

Cumulative effects of human disturbance and climate change on salmon habitat in Central Yukon

Daniel Yip

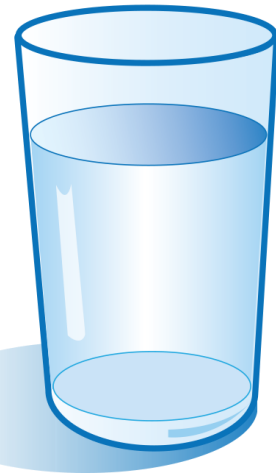
Chrystal Mantyka-Pringle



Confluence of the Indian and Yukon Rivers
Credit: Malcolm Boothroyd

What are cumulative effects and why are they important?

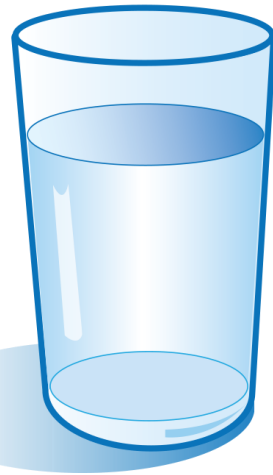
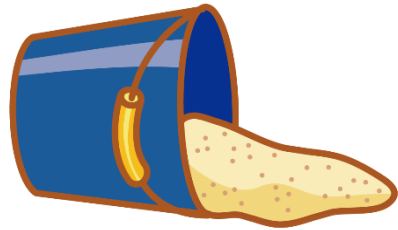
What are cumulative effects and why are they important?



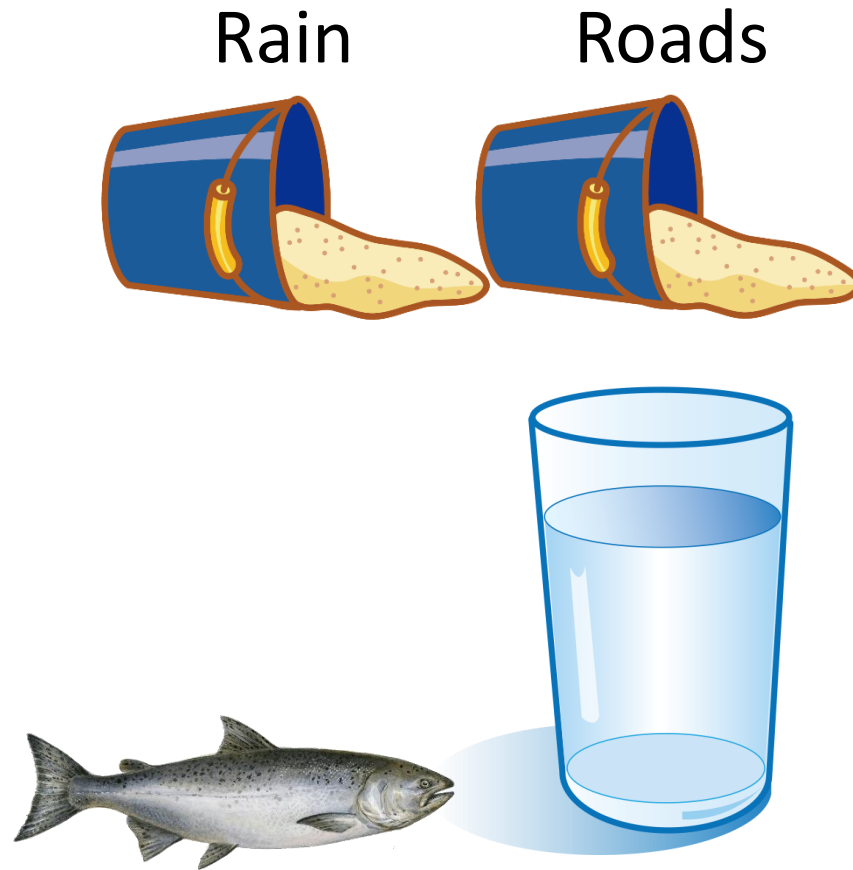
Undisturbed spawning habitat

What are cumulative effects and why are they important?

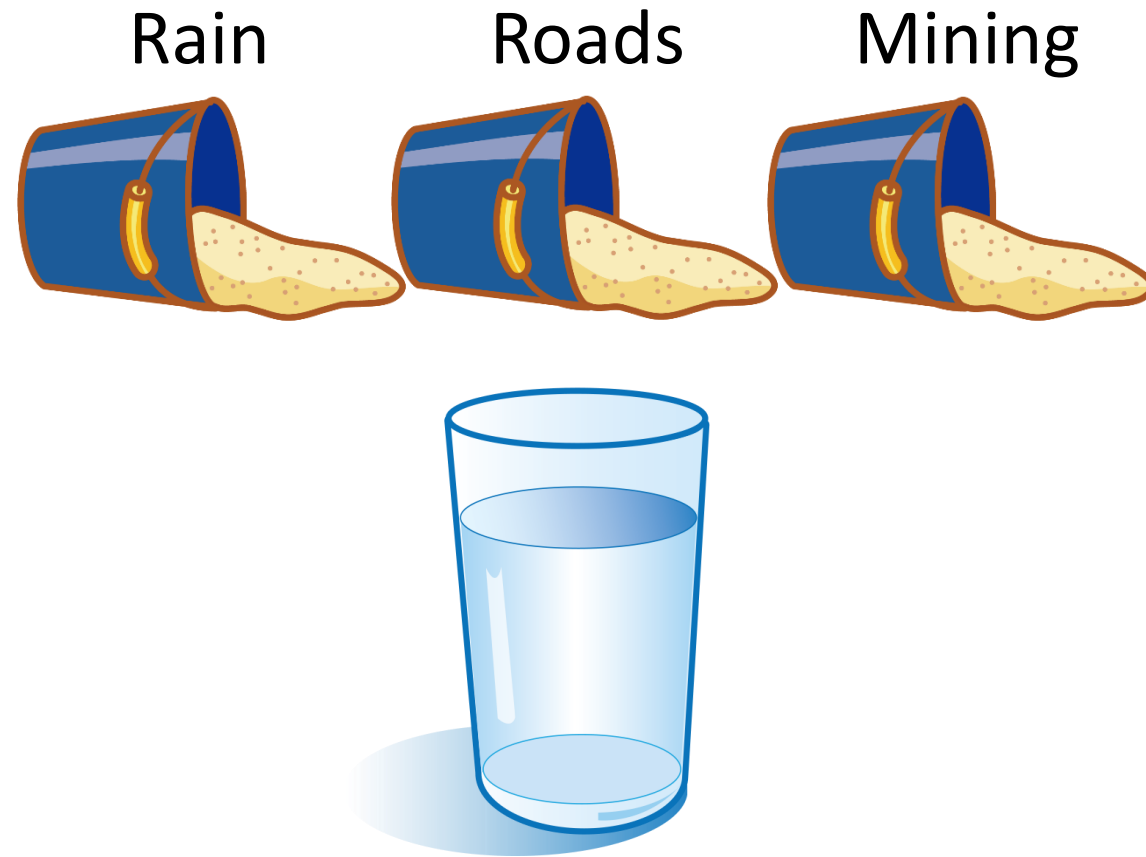
Rain

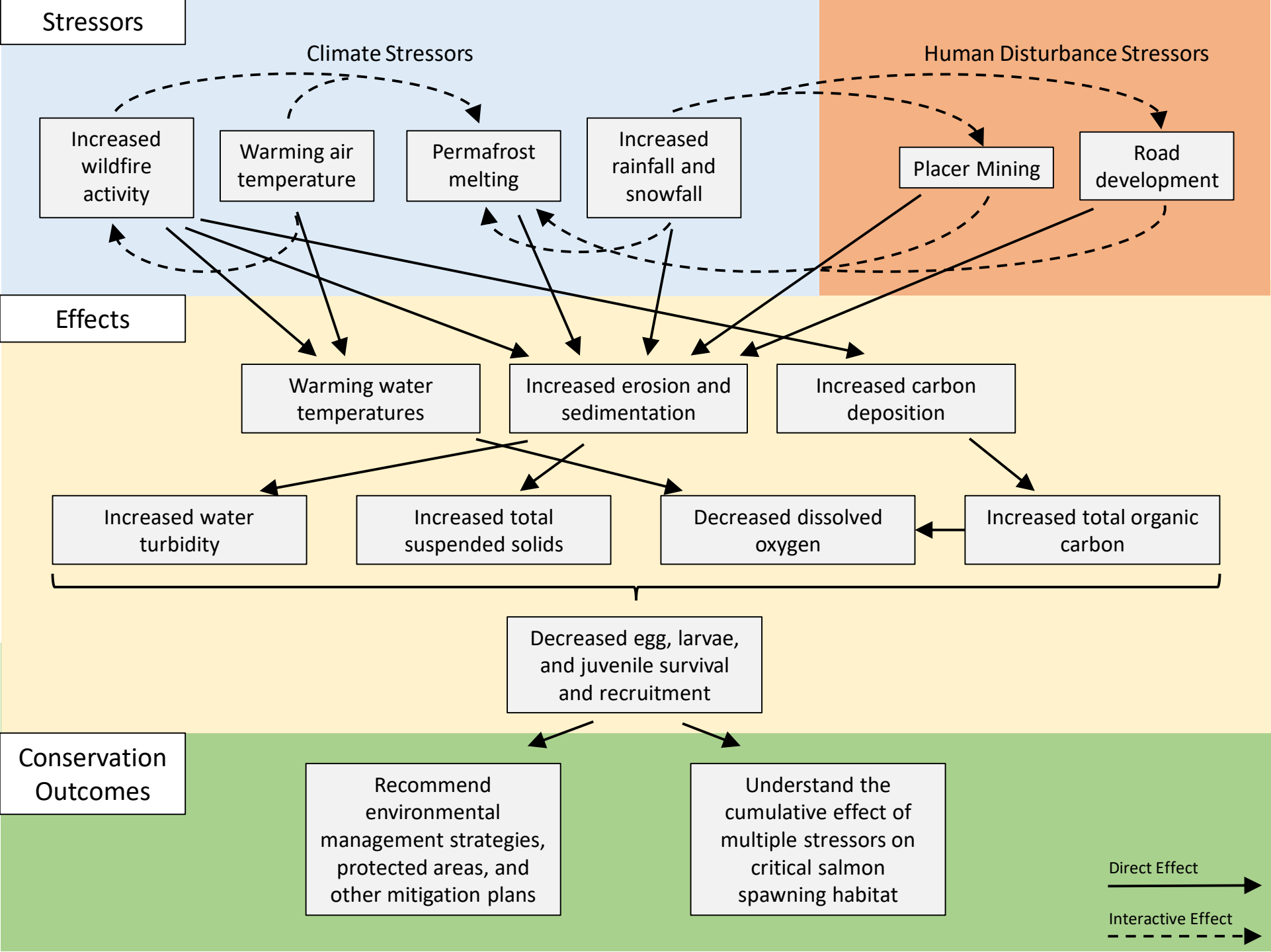


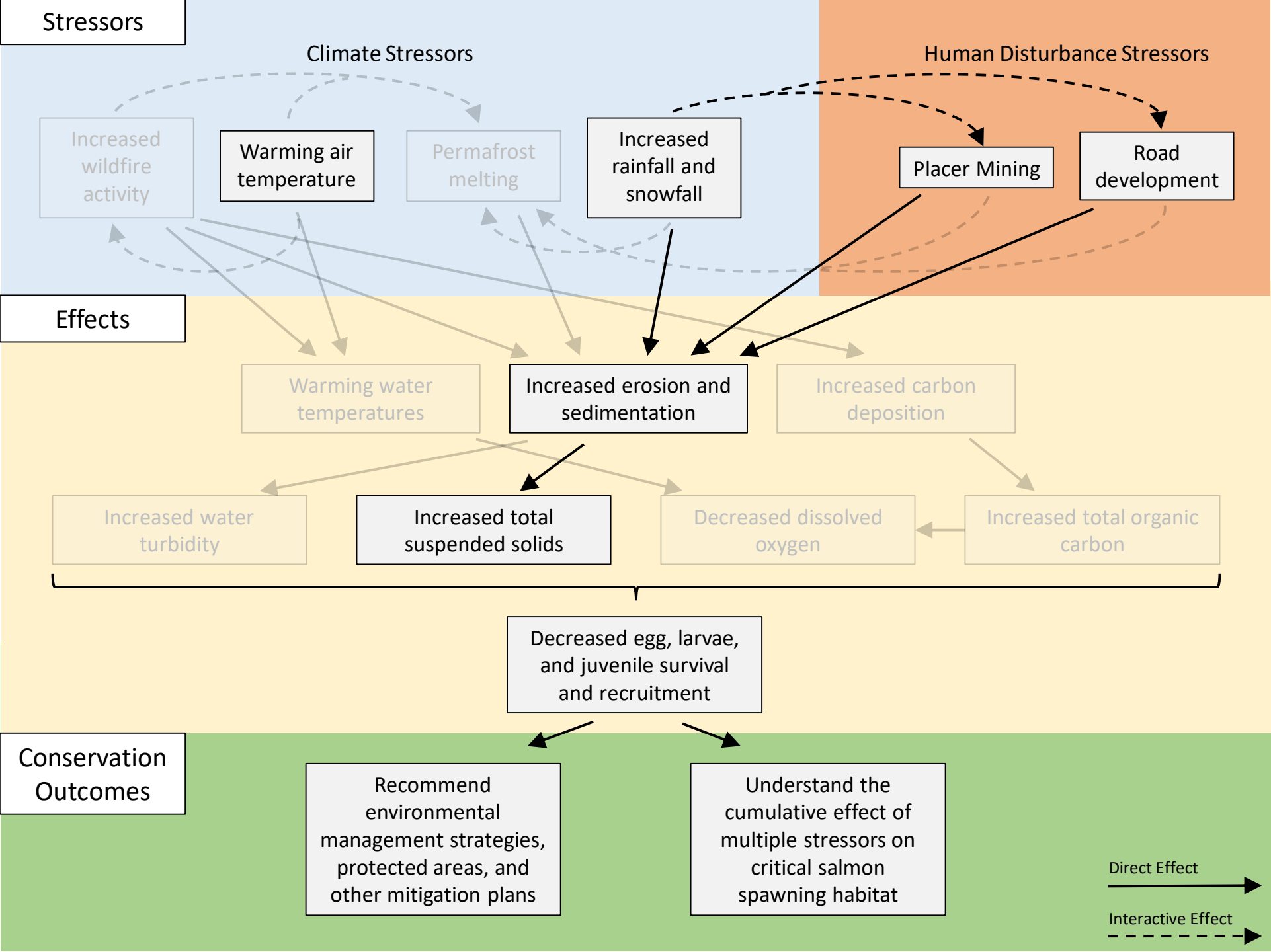
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High density of human disturbance in Central Yukon

Placer Mining – the
dredging of watercourses
and creek beds to extract
gold.

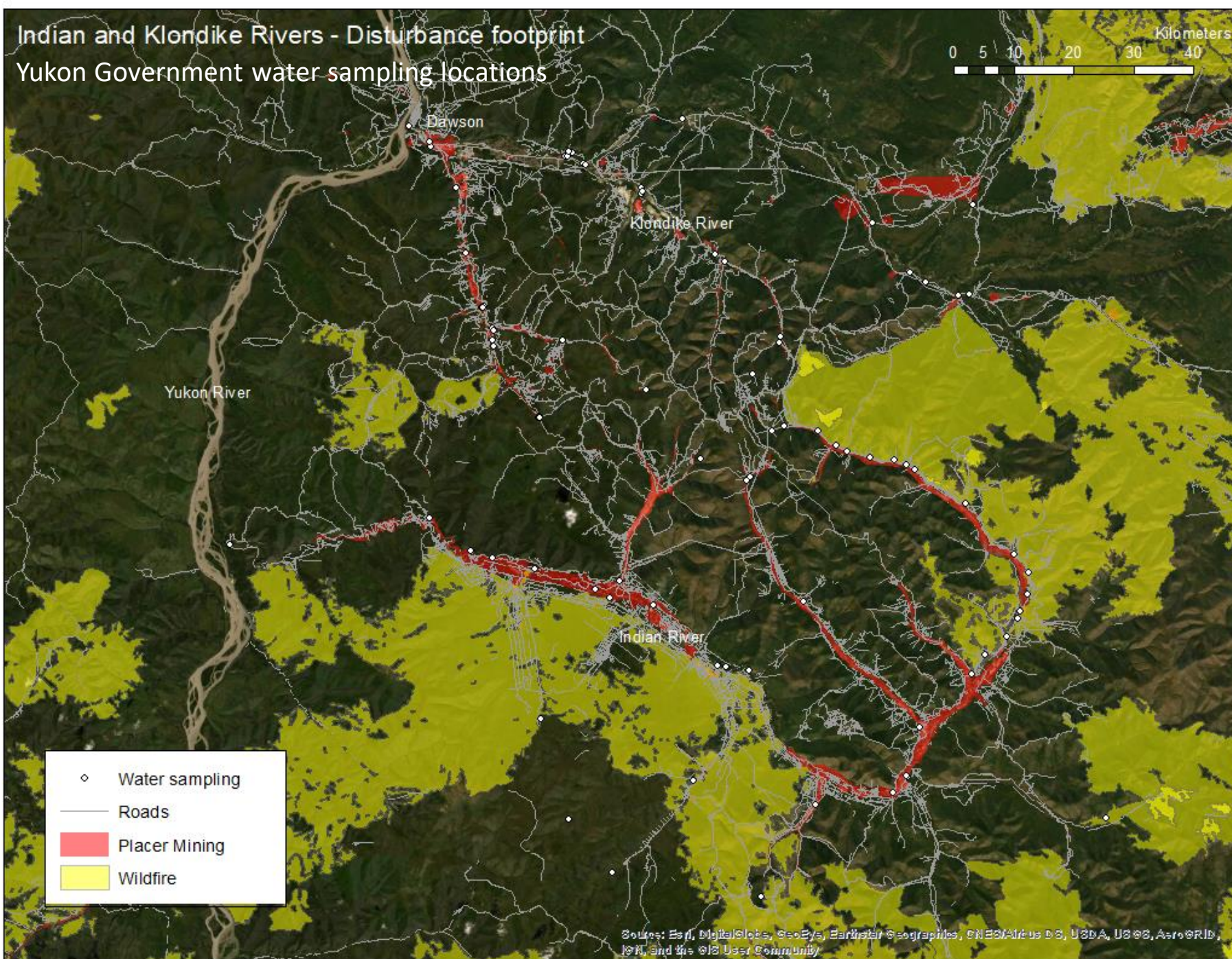
Road Development – to
support exploration and
mining, and other industrial
activities.



Hunker Creek
Credit: Malcolm Boothroyd

Indian and Klondike Rivers - Disturbance footprint Yukon Government water sampling locations

0 5 10 20 30 40 Kilometers



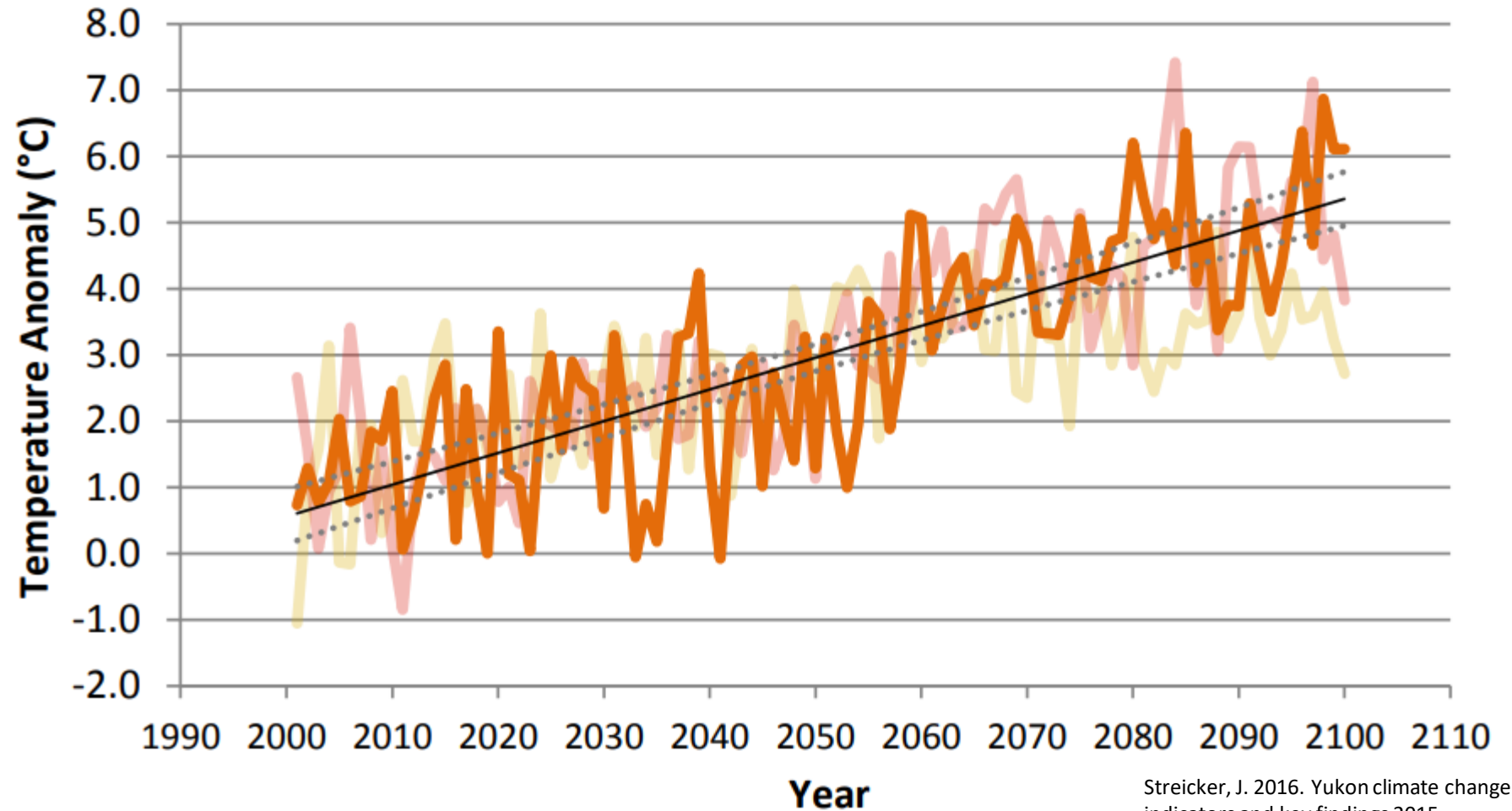
10,133 water samples collected by YG within the Indian and Klondike river watersheds

86 unique sampling locations

13 years of sampling (2007-2019)

Current and projected climate patterns

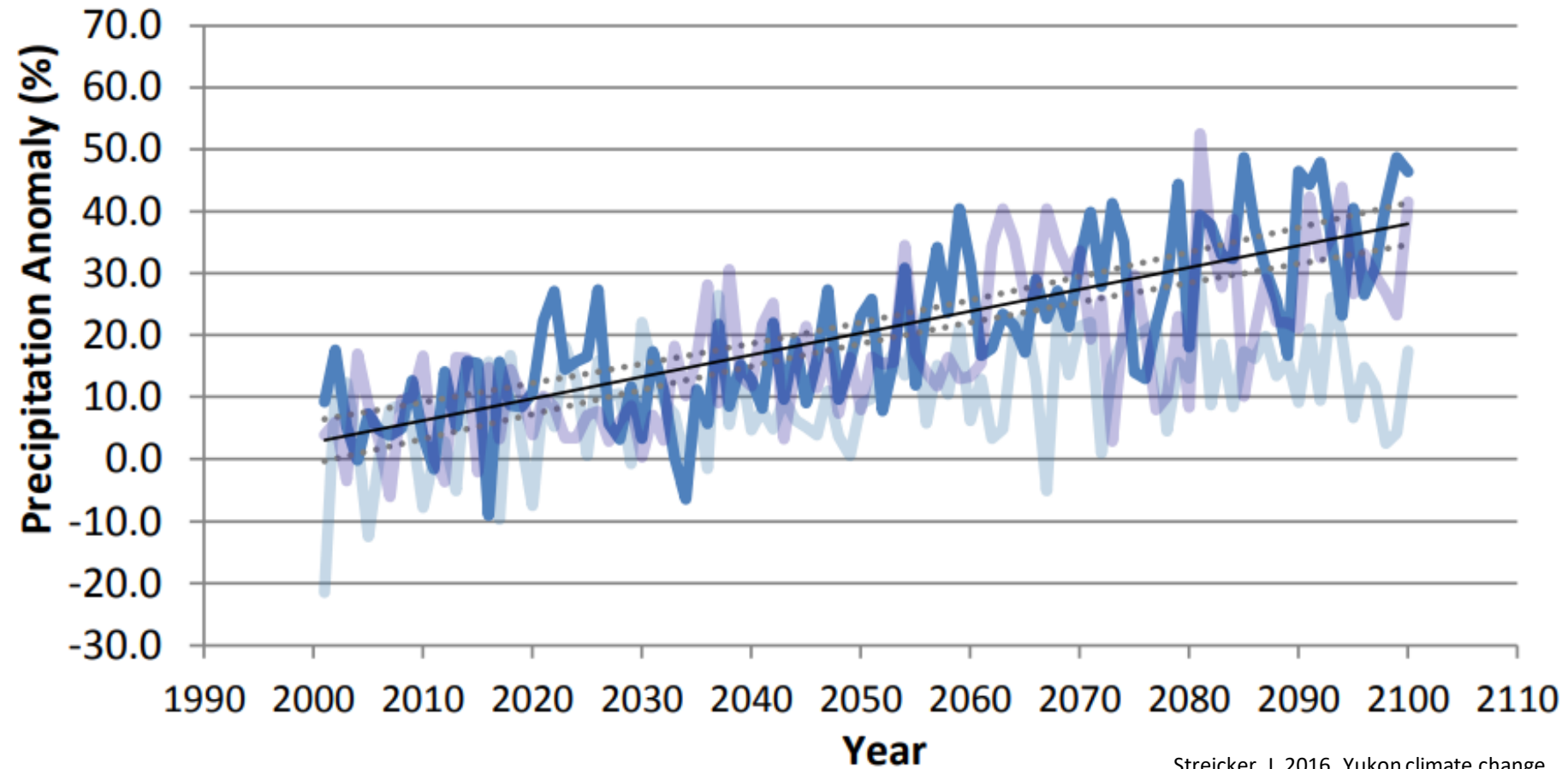
Yukon Projected Temperature Anomaly



Streicker, J. 2016. Yukon climate change indicators and key findings 2015.

Current and projected climate patterns

Yukon Projected Annual Precipitation



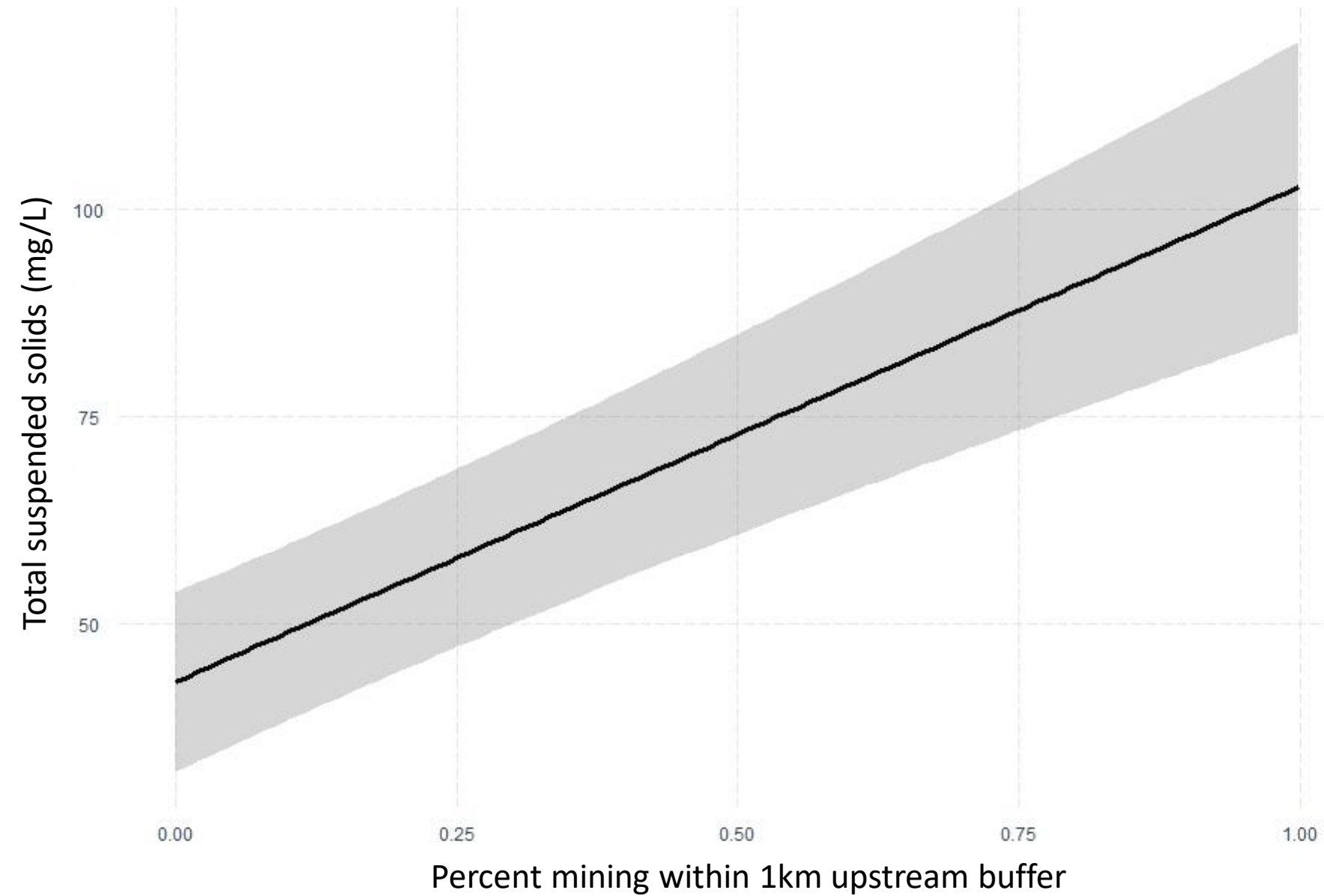
Streicker, J. 2016. Yukon climate change indicators and key findings 2015.



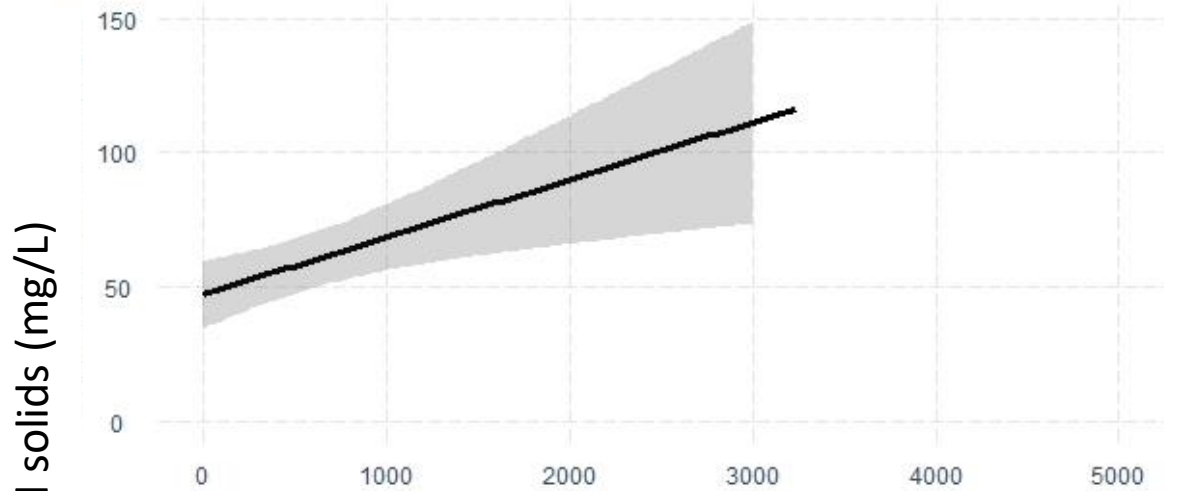
Water Quality Measurement	Climate and Landscape Disturbances
Total suspended solids (TSS)	Road density
	% disturbance from mining
	Annual precipitation
	Average temperature
	Surface runoff

How does each of these disturbances impact water quality?

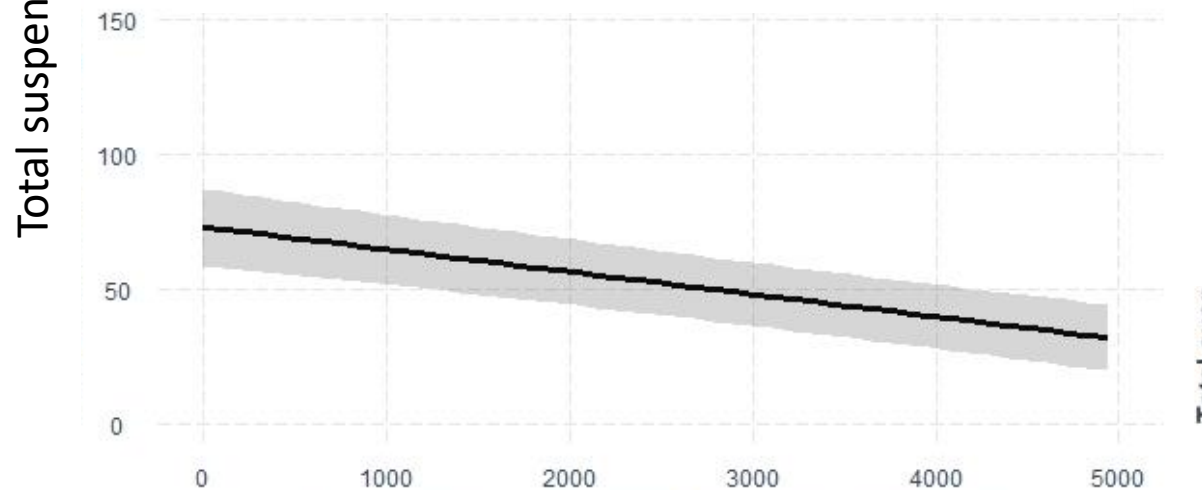
What is the combined effect of human disturbance and climate change on water quality?



The amount of sediment increases with upstream mining activity

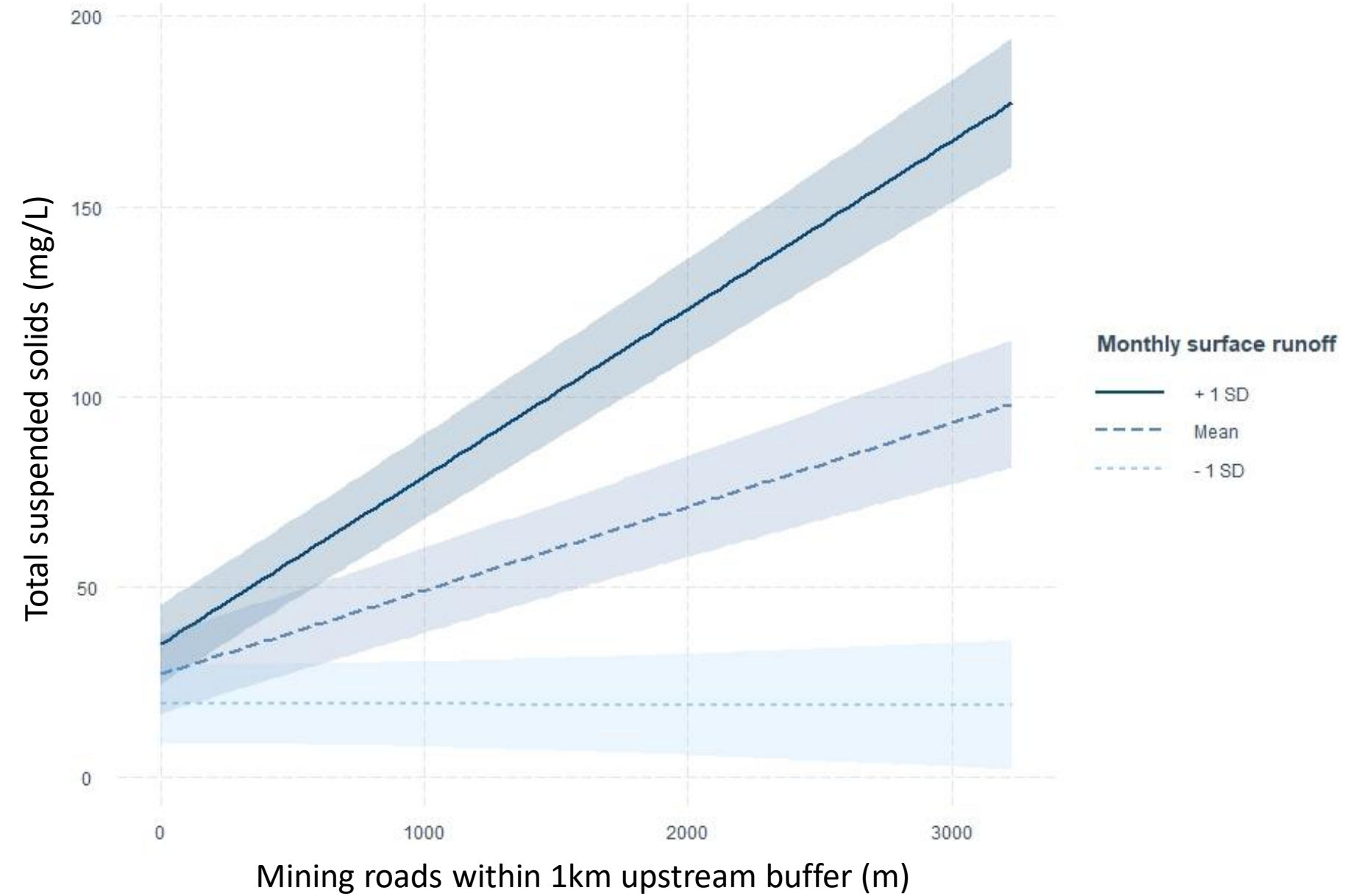


Mining roads within 1km upstream buffer (m)



Transportation roads within 1km upstream buffer (m)

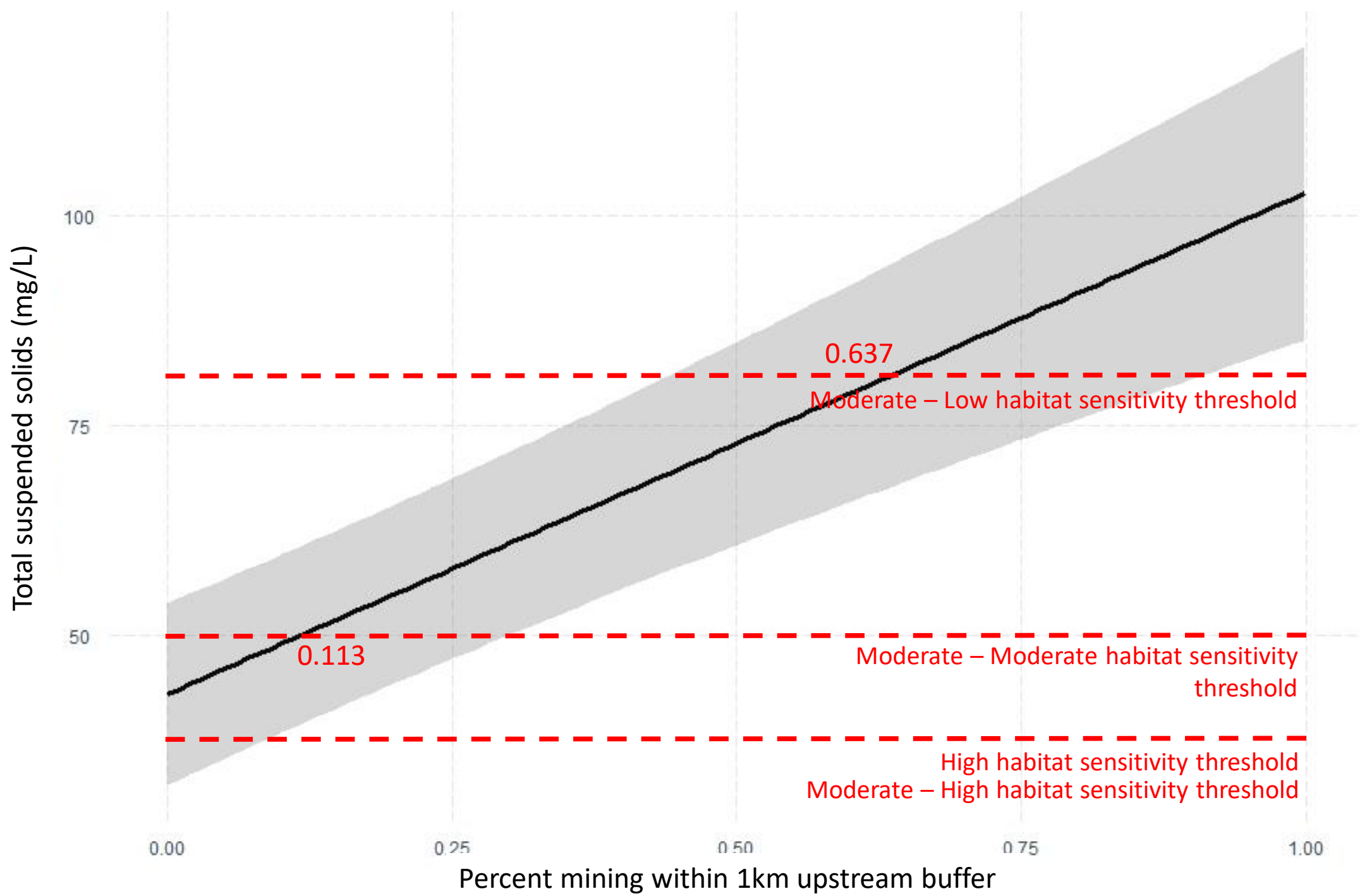
The amount of sediment increases with the density of unpaved and active industry roads upstream of water sampling



Impacts on water quality by mining roads are significantly influenced by snow melt, rain, and snow patterns

Fisheries and Oceans
Canada water quality
objectives for high
sensitivity salmon
habitat

Salmon Habitat Sensitivity	Water Quality Objective (mg/L)
High	<25
Moderate – High	<25
Moderate – Moderate	<50
Moderate – Low	<80
Low	<200





Surface disturbance thresholds in current climate conditions

Salmon Habitat Sensitivity	Mining threshold (% disturbance)	Road threshold (m/km ²)
High	0	0
Moderate – High	0	0
Moderate – Moderate	11.3	105
Moderate – Low	63.7	842
Low	No threshold	No threshold

Project
Partners



Funding

