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Flood modelling and mitigation planning in BC's Lower Fraser River and Southcoast

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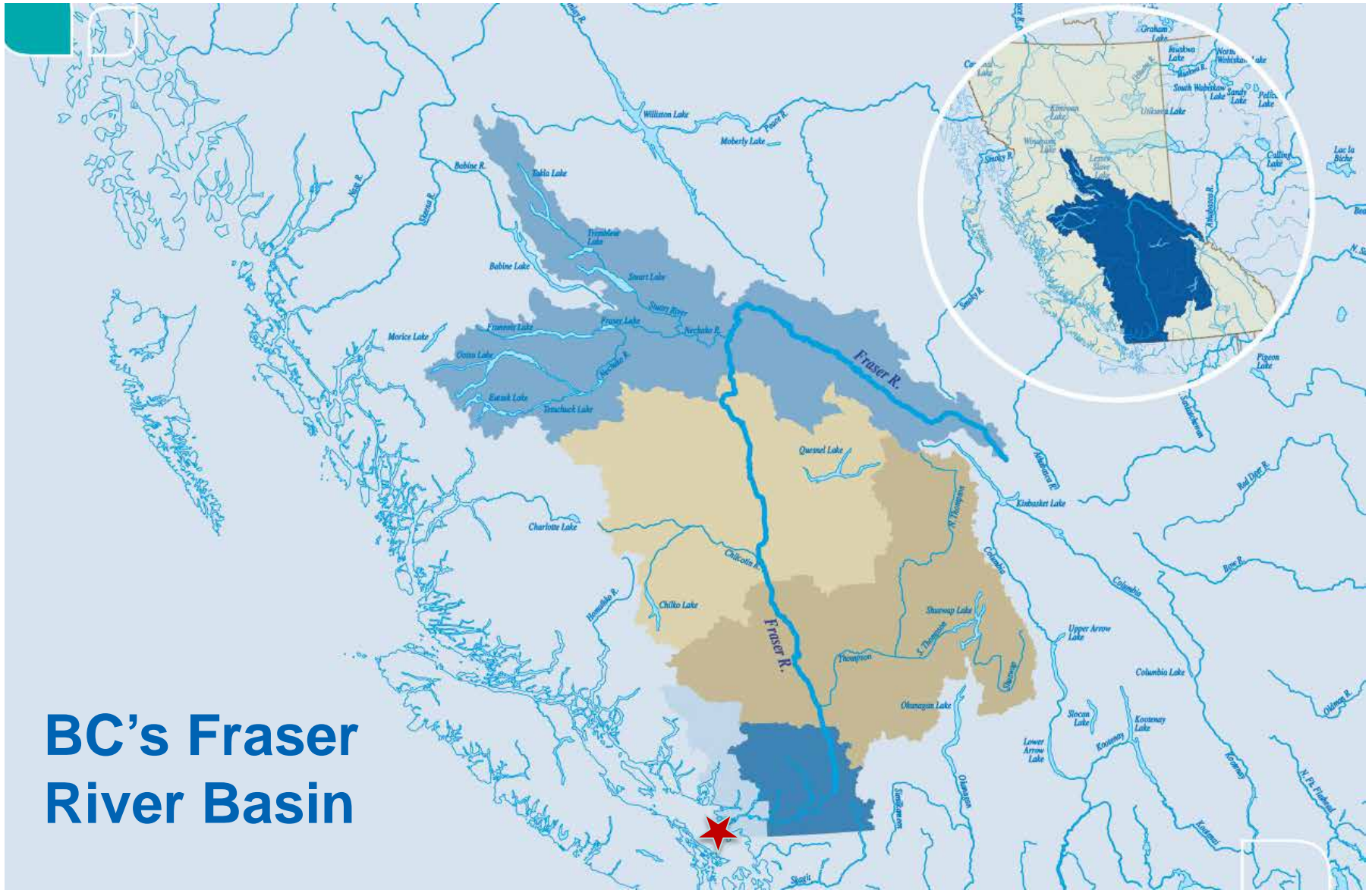
Flood Modelling and Mitigation Planning in BC's Lower Fraser River and South Coast

Salish Sea Ecosystem Conference – April 6, 2018



Presented by: Steve Litke, Fraser Basin Council

BC's Fraser River Basin



Lower Mainland Flood Management Strategy – Why & Where?

Aims to reduce flood vulnerability and increase resilience for communities along the Lower Fraser River and south coast



Coastal storm surge
(winter flood)



Fraser River freshet
(spring flood)

Lower Mainland Flood Management Strategy: Who?

Fraser Basin Council

§ Facilitator, coordinator, administrator

Partners – all orders of government, the private sector and civil society (50+ bosses)

§ Funding, data, advice and expertise

§ Other key work in parallel



Value and Benefit of a Regional Flood Strategy?

- Sharing information and lessons learned among peers, practitioners and professionals
- Enhancing communications, coordination and collaboration
- Implementing projects of regional benefit, strategically filling knowledge gaps
- Communicating a strong business case for action and improvements across the region
- Leveraging a cost-shared approach for planning and implementation

Lower Mainland Flood Management Strategy: When?

Phased approach:

- Phase 1 (2014-2016)
 - Improving Knowledge Base
- Phase 2 (2017 – 2019)
 - Building the Strategy
- Phase 3 (2020 and beyond)
 - Implementation



Phase 1 of the Strategy (2014-2016) – What?

Building a better understanding:

- Flood hazards
- Flood vulnerabilities
- Flood protection infrastructure, policies and practices

Phase 2 of the Strategy (2016-2019) – What?



Developing a regional action plan:

- National, provincial, regional, local priorities
- Recommended management options for diverse local circumstances
- Recommendations for secure, sustainable funding
- Through technical analysis in parallel with engagement, dialogue, consultation, and consensus building

⊘ Phase 3 – Implementation

Flood Hazards and Climate Change in the Lower Mainland

Climate change anticipated to significantly change flood risk:

Coastal

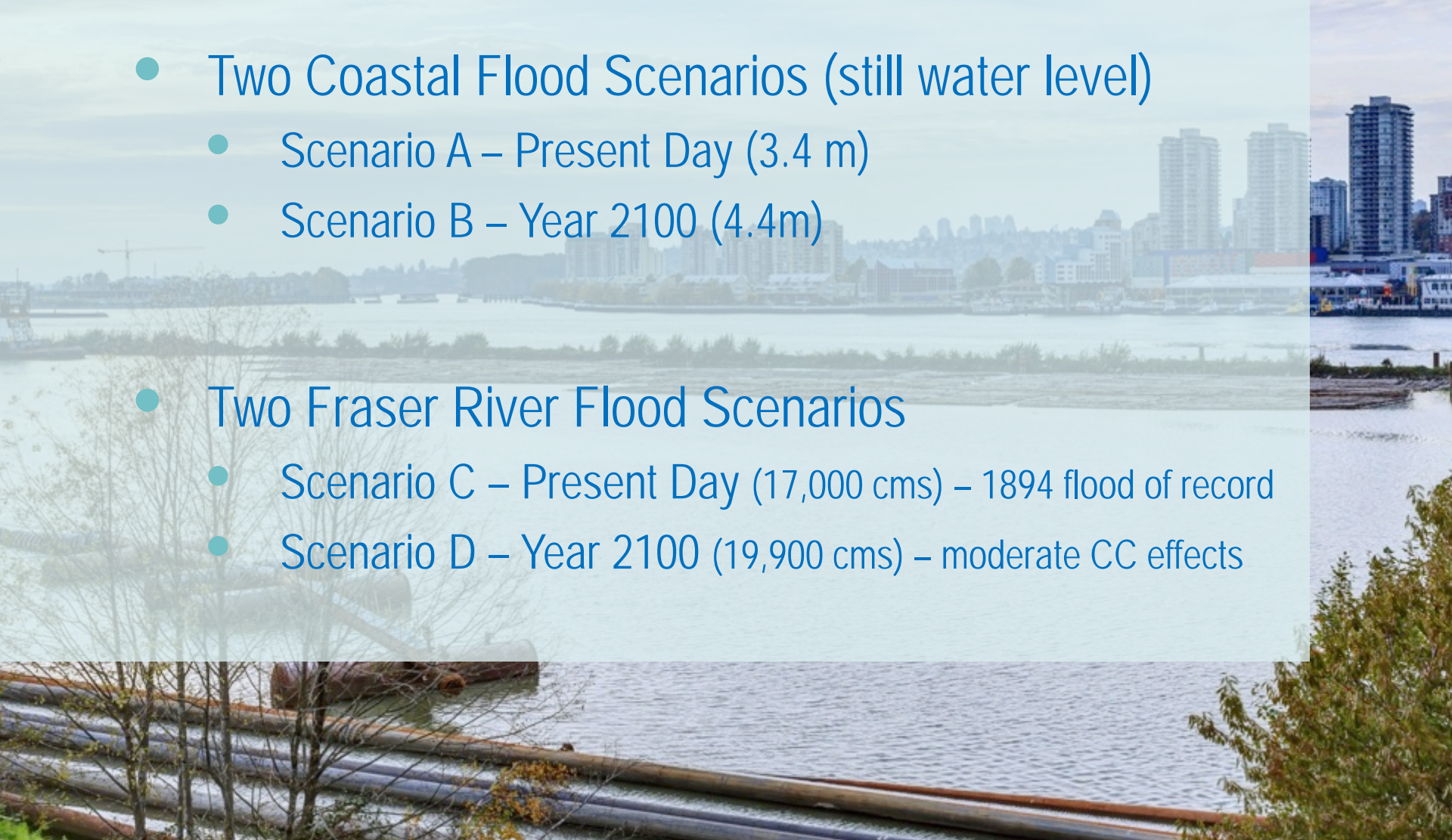
- Sea level is projected to rise on average by 0.5 m by 2050, by one metre by 2100, two metres by 2200 . . .
- Increased intensity and frequency of storm surges

Fraser River

- Hydrological changes in the Fraser River Basin related to snowpack, rate of snowmelt and incidence of rainfall
- Larger and more frequent Fraser floods are projected for the Fraser for the year 2100

Results – Analysis of Flood Scenarios (approx. 1:500 or 0.2% AEP)

- Two Coastal Flood Scenarios (still water level)
 - Scenario A – Present Day (3.4 m)
 - Scenario B – Year 2100 (4.4m)
- Two Fraser River Flood Scenarios
 - Scenario C – Present Day (17,000 cms) – 1894 flood of record
 - Scenario D – Year 2100 (19,900 cms) – moderate CC effects



Results – Regional Assessment of Flood Vulnerabilities



4 major flood scenarios assessed:

- 2 coastal & 2 Fraser River – Present Day & 2100

Flood-related direct losses & indirect economic losses related to:

- People and communities
- Residential, commercial and public/institutional buildings
- Select infrastructure
- Cargo shipping delays
- Agriculture

Lower Mainland Flood Management Strategy

Coastal Flood Scenarios Map

A Map Showing Estimated Flood Extents for:

-  Scenario A (Present Day)
-  Scenario B (Year 2100)
- Further Extent of Flooding
-  Existing Waterways
-  First Nations Reserves & Treaty Lands
-  Municipal Boundaries (white line)
-  Highways
-  Rail & Shipping Connections



For more detail, including some essential facilities located in floodplain areas, see regional and subregional maps in the report *Regional Assessment of Flood Vulnerability*.

These maps will also be posted separately at floodstrategy.ca.

Note: as Maps A1 maps prepared for this project are for general illustrative purposes at a regional scale. They are not floodplain maps and do not have official designation of floodplains. For this reason, they should not be used for site-specific flood management planning. See the full vulnerability assessment report for more detailed maps and explanation on use.



Lower Mainland Flood Management Strategy


Fraser River Flood Scenarios Map


A Map Showing Estimated Flood Extents for:


 Scenario C (Present Day)

 Scenario D (Year 2100)
- Further Extent of Flooding

 Existing Waterways

 First Nations Reserves & Treaty Lands

 Municipal Boundaries (white line)

 Highways

 Rail & Shipping Connections

 N
0 5km 10km



For more detail, including some essential facilities located in floodplain areas, see regional and subregional maps in the report *Regional Assessment of Flood Vulnerability*.

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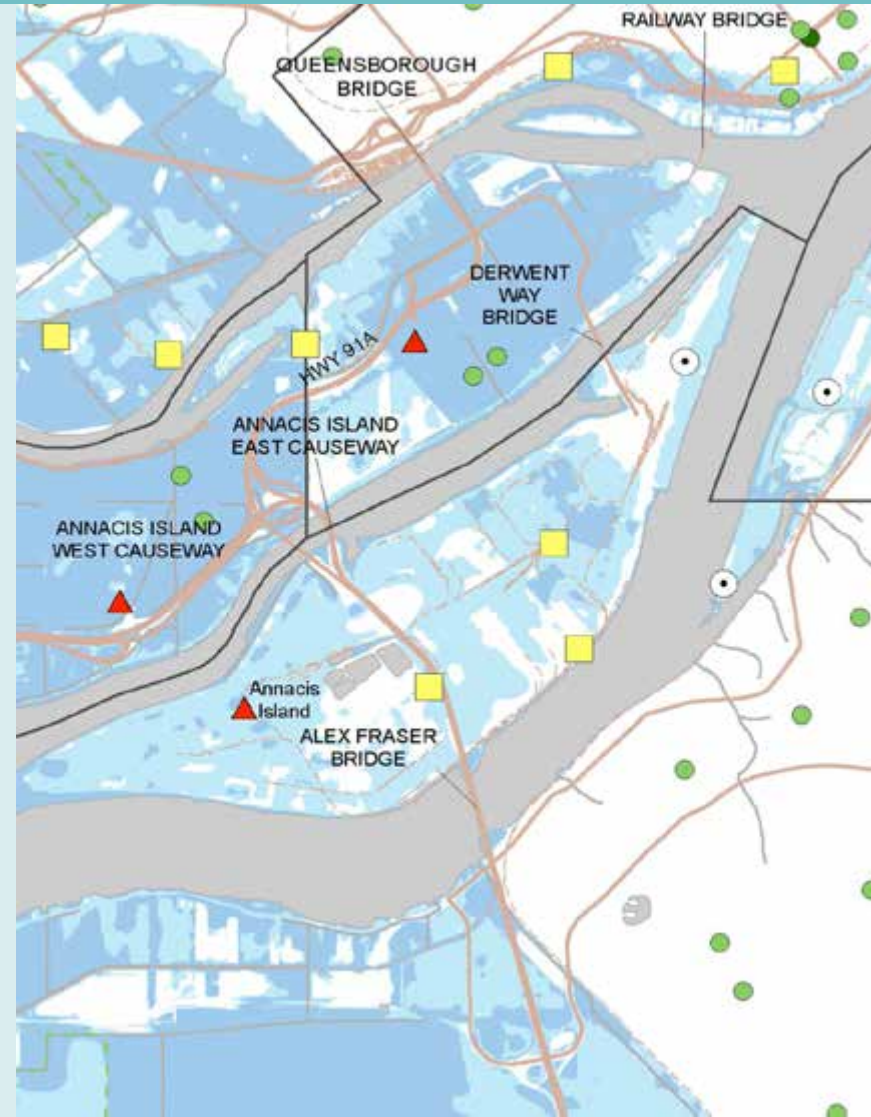


Flood Extent and Depth Mapping

Results – Flood Extent Maps

Includes locations of critical facilities such as:

- Fire, police and EOCs
- Hydroelectric Sub-stations
- Airport & port facilities
- Hospitals
- Schools



Regional and Local Coastal Flood Modeling

- BC Storm Surge Forecast System
<http://www.stormsurgebc.ca>
- Examples of local coastal flood modeling:
 - Vancouver
 - Surrey
 - Richmond, Delta, Squamish, West Vancouver / North Vancouver



Integrating Climate Change and Coastal Processes into Flood Mitigation Planning

For further consideration:

- Local storm surge hazards (wind and wave effects, shoreline geometry, land subsidence and uplift / RSLR)
- Coastal and riverine sediment transport processes
- Uncertainty – pick a number and start, monitor actual CC impacts, continual improvement of science and planning
- Flood protection works, land use decisions, and other policies and practices will need to evolve to keep pace with changes in flood hazards

Integrating Climate Change and Coastal Processes into Flood Mitigation Planning

For further consideration:

- Transition from the status quo to climate adaptation and resilience (e.g. redevelopment cycles, infrastructure renewal cycles)
- Institutional / societal inertia (e.g. updating regulations and capacity to enable innovative solutions that are presently outside the box)
- Low risk pilot projects?
- Talk about risk tolerance
- Talk about land use change or retreat (over time)

Floodplain Modelling and Mapping Project

An aerial photograph of a river system with floodplains. The river flows from the top right towards the bottom left. The floodplains are shown as lighter, flatter areas adjacent to the river. A grid of roads and fields is visible in the lower right. The image is overlaid with a project diagram consisting of six light blue text boxes connected to the river and floodplain areas by white lines.

Evaluate effectiveness of management options and cascading impacts

Assess water levels under different flood frequencies and dike breach scenarios

Assess dike resilience under scenarios and the likely sequence of dike breaches

Inform emergency planning, preparedness and response

•More accurate flood extent and depth estimates

Education tool for decision-makers, stakeholders and the public

Thank You! For more information:
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