The 2016 Kaskawulsh Glacier Event – What is it and Why is it Significant for Upper Yukon River Chum Salmon?

Yukon River Panel

December 2016

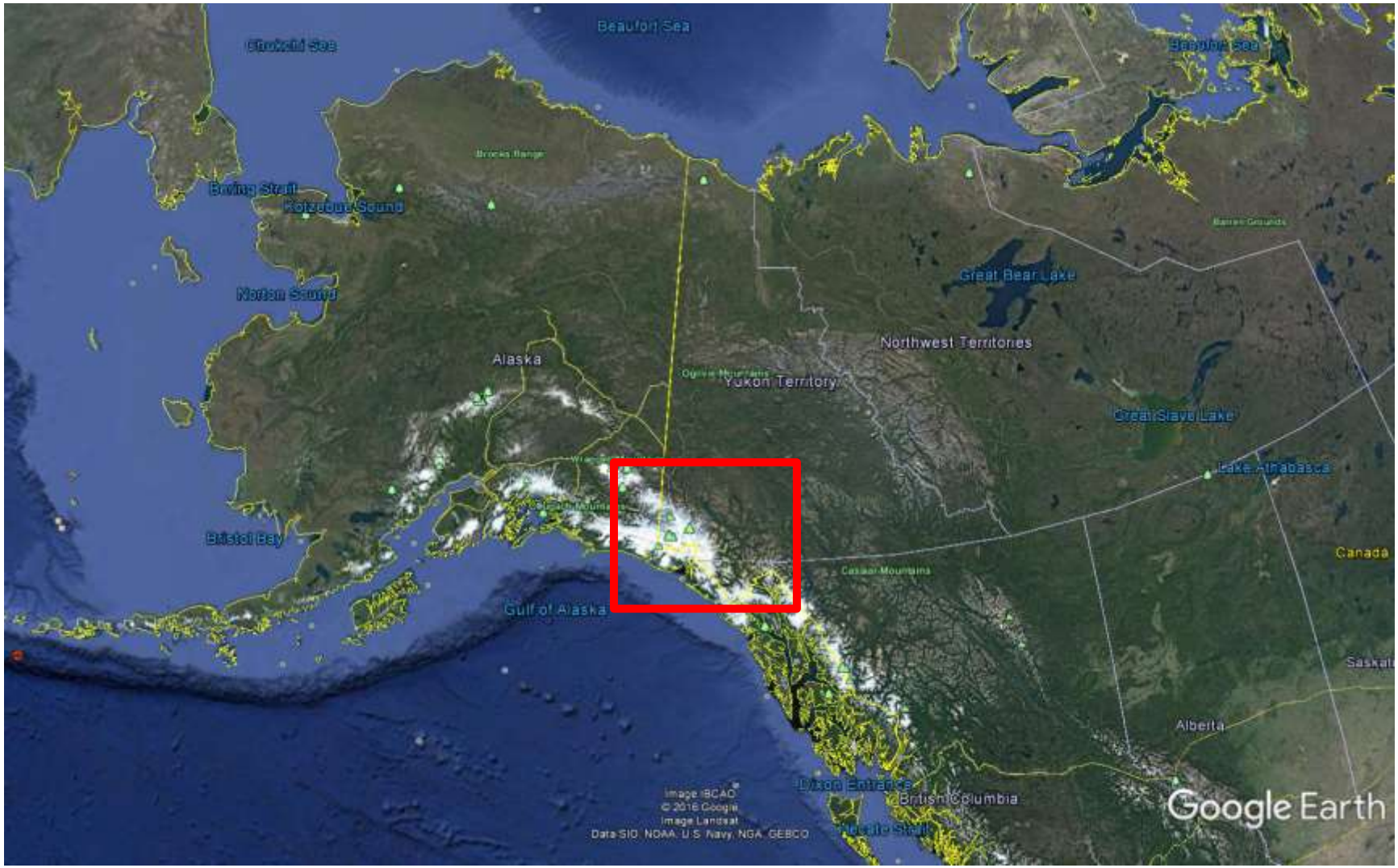
Canada

Context

With its source in the St. Elias Mountain icefields, the Kaskawulsh glacier is located on drainage divide between the Alsek and Yukon basins *(southwestern Yukon)*.

For the last ~300 year, the Kaskawulsh glacier has drained into the Yukon River basin via the Slims River, to Kluane Lake / River and downstream to the White River.

Prior to the 1700s, geologic evidence identifies that Kluane Lake and Kaskawulsh glacier drained entirely into the Alsek basin.


Beaufort Sea
Chukchi Sea
Brooks Range
Bering Strait
Kotzebue Sound
Norton Sound
Great Bear Lake
Northwest Territories
Alaska
Ogilvie Mountains
Yukon Territory
Great Slave Lake
Lake Athabasca
Bristol Bay
Canada
Cassiar Mountains
Gulf of Alaska
Alberta
British Columbia
Image IBCAO
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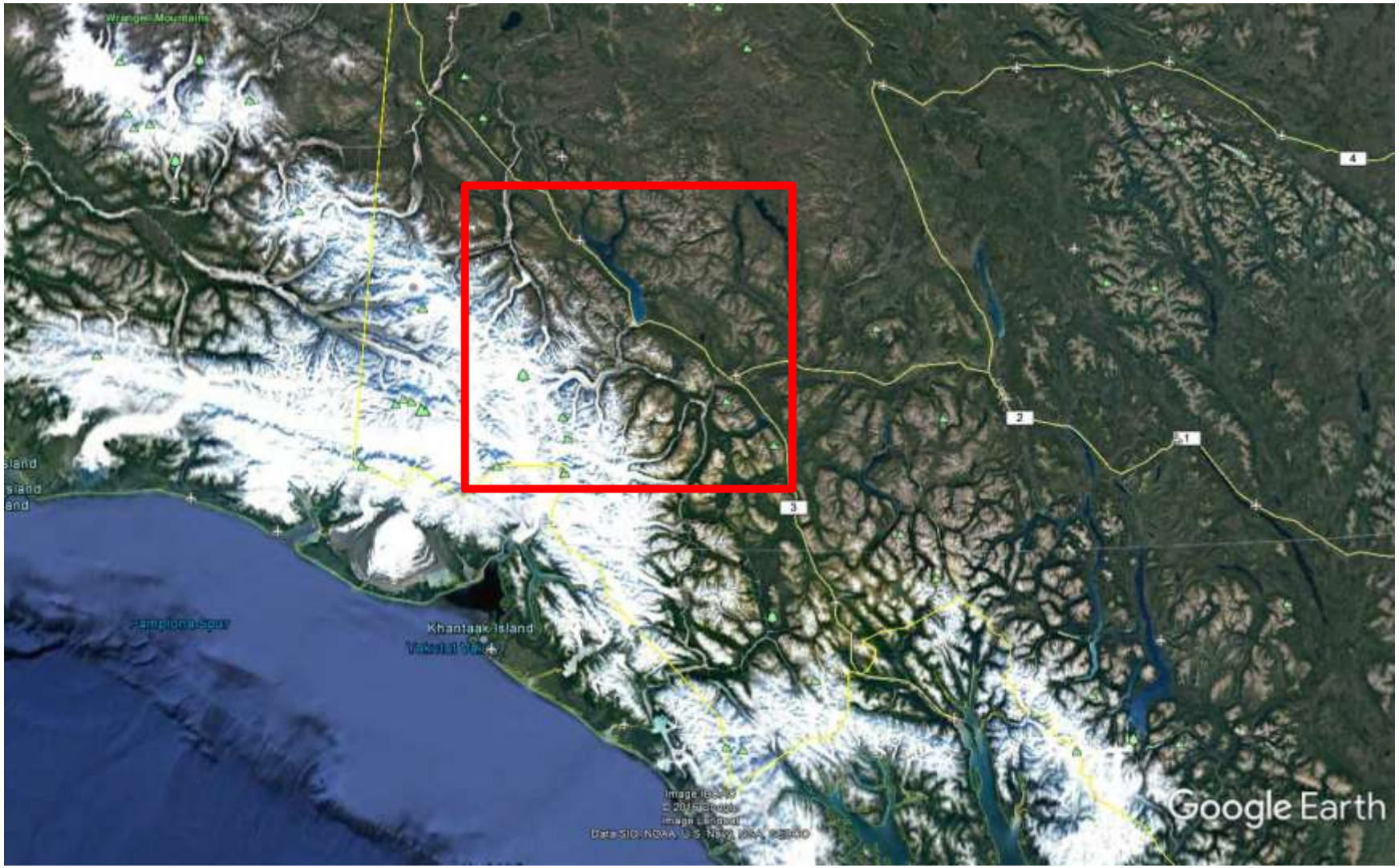
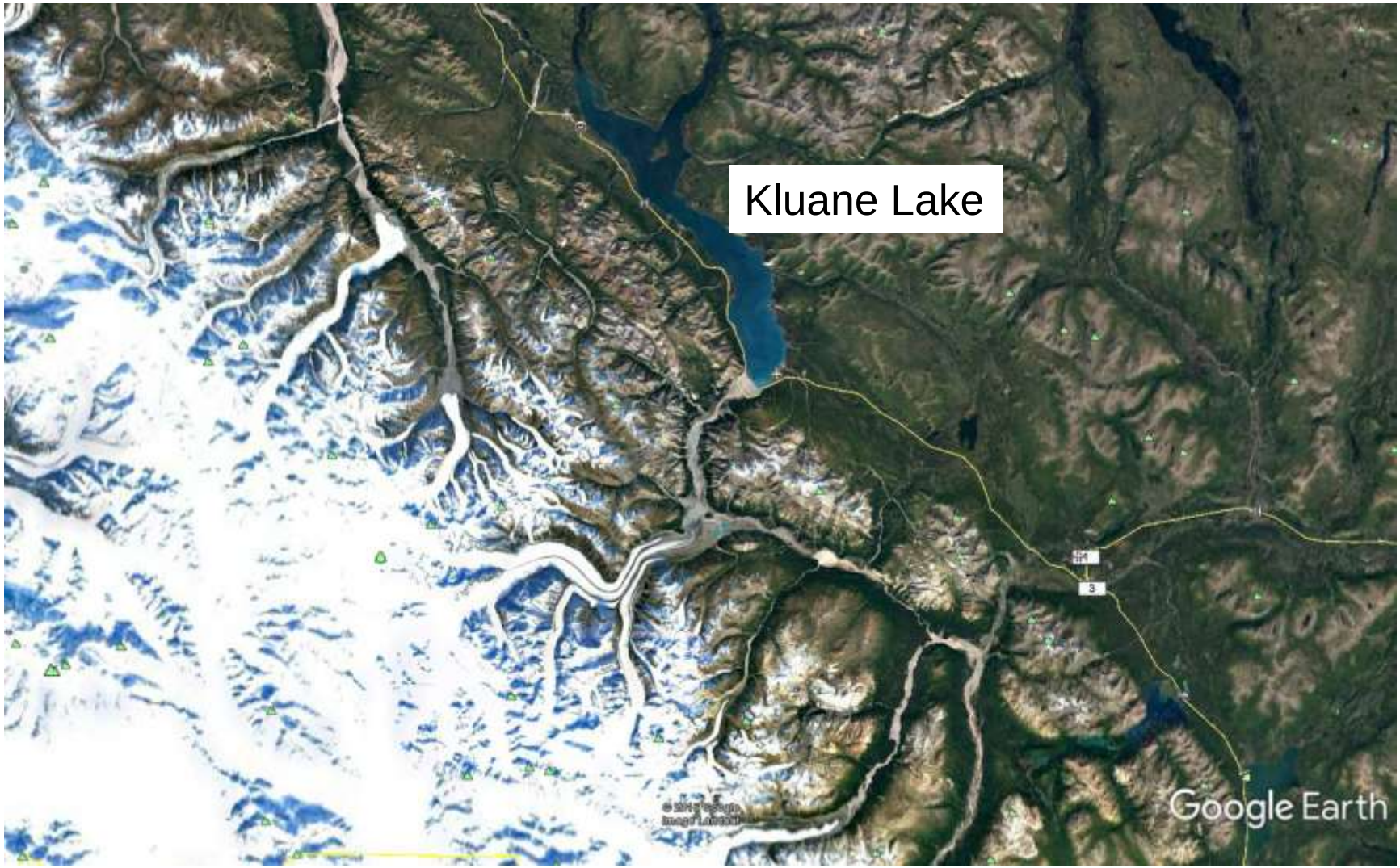
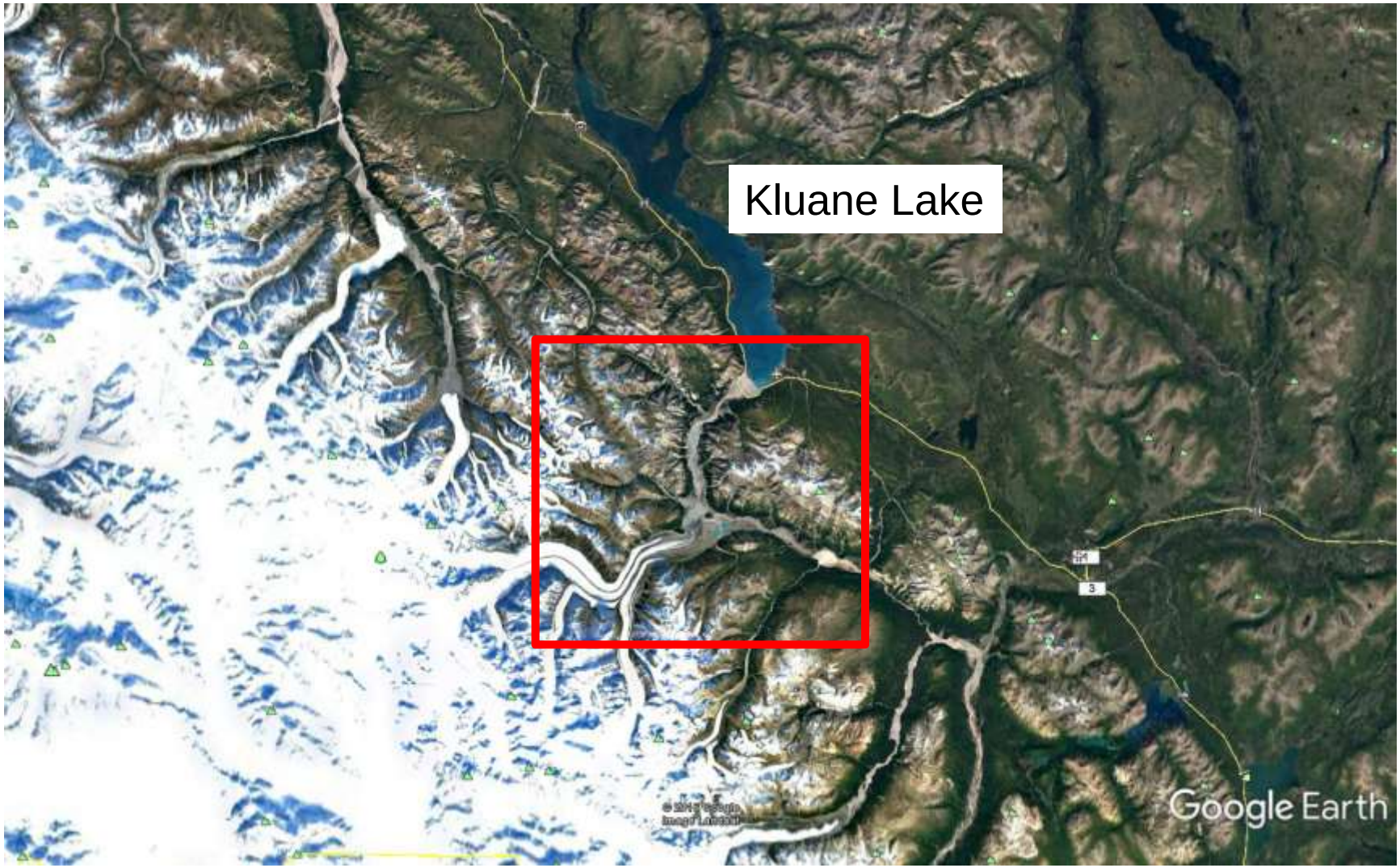
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google Earth

Canada

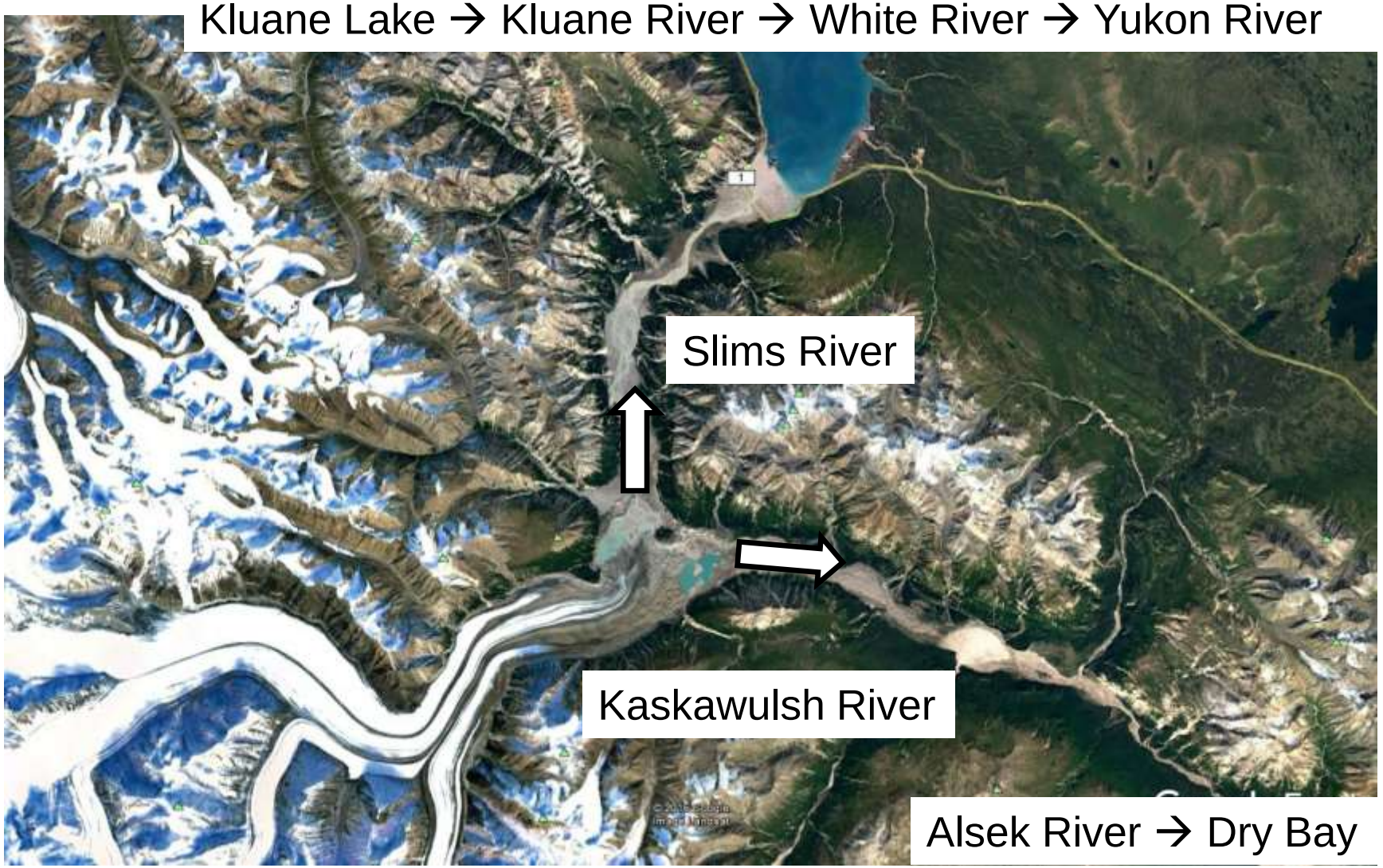

Wrangel Mountains
Khantaak Island
Google Earth


Wrangel Mountains
Khantaak Island
Google Earth


Kluane Lake
Google Earth


Kluane Lake
Google Earth

Kluane Lake → Kluane River → White River → Yukon River



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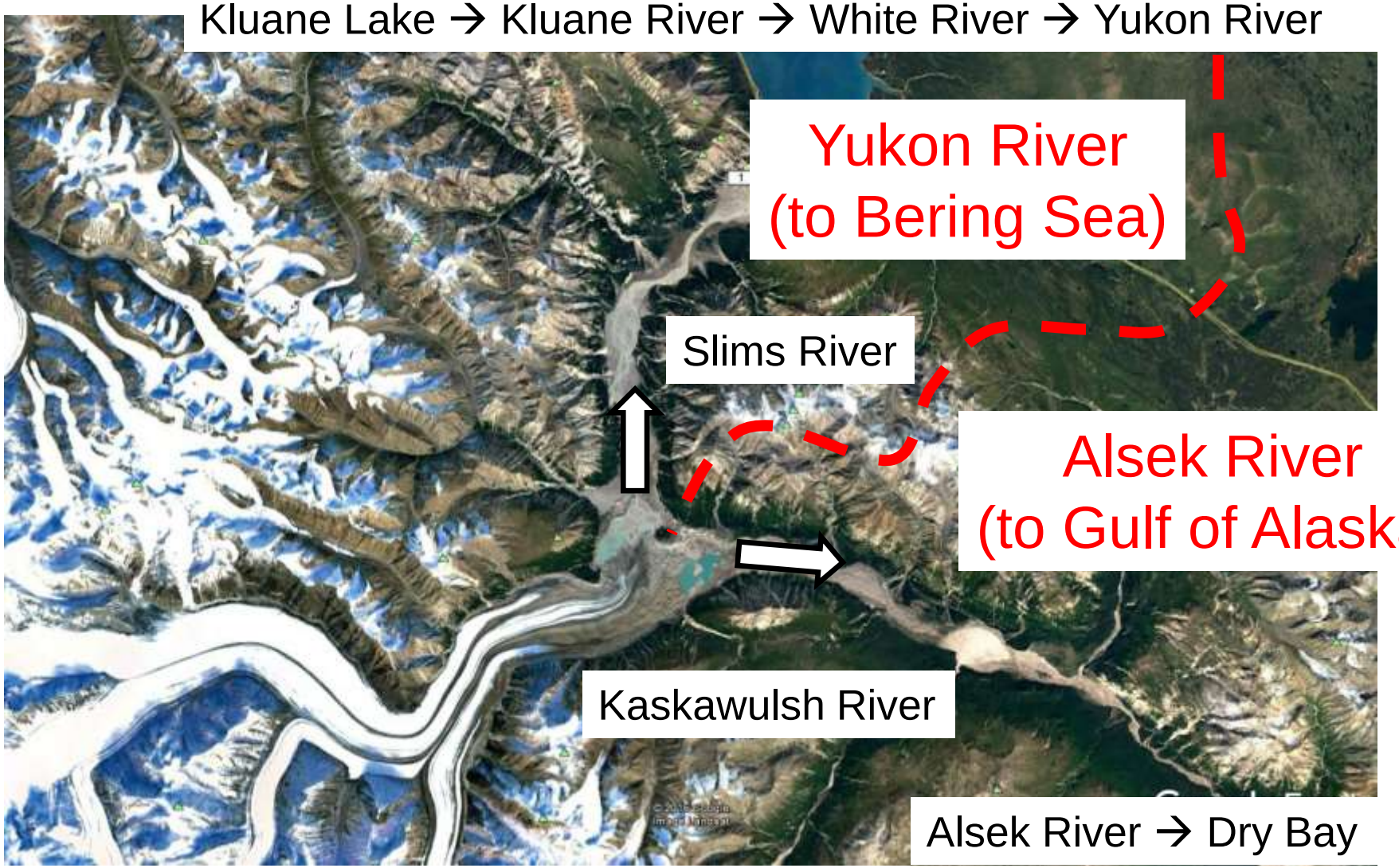

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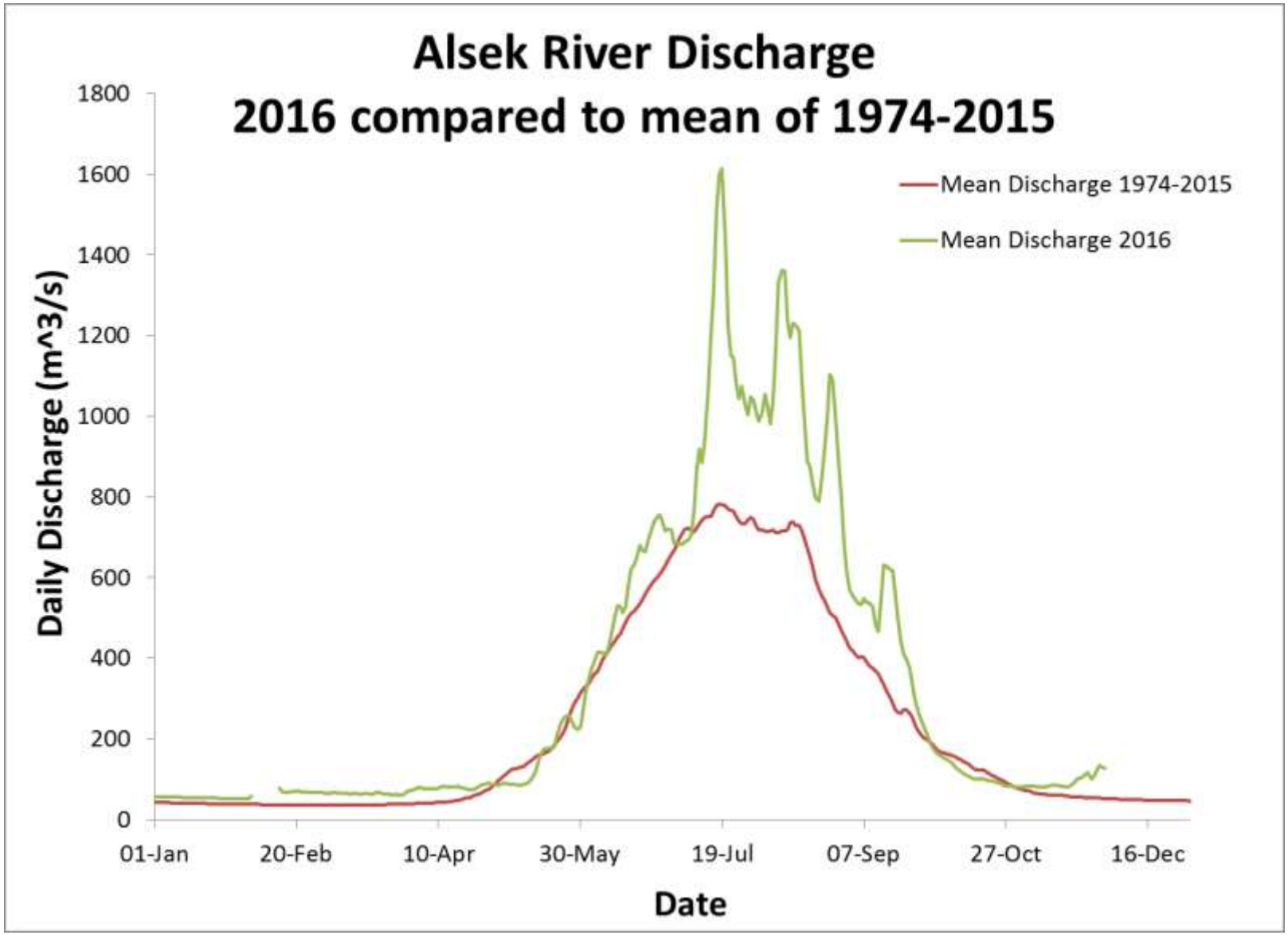
What Occurred?

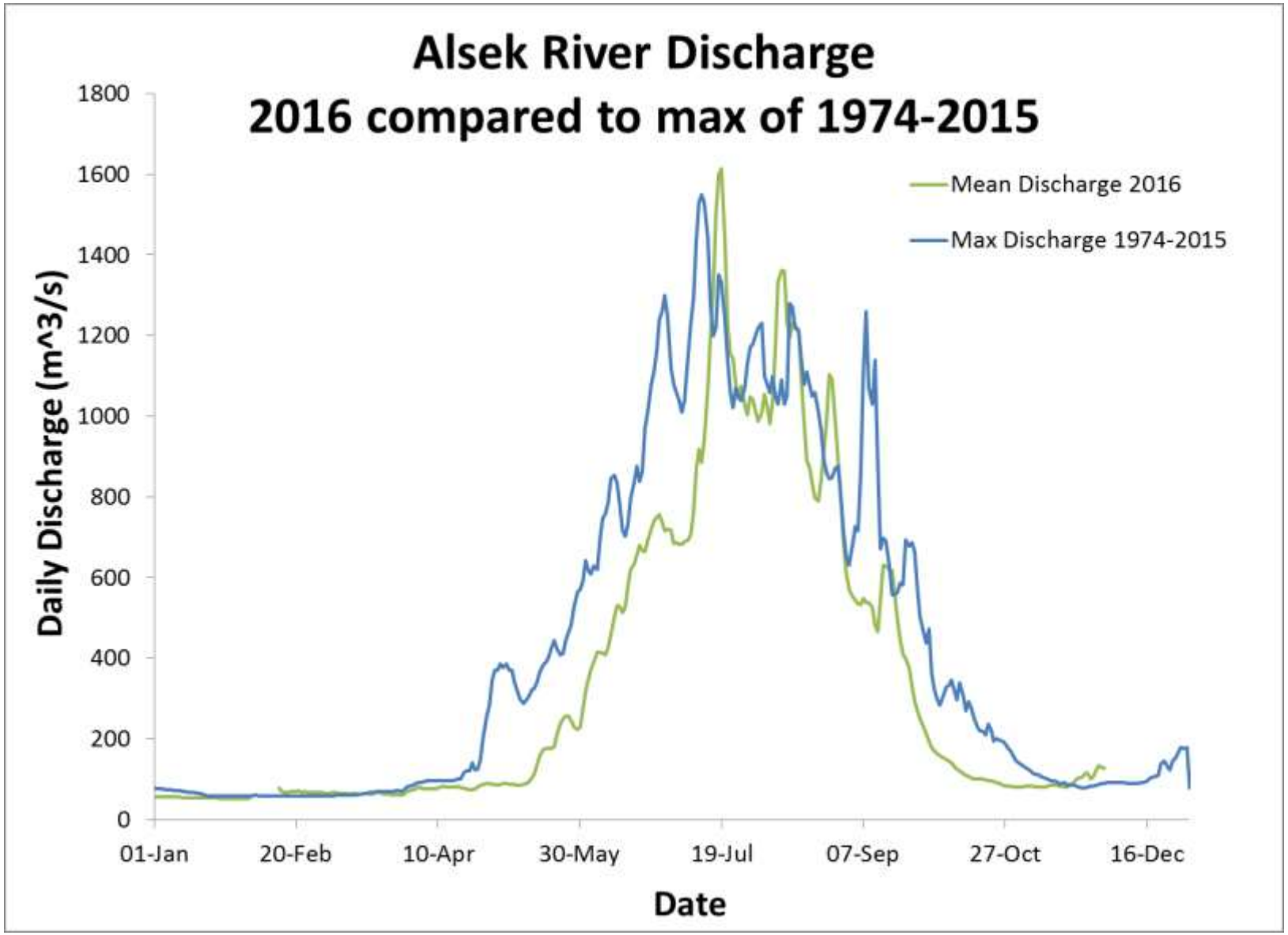
In early 2016, progressive retreat of the Kaskawulsh glacier resulted in a shift of meltwater flow from the Slims River (Yukon drainage) to the Kaskawulsh River (Alsek drainage).

Result:

- Flow to the Slims River has declined significantly.
- Flow to the Alsek River has increased.
- Kluane Lake water level has dropped by several feet.


Alsek River Discharge
2016 compared to mean of 1974-2015
Mean Discharge 1974-2015
Mean Discharge 2016
Daily Discharge (m^3/s)
1800
1600
1400
1200
1000
800
600
400
200
0
01-Jan
20-Feb
10-Apr
30-May
19-Jul
07-Sep
27-Oct
16-Dec
Date

Canada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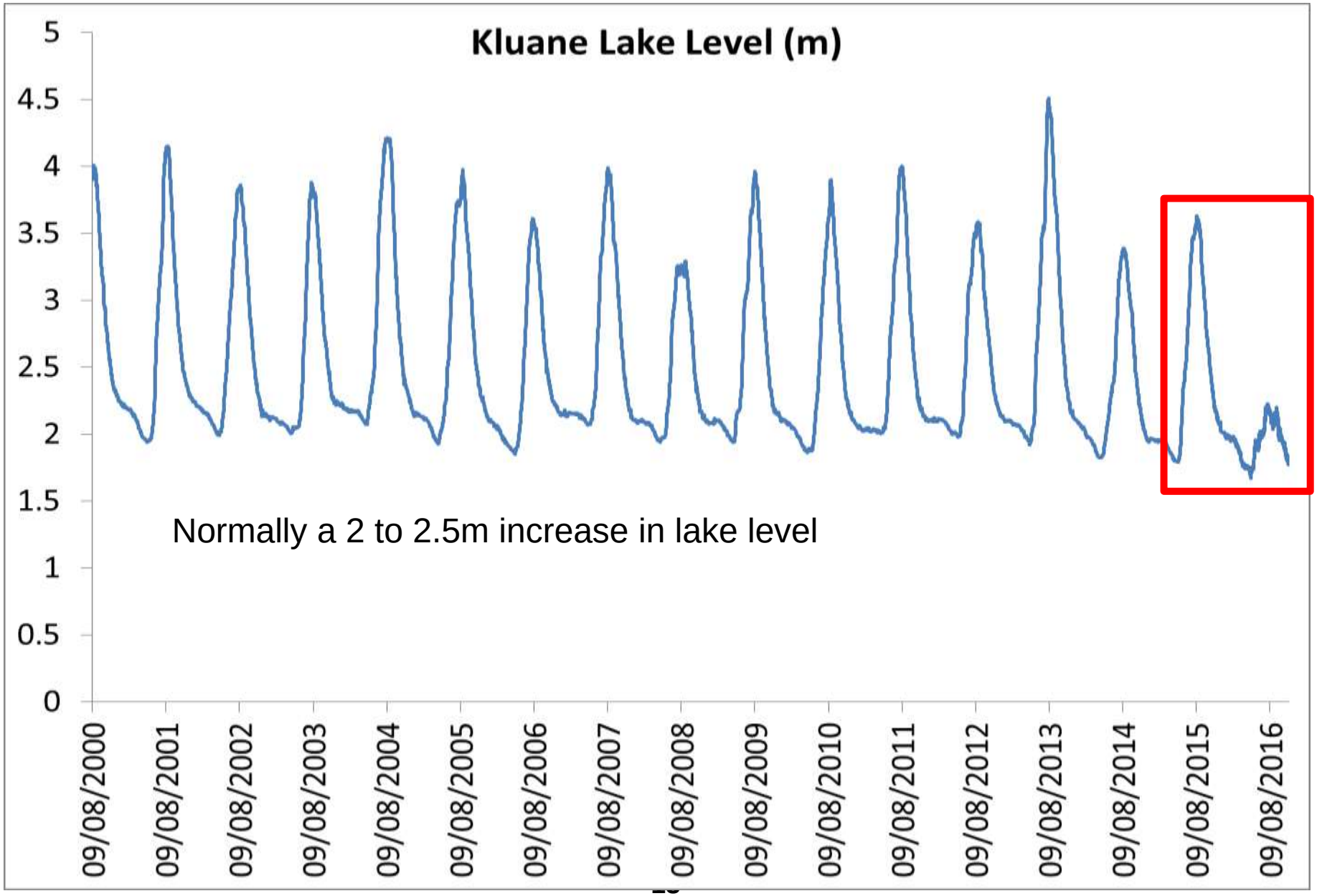
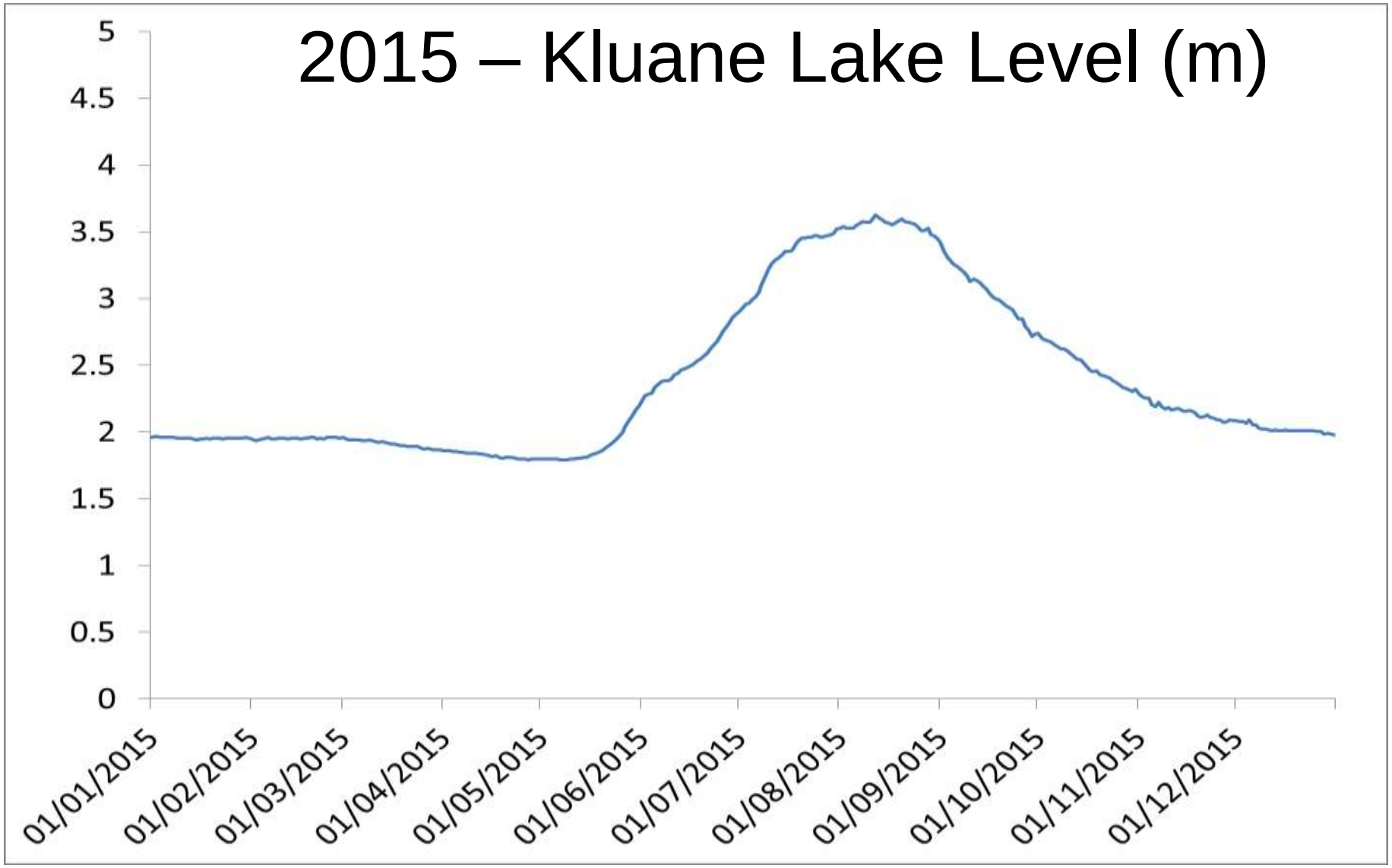

Kluane Lake Level (m)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
09/08/2000
09/08/2001
09/08/2002
09/08/2003
09/08/2004
09/08/2005
09/08/2006
09/08/2007
09/08/2008
09/08/2009
09/08/2010
09/08/2011
09/08/2012
09/08/2013
09/08/2014
09/08/2015
09/08/2016
Normally a 2 to 2.5m increase in lake level


2015 – Kluane Lake Level (m)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
01/01/2015
01/02/2015
01/03/2015
01/04/2015
01/05/2015
01/06/2015
01/07/2015
01/08/2015
01/09/2015
01/10/2015
01/11/2015
01/12/2015

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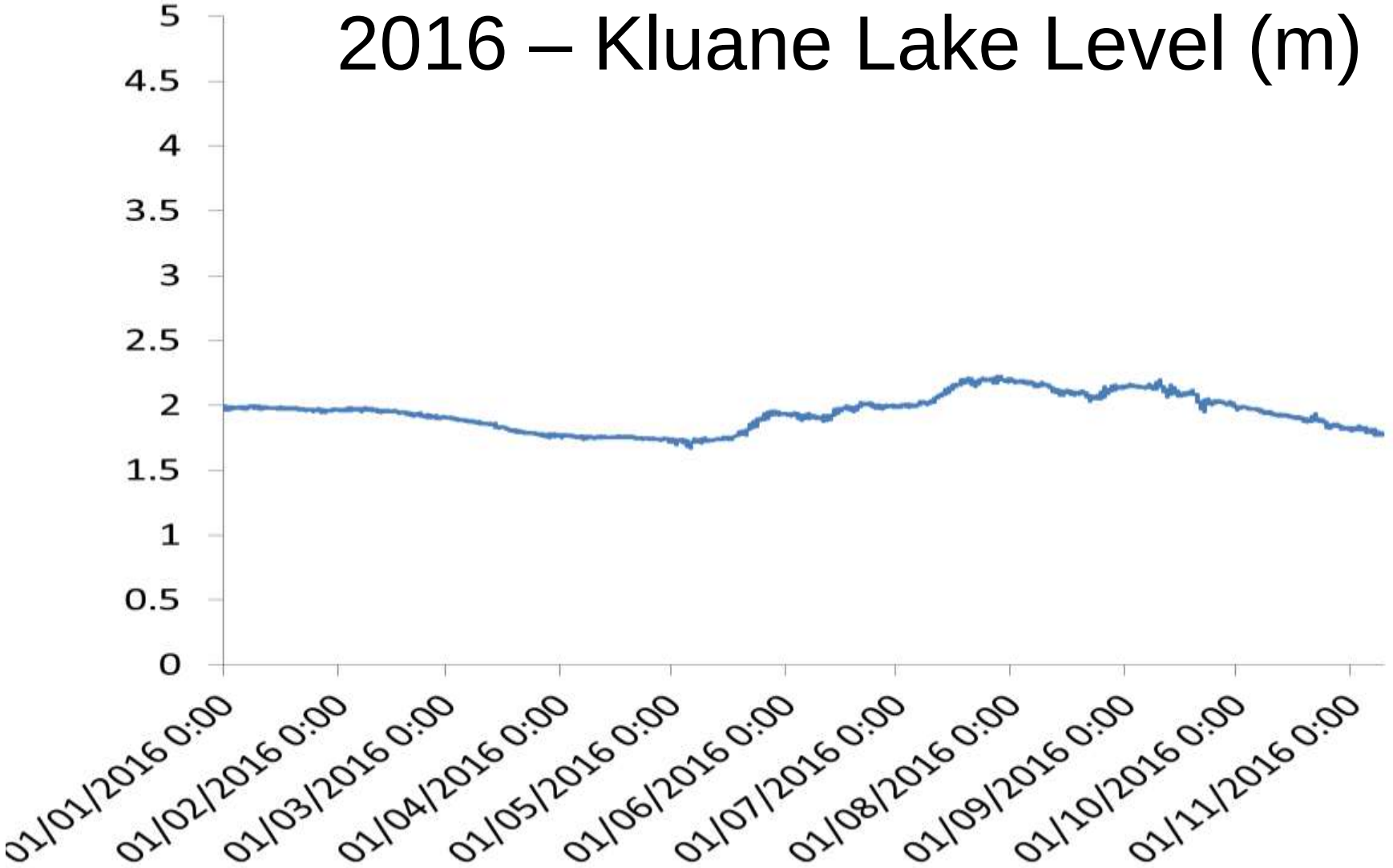
2016 – Kluane Lake Level (m)



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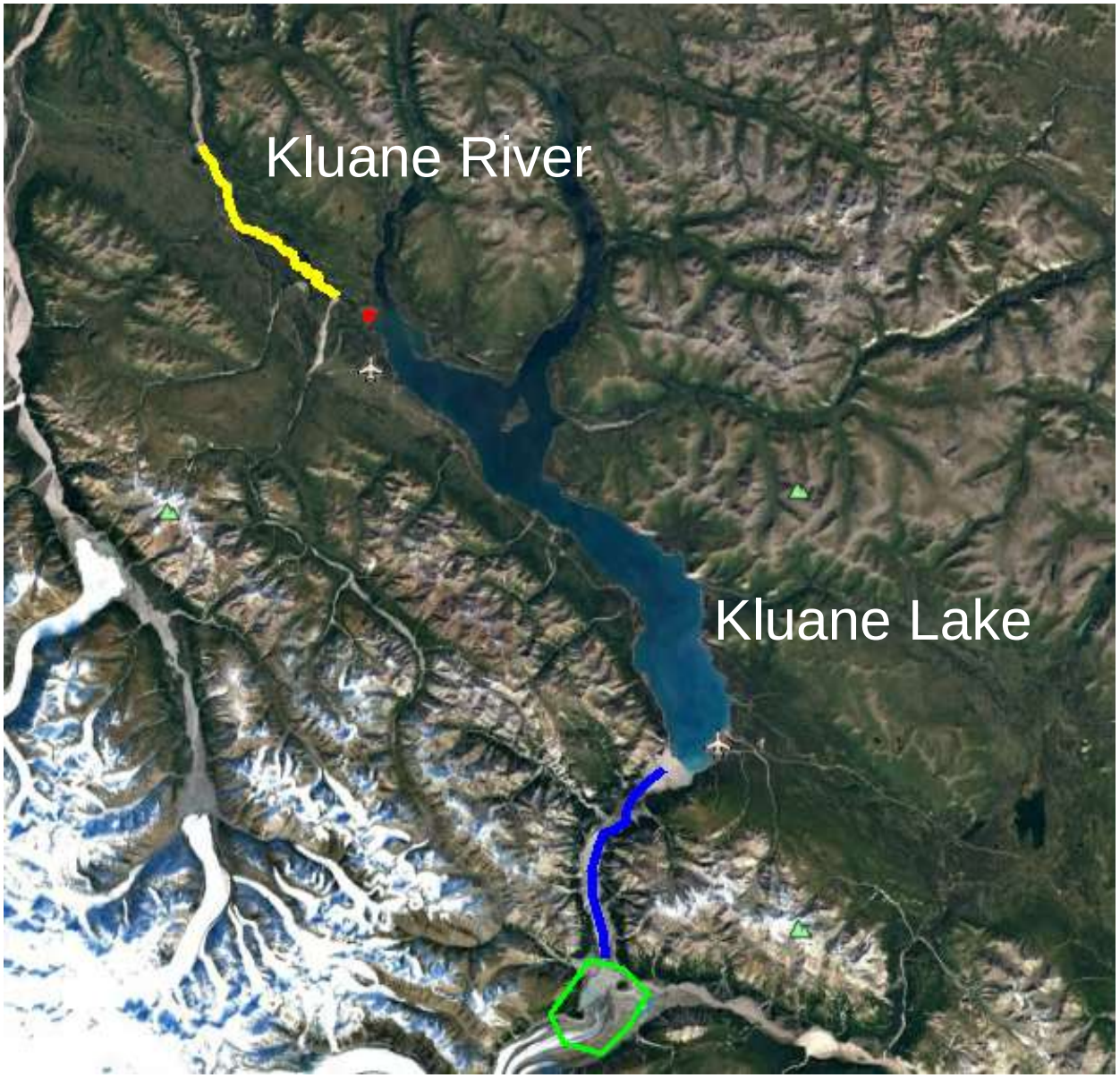
Why is it Important?

- Hydrology of Kluane Lake and Kluane River has changed significantly.
- Extensive chum salmon spawning areas / habitat in Kluane Lake and Kluane River.


Kluane River
Kluane Lake

Slims River Delta (Kluane Lake)

Canada

Kluane River

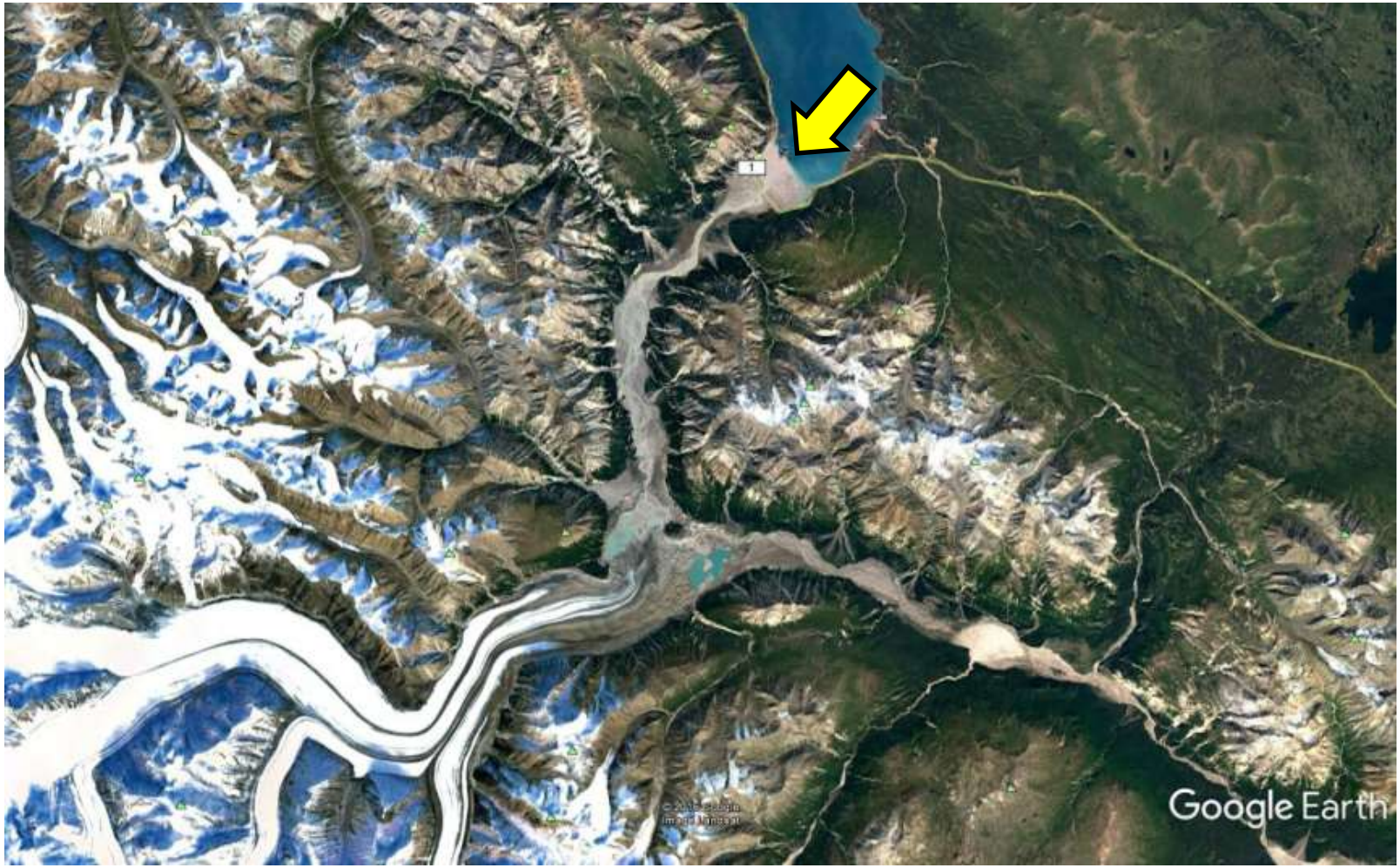
Canada

Kluane River / Lake Chum Salmon

The Kluane River provides spawning habitat for 10% - 15% of Yukon River fall chum.

- Approximately 25% of Yukon River fall chum return to the upper Yukon River in Canada (mainstem stocks).
- Of these, on average nearly half (46%) return to the White River - with principal spawning areas located in Kluane River and in Kluane Lake.

Slims River Estuary (Kluane Lake)



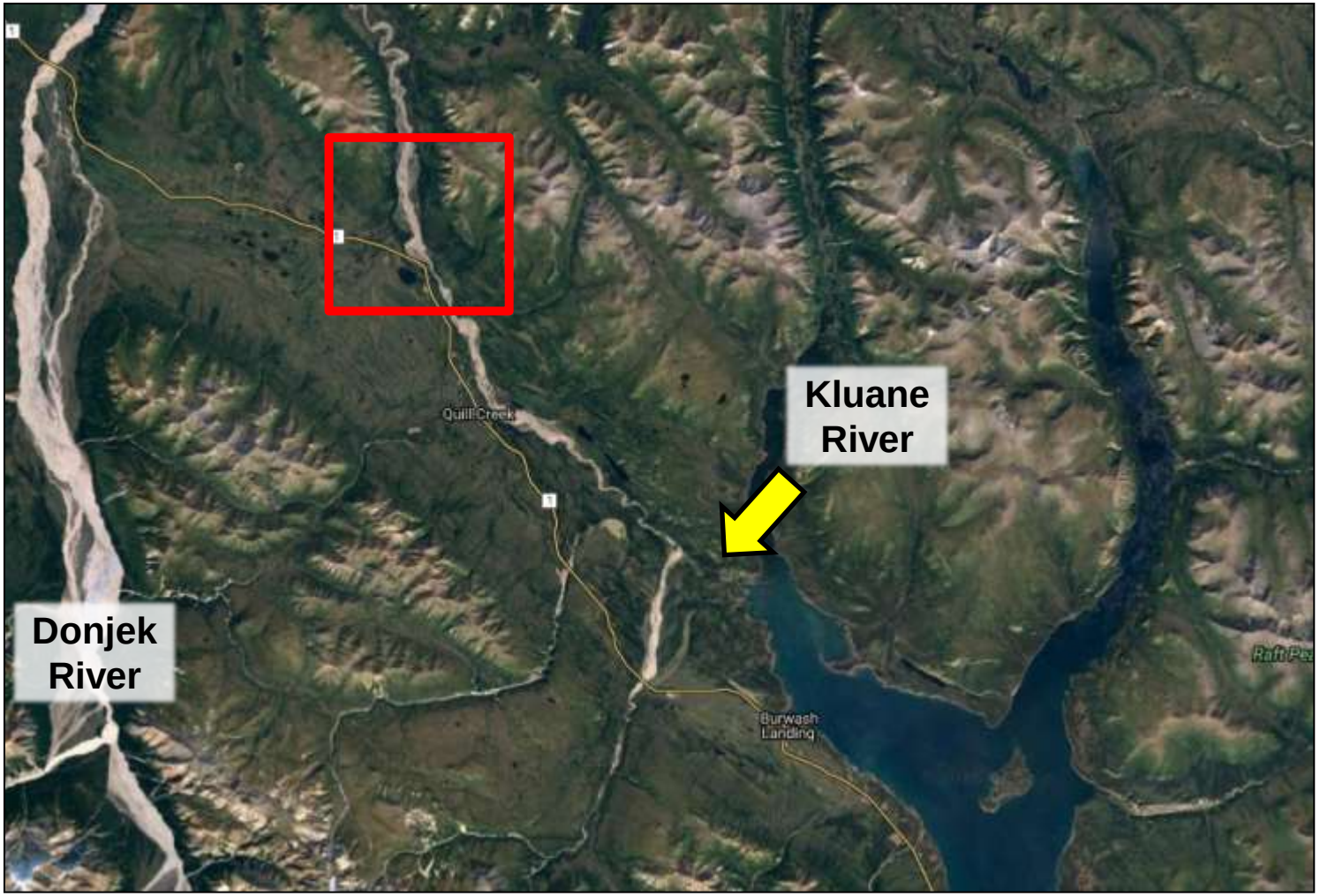
Slims River Estuary – July 2015

Slims River Estuary – July 2016

Photo Credit - Lance Goodwin / Yukon News

Slims River Estuary

Kluane River



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Kluane River

Canada

Kluane River - Swede Johnson Slough (side)

2005

2016

Photos: Al Von Finster

Kluane River - Swede Johnson Slough (main)

2005

2016

Photos: Al Von Finster

Effects on Kluane River Fall Chum Salmon?

- What hydrological changes have occurred (some data gaps)?
- What hydrological changes are yet to happen (multi year)?
- What is the impact on chum salmon in Kluane Lake and Kluane River?

Comments / Questions ?