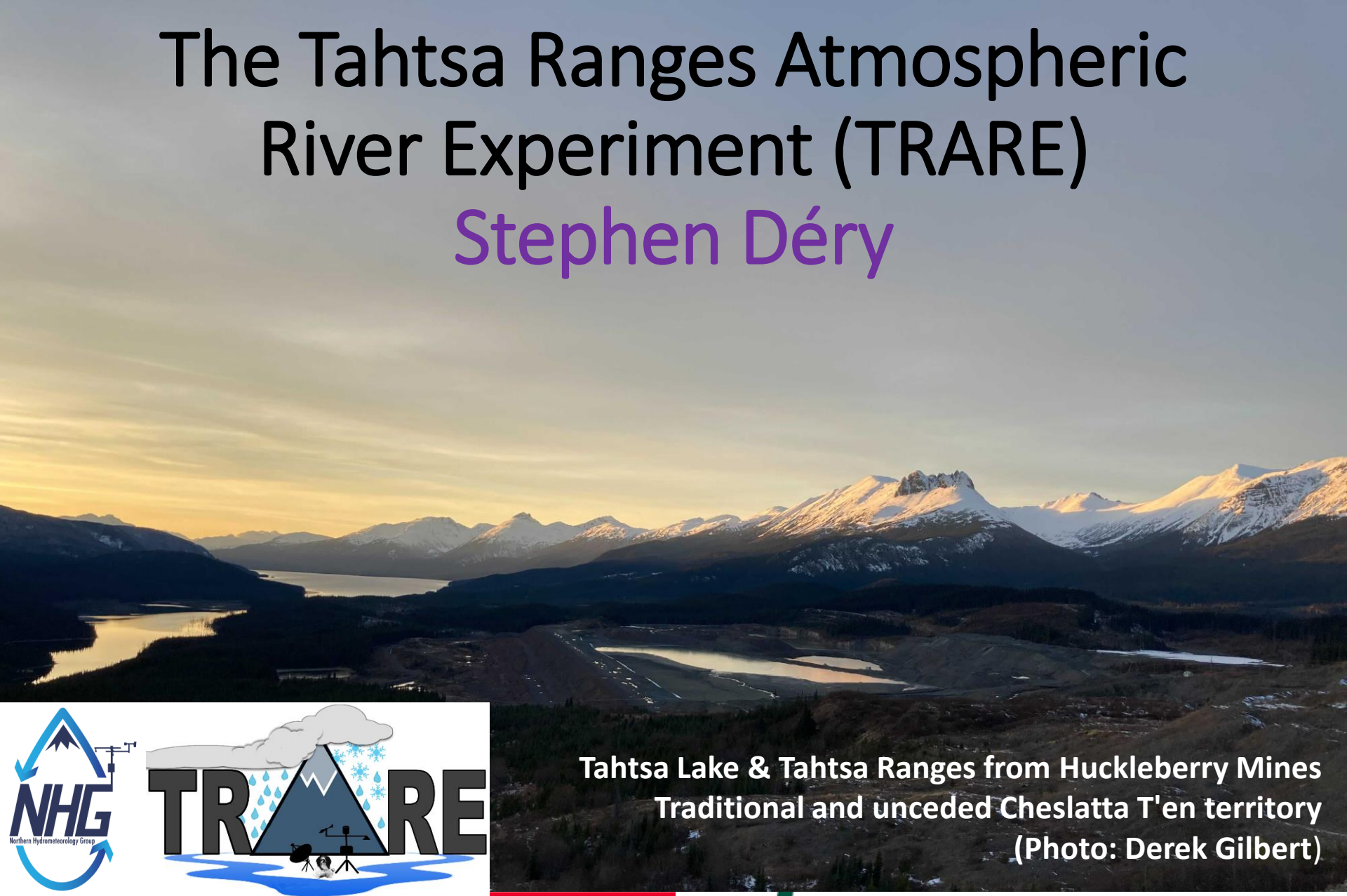
The Tahtsa Ranges Atmospheric River Experiment (TRARE)

Stephen Déry



Tahtsa Lake & Tahtsa Ranges from Huckleberry Mines
Traditional and unceded Cheslatta T'en territory
(Photo: Derek Gilbert)

NHG Northern Hydrometeorology Group

TRARE

NSERC CRSNG

RioTinto

UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

Atmospheric Rivers – Rivers in the Sky

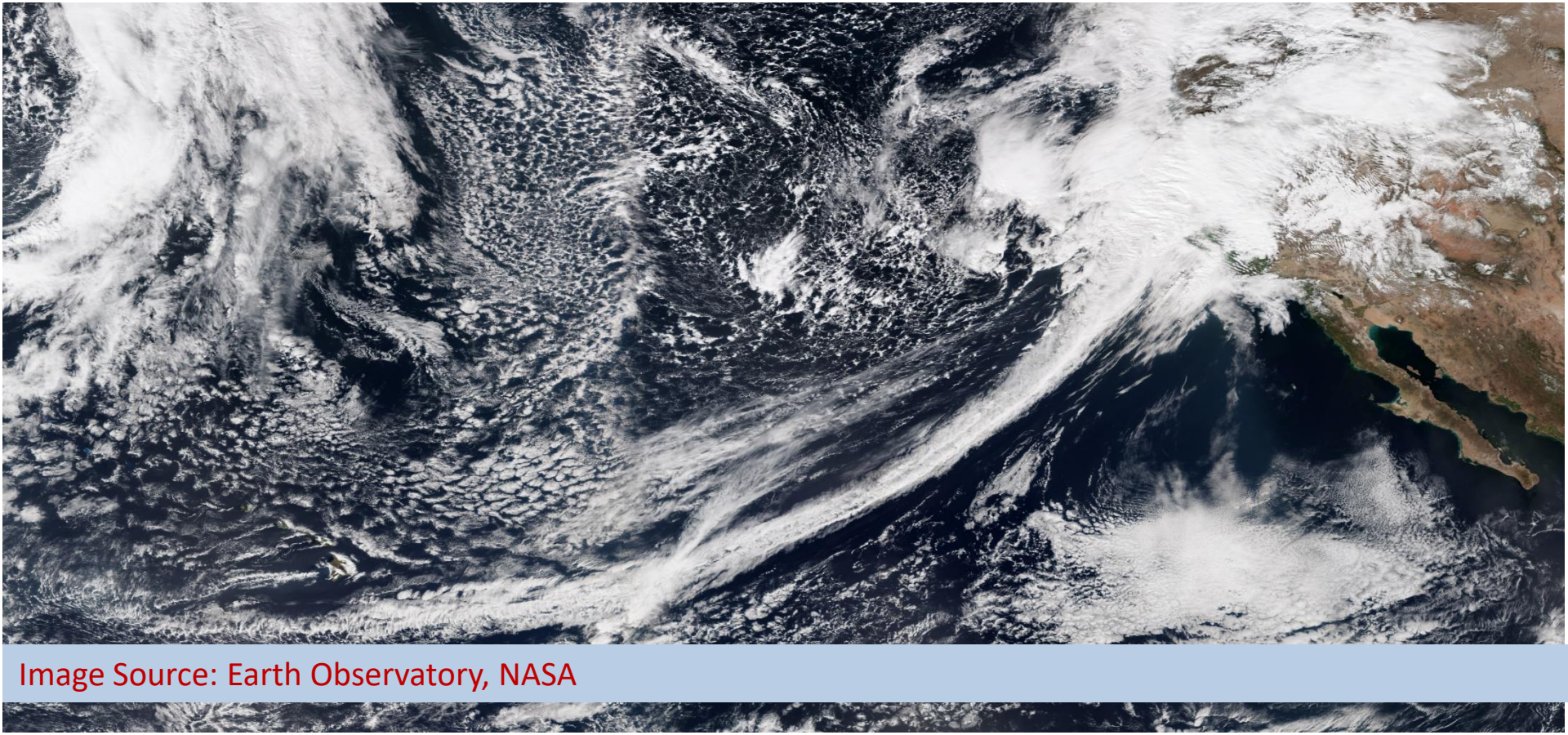


Image Source: Earth Observatory, NASA

"Atmospheric rivers are relatively long, narrow regions in the atmosphere – like rivers in the sky – that transport most of the water vapor outside of the tropics. These columns of vapor move with the weather, carrying an amount of water vapor roughly equivalent to the average flow of water at the mouth of the Mississippi River. When the atmospheric rivers make landfall, they often release this water vapor in the form of rain or snow." Source: NOAA

Atmospheric rivers & floods


Source: TranBC/BC MoTI

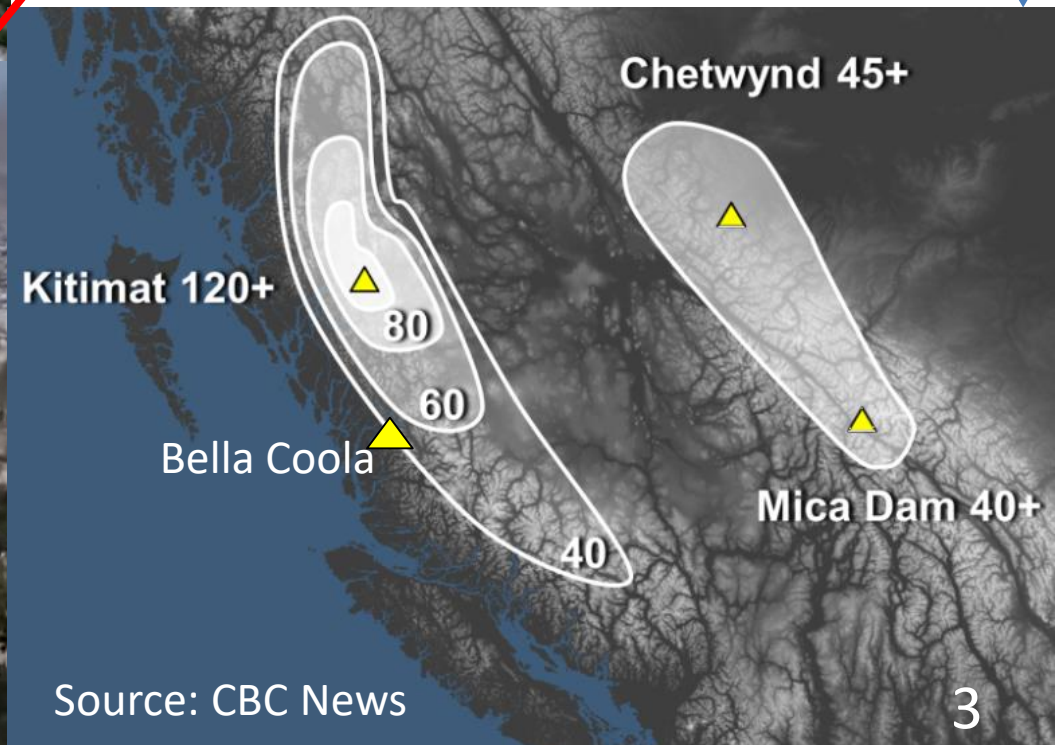
For 1979-2016, 78% of BC floods were caused by 'Pineapple Express' storms with damages >$500M

2010 Bella Coola floods induced by AR with 250 mm of rain, $45M in damages (1/200 year event)

Feb. 2015 Kitimat record snowfall ~2 m during AR, spring floods followed snowmelt

Nov. 2021 southern BC flood (277.5 mm in Hope)


Source: Wikipedia



Source: CBC News

TRARE Objectives

- tracking atmospheric and terrestrial pathways of storm-generated precipitation in the upper Nechako Watershed;
- understanding precipitation formation, distribution and extremes on the western and eastern slopes of the Coast Mountains;
- training highly qualified personnel (HQP) on the operation of state-of-the-art meteorological equipment, real-time weather forecasting, storm monitoring, data interpretation, and remote field work skills.

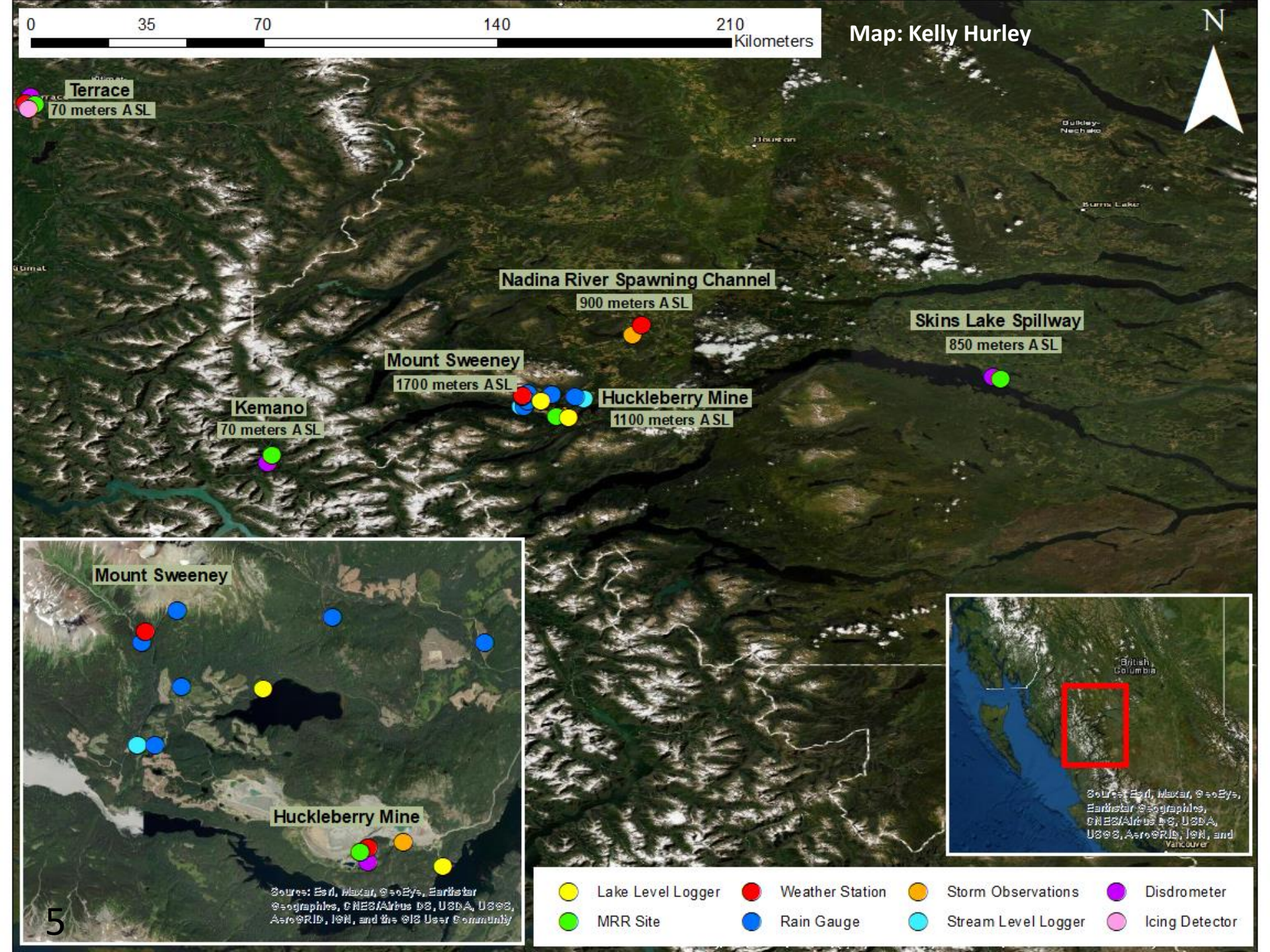

0
35
70
140
210
Kilometers
Map: Kelly Hurley
N
Terrace
70 meters ASL
Nadina River Spawning Channel
900 meters ASL
Skins Lake Spillway
850 meters ASL
Mount Sweeney
1700 meters ASL
Huckleberry Mine
1100 meters ASL
Kemano
70 meters ASL
Mount Sweeney
Huckleberry Mine
British Columbia
Vancouver
Lake Level Logger
Weather Station
Storm Observations
Disdrometer
MRR Site
Rain Gauge
Stream Level Logger
Icing Detector

Photo: Derek Gilbert

Hot Plate

Micro Rain Radar

Optical Disdrometer

Weather Station

Mt. Sweeney

Photos: NHG

Nadina River Spawning Channel

Mt. Sweeney tipping bucket rain gauge

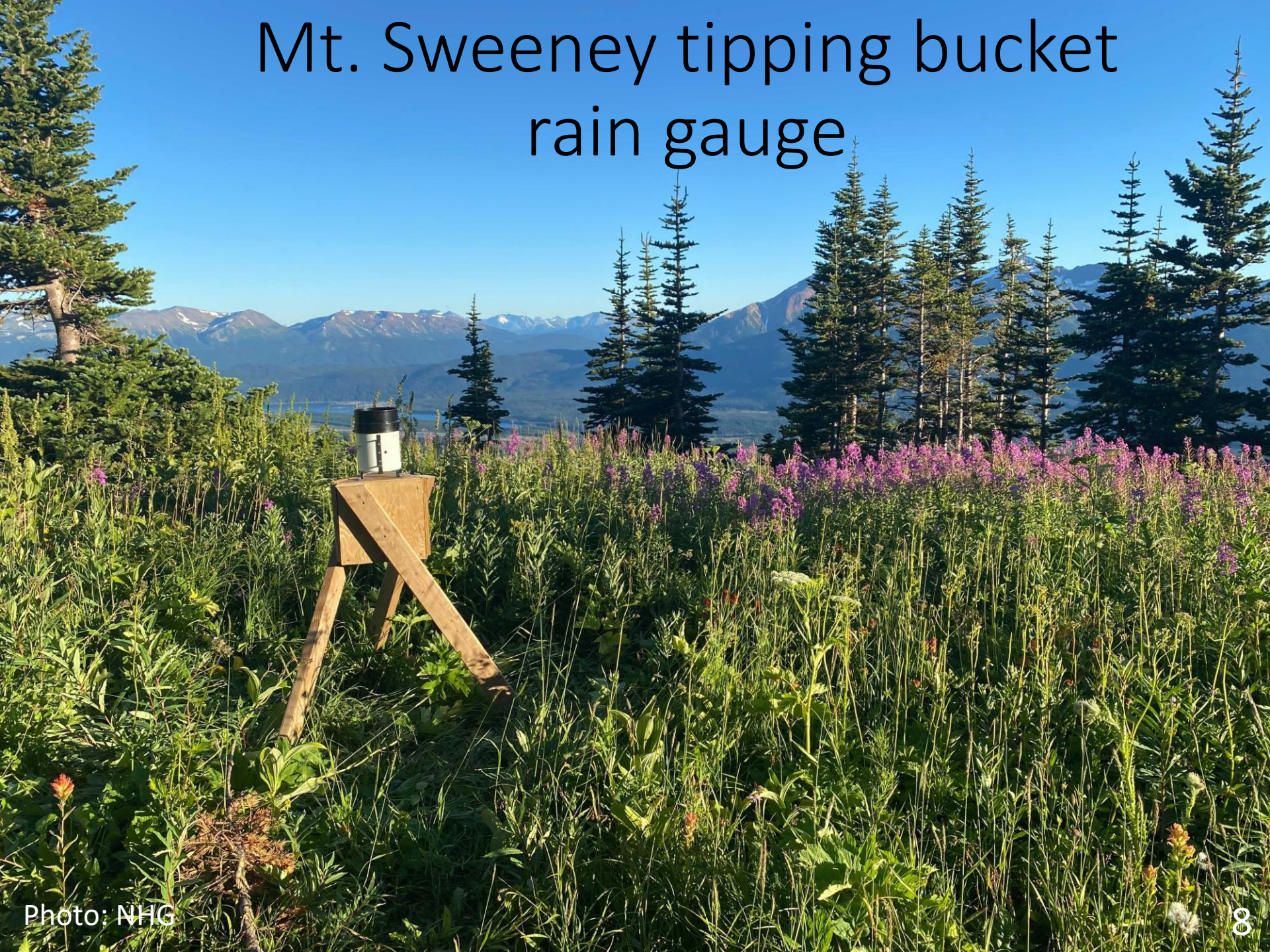
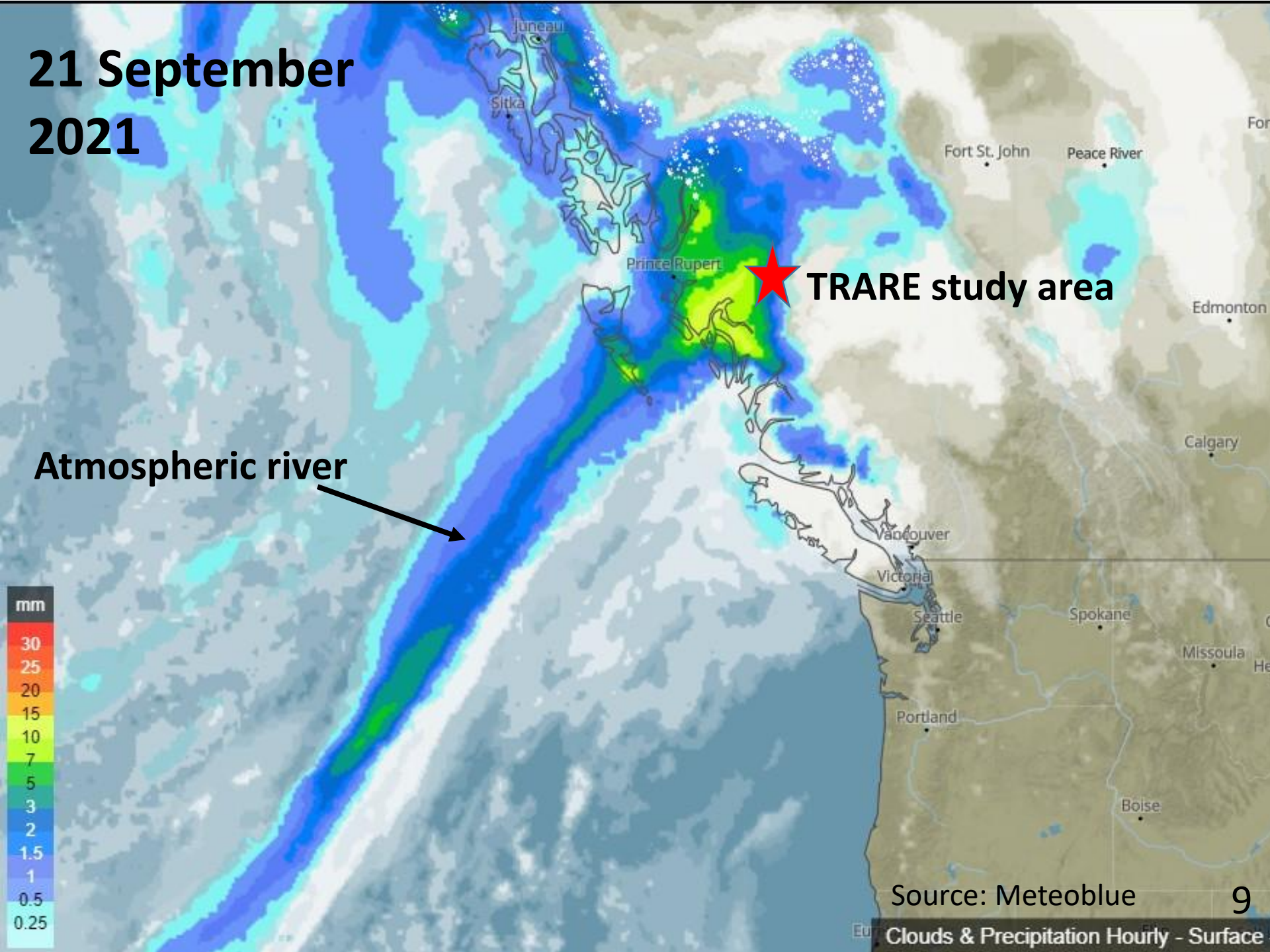
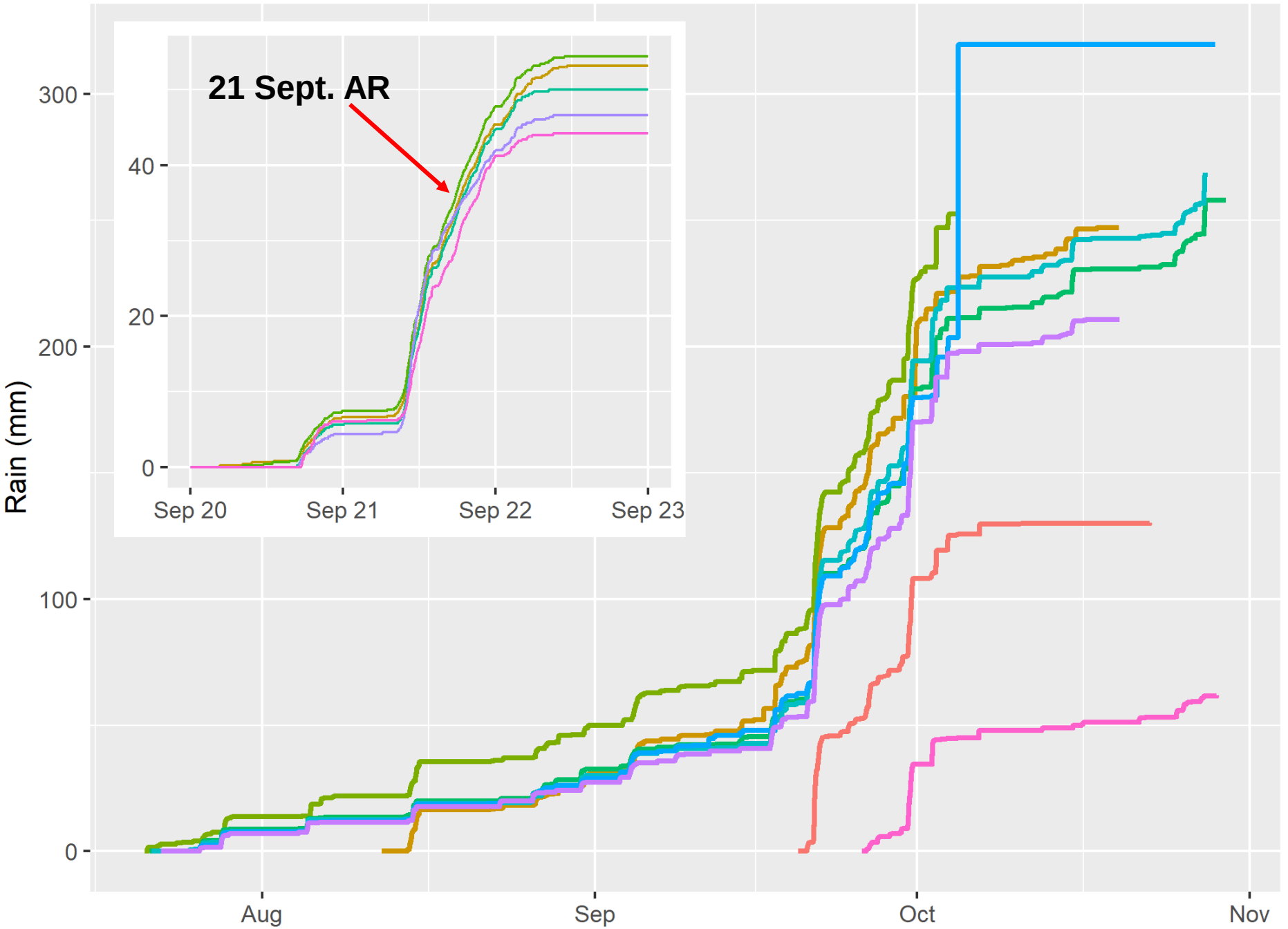


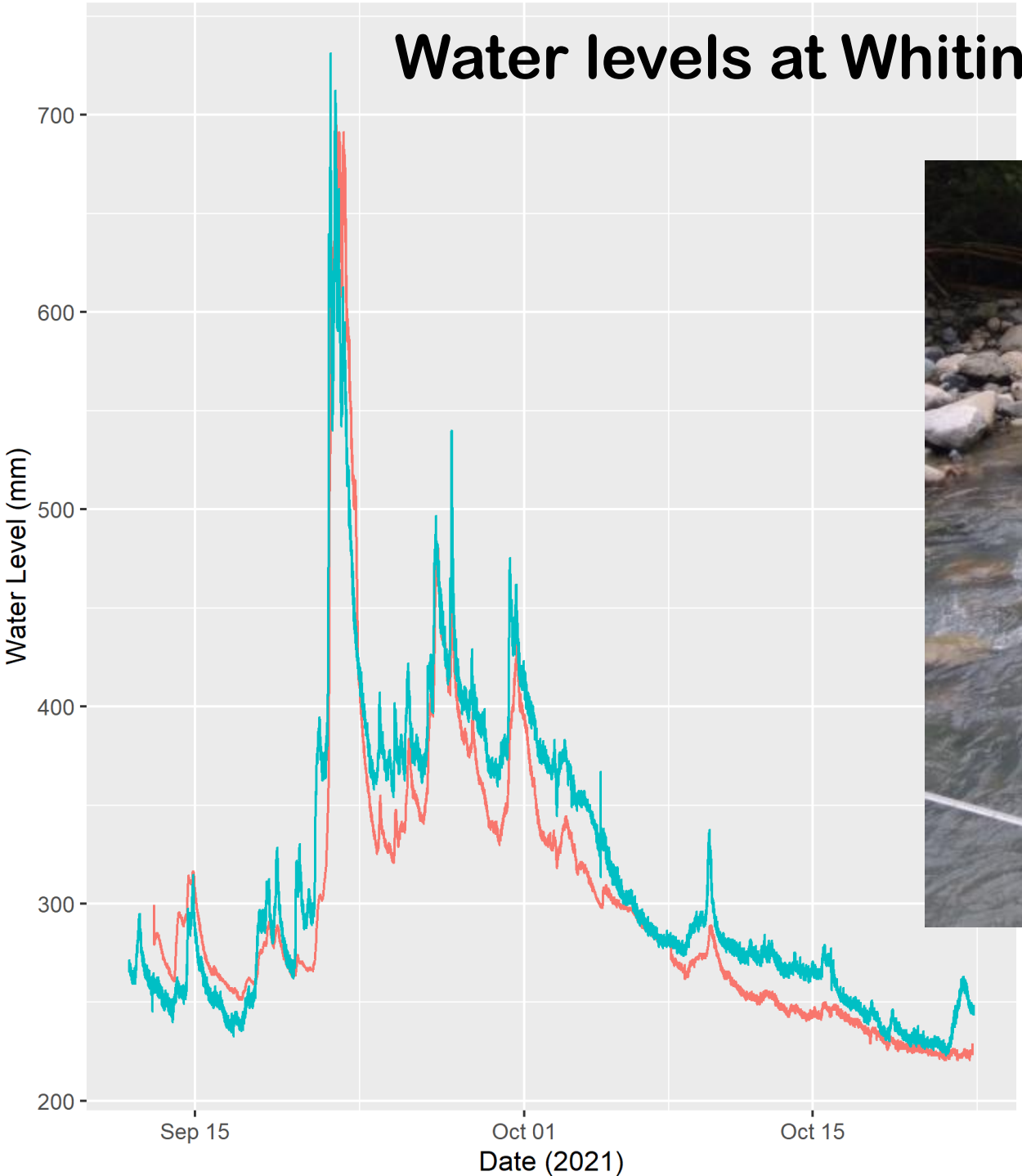
Photo: NHG


21 September 2021
Juneau
Sitka
Fort St. John
Peace River
Prince Rupert
TRARE study area
Edmonton
Calgary
Atmospheric river
Vancouver
Victoria
Seattle
Spokane
Missoula
Portland
Boise
mm
30
25
20
15
10
7
5
3
2
1.5
1
0.5
0.25
Source: Meteoblue
Clouds & Precipitation Hourly - Surface

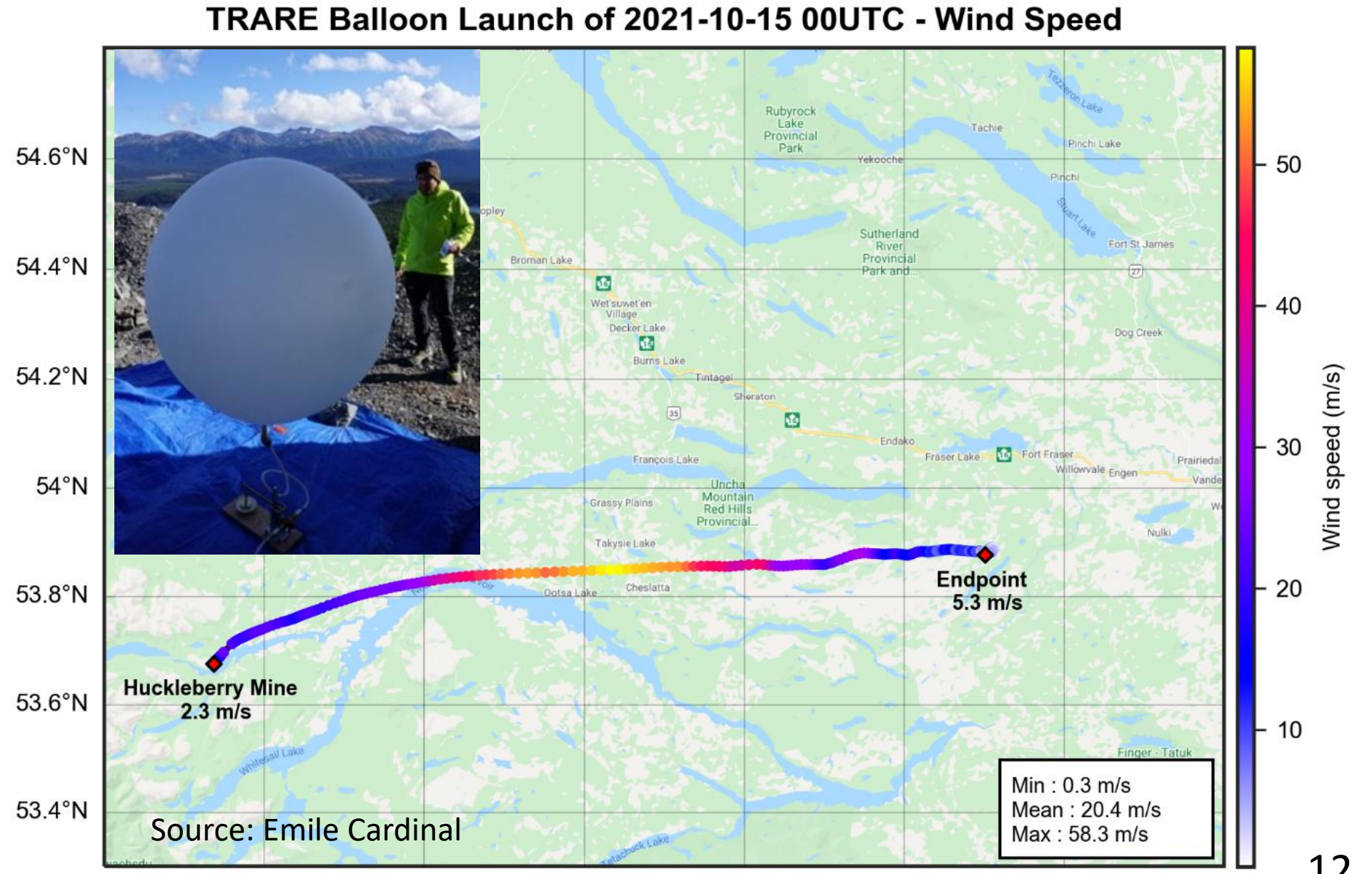
Precipitation in the Nechako Watershed



Water levels at Whiting & Rhine Creeks

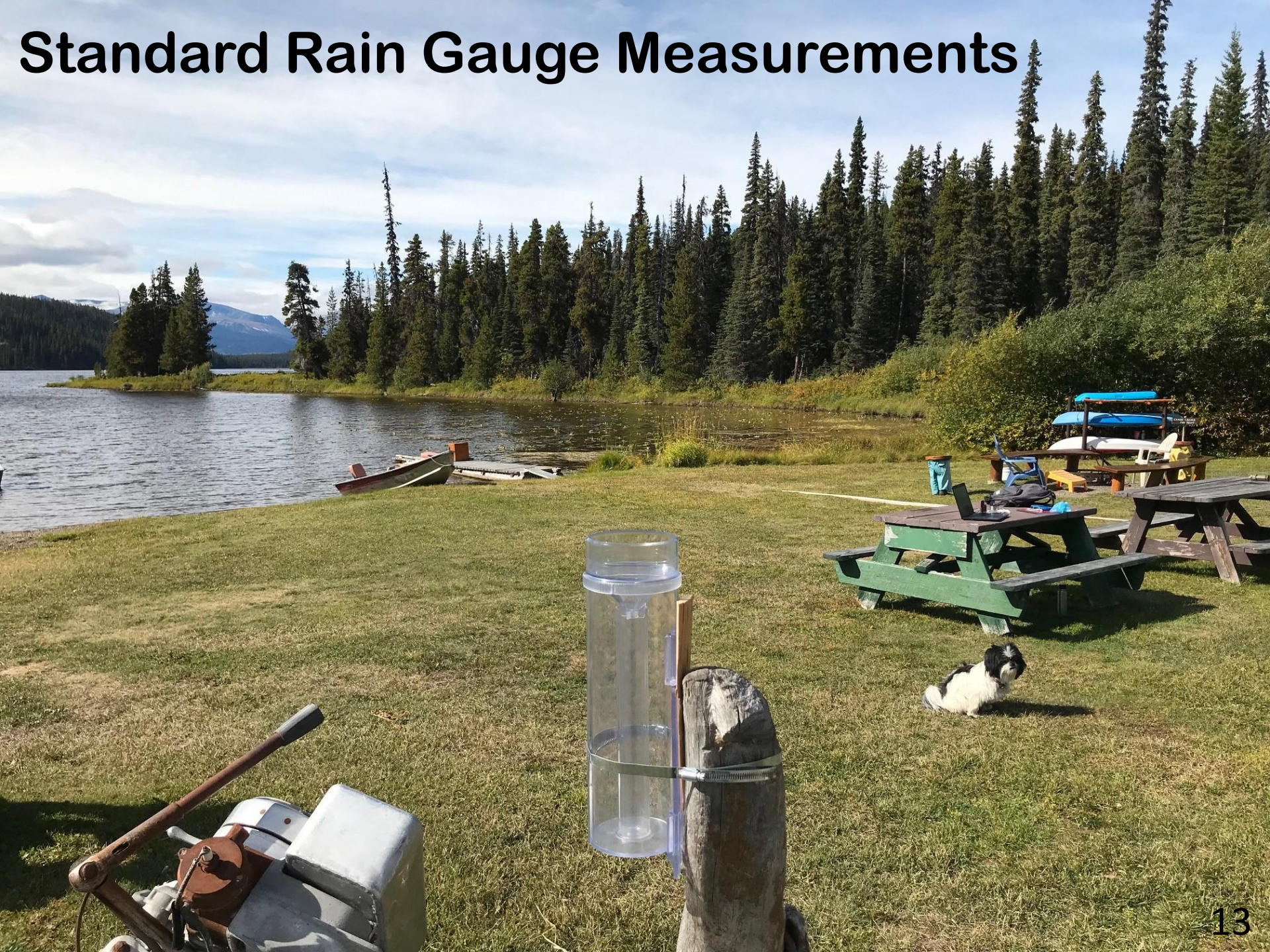


Weather balloon & radiosonde trajectory



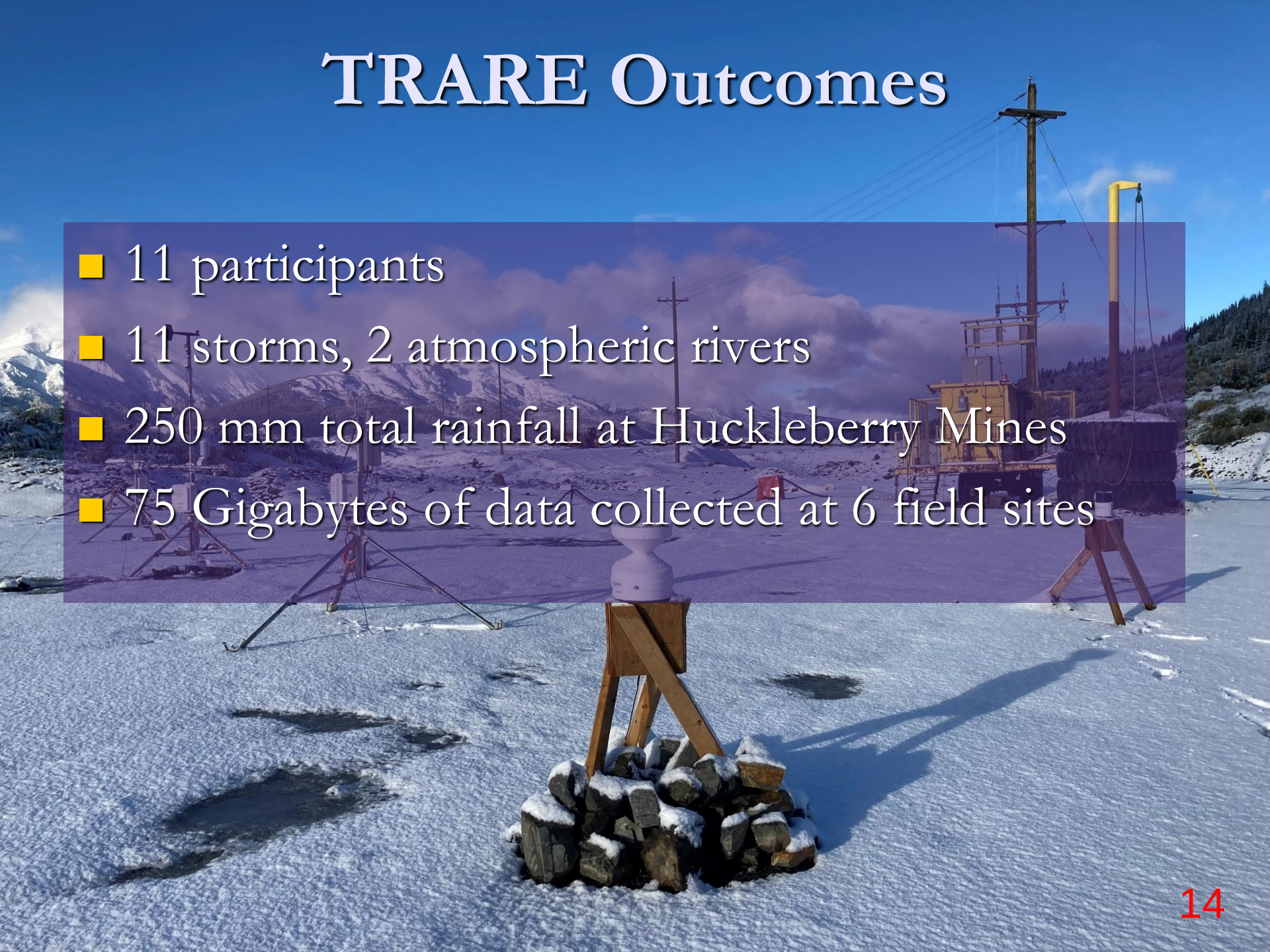
Source: Emile Cardinal

Standard Rain Gauge Measurements



TRARE Outcomes

- 11 participants
- 11 storms, 2 atmospheric rivers
- 250 mm total rainfall at Huckleberry Mines
- 75 Gigabytes of data collected at 6 field sites



Relevance to the WEI process

- With climate change, the number and intensity of atmospheric rivers influencing the Nechako is expected to increase substantially in the 21st century
- Future water management needs to consider the potential impacts of such storms on reservoir levels

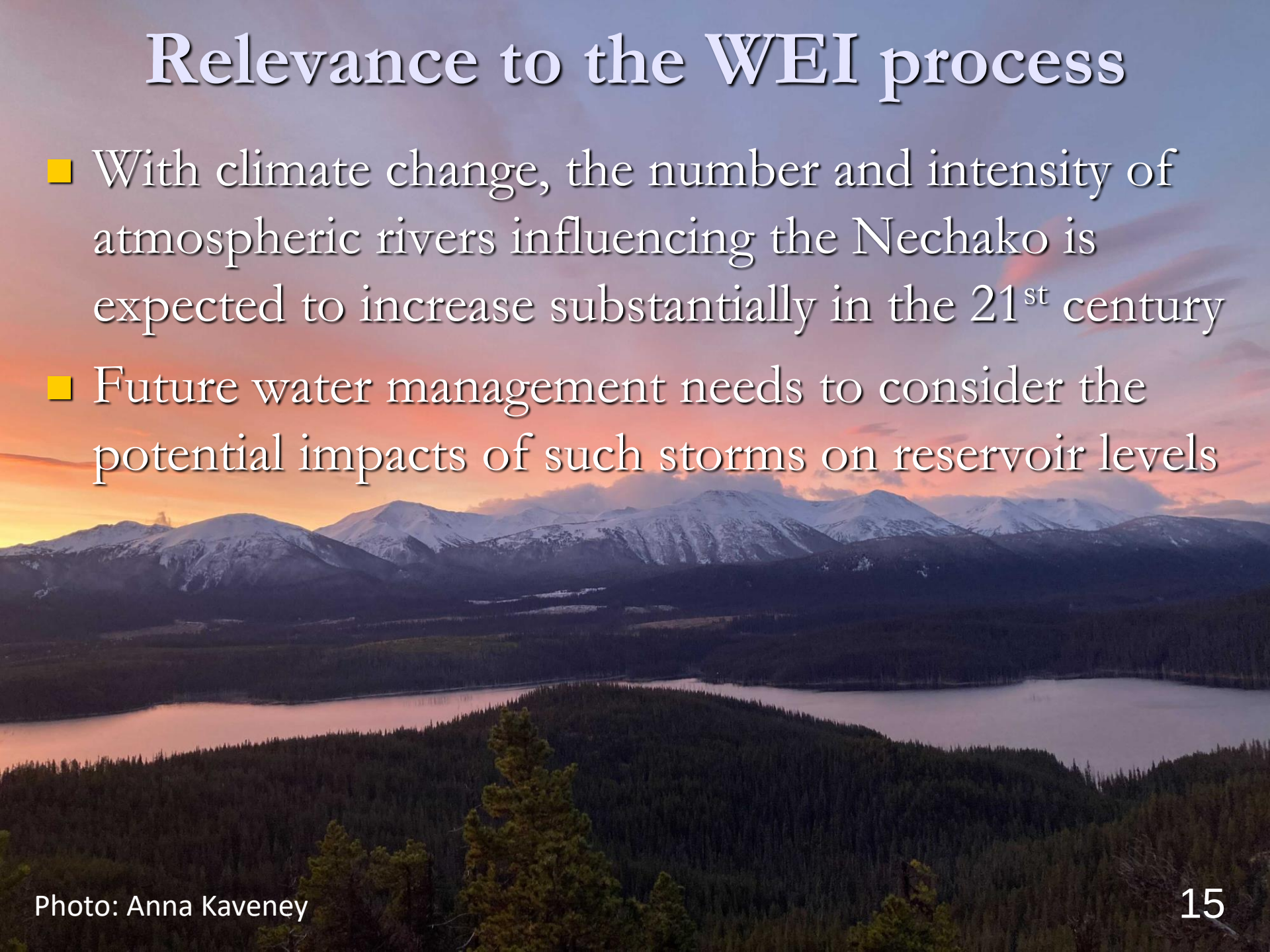


Photo: Anna Kaveney

Find out more about TRARE

- UNBC press release
- CICK News Podcast
- Prince George Citizen article
- CBC Daybreak North interview
- TRARE website (http://web.unbc.ca/~sdery/irc/trare.php)
- Nechako IRC Newsletter

Thanks to all our partners and sponsors!

NSERC CRSNG

Rio Tinto

UNBC University of Northern British Columbia

Tatuk Lake Wilderness Resort accessible for everyone

Fisheries and Oceans Canada

Pêches et Océans Canada

UQÀM Université du Québec à Montréal

McGill

British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development

Cheslatta Carrier Nation

Imperial Metals

Huckleberry Mines Ltd.

Water Survey Relevés hydrologiques

Nadina Lake Lodge

Project Learning Tree Canada An initiative of SFI

eco canada

real estate foundation British Columbia

17

Response of Laventie Creek and Tahtsa Lake to an Atmospheric River (2-3 November 1993)