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# Climate Change, Droughts, and Floods

George Roman, MSc, PMP

Manager, River Forecast Centre & Flood Safety



Ministry of  
Forests, Lands, Natural  
Resource Operations  
and Rural Development



FIRST NATIONS  
LAND MANAGEMENT  
RESOURCE CENTRE

Dec.11, 2019, Victoria, BC



Photo Source: AM1150 Kelowna



Source: Monica Lamb-Yorski; Williams Lake Tribune



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## Talk Overview

- Drought, Climate Change & Provincial Resources
- Floods, Climate Change & Provincial Resources
- Questions / Listen & Learn



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# Climate Change and Drought



## Thousands gather in downtown Victoria as part of global climate strike

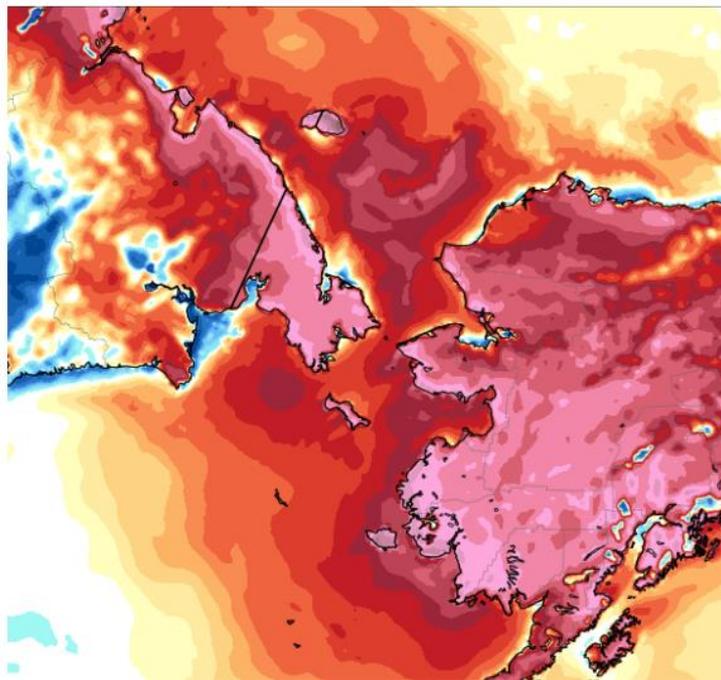
Roxanne Egan-Elliott / Times Colonist

SEPTEMBER 27, 2019 06:34 PM



Thousands of people attend the climate-strike rally on the lawn of the legislature on Friday.  
Photograph By ADRIAN LAM, TIMES COLONIST

# Record-crushing heat torches Alaska



**ALL-TIME RECORD HIGH**  
**ANCHORAGE, AK**

**NEW RECORD**

**90°**

JULY 4, 2019

**OLD RECORD**

**85°**

JUNE 14, 1969

Old Record High for July 4:  
77° set in 1999.

**Alaska Heat Wave Shatters Temperature Record in Largest City Anchorage, Touches 32 Degrees Celsius**



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# 'A Harbinger of Things to Come': Farmers in Australia Struggle With Its Hottest Drought Ever

By **Casey Quackenbush** | Photographs by Adam Ferguson for TIME

February 21, 2019

The face of Australia's drought crisis | ABC News





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# European Heat Waves: Summer 2019

**BLAST FURNACE Paris to hit hottest temperature in history at 42C today as Europe sizzles in new heatwave**





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CHILE

# Chile's mega-drought rolls on

Three quarters of COP25 host Chile is hit by severe drought, prompting an 'agricultural emergency' covering six regions

Lorena Guzmán October 11, 2019





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VANCOUVER ISLAND

## Victoria weather record shattered as heat grips Vancouver Island

CTV Vancouver Island

Published Wednesday, June 12, 2019 9:27AM PDT

Last Updated Wednesday, June 12, 2019 2:34PM PDT

## 17 temperature records broken in B.C. heat wave, including in Vancouver and Victoria

*by Charlie Smith on June 13th, 2019 at 8:46 AM*



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## Key Roles of Province: Drought Management

- Monitoring broad provincial & regional drought levels
- Coordinating provincial communications
- Implementing regulatory restrictions on water use as necessary (*Water Sustainability Act*)
- Supporting local emergency preparedness & response



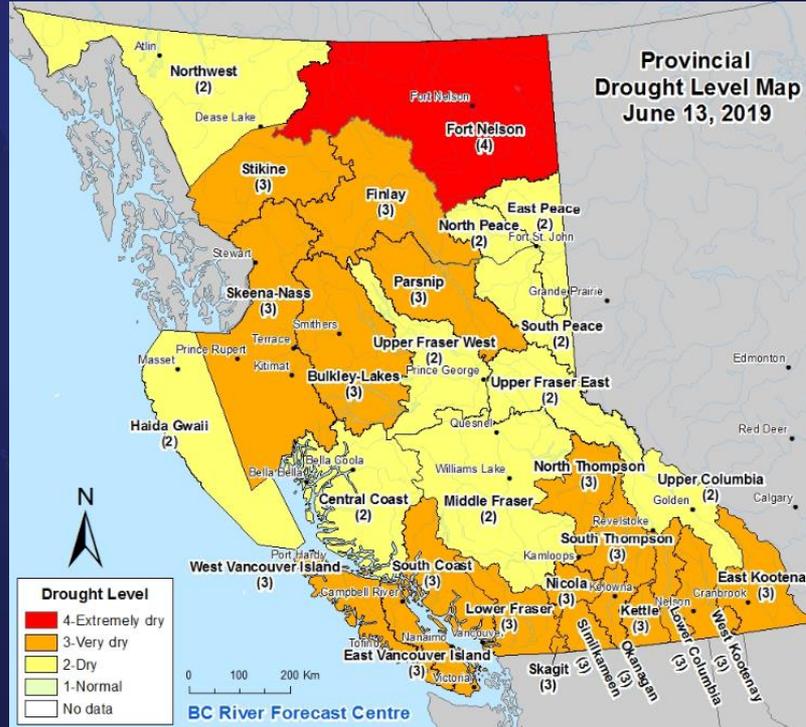
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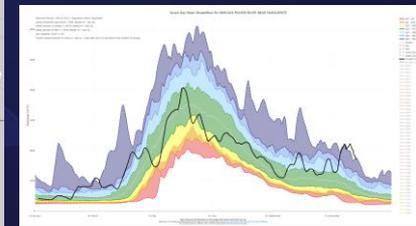
# Drought Monitoring & Communications in B.C.

Drought Classification

Level	Conditions	Significance	Objective
1 (Green)	Normal Conditions	There is sufficient water to meet human and ecosystem needs	Preparedness
2 (Yellow)	Dry Conditions	First indications of a potential water supply problem	Voluntary conservation
3 (Orange)	Very Dry Conditions	Potentially serious ecosystem or socio-economic impacts are possible	Voluntary conservation and restrictions
4 (Red)	Extremely Dry Conditions	Water supply insufficient to meet socio-economic and ecosystem needs	Voluntary conservation, restrictions and regulatory action as necessary



2011: 76 sites  
2019: 322 Sites



# British Columbia Drought Information Portal

- Drought in BC
- BC Drought Map
- West Coast Stream Watch
- Historical BC Drought Information
- 7-Day Average Streamflow Map



## British Columbia Drought Information Portal

*A geographic drought level information system for the Province of British Columbia*

Drought is a recurrent feature of climate involving a deficiency of precipitation over an extended period of time, resulting in a water shortage. The British Columbia Drought Information Portal (DIP) was created as a single source geographic drought level information system for British Columbians. The application uses multiple embedded maps to provide information on provincial drought levels, historical drought time-lapse information and other drought information. Drought levels and other data are updated regularly as it becomes available.

[Drought Information Bulletins](#)

[Angling Closure Information Bulletins](#)

Drought Levels	2019 DROUGHT LEVELS AT A GLANCE												
	1	Normal	2	3	4	5	6	7	8	9	10	11	12
BC	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - West	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - East	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - South	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - North	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - West Coast	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - Interior	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - South Coast	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - North Coast	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - West Coast (North)	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - West Coast (South)	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - Interior (North)	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - Interior (South)	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - South Coast (North)	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - South Coast (South)	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - North Coast (North)	2	2	2	2	2	2	2	2	2	2	2	2	2
BC - North Coast (South)	2	2	2	2	2	2	2	2	2	2	2	2	2



## 2019 DROUGHT LEVELS AT A GLANCE

Drought Levels:	1	Normal	2	Dry	3	Very Dry	4	Extremely Dry							
BASINS	30-May	13-Jun	27-Jun	04-Jul	11-Jul	17-Jul	25-Jul	01-Aug	08-Aug	15-Aug	22-Aug	06-Sep	19-Sep	03-Oct	28-Oct
Fort Nelson	3	4	3	3	2	1	1	1	1	1	1	1	1	1	1
East Peace	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
North Peace	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
South Peace	2	2	3	3	2	1	1	1	1	1	1	1	1	1	1
Northwest	2	2	2	2	3	3	3	3	3	3	3	2	2	2	2
Stikine	2	3	3	3	3	3	3	3	3	3	3	2	1	1	1
Skeena-Nass	2	3	3	3	3	2	2	2	3	3	2	2	1	1	1
Bulkley-Lakes	2	3	3	3	3	2	2	2	3	3	3	3	1	2	1
Finlay	2	3	3	3	3	3	2	2	1	1	1	1	1	1	1
Parsnip	2	3	3	3	3	3	2	2	2	2	1	1	1	1	1
Upper Fraser West	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Upper Fraser East	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
Upper Columbia	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1
Lower Columbia	1	3	3	3	3	3	2	2	2	2	1	1	1	1	1
West Kootenay	1	3	3	3	3	3	2	2	2	2	2	2	1	1	1
East Kootenay	2	3	3	3	2	2	1	1	1	1	1	1	1	1	1
Middle Fraser	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
North Thompson	2	3	3	3	3	1	1	1	1	1	1	1	1	1	1
South Thompson	2	3	3	3	3	2	1	1	1	1	1	1	1	1	1
-Salmon River	2	3	3	3	2	2	1	1	1	1	1	2	1	1	1
Nicola	2	3	3	3	2	2	2	2	2	2	2	2	1	1	1
-Coldwater River	2	3	3	3	3	3	3	4	4	4	4	4	2	1	1
Similkameen	2	3	3	3	3	3	2	2	2	3	3	3	1	1	1
Okanagan	2	3	3	3	3	2	2	2	2	2	2	2	1	1	1
Kettle	2	3	3	3	3	2	2	2	2	1	2	2	1	1	1
Skagit	2	3	3	3	3	3	3	3	3	3	3	3	1	1	1
Lower Fraser	2	3	3	3	3	3	3	3	3	3	3	3	1	1	1
South Coast	2	3	3	3	3	3	3	3	3	3	3	3	1	1	1
Central Coast	2	2	2	2	2	2	2	2	1	1	2	2	1	1	1
West Vancouver Island	3	3	3	3	2	2	1	1	1	1	1	1	1	1	1
East Vancouver Island	3	3	3	3	3	3	2	2	2	2	2	3	1	1	1



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# Drought Resources & Tools



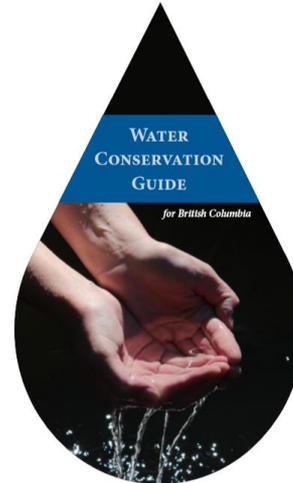
British Columbia Drought Response Plan

Updated June 2018

Prepared by the Ministry of Environment and Climate Change Strategy  
on behalf of the Inter-Agency Drought Working Group

SMALL WATER SYSTEM  
GUIDEBOOK  
FEBRUARY 2017

HEALTH PROTECTION BRANCH  
MINISTRY OF HEALTH



December 2013



American Planning Association  
Creating Great Communities for All

*Falling Dominoes:*  
A Planner's Guide to Drought  
and Cascading Impacts



An American Planning Association Report

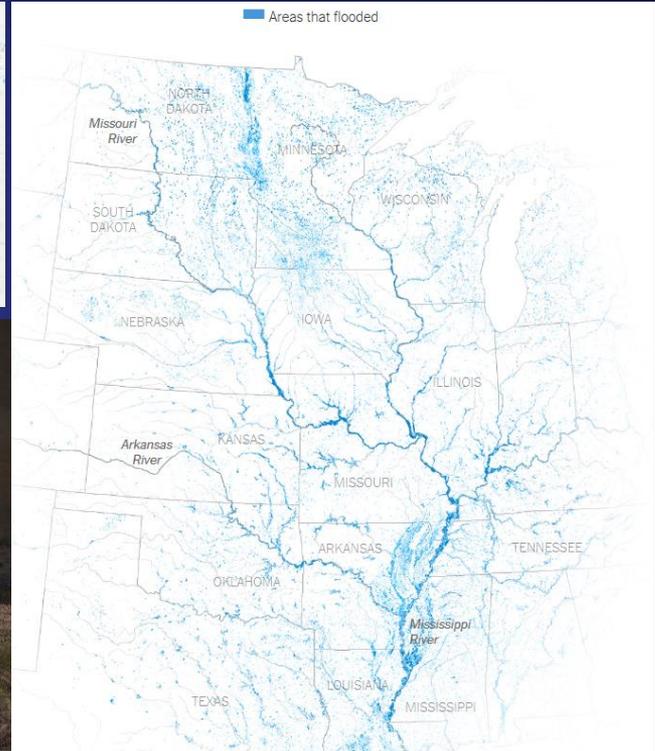


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# Climate Change & Floods USA: Mississippi, 2019

## The Great Flood of 2019: A Complete Picture of a Slow-Motion Disaster

By Sarah Almkhatar, Blacki Migliozi, John Schwartz and Josh Williams | Sept. 11, 2019





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India, 2019

# Monsoon mayhem: Over 50 killed as 9 states face flood fury, red alert in Kerala





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# France, December, 2019

## Deadly flooding strikes southern France for 2nd time in a week

By [Eric Leister](#), AccuWeather senior meteorologist

Updated Dec. 3, 2019 6:35 AM





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# Recent Floods in Canada

Calgary, June 2013



**Flood, wet and fears of high water: what Ontario, Quebec and New Brunswick look like in a deluge**



BY [JESSE FERRERAS](#) - GLOBAL NEWS

Posted April 25, 2019 3:20 pm

Updated April 26, 2019 12:12 pm

Ottawa, Ont.



Eastern Canada, April 2019



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## Recent Floods in BC

Grand Forks, May 2018



Chilcotin, July 2019





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# Fraser River Flood, 1894





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## Key Roles of Province: Flood Management

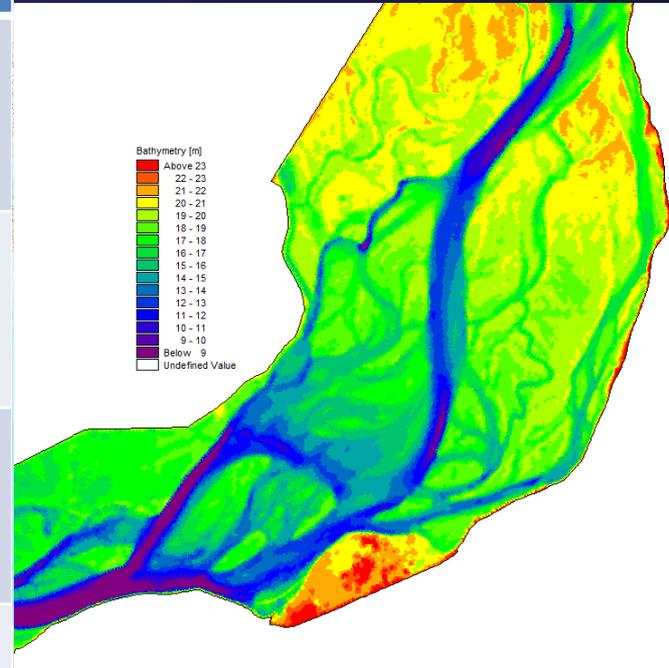
- Monitoring, issuing streamflow advisories/flood watches/warnings
- Administering the *Dike Maintenance Act* and Dam Safety Program
- Guidelines: e.g., Land Use in Flood Hazard Areas
- Supporting local emergency preparedness & response
- Funding for flood mitigation projects (EMBC)





# Flood Monitoring & Modelling

Model	Full Name	Use / Application
WARNS	<b>W</b> Ater and <b>R</b> outing <b>N</b> umeric <b>S</b> ystem	Spring Snowmelt 19 sites: Fraser, Thompson
CLEVER	<b>C</b> hannel <b>L</b> inks <b>E</b> volution <b>E</b> fficient <b>R</b> outing	Spring Snowmelt 100 locations (→160 in 2020)
COFFEE	<b>C</b> Oastal <b>F</b> all <b>F</b> lood <b>E</b> nsemble <b>E</b> stimation	Fall/Winter Rainy Season 93 coastal watersheds
Lower Fraser Hydraulic Models		Lower Fraser River flood peak forecast, engineering



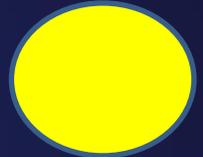
Since 2011: >4X Expansion



# Advisories, Flood Watches, and Flood Warnings

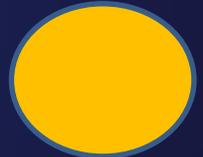
## High Streamflow Advisory

- River levels are rising or expected to rise rapidly, but no major flooding is expected. Minor flooding in low-lying areas is possible.



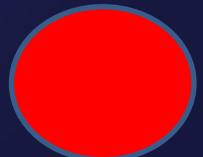
## Flood Watch

- River levels are rising and will approach or may exceed bankfull. Flood of areas adjacent to affected rivers may occur



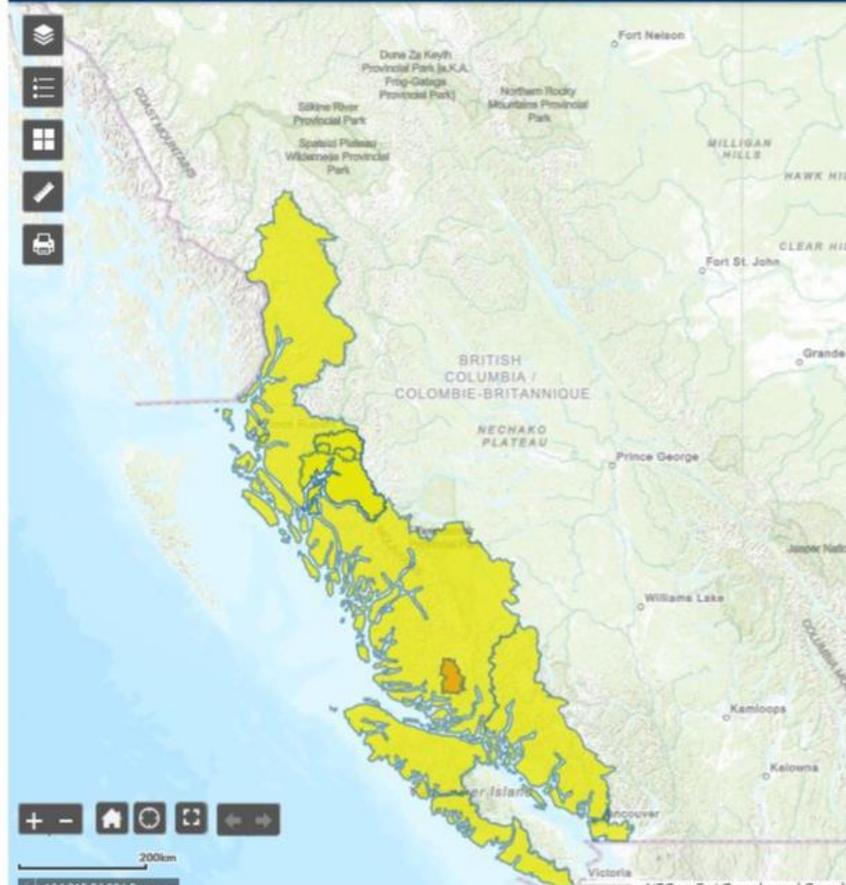
## Flood Warning

- River levels have exceeded bankfull or will exceed bankfull imminently. Flooding of areas adjacent to the rivers affected will result.



Flood Warnings and Advisories

BRITISH COLUMBIA Flood Warning and Advisory Notifications



**Flood Watch– Kingcome River (UPGRADED)**  
**High Streamflow Advisory – Coast**  
**ISSUED: 4:00 AM November 17, 2019**

The River Forecast Centre is **upgrading** to a **Flood Watch** for:

- **Kingcome River**



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# Flood Resources & Tools

## Provincial Flood Emergency Plan

Updated  
May 31, 2019

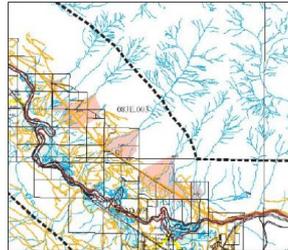


Ministry of  
Forests, Lands, Natural  
Resource Operations  
and Rural Development

September, 2004

## Flood Hazard Map User Guide

How to access and use BC Flood Hazard Maps to assist  
in land use decisions for flood prone areas.



Ministry of  
Water, Land and  
Air Protection



## FLOOD HAZARD AREA LAND USE MANAGEMENT GUIDELINES



May 2004

Ministry of Water, Land and Air Protection

Province of British Columbia

Amended by:  
Ministry of Forests, Lands, Natural Resource Operations and Rural  
Development

January 1, 2018

PROFESSIONAL PRACTICE GUIDELINES



NATURAL HAZARDS

## LEGISLATED FLOOD ASSESSMENTS IN A CHANGING CLIMATE IN BC

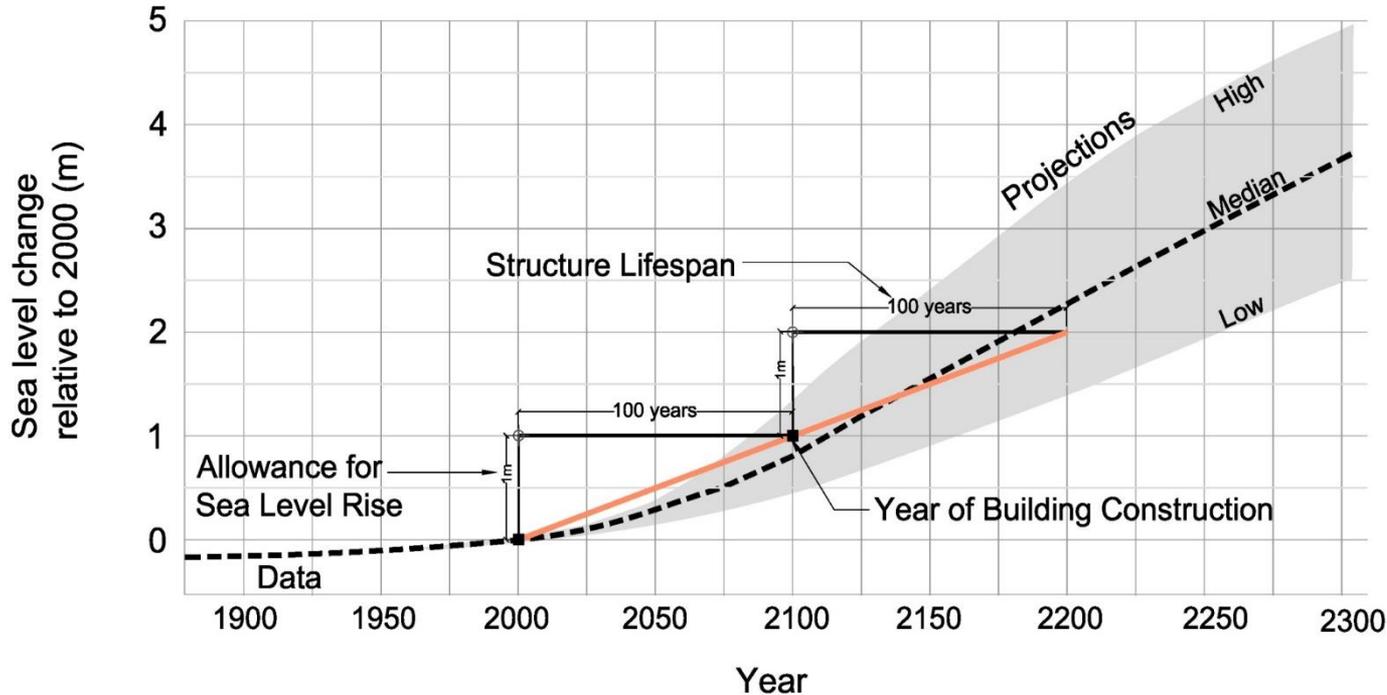
VERSION 2.1  
PUBLISHED AUGUST 28, 2018



ENGINEERS &  
GEOSCIENTISTS  
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# 2018 Sea Level Rise Guidance



Plan for **0.5m** sea level rise by 2050, **1.0m** by 2100



## Strategic Future Provincial Directions

- Drought and flood risks are increasing due to climate change
- Must incorporate indigenous perspectives, values & needs
- Enhancing community **resilience** to flood & drought
- Province is initiating a BC Flood Risk Strategy
- Province will develop a Drought Preparedness Strategy

↑  
Coordinating  
with initiatives  
in other  
Ministries  
↓



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## For More Information (Province of BC)

### Internet Resources

Drought & Flooding: <http://gov.bc.ca/water>

Emergency Information: [www.emergencyinfobc.gov.bc.ca](http://www.emergencyinfobc.gov.bc.ca)

### Contacts

Emergency Management BC: 1-800-663-3456

CEPF Grant Funding Program: Rebecca Bishop: [rbishop@ubcm.ca](mailto:rbishop@ubcm.ca)

Regional FLNRORD Ministry Staff in Your Area



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## Questions / Listen & Learn

- How can we better reflect Indigenous values & needs in provincial flood and drought strategies & programs?
- Do you have stories from your community we could learn from?
- Other questions?