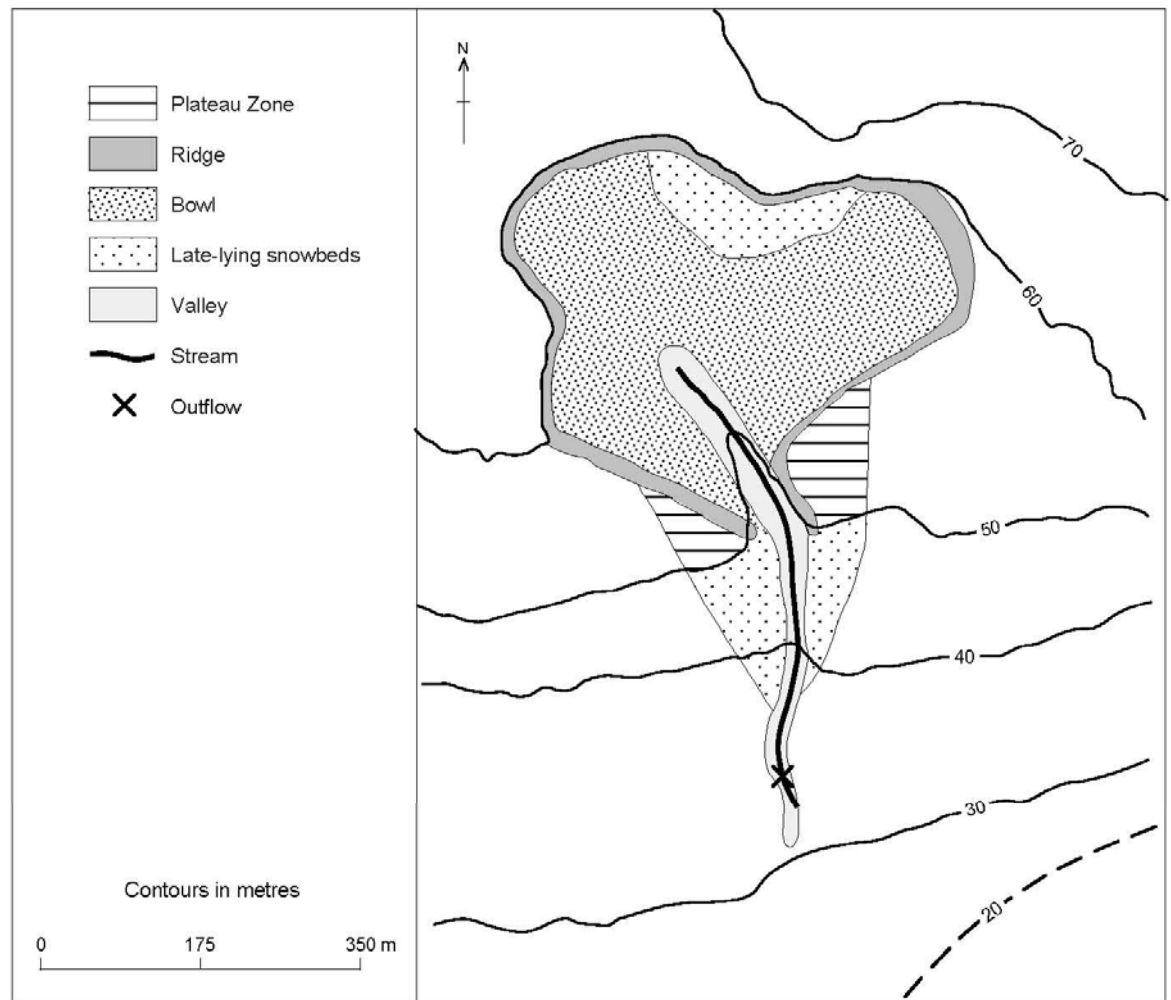




**Bowl Shape Terrain (polar desert)**

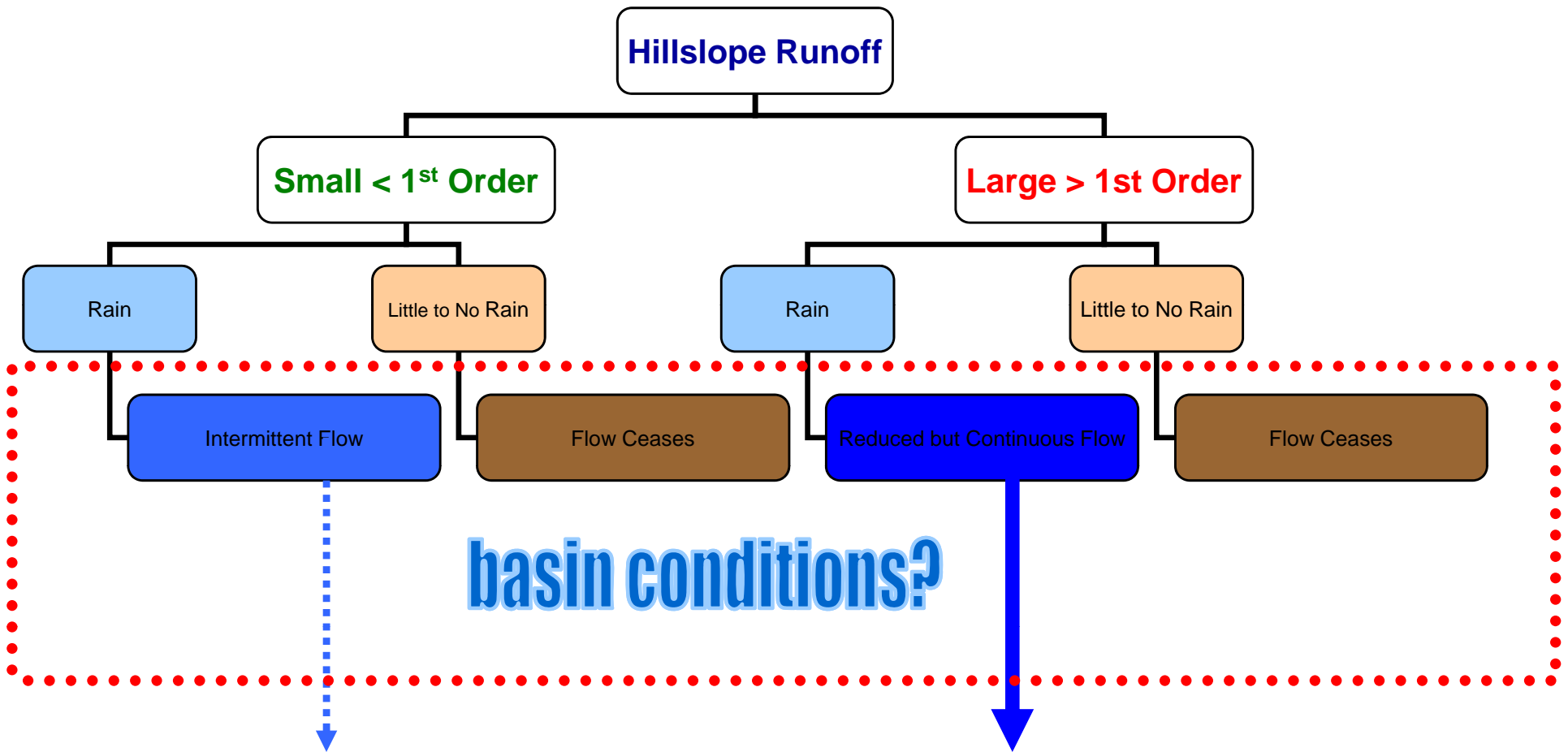
- captures snow, supplies creek
- when dry (ft = 0.71 m), stores rainwater, delays creek flow

*June 2008*

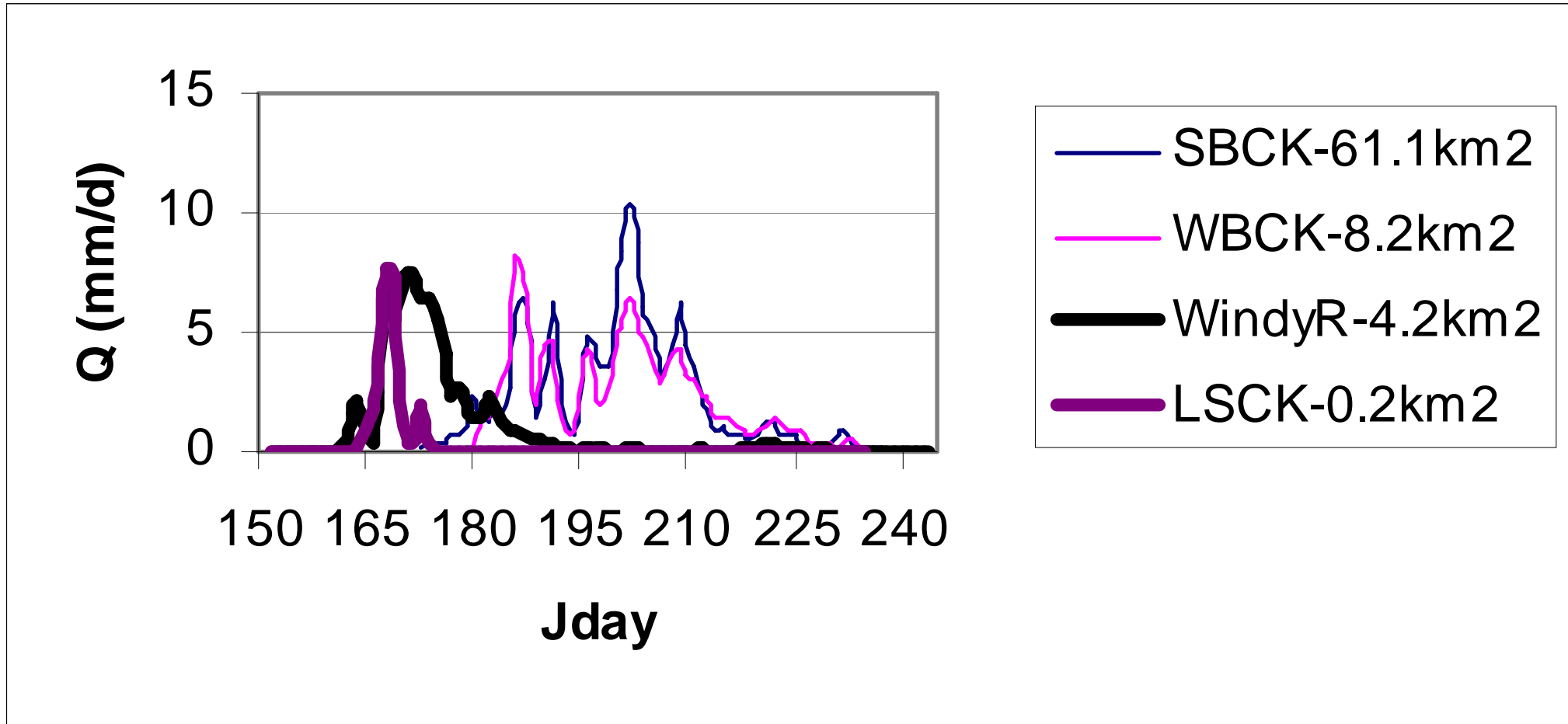


# Pattern of Hillslope-Wetland Linkage

## -Post-Snowmelt Period? *(based on 2007 & 2008 data)*



# Stream Discharge Comparison



*\*NOTE discharge data (1976) for Snowbird Creek and Whitebear Creek from Wedel et al. 1976*



# 2009 Summer Plans

## *Assess Freshwater Supply*

-expand snow survey



## *Hillslope-Wetland Linkage*

-expand creek network



## *Pond Connectivity*

-hydrology  
-carbon flux, terrestrial pathways  
-PBP vs. Cape Bounty



## *Soil Moisture, Ground ice & Evap,*

-cal./validate RS imagery (A. Wegner)



# 2008 Outreach



*PCSP 50<sup>th</sup> Anniversary, July 12*



- \*School Visit, Website: [polardiary.com](http://polardiary.com)*
- \*Training (snowcover, post snowmelt)*
- \*Community Open House at PBP, July 19*
- \*T.V. program, Turtle Island*



# 2009 Outreach

## 17th International NRB Symposium and Workshop

MANAGING HYDROLOGICAL UNCERTAINTY  
IN HIGH LATITUDE ENVIRONMENTS

### CALL FOR ABSTRACTS



The 17th International Northern Research Basins Symposium and Workshop will be held afloat in the Canadian Eastern Arctic (Iqaluit - Pangnirtung -Kuujjuaq), August 12 - 18 2009.

We invite delegates to submit abstracts to [nrb17@NorthernResearchBasins.com](mailto:nrb17@NorthernResearchBasins.com). Please see [www.northernresearchbasins.com/nrb17.html](http://www.northernresearchbasins.com/nrb17.html) for further details about abstract submissions as well as registration information

December 15, 2008  
January 10, 2009  
February 15, 2009  
May 28, 2009  
June 15, 2009

Abstract Due  
Abstract Acceptance Reply  
Registration & Payment  
Final Registration & Payment  
Final Paper Due



