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Karen Dunmall

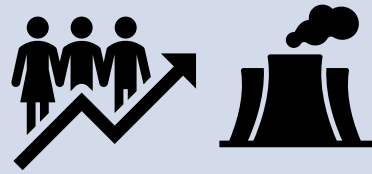
Michelle Gruben

Jody Illasiak

Jon Moore



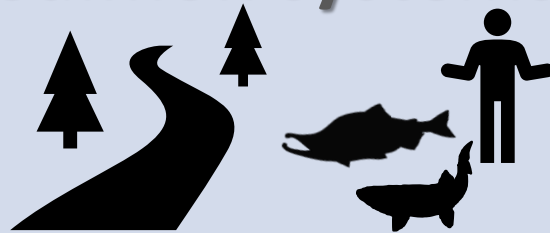
People



Climate change



Salmon systems



Glacial retreat and salmon

Opportunities and challenges in rapidly-changing watersheds

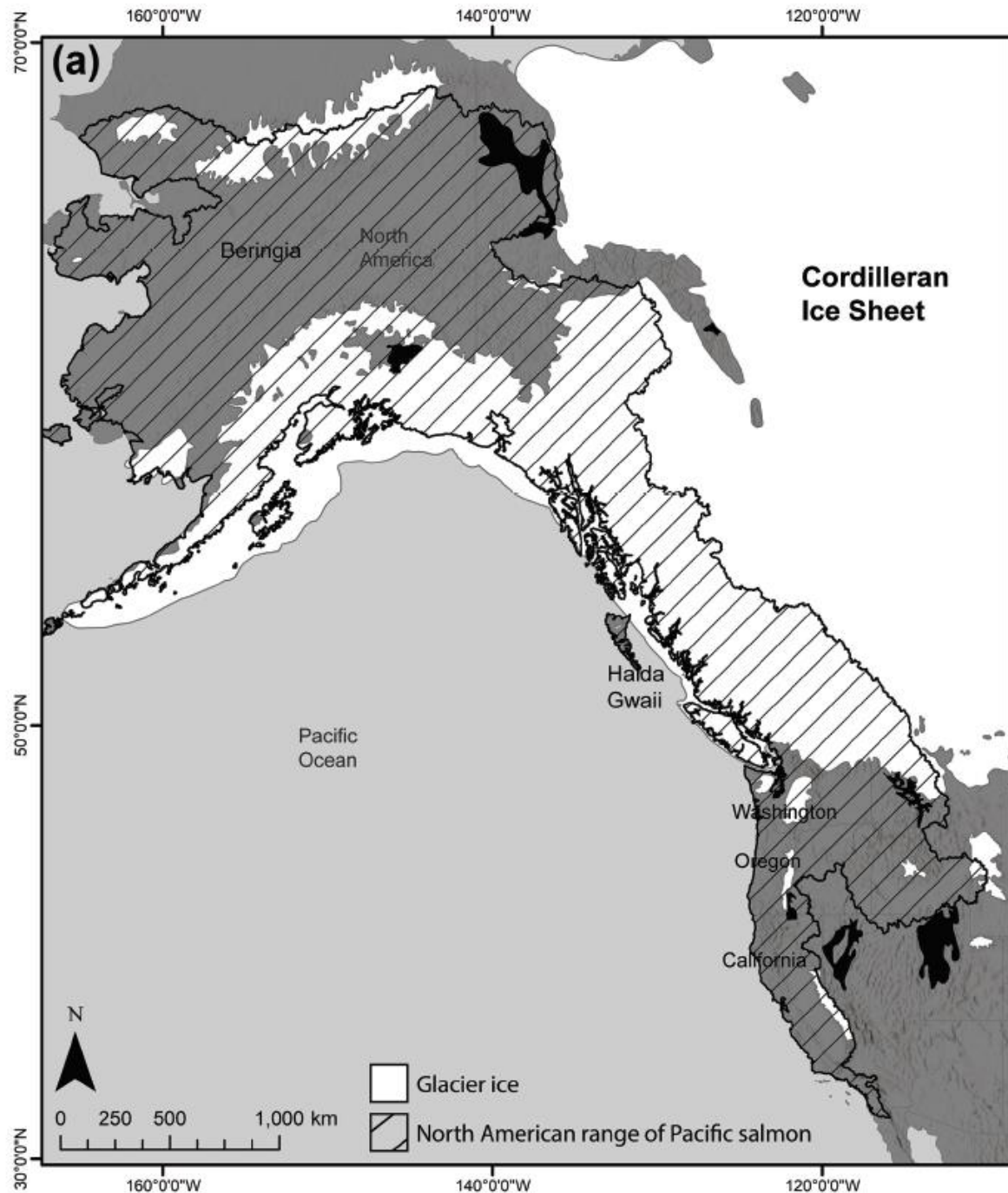


Jonathan Moore

jwmoore@sfu.ca

www.jonwmoore.org

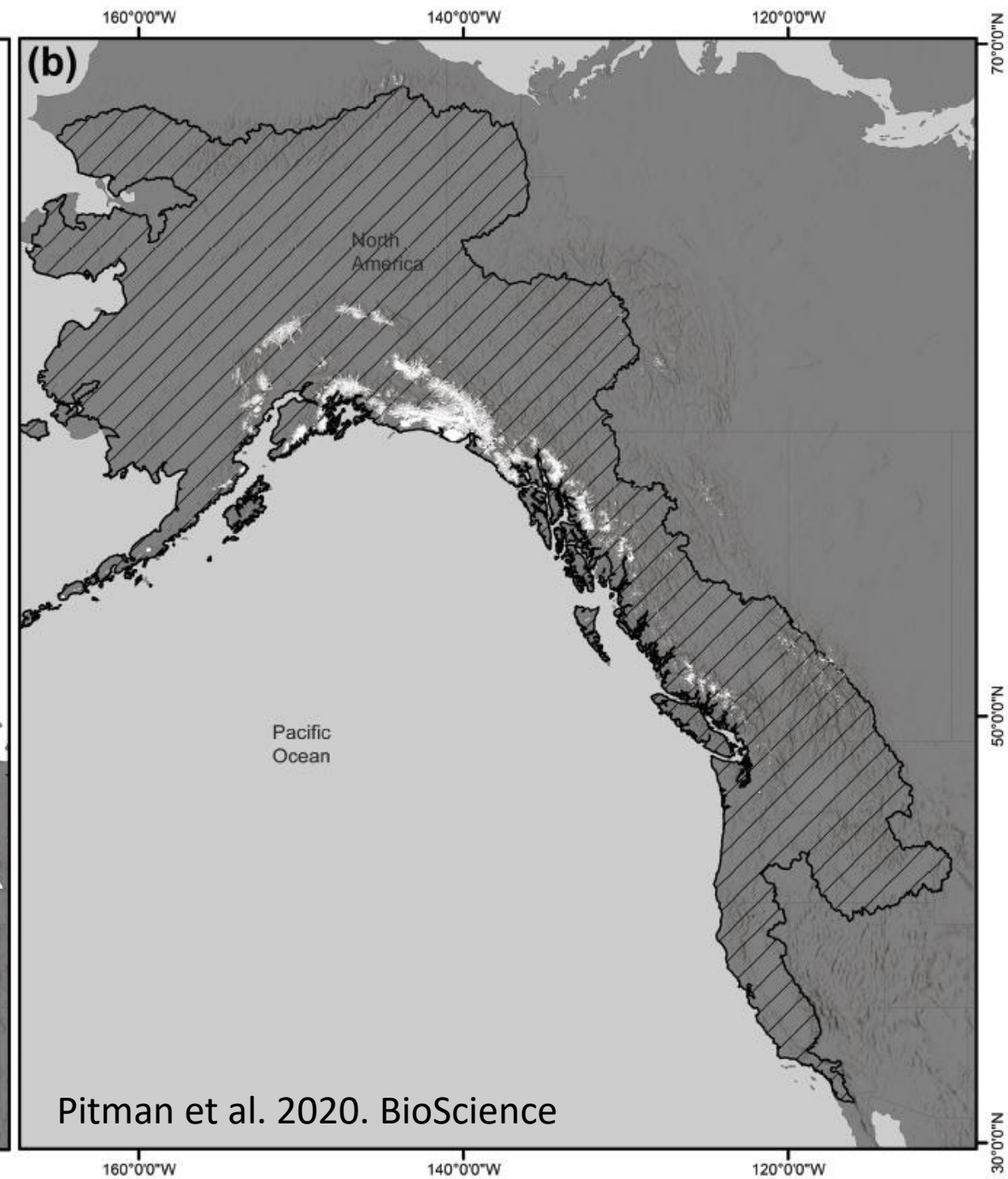
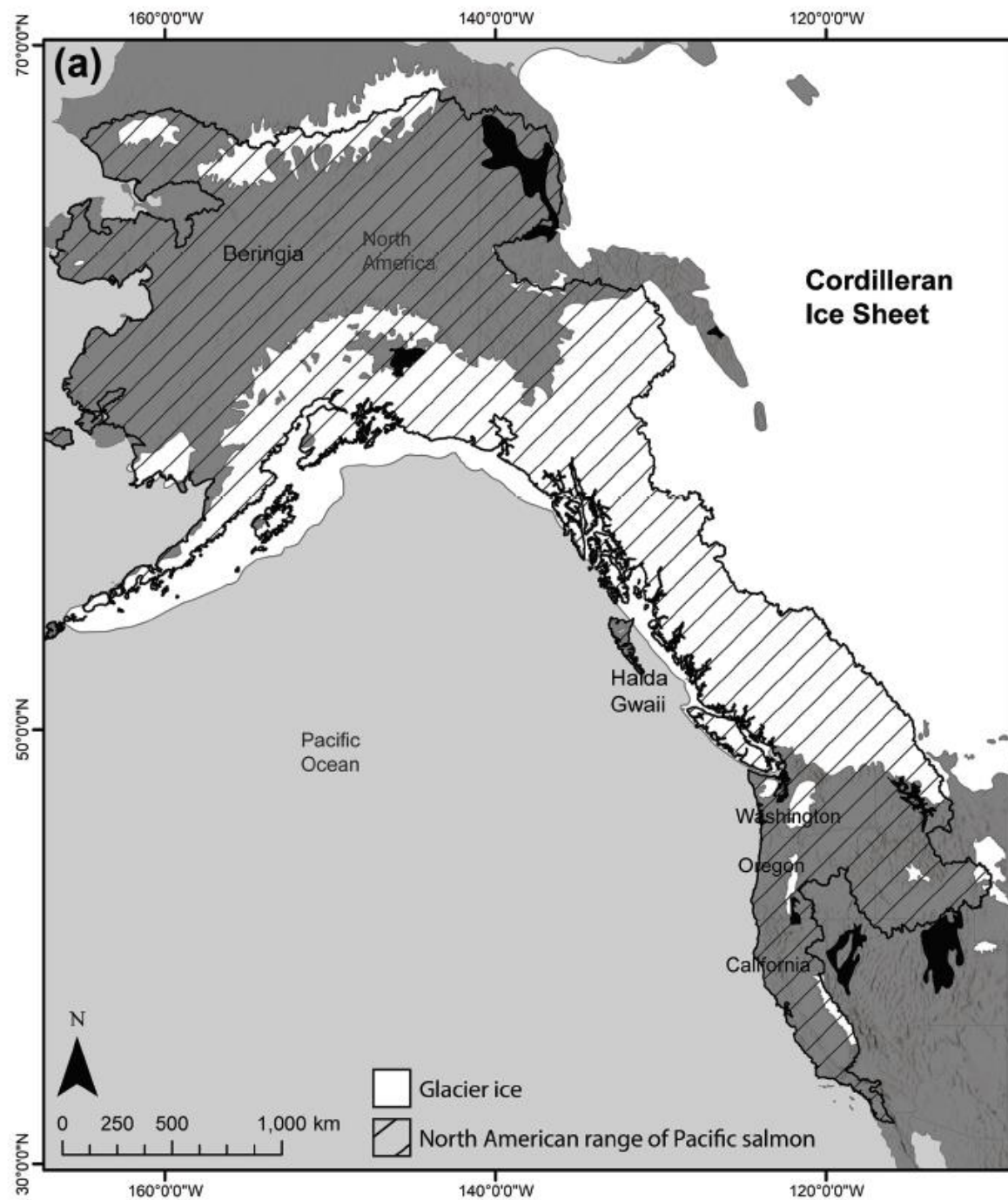
@jon_w_moore



18,000 years ago

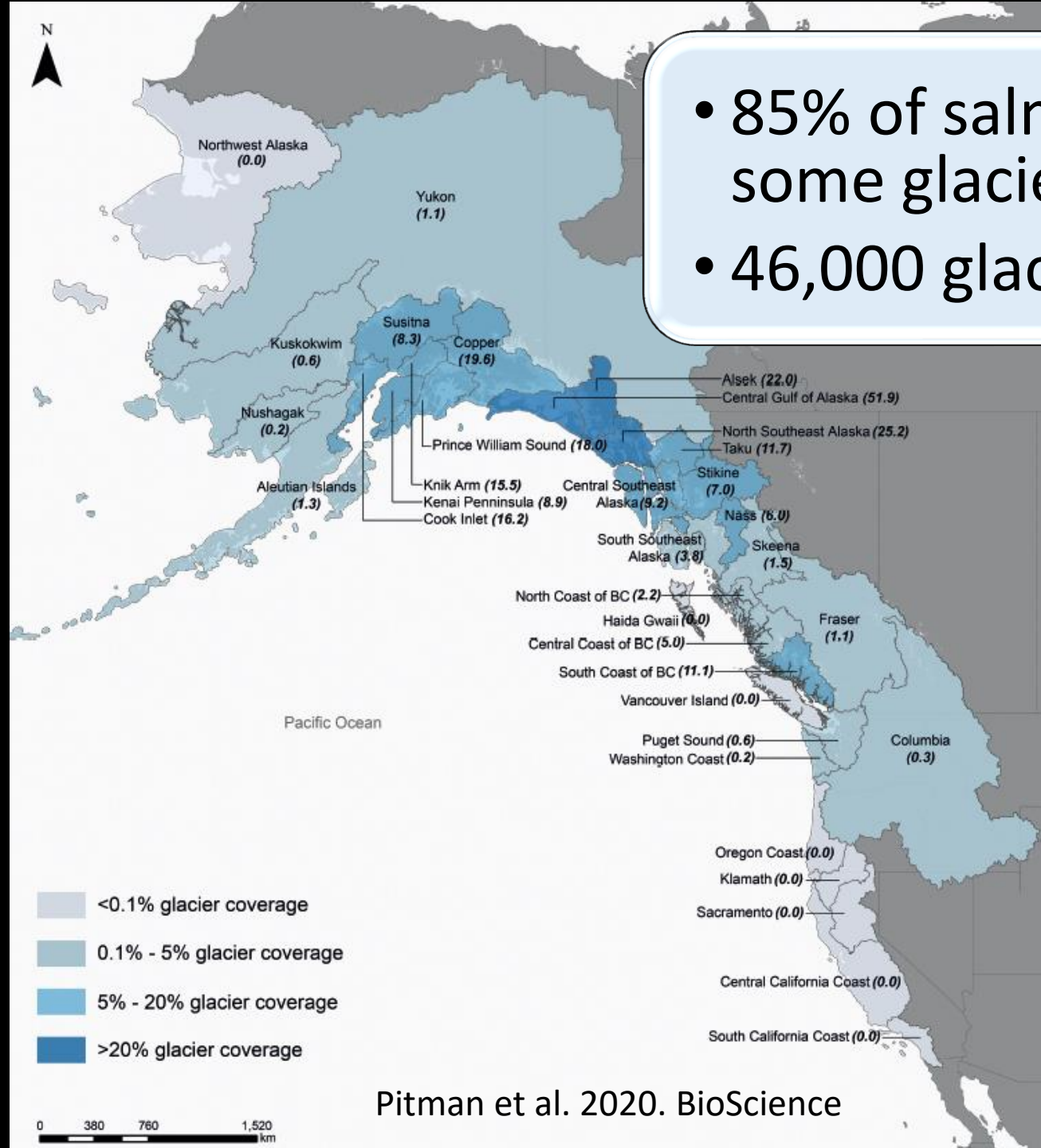
- 10 degrees colder
- Sea level was >100 m lower





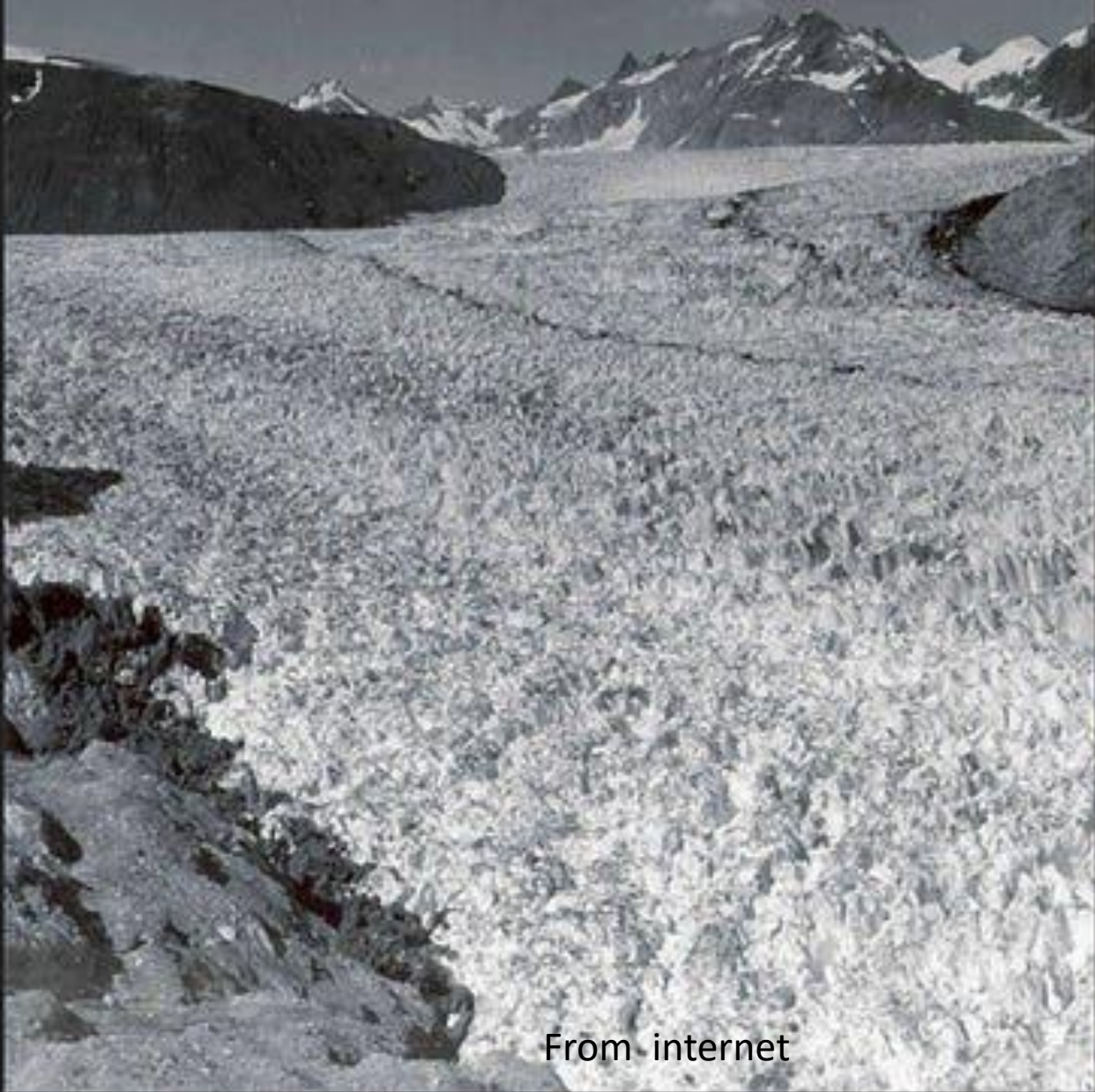


- 85% of salmon regions have some glaciers
- 46,000 glaciers



Pitman et al. 2020. BioScience

1941



From internet



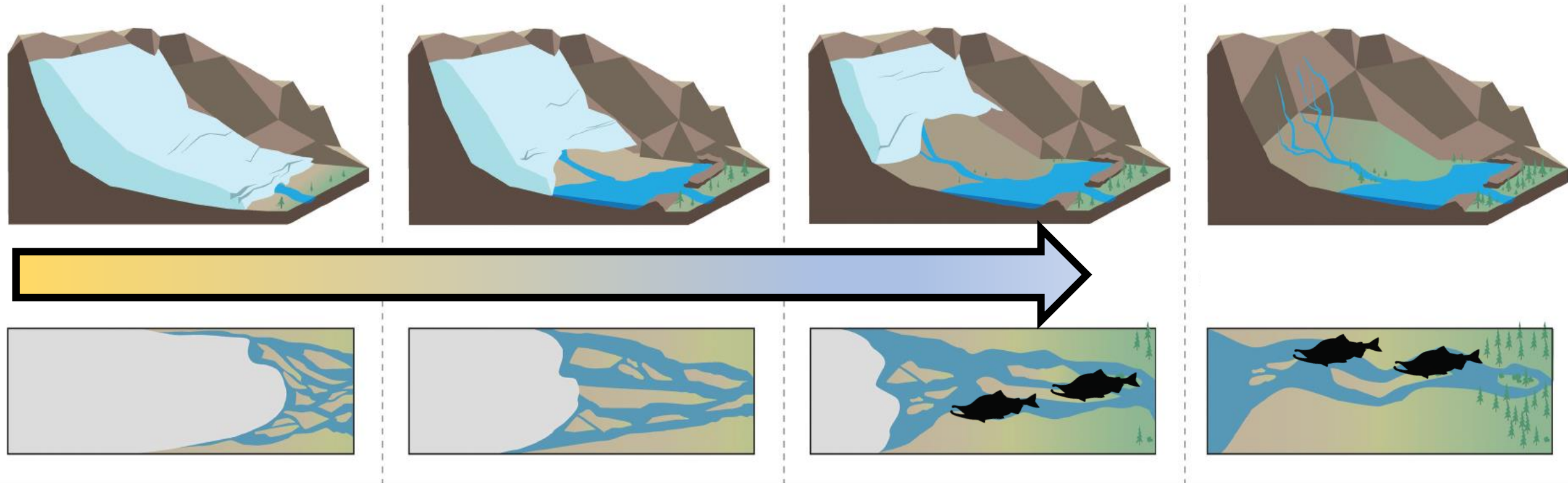
2004



- 80% of glaciers gone in western Canada by 2100 with moderate emissions

How is contemporary glacier retreat impacting salmon?



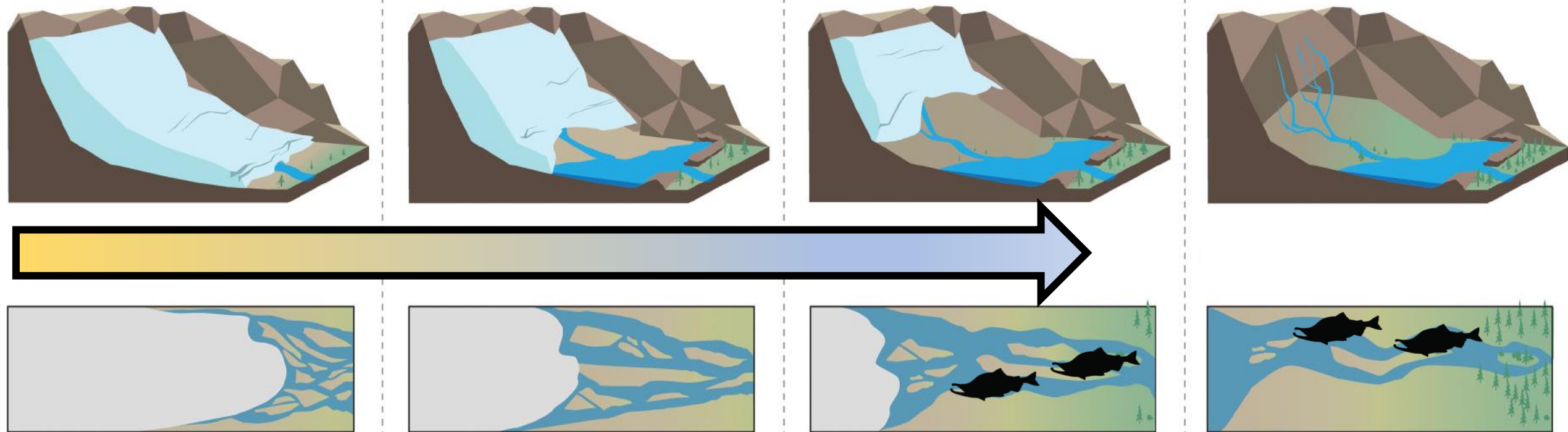


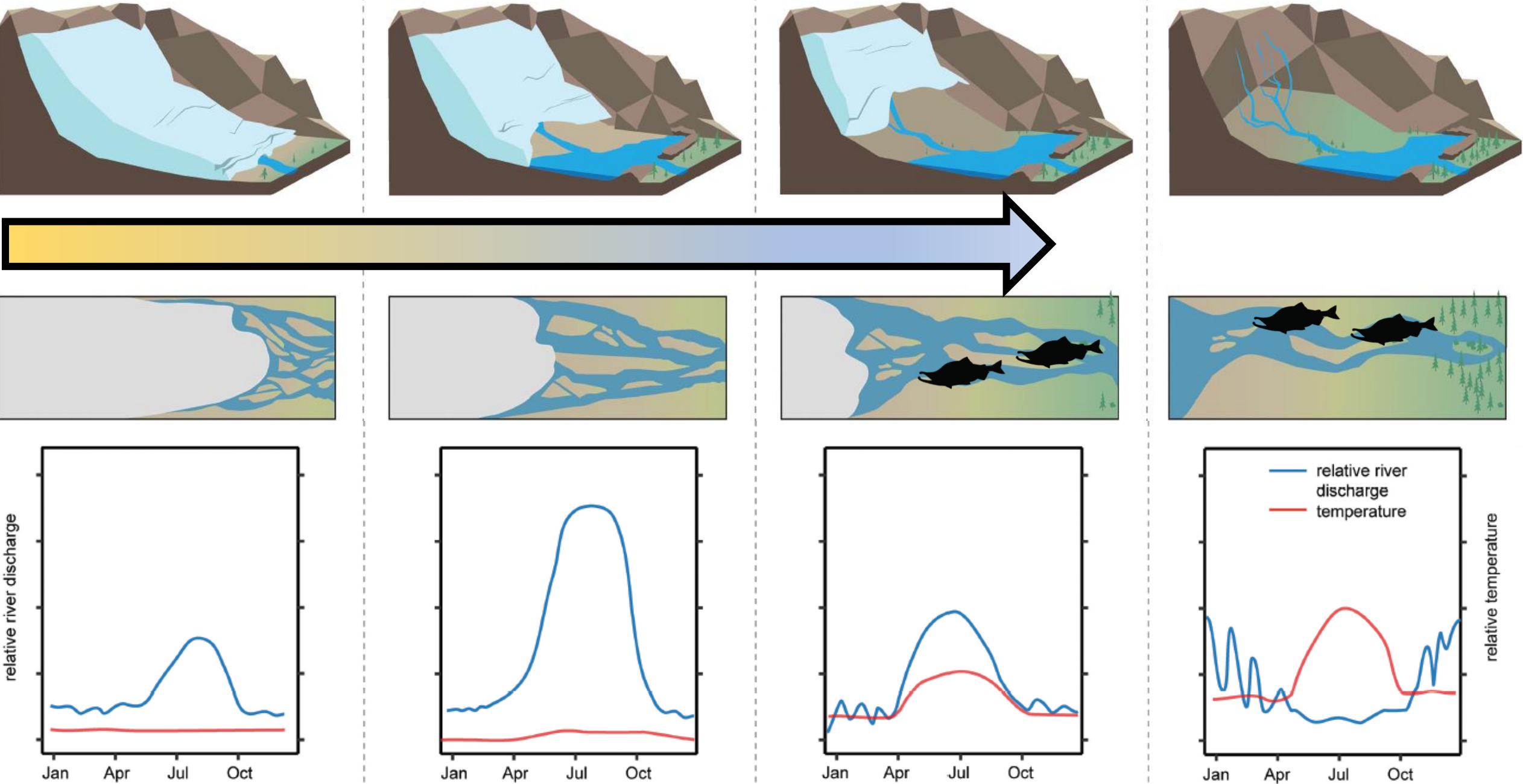
Glacier Retreat and Pacific Salmon

KARA J. PITMAN, JONATHAN W. MOORE, MATTHEW R. SLOAT, ANNE H. BEAUDREAU, ALLISON L. BIDLACK, RICHARD E. BRENNER, ERAN W. HOOD, GEORGE R. PESS, NATHAN J. MANTUA, ALEXANDER M. MILNER, VALENTINA RADIĆ, GORDON H. REEVES, DANIEL E. SCHINDLER, AND DIANE C. WHITED



Pitman et al. 2020. BioScience

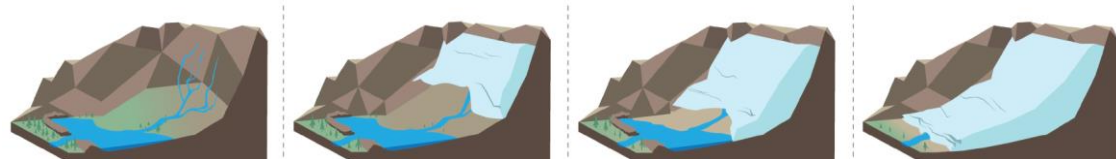
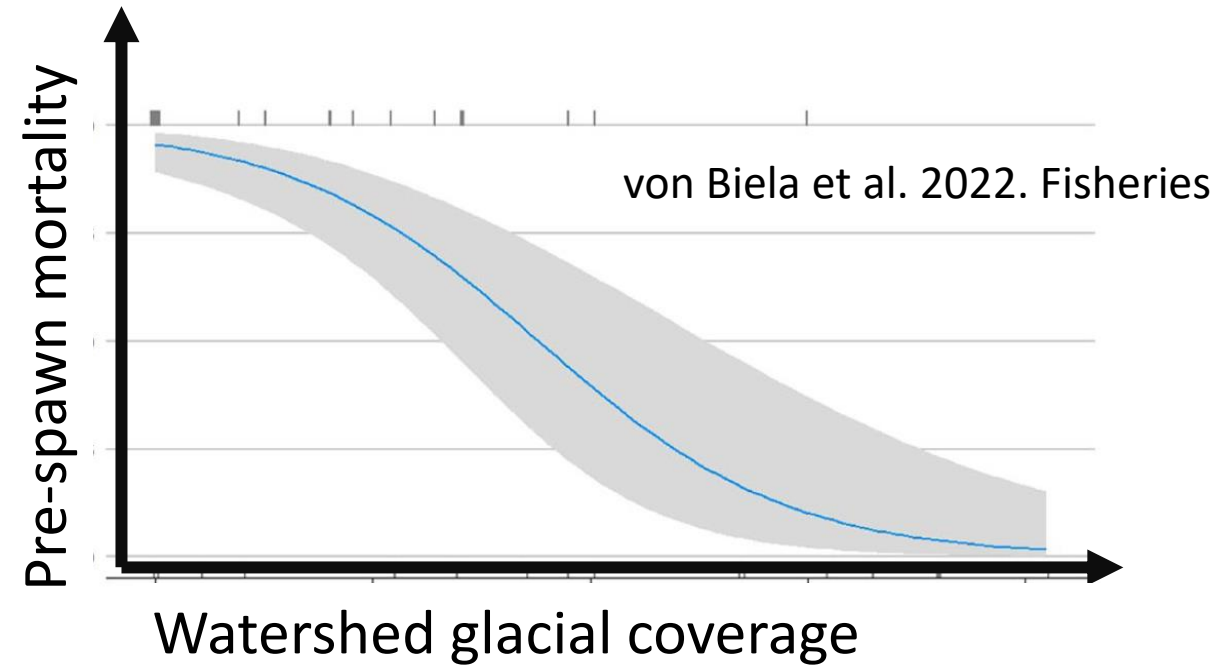




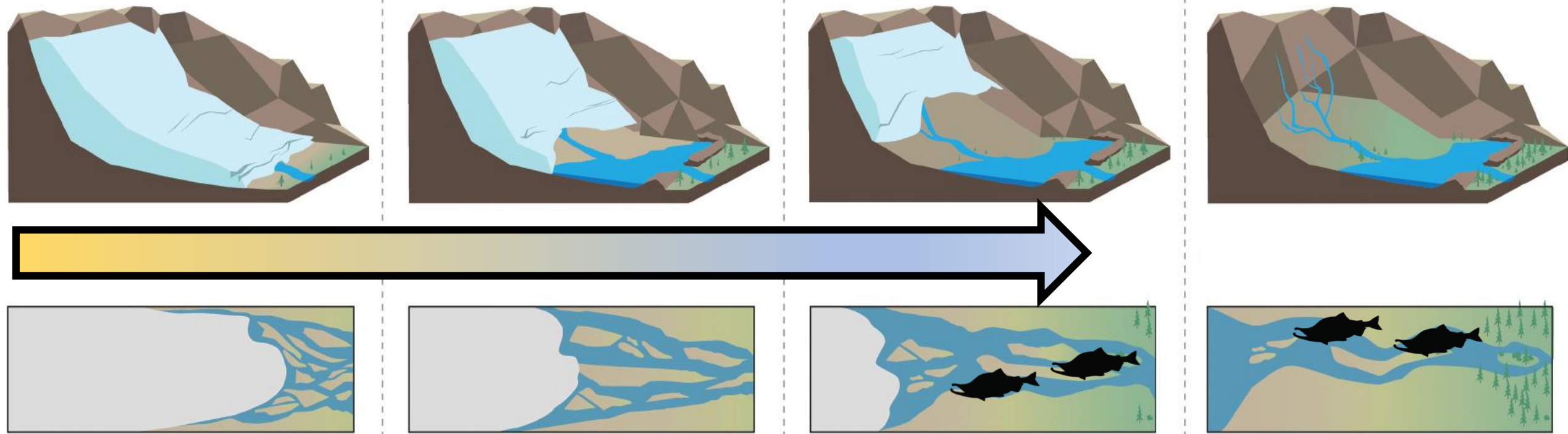
2019 Drought in Alaska



Glaciers provide cool summer water to salmon streams



Pitman et al. 2020. BioScience

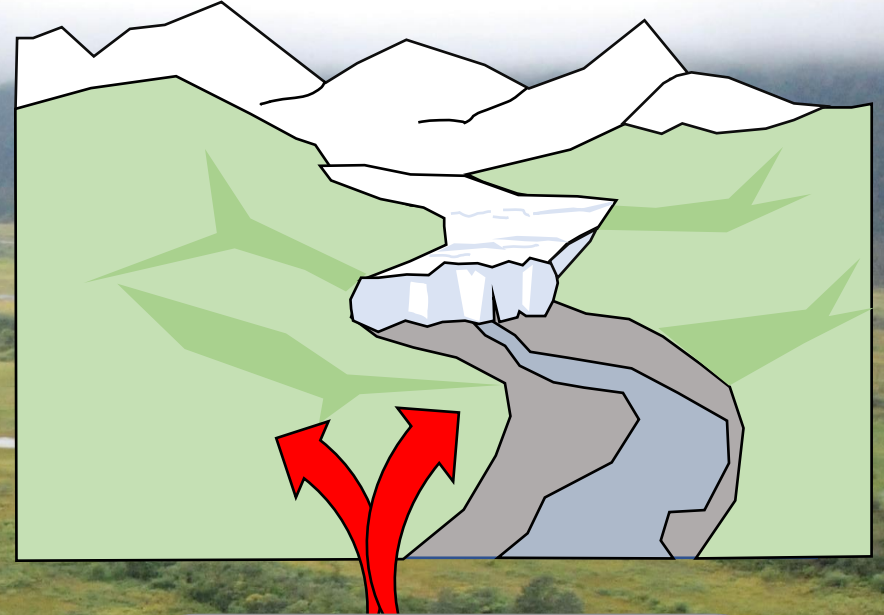


Turbidity

Invertebrate prey



Context matters



- Regional climate
- Watershed size
- Lakes
- River valley form



**FLATHEAD LAKE
BIO STATION**
UNIVERSITY OF MONTANA



TAKU RIVER TLINGIT
First Nation



SFU

2007

2019

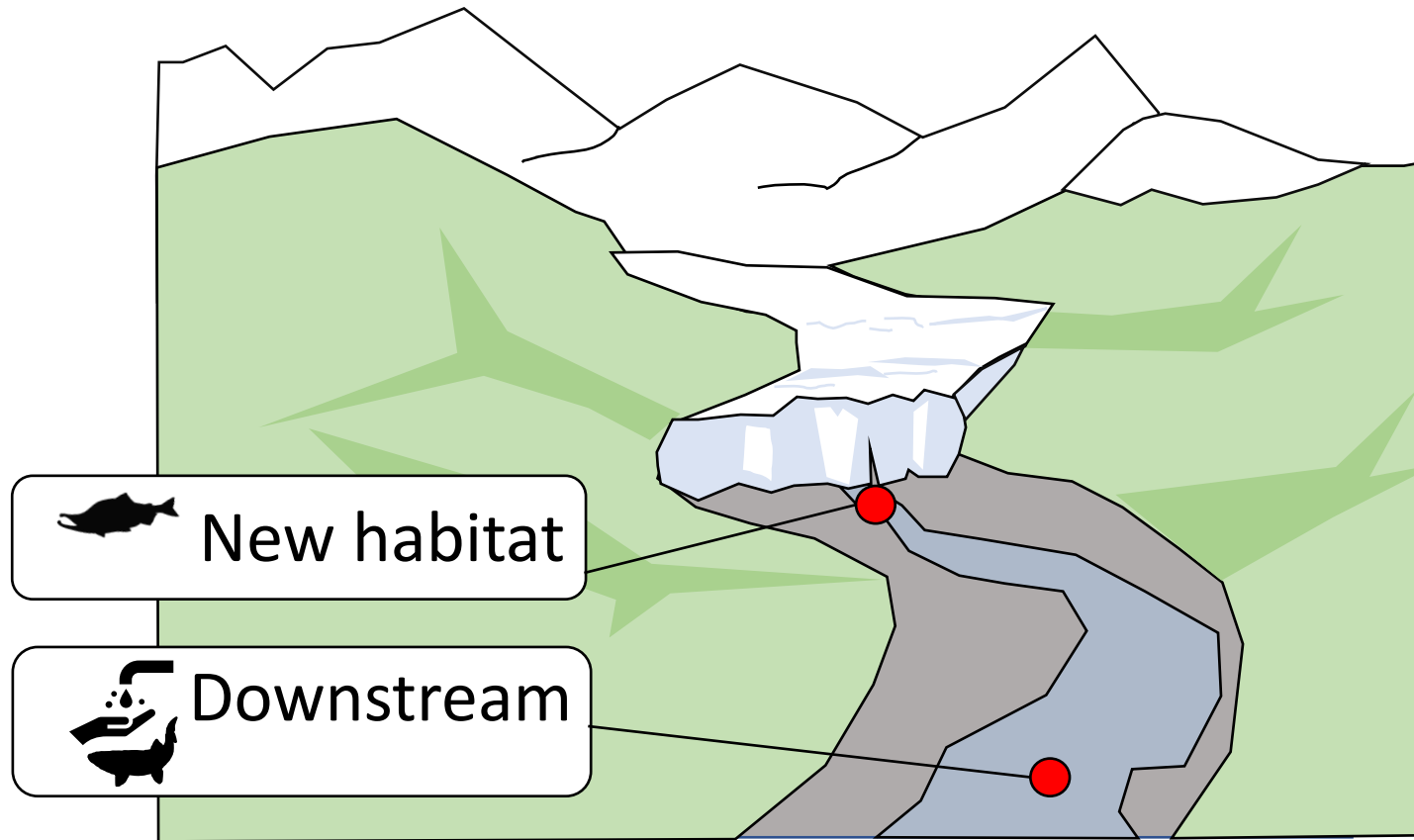


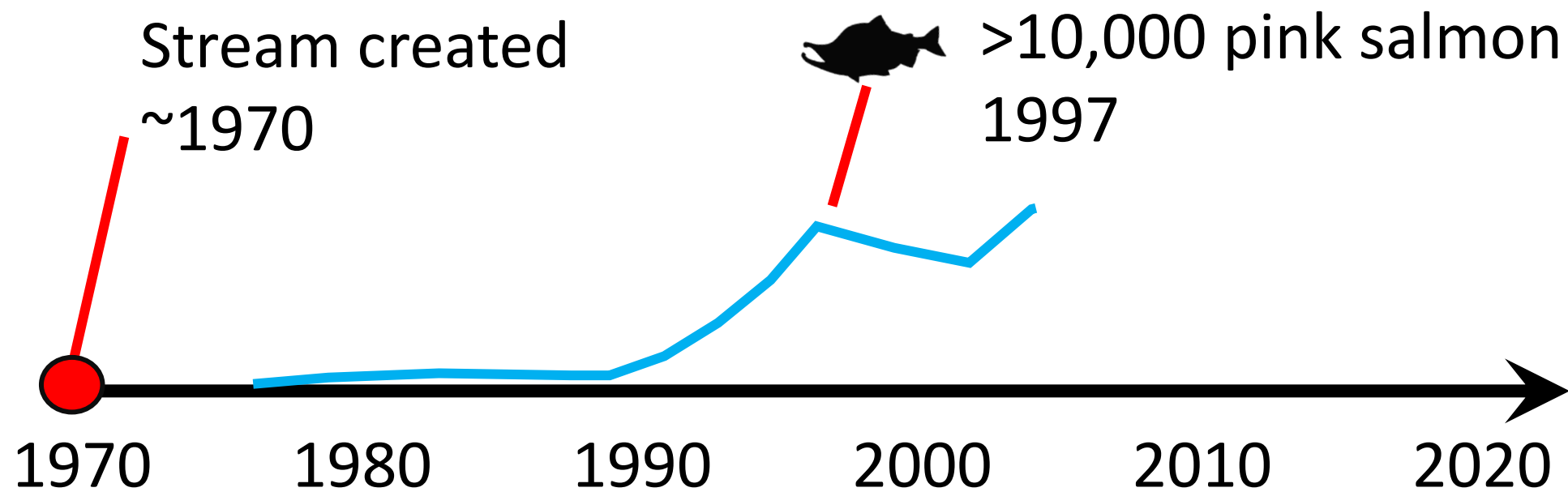
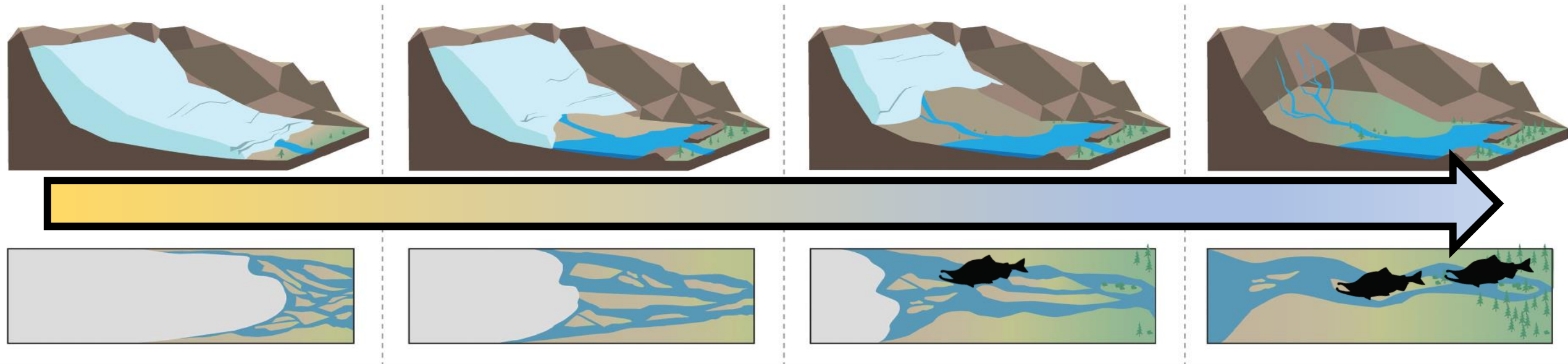
Pictures: Mark Connor

Chris Sergeant

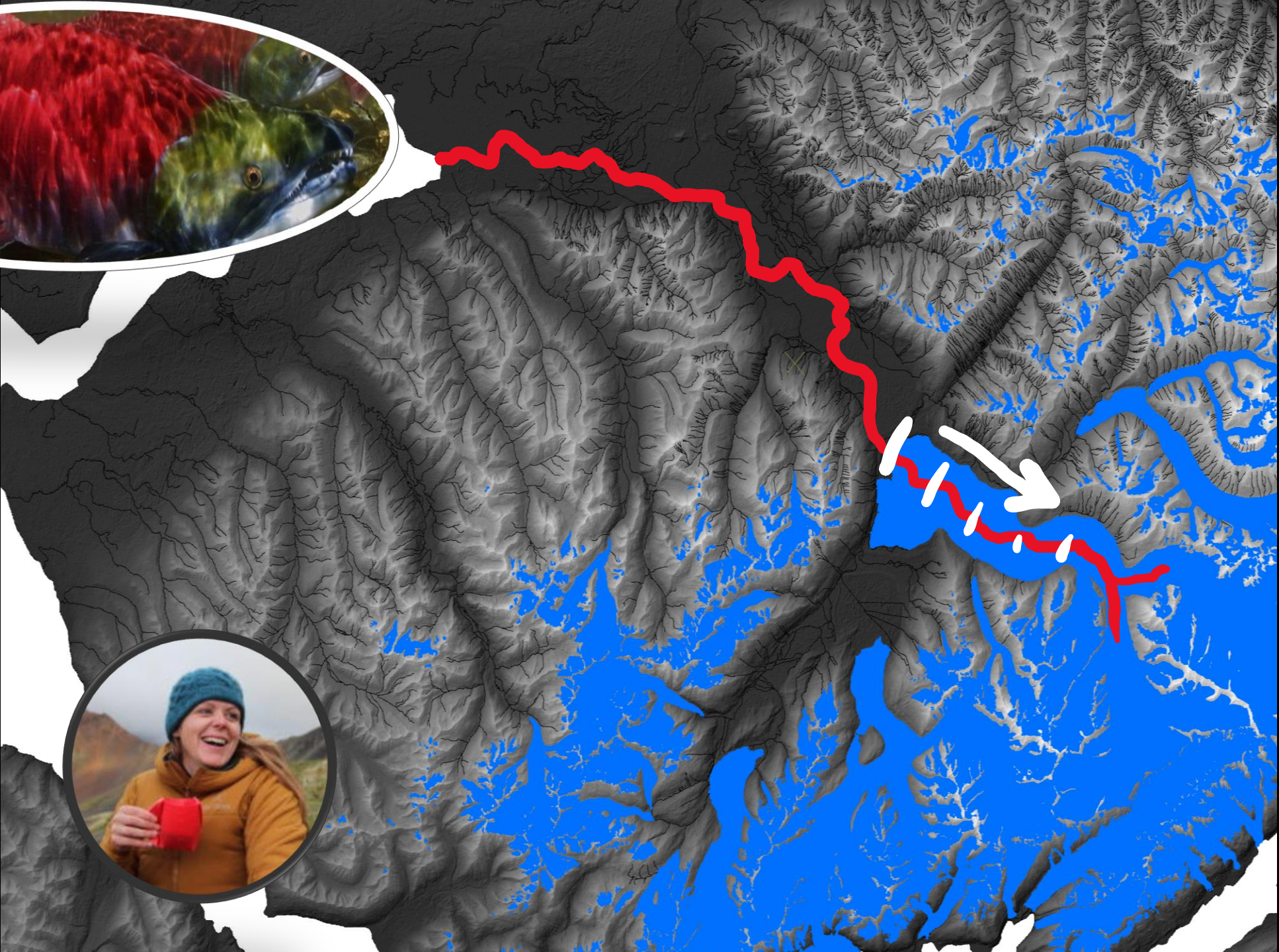


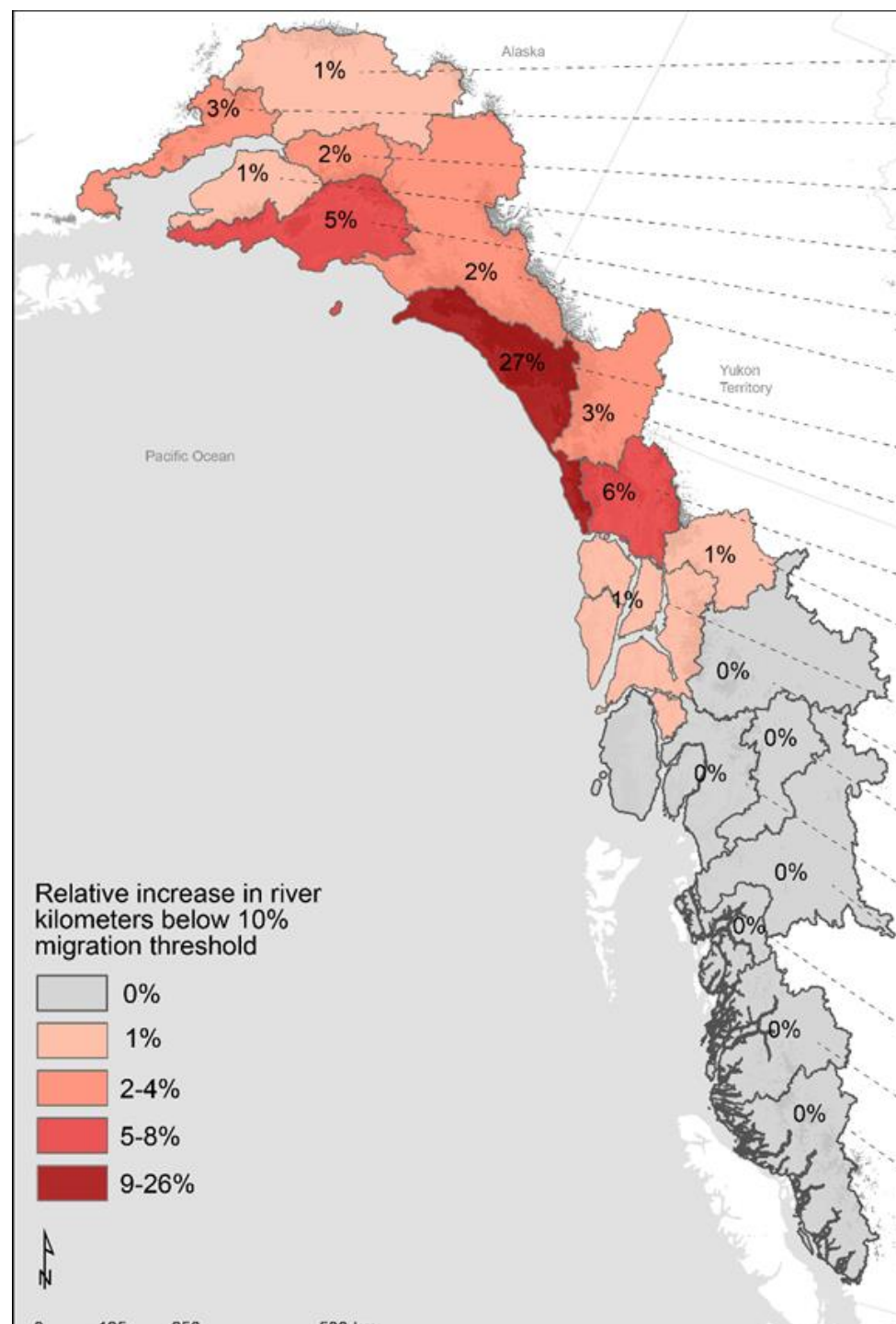
How is contemporary glacier retreat impacting salmon systems?





Milner et al. 2011, and many more!





Glacier retreat will create >6000 km of new rivers for salmon over the next 100 years



ARTICLE

<https://doi.org/10.1038/s41467-021-26897-2>

OPEN

Check for updates

Glacier retreat creating new Pacific salmon habitat in western North America

Kara J. Pitman¹, Jonathan W. Moore¹, Matthias Huss^{2,3,4}, Matthew R. Sloat⁵, Diane C. Whited⁶, Tim J. Beechie⁷, Rich Brenner⁸, Eran W. Hood⁹, Alexander M. Milner^{10,11}, George R. Pess¹², Gordan H. Reeves¹³ & Daniel E. Schindler¹⁴

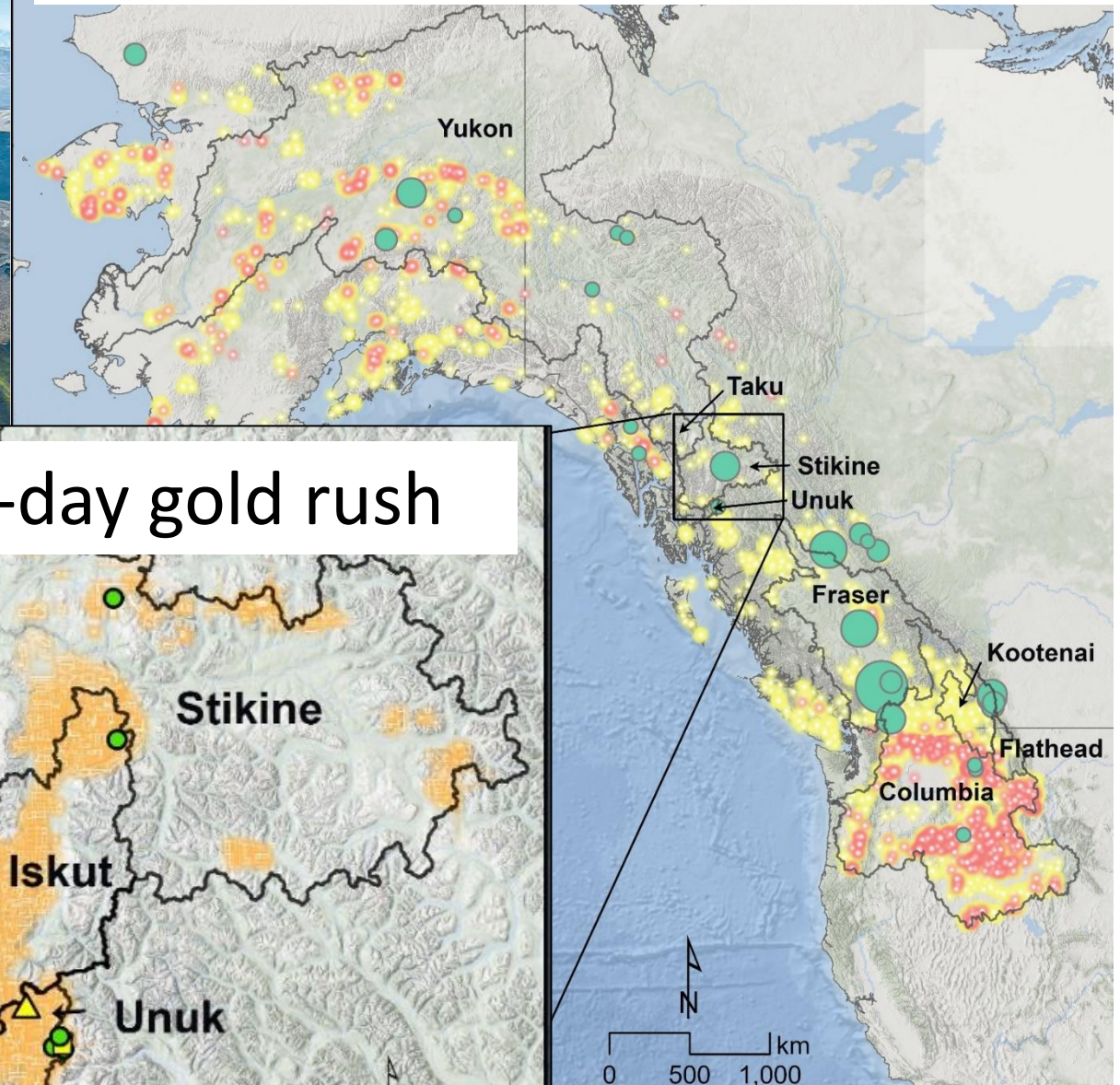


Glacier retreat— frontiers for salmon & mining

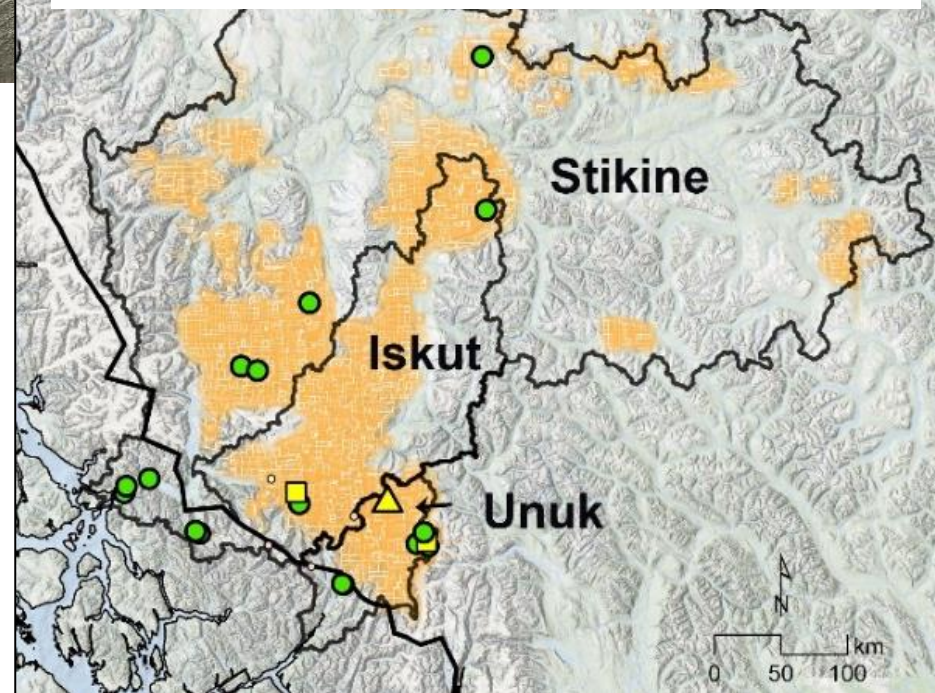
“In eight years of glacial retreat, at the rate it has been going, there could be an ore body sticking right out of the ground that nobody’s even seen before”
<https://www.mining.com/web/a-revival-takes-shape-in-bcs-golden-triangle/>



Mines across the salmon coast



Modern-day gold rush

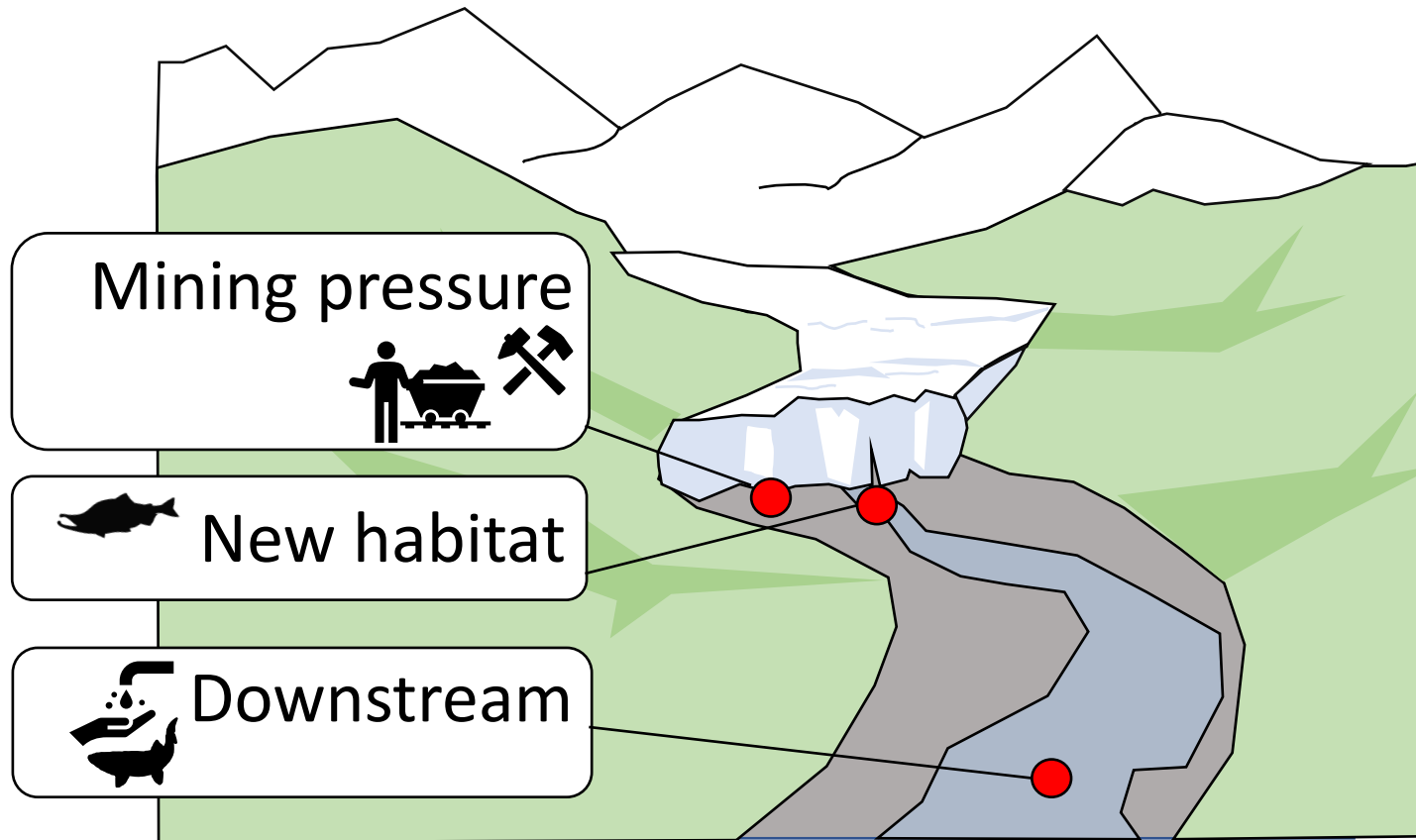


Canada's mines pose transboundary risks

Erin K. Sexton^{1*}, Christopher J. Sergeant^{1,2},
Jonathan W. Moore³, Alana R. Westwood⁴, David M.
Chambers⁵, Megan V. McPhee², Sonia A. Nagorski⁶,
Sarah L. O'Neal⁷, Jill Weitz⁸, Adrienne Berchtold⁹,
Marissa Capito¹⁰, Christopher. A. Frissell^{1,11}, Jennifer
Hamblen¹², F. Richard Hauer¹, Leslie A. Jones¹³, Greg
Knox⁹, Randal Macnair¹⁴, Rachel L. Malison¹, Vicki
Marlatt¹⁵, Jennifer McIntyre¹⁶,
Nikki Skuce¹⁷, Diane C. Whited¹

Sergeant et al. in revision

How is contemporary glacier retreat impacting salmon systems?



Towards stewarding the oncoming future of salmon systems





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@jon_w_moore 



Salmon Watersheds Lab



NSERC
Liber Ero
Wilburforce

Gordon & Betty Moore Foundation