Truth and consequences: increased flooding under climate change and invasive plants

David R. Clements, Sarah Demian, Aidan Anderson, Jaylene Braithwaite, and Lauren Mckenna

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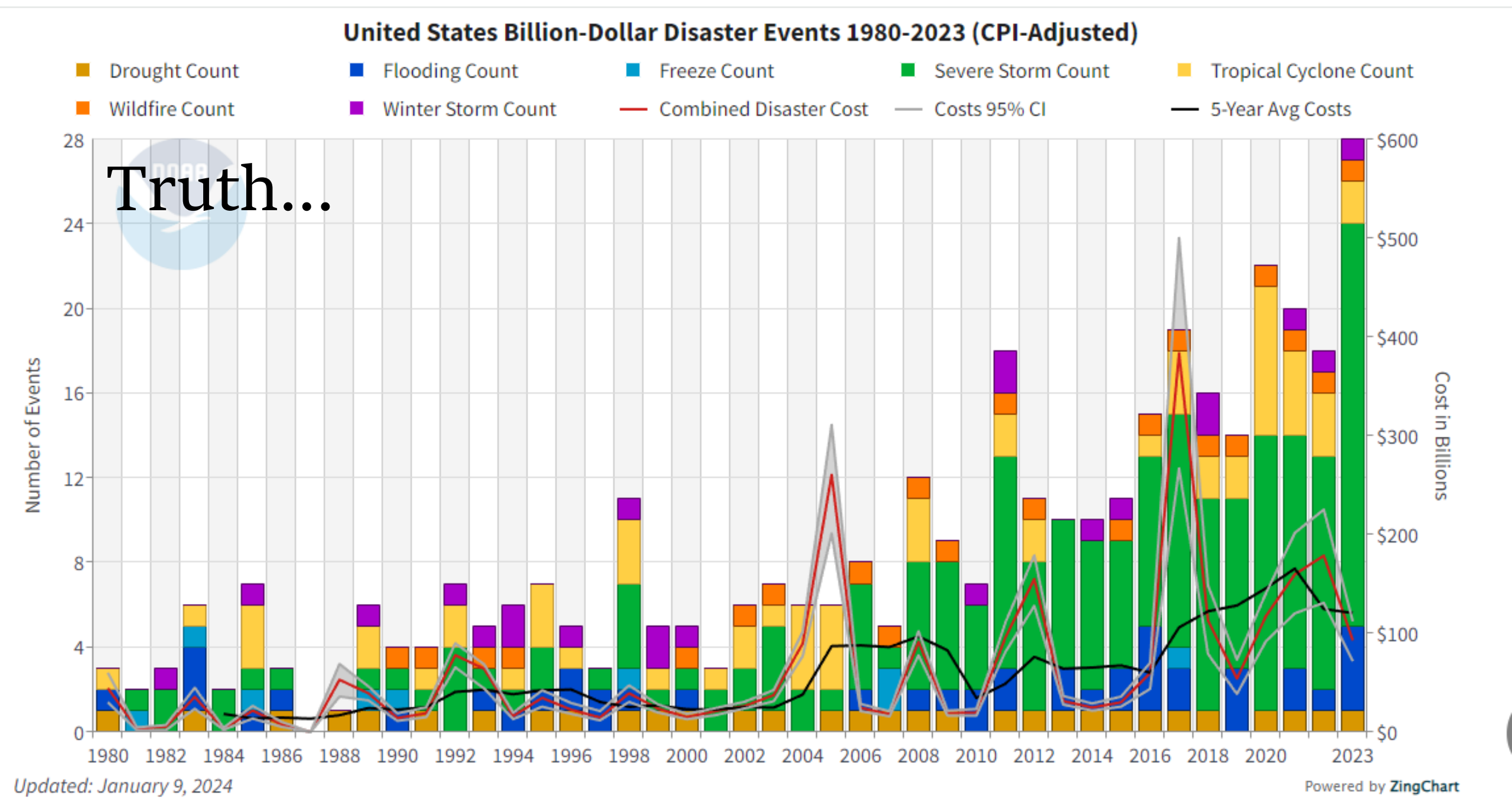
United States Billion-Dollar Disaster Events 1980-2023 (CPI-Adjusted)
Drought Count
Flooding Count
Freeze Count
Severe Storm Count
Tropical Cyclone Count
Wildfire Count
Winter Storm Count
Combined Disaster Cost
Costs 95% CI
5-Year Avg Costs
Truth...
Number of Events
Cost in Billions
0
4
8
12
16
20
24
28
$0
$100
$200
$300
$400
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$600
1980
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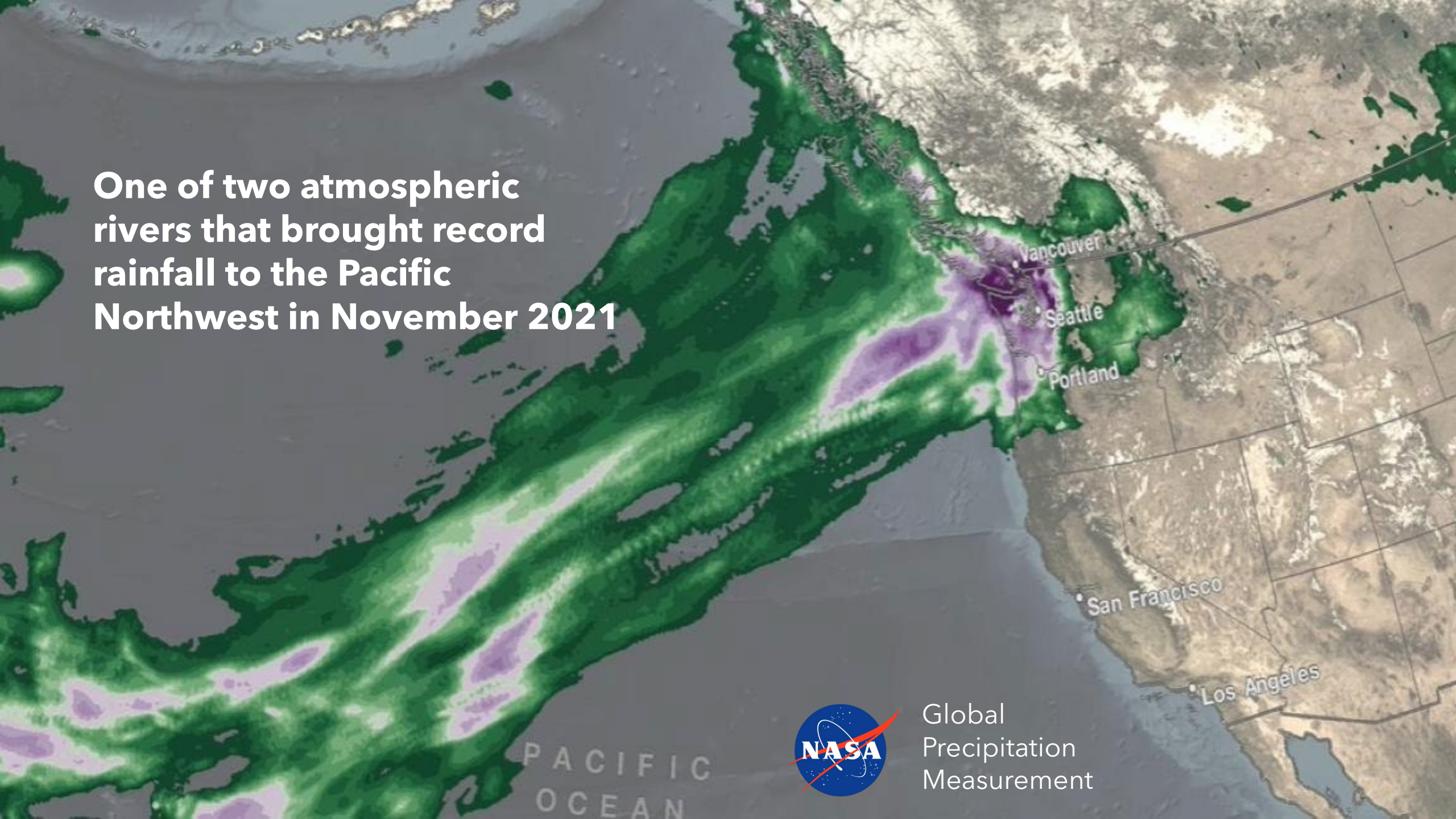
Updated: January 9, 2024
Powered by ZingChart


One of two atmospheric rivers that brought record rainfall to the Pacific Northwest in November 2021
Vancouver
Seattle
Portland
San Francisco
Los Angeles
PACIFIC OCEAN
NASA
Global Precipitation Measurement

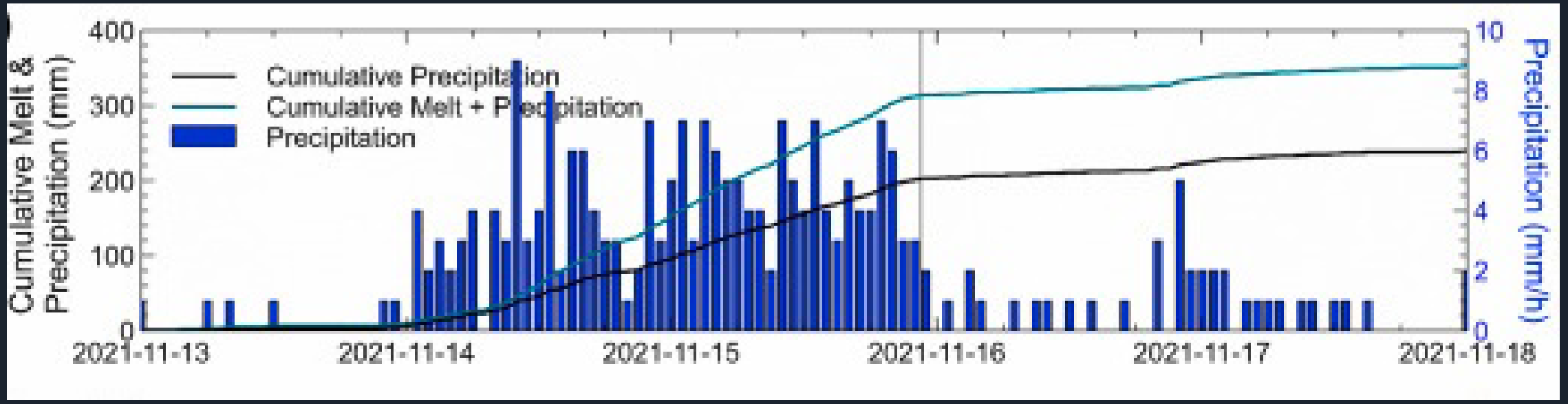
Fraser Valley Flooding, November 2021

Ben Nelms/CBC

Consequences: Costliest natural disaster ever in British Columbia

- Insurance costs estimated at $450 million by the Insurance Bureau of Canada
- BC Premier David Eby announced a $76.6 million upgrade to the Barrowtown Pump Station Feb. 14, 2024
- Part of $180 million spent by Province for Abbotsford flood recovery and mitigation

Truth: Unprecedented rainfall levels

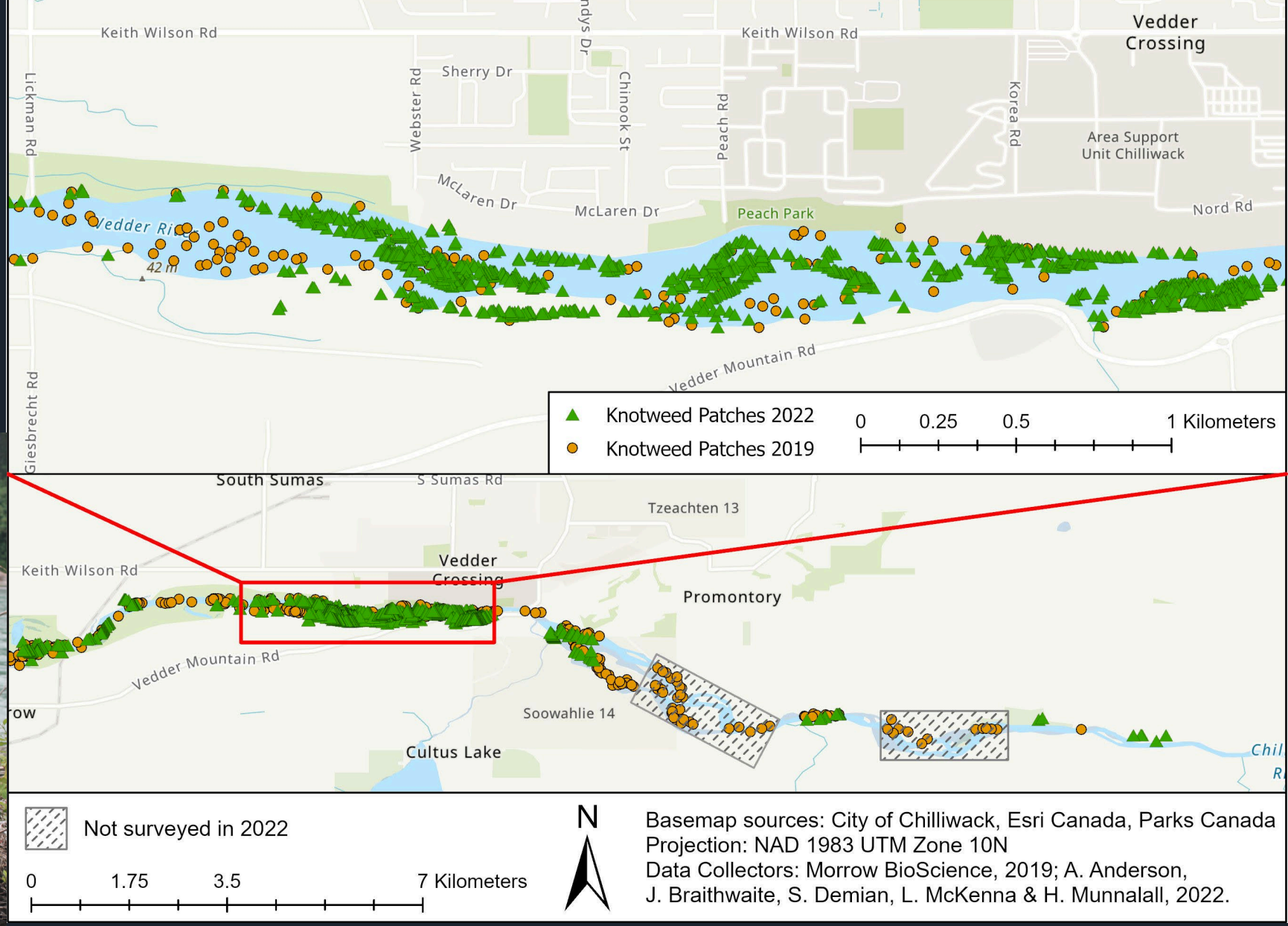


Rainfall in the Chilliwack Basin, British Columbia, Canada for 13-18 November 2021 lead to discharge of over 700m^3s^{-1}, over ten times the mean discharge

Chilliwack-Vedder River November 2021

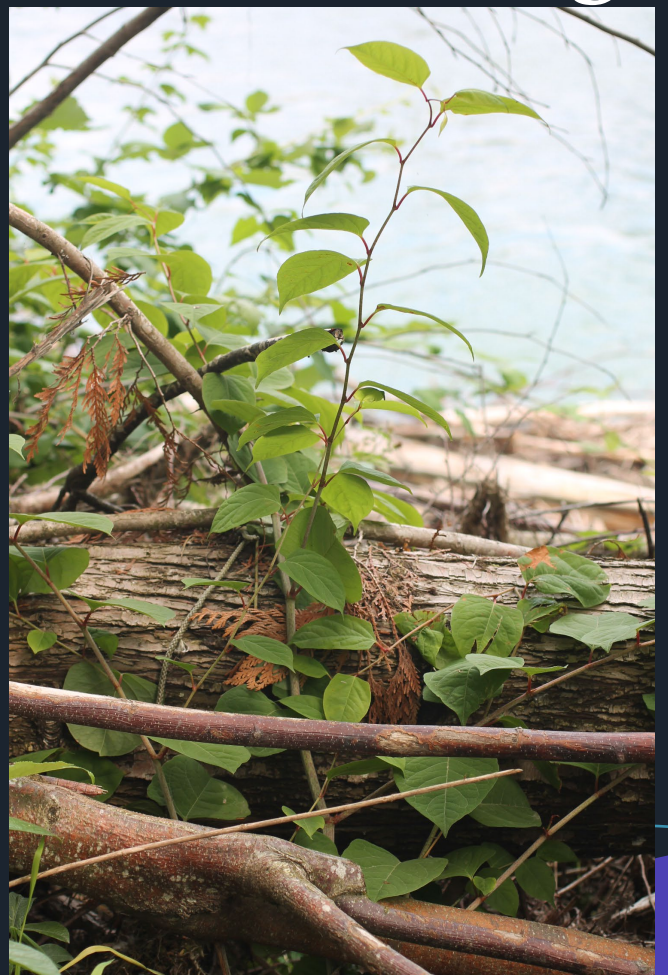
Chilliwack-Vedder River 2021 & 2022

Consequences: 1690 knotweed patches in 2022 vs. 341 patches in 2019

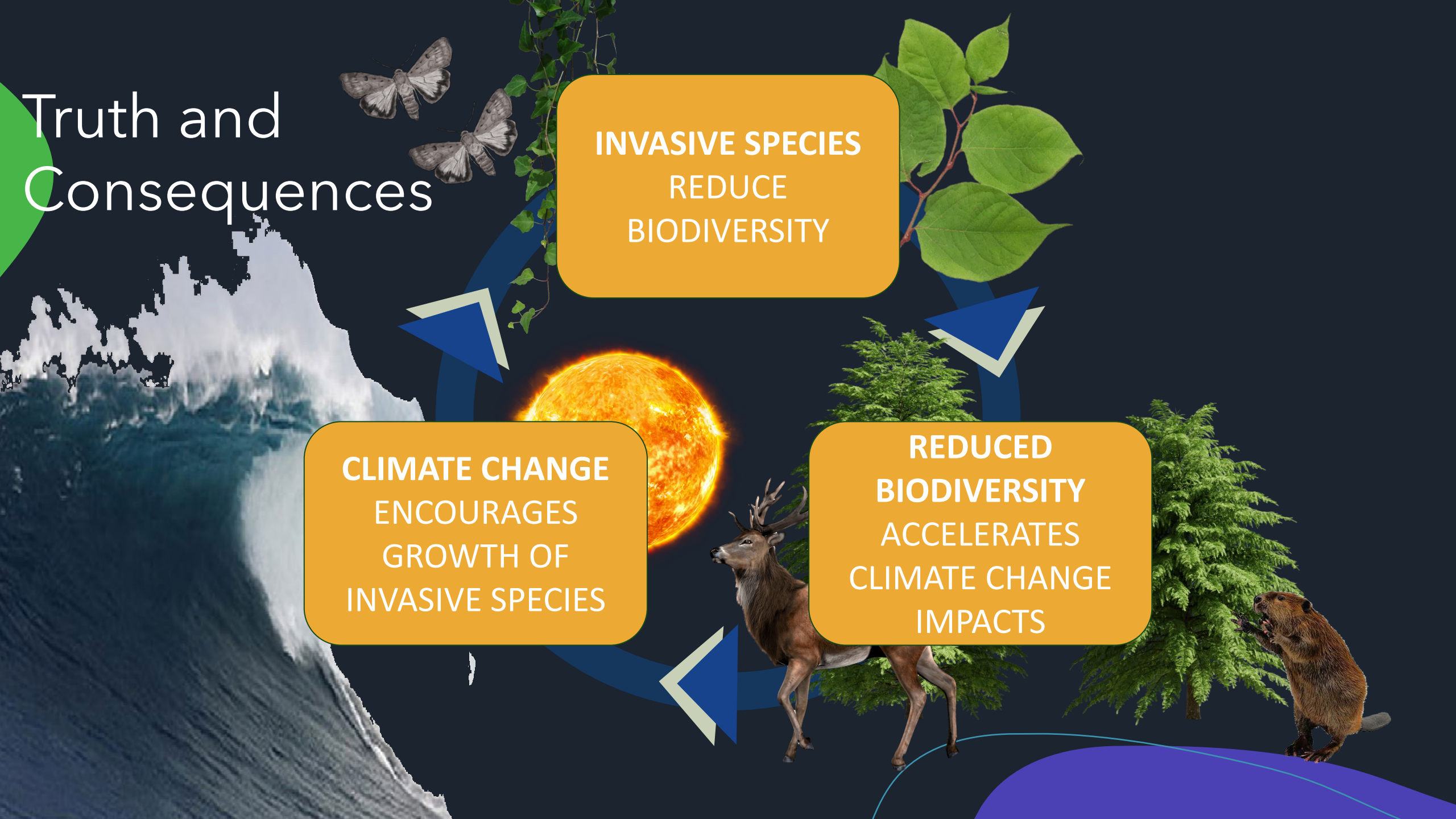


Lauren Mckenna and Jaylene Braithwaite surveying knotweed patches on the Chilliwack-Vedder River in 2022

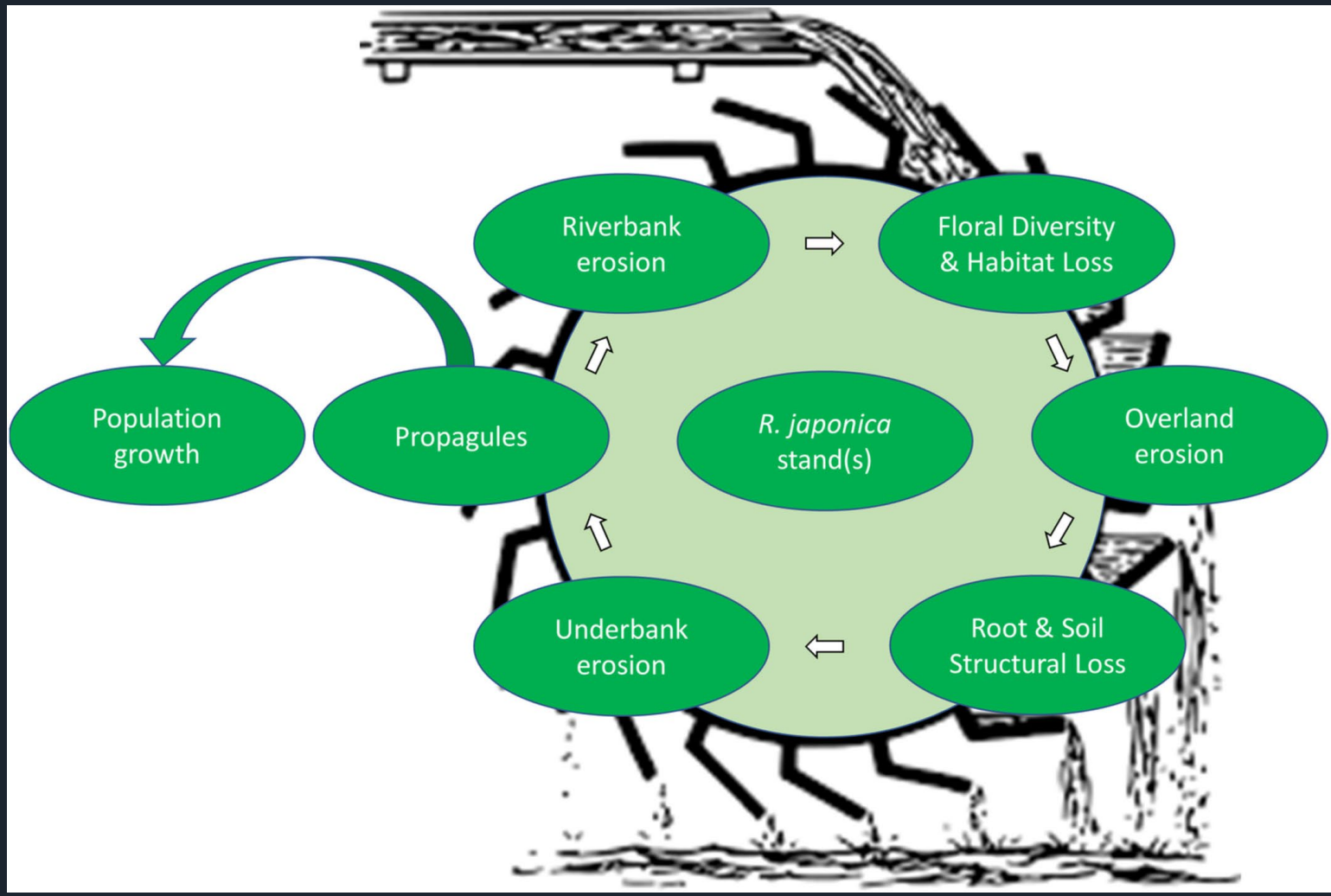
Natural consequences: many invasive species like knotweed thrive on flooding



Truth and Consequences

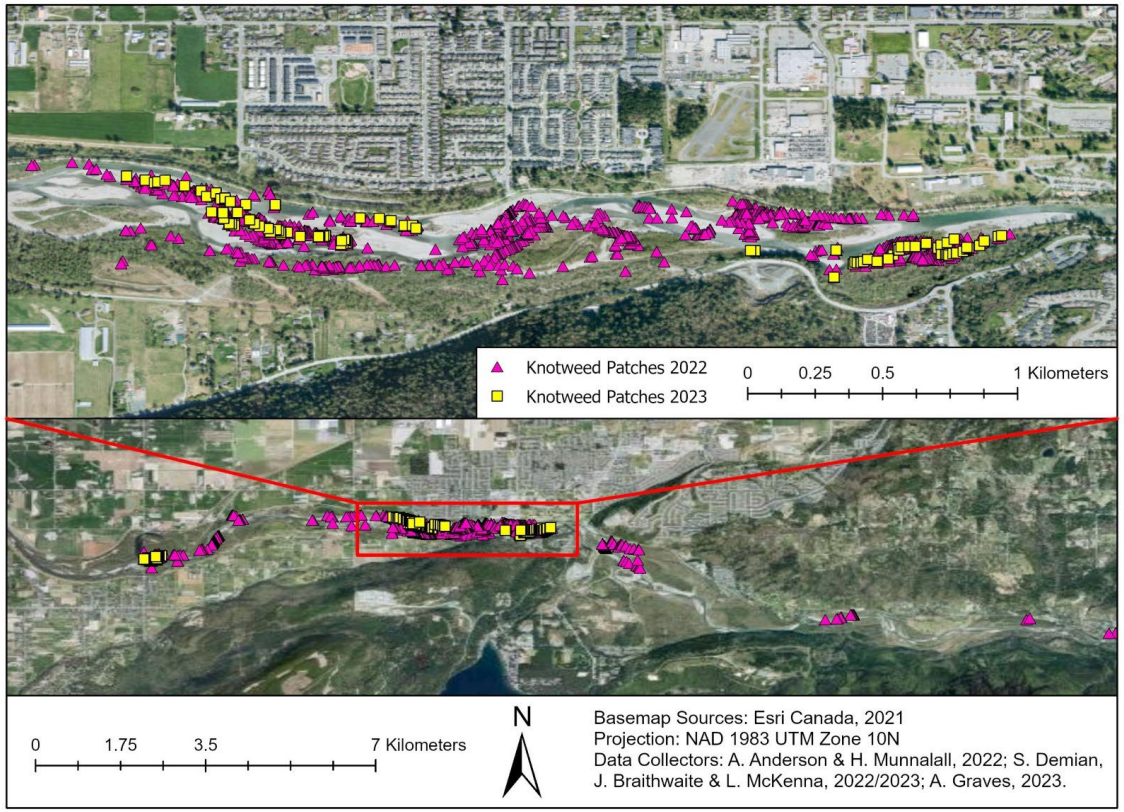


"As some hydrological regimes shift towards more frequent and severe storm events in response to climate change, positive feedback loops may develop in these regions between existing knotweed s.l. populations, sudden riverbank failure, and increased flood-related damage, with presumably significant impacts on riparian infrastructure."



Brian Colleran, Shaw Nozaki Lacy, and Maria Rafaela Retamal (2020) Invasive Japanese knotweed (*Reynoutria japonica* Houtt.) and related knotweeds as catalysts for streambank Erosion. *River Res Appl*

Consequences: knotweed persistence and spread erodes environmental quality



Follow-up mapping in 2023 showed persistence of knotweed patches spread by the flood in 2021

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