



Apr 26th, 11:30 AM - 1:00 PM

## Managing Floodplains Collaboratively: Cross-border learning on fish, farms, and floods

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Dan Straker

Gillian Fuss

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<https://cedar.wwu.edu/ssec/2022ssec/allsessions/220>

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**Speaker**

Lina Azeez, Dan Straker, Gillian Fuss, Kari Quaas, Beth leDoux, David Roberts, and Lindsey Desmul

# Managing Floodplains Collaboratively: Cross-border learning on fish, farms, and floods



David Roberts, Peak Sustainability

Gillian Fuss, First Nations Emergency Planning Secretariat

Lina Azeez, Watershed Watch Salmon Society

Dan Straker, Resilient Waters

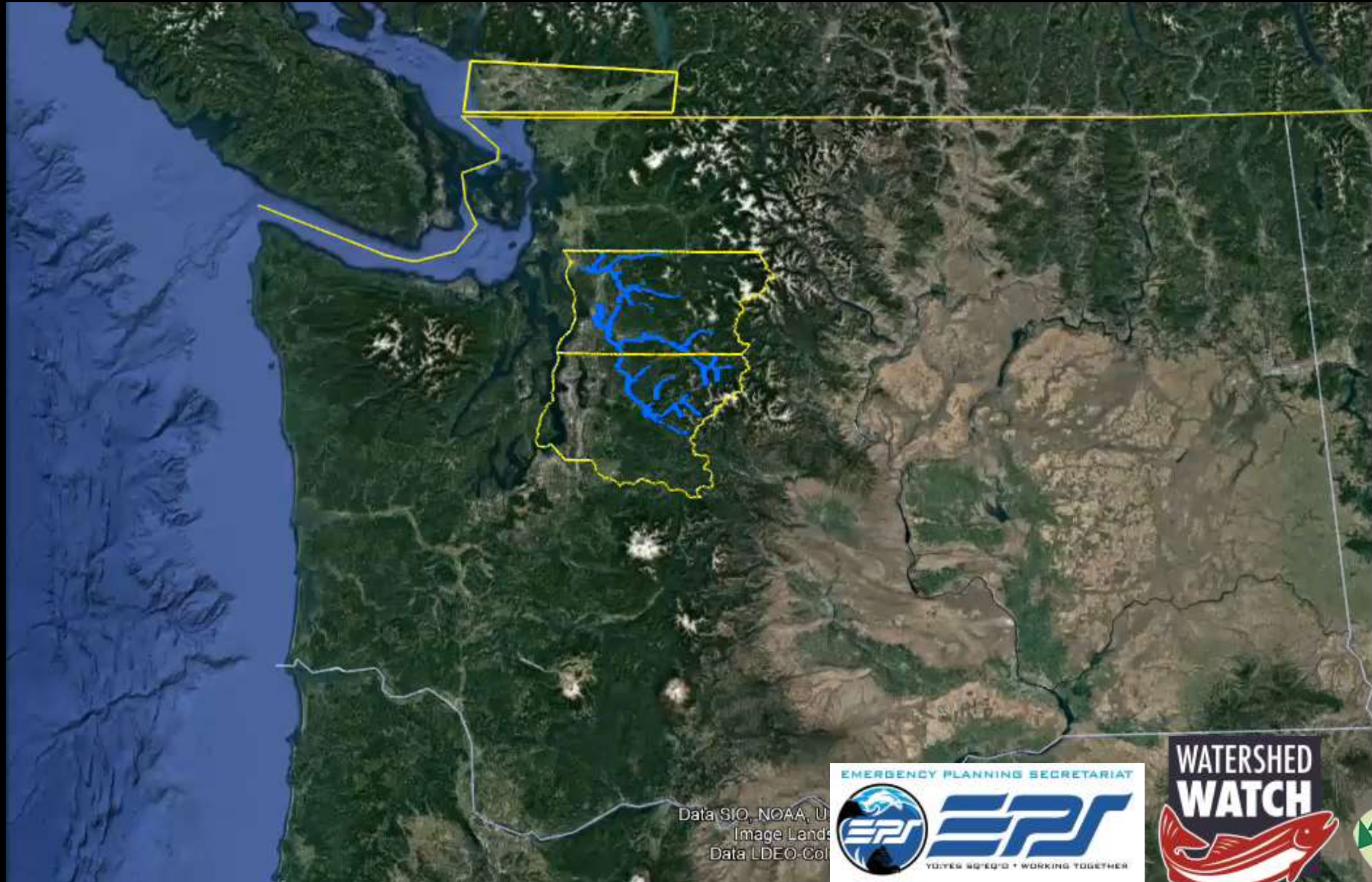
Lindsey Desmul, Washington Department of Fish and Wildlife

Kari Quaas, Snohomish Conservation District

Beth LeDoux, King County



# British Columbia, Fraser River Valley



Data SIO, NOAA, US  
Image Landsat  
Data LDEO-Columbia



SALMON SOCIETY

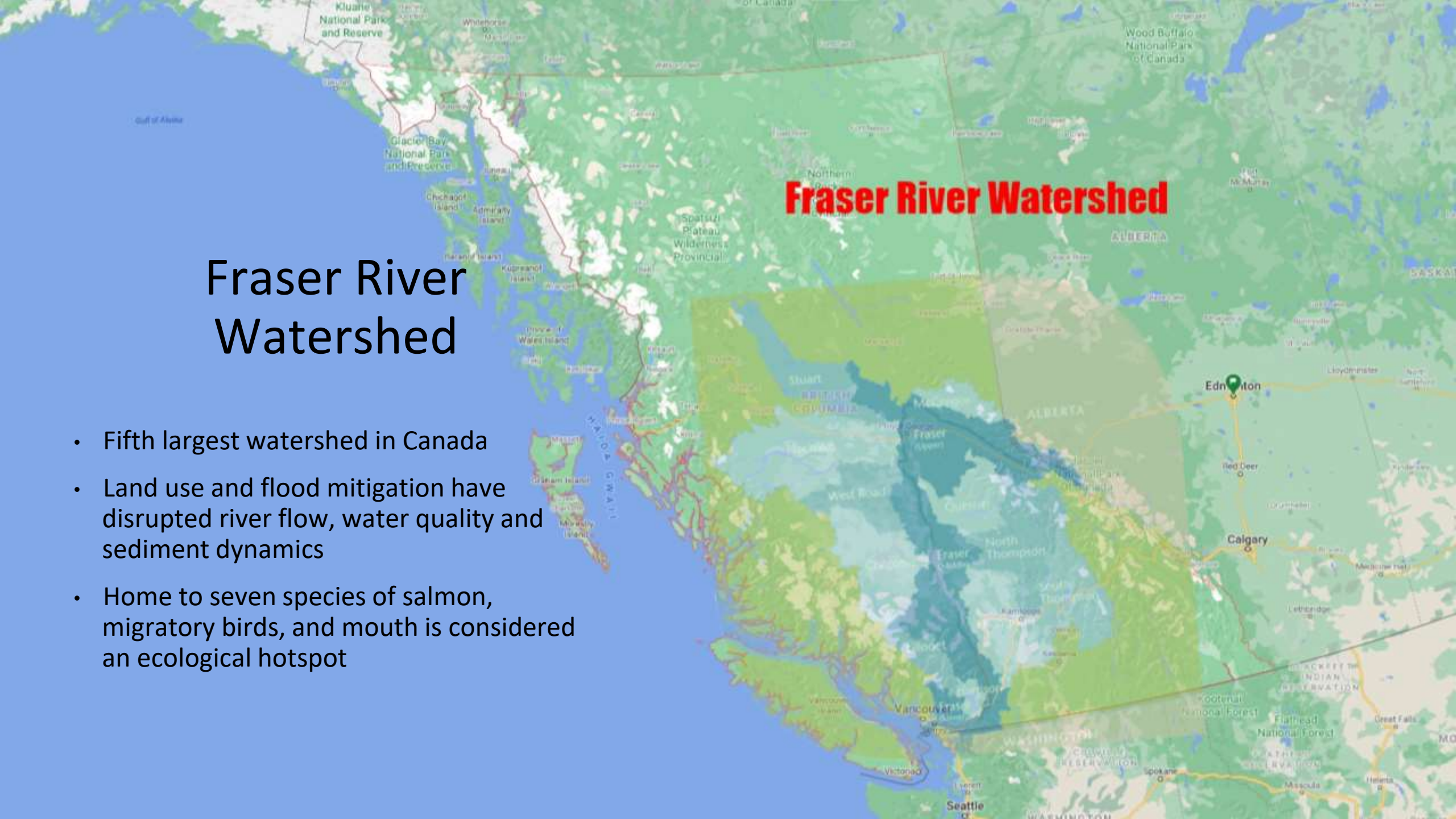




# Fraser River Watershed

- Fifth largest watershed in Canada
- Land use and flood mitigation have disrupted river flow, water quality and sediment dynamics
- Home to seven species of salmon, migratory birds, and mouth is considered an ecological hotspot

**Fraser River Watershed**



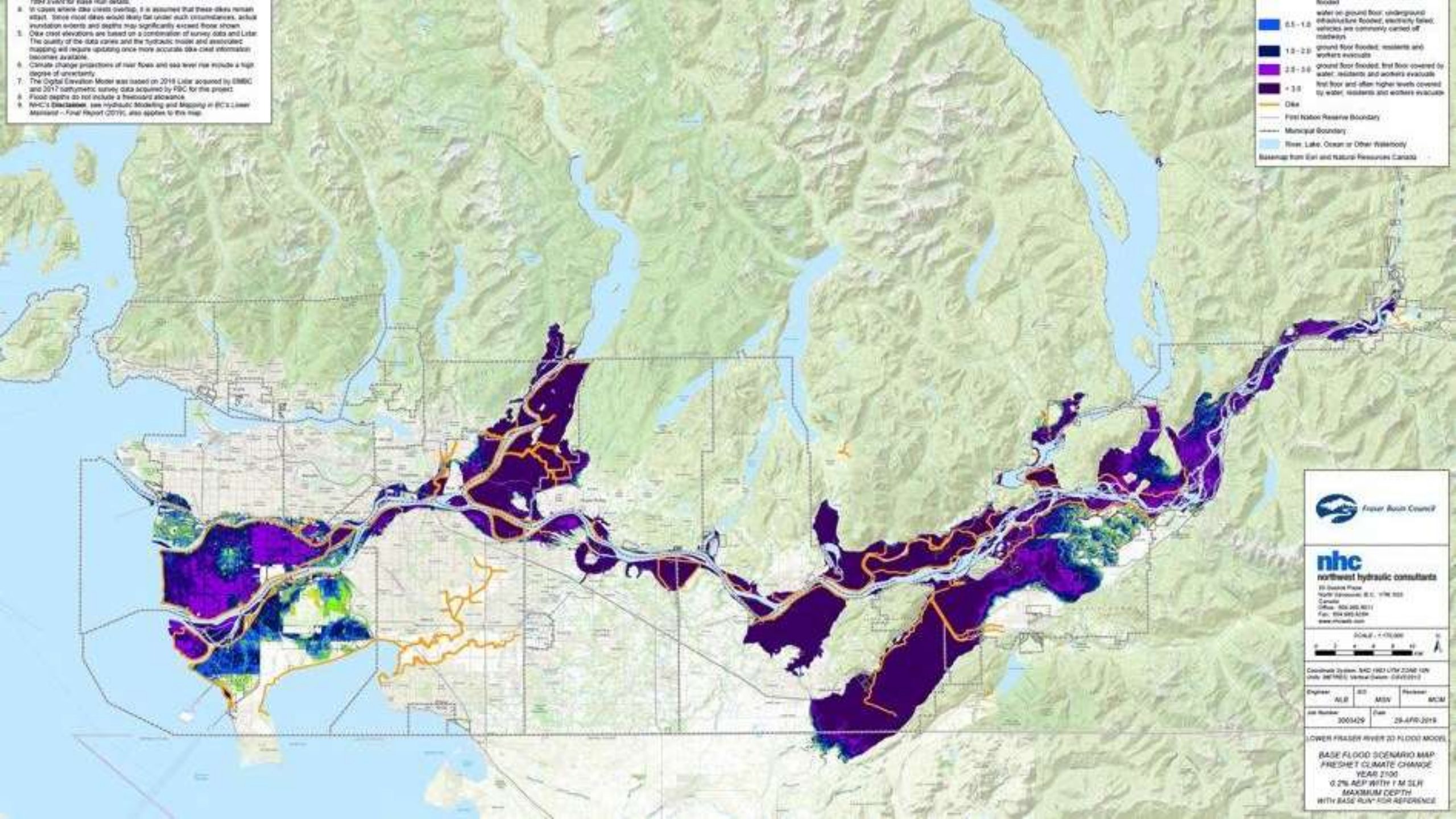


8. Refer to the Flood Risk Detail map for more detail.
9. In cases where dike crest profiling, it is assumed that these dikes remain intact. Some dike dikes would likely fail under such circumstances, actual inundation extents and depths may significantly exceed those shown.
10. Dike crest elevations are based on a combination of survey data and LIDAR. The quality of the data varies and the hydraulic model and associated mapping will require updating once more accurate dike crest information becomes available.
11. Climate change projections of river flows and sea level rise include a high degree of uncertainty.
12. The Digital Elevation Model was based on 2018 LIDAR acquired by EMBC and 2017 bathymetric survey data acquired by FRC for the project.
13. Flood depths do not include a freeboard allowance.
14. NHC's Disclaimer, see Hydraulic Modelling and Mapping in BC's Lower Mainland - Final Report (2019), also applies to this map.

**Notes:**

- Water on ground floor, underground infrastructure flooded, electricity failed, vehicles are commonly carried off roadways
- 1.0 - 1.2 ground floor flooded, residents and workers evacuate
- 2.0 - 2.8 ground floor flooded, first floor covered by water, residents and workers evacuate
- > 3.0 first floor and often higher levels covered by water, residents and workers evacuate

— Dike  
 First Nation Reserve Boundary  
 Municipal Boundary  
— River, Lake, Ocean or Other Waterbody  
 Sourced from Esri and Natural Resources Canada



  
  
 50 South Fraser  
 North Vancouver, B.C. V7M 5S5  
 Canada  
 Office: 604.265.8211  
 Fax: 604.265.4256  
[www.nhc.ca](http://www.nhc.ca)

SCALE: 1:75,000  


Coordinate System: NAD 1983 UTM ZONE 18N  
 Units: METERS; Vertical Datum: CGVD(1985)

Engineer:	ALB	GD	MSV	Reviewer:	BGM
File Number:	3003425	Plan:	29-APR-2019		

LOWER FRASER RIVER 2D FLOOD MODEL  
 BASE FLOOD SCENARIO MAP  
 FRESHET CLIMATE CHANGE  
 YEAR 2100  
 0.2% AEP WITH 1 M SLR  
 MAXIMUM DEPTH  
 WITH BASE RAIN-FOR REFERENCE



# Flooding in the Lower Mainland

- Diking is the main method of flood protection, 97% of the Dikes are not up to current standards
- Environmental impacts from diking and single-use floodplains are numerous
- Lack of regional or watershed coordination and goal setting
- Lack of funding and appetite for different solutions







# Mainland Coast Salish Flood Risk Assessment Project

First Nations'  
Reserves Affected  
by Flood Events -  
100 Year Events  
with and without  
1m Sea Level Rise

There are 109 First Nation Reserves in St6in T6m6xw, and many of them are subject to periodic flood events mainly due to the Fraser River freshet. This is a representation of severe flooding, at a modelled 100 year (1% AEP) event, both with and without effects of climate change, including a 1m Sea Level Rise (SLR).

Current 100 year event - 51 reserves are affected to some degree (dark orange).  
100 year with climate change - 61 reserves are affected to some degree (rod hatching).

Notes: Semiahmoo is affected by flood events, but we don't have modelling for that area. The City of Surrey 200 year floodplain is used as a proxy for the 100 year SLR event.  
The Tszwawssen FN shapefile is digitized from online sources, and is for illustrative purposes only on this map.

**Legend**

- First Nation Reserves
- Flood Affected Reserves (100y)
- Flood Affected Reserves (100y + 1m SLR)
- 100 year
- 100 year + 1m SLR
- Noatak Flood (96)

1:200,000



REFERENCE:	UNITS
PROJECTION: UTM Zone 10	DALY NAD 83
CRS: Canada	QAGCS UTM





- Emergency Planning Secretariat
- Emerging body in the Lower Mainland, supporting Mainland Coast Salish First Nations with climate adaptation and emergency planning
- Support communities with proactive flood planning
- Improving emergency planning/response capacity
- Advocate for large scale change, and for UNDRIP to be upheld in all planning activities



Priorities for Action

Understanding  
Disaster Risk

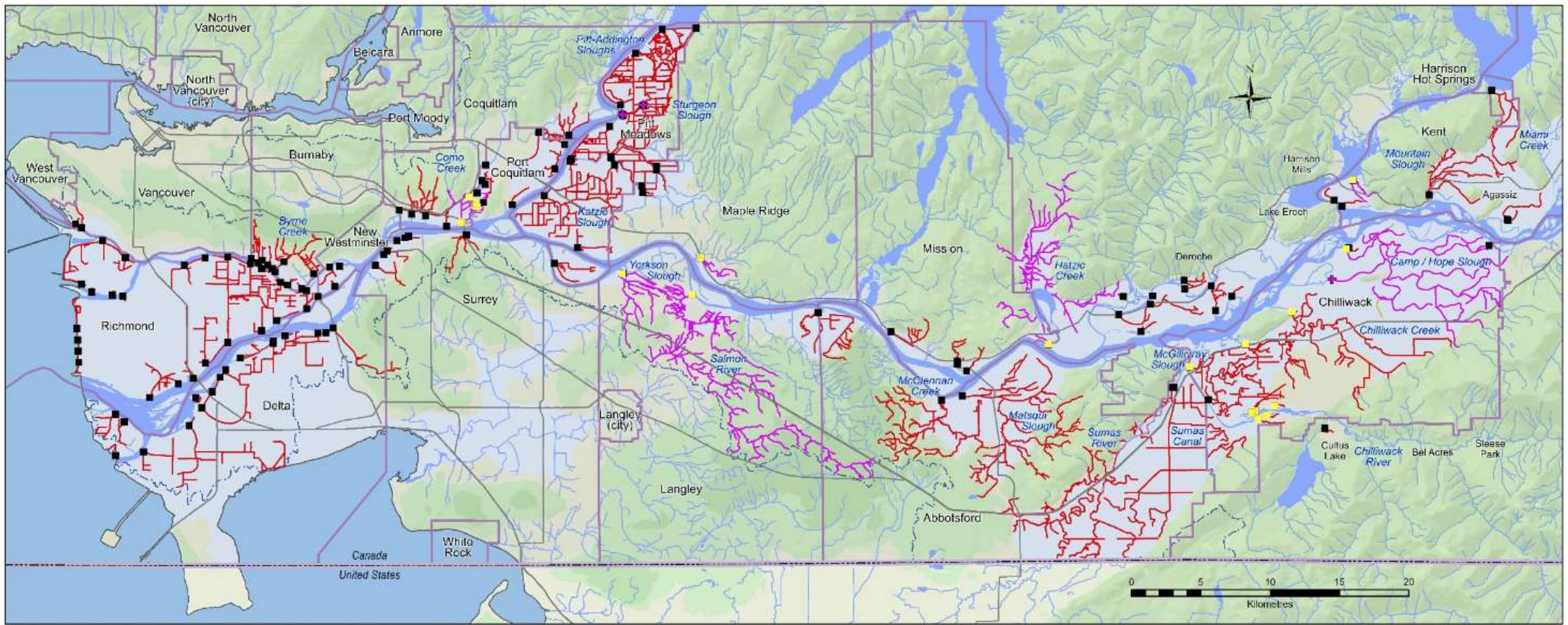
Strengthening  
Governance

Investing in  
Risk  
Reduction  
and  
Resilience

Enhance  
Preparedness  
& Build Back  
Better

Strengthening Tactical Capacity

Emergency Humanitarian Aid (Sphere)



- 600km of dikes
- 100 pump stations
- 500 gates

Flood control infrastructure impacting potential salmon habitat in the lower Fraser River floodplain

# DISCONNECTED WATERS

1,500 km of potential salmon habitat impacted by 156 flood control structures

119 additional structures control farm land, urban or industrial areas



- Legend**
- Floodbox and/or Pump Station
  - Fish-Friendly Flood Control Structure
  - ⊕ Upgrade to Fish-Friendly Structure (2019)
  - Disconnected Waterways
  - Partially Disconnected Waterways
  - Other Waterways
  - Highways
  - Municipal Boundary
  - Fraser River Watershed
  - Canada/US Border
  - Floodplain
  - Lakes and Rivers



These data are up to date as of March 26, 2015. However, WWSS is continuing to work with municipalities and landowners to confirm types and locations of flood control infrastructure, including whether the infrastructure is fish-friendly.



# What's the issue?

- In the lower mainland, over 85% of floodplain lost or removed
- Insufficient habitat for salmon's early rearing stage
- Costly infrastructure upgrades are required
- Current flood control structures are aging, undersized, and blocking salmon access to important former habitats
- Current flood control upgrades are not required to be nature-based or fish-friendly
- Many of the affected salmon populations are designated as endangered or threatened and require rebuilding. They may also support at-risk wildlife (e.g., SARA-listed killer whales).







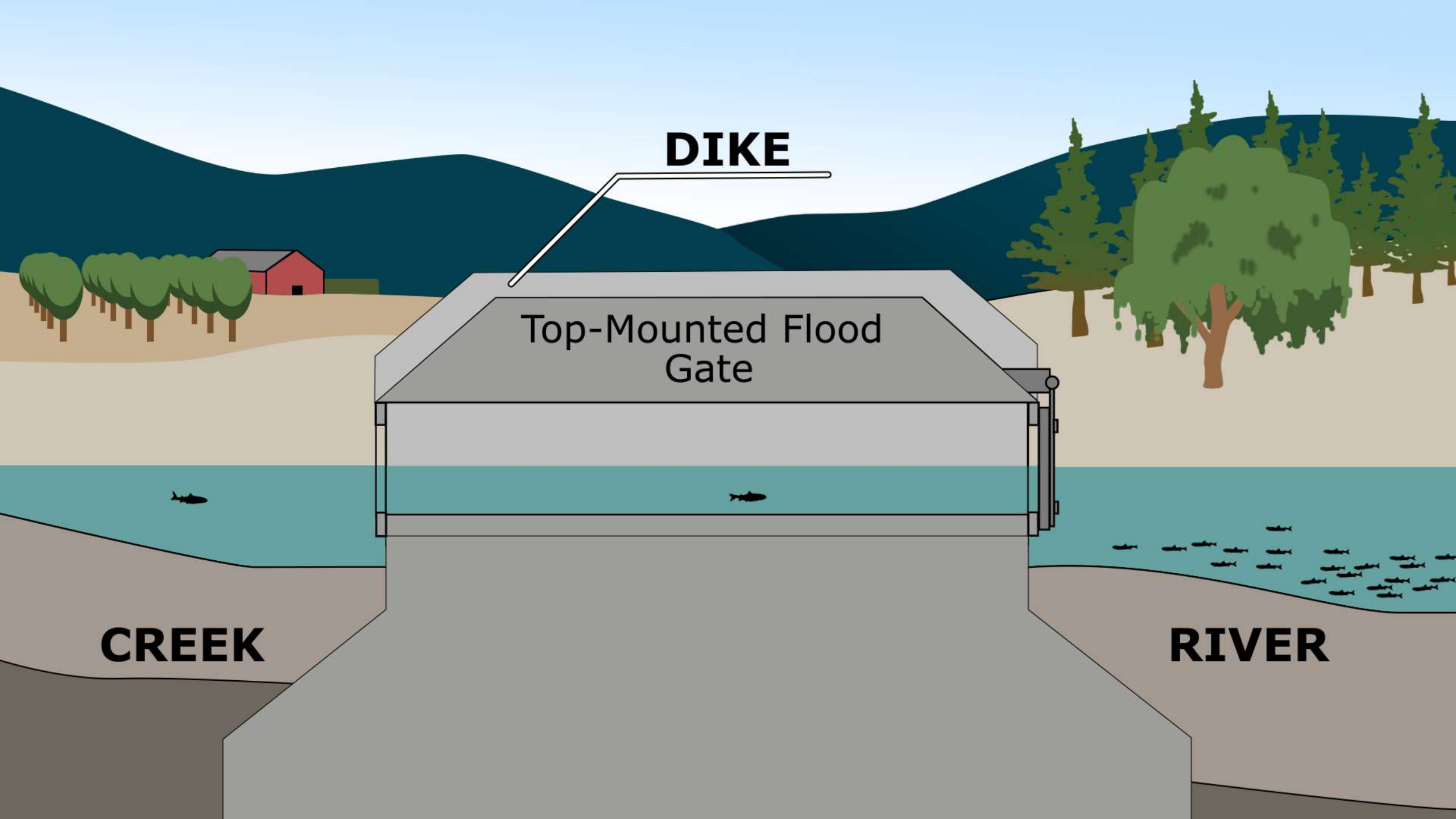


**DIKE**

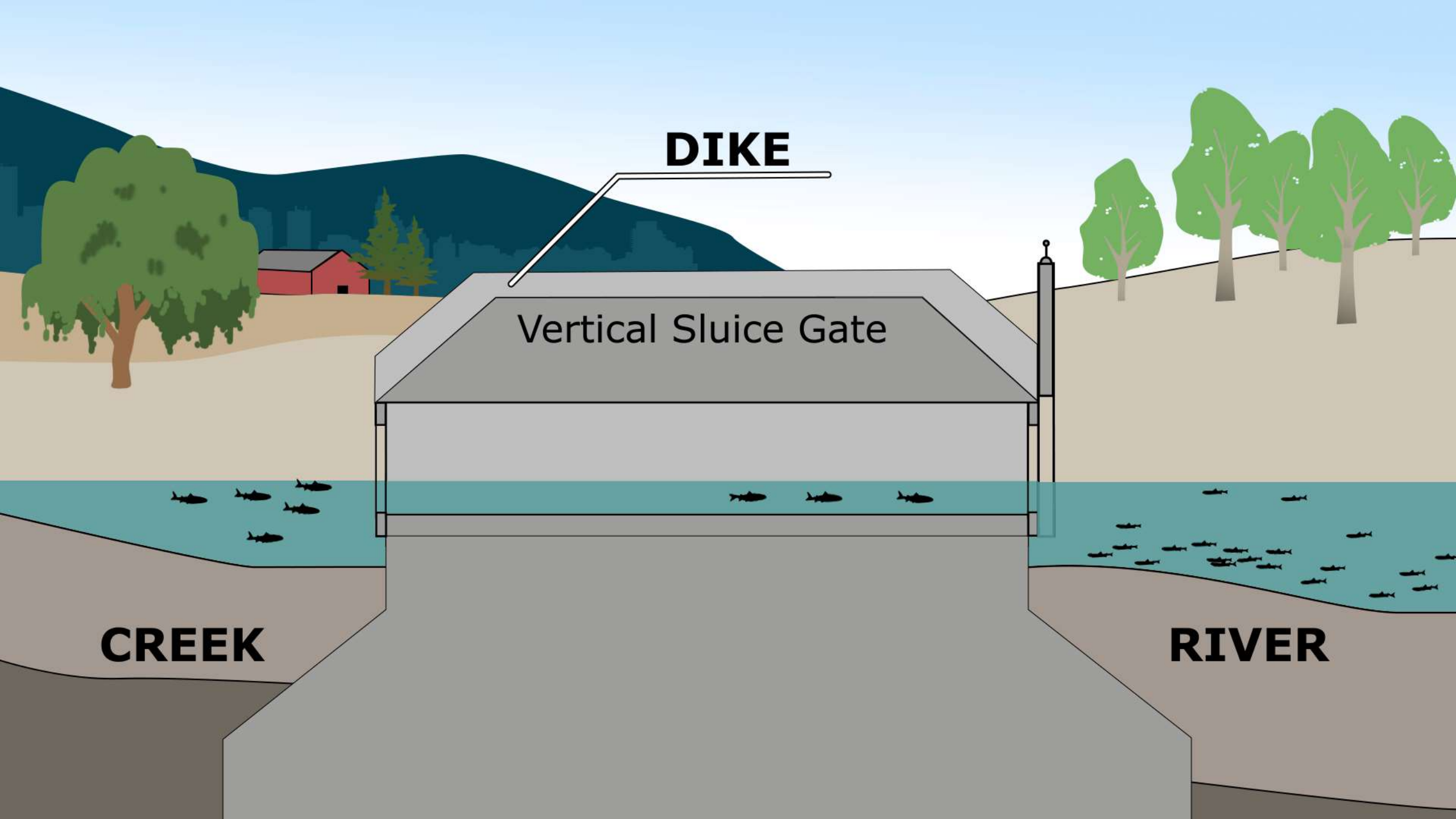
Top-Mounted Flood Gate

**CREEK**

**RIVER**







**DIKE**

Vertical Sluice Gate

**CREEK**

**RIVER**



# RESILIENT WATERS: MANAGING FLOODS FOR ALL

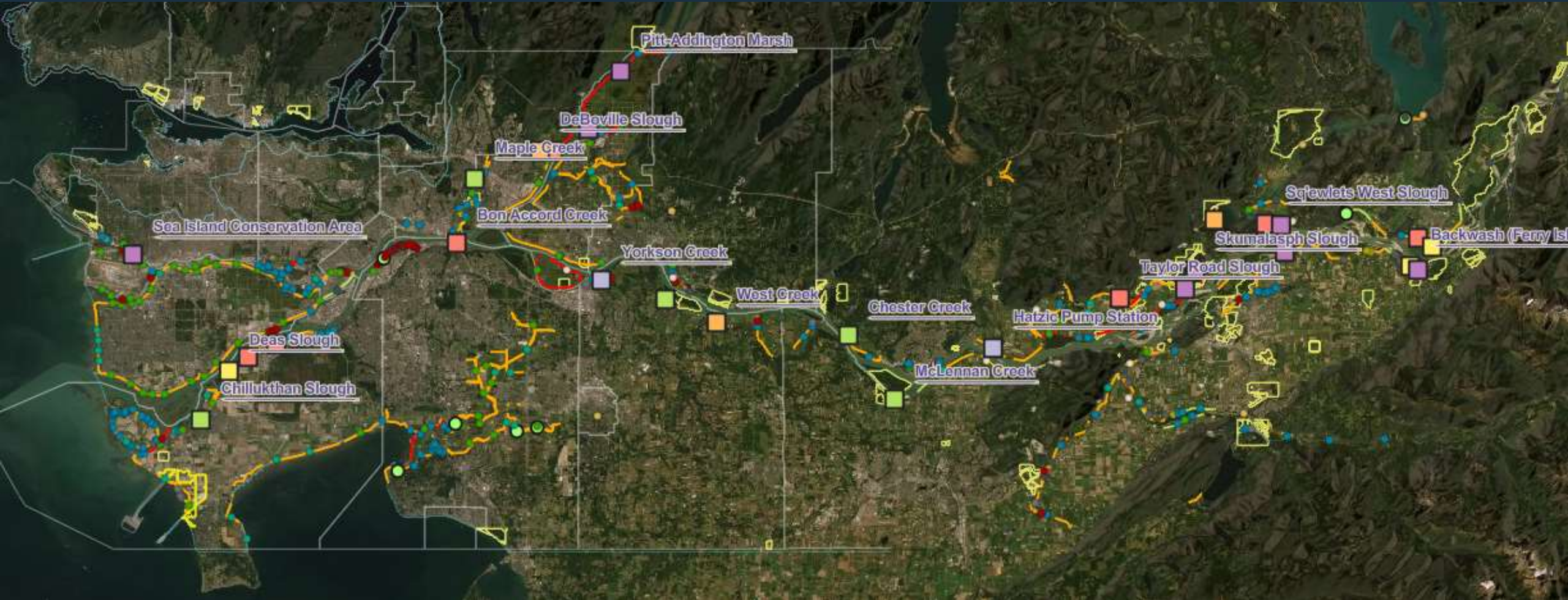
This report brings forward the recommendations and visions for managing floods in the lower Fraser River watershed. Managing floods is vital for the protection of homes, farms and businesses as well as ecological values so integral to creating liveable communities and healthy habitats.

Final Report

The objectives of the workshop were to:

- foster shared learning and collaboration;
- begin developing a shared vision for future fish-friendly flood control infrastructure (FCI);
- discuss the challenges in upgrading outdated flood control infrastructure along the lower Fraser;
- collaborate in a multi-sector/agency environment to develop a comprehensive list of issues and actions, priorities and success indicators for future consideration and follow-up; and
- identify key criteria for prioritizing flood control structures and adjacent habitats for restoration.

# Identifying Restoration Opportunities: 2019-2021



[www.resilientwaters.ca/map-data](http://www.resilientwaters.ca/map-data)



KERR WOOD LEIDAL  
consulting engineers



HOW WE'RE DOING IT

# Collaborative Research

- Fish and Habitat Assessment Pearson Ecological
- Colony Farm Gate Study – UBC, Kwikwetlem FN, Metro Vancouver
- Modelling Wetland Evolution – SFU



Photo: Watershed Watch Salmon Society

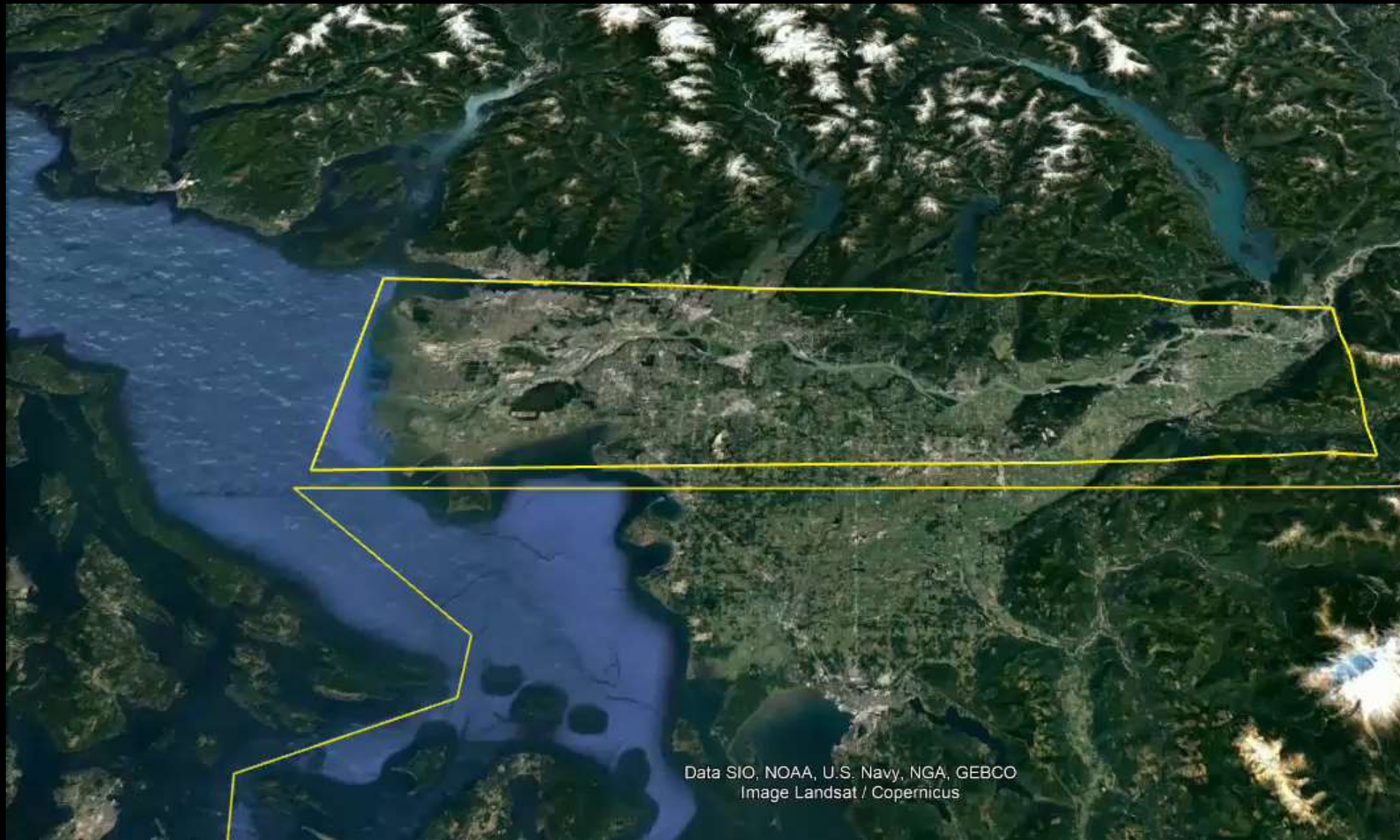


- Re-imagining Floodplains  
Advisory Group
- Building Back Better Together –  
Flood Recovery





# Washington State, Snohomish and Stillaguamish Rivers





# *Fish Farm Flood*

Working together for our best future

## 2022 Salish Sea Ecosystem Conference

Beth leDoux

King County

Water and Land Resources



King County





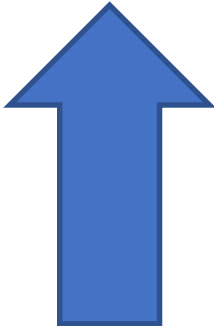








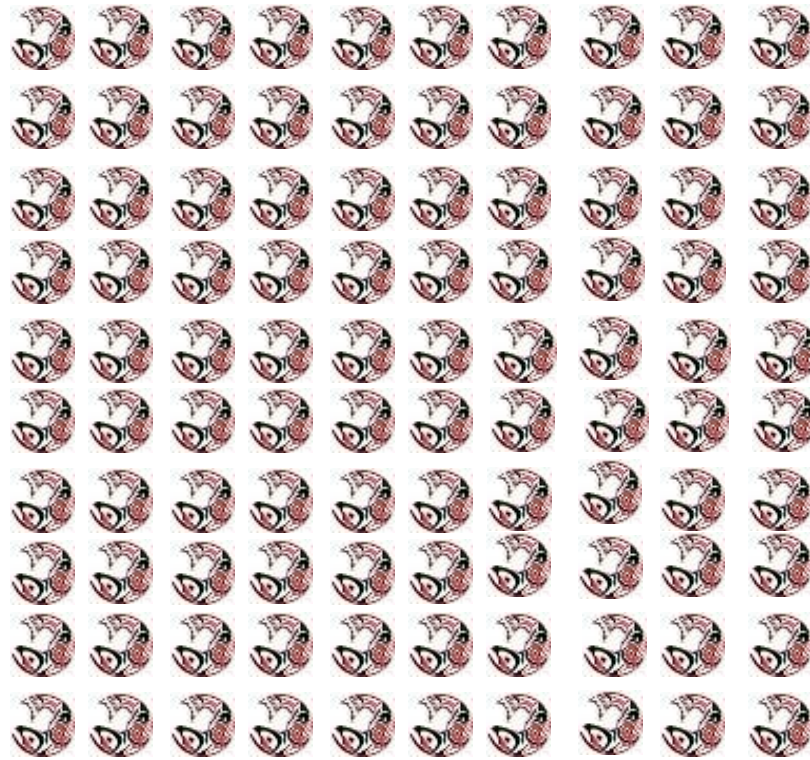
With FFF



Without FFF

# Fish Driver

Historical Chinook Abundance



Today





# Fish Priority





# Farm Drive r





# Farm Priority



# Flood Driver





# Flood Priority











**Bobbi Lindemulder**  
*Individual Farmer*

**Kurt Nelson**  
*For Daryl Williams*  
*Tulalip Tribes*

**Libby Rr**

Beth leDoux

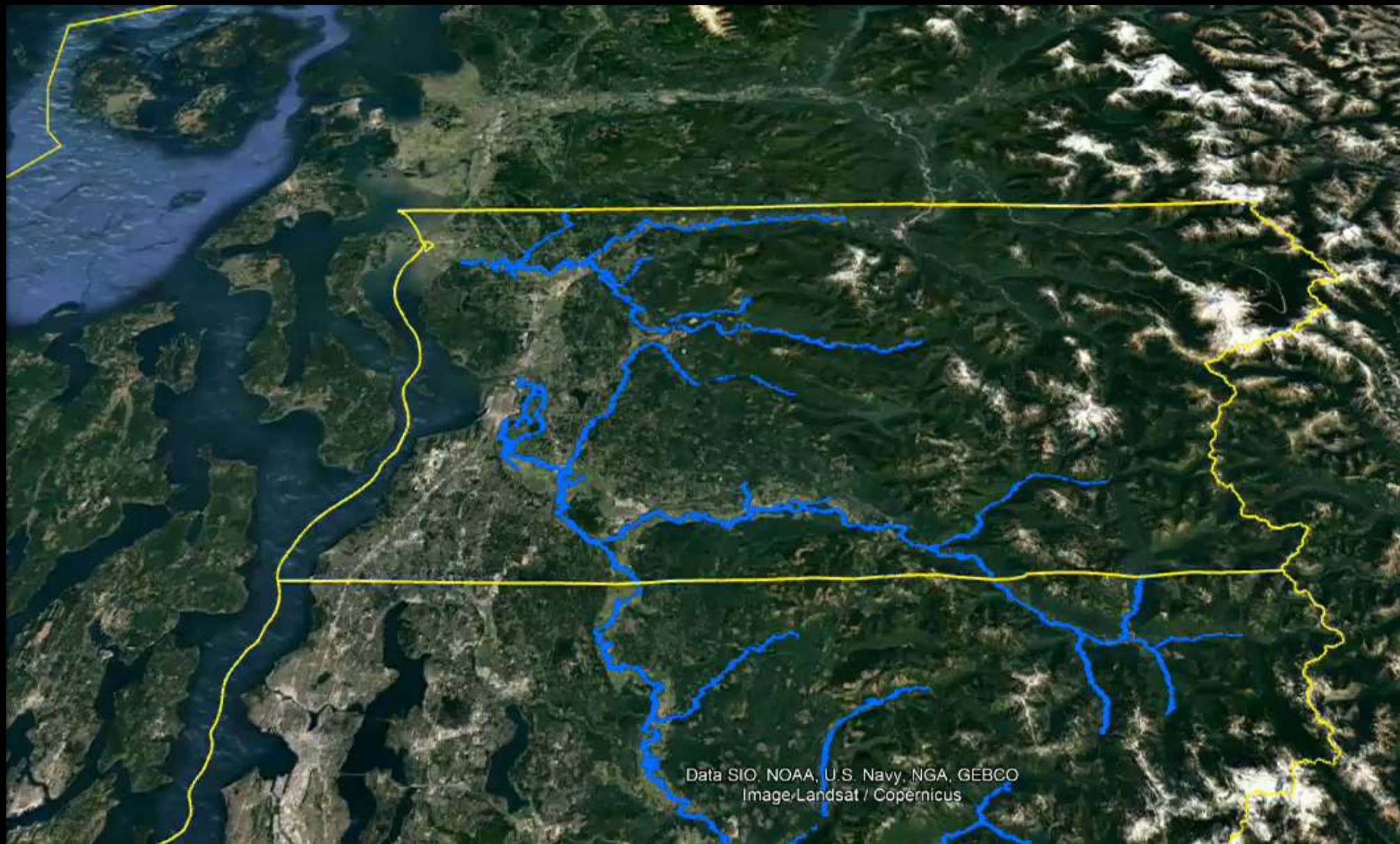
King County, Water and Land Resources Division

206-477-4750

[Beth.ledoux@kingcounty.gov](mailto:Beth.ledoux@kingcounty.gov)



# Washington State, King County





Washington  
State

Snohomish County

*Stillaguamish River*

*Snohomish River*

[www.farmfishflood.org](http://www.farmfishflood.org)























Why?

What?

Common Ground:

Shared heritage

FIX / PAIN  
REAL BIG MISS  
STORY

Farmers are stewards of the land  
- want to do the right thing

PROJECTS THAT FUND FARMERS

SLS → BROADER PARTICIPATION  
→ MORE INCLUSION FORWARD

POINTS OF CONTACT

PARTNERING

WHAT do AGENTS WANT?

BARRIERS

- block for tribal members to  
be in AG.

YES  
- High use groups  
- ...  
- ...  
- ...  
- ...  
- ...  
- ...  
- ...  
- ...

NO  
- ...  
- ...  
- ...  
- ...  
- ...  
- ...  
- ...  
- ...  
- ...





How?



***If we are serious about making progress for farm, fish, and flood interests, we must find concrete ways to bring the right people together to develop solutions.***

***We need to remove physical, regulatory, policy, and funding barriers.***

