INTEGRATED SUSTAINABILITY

SCRD Water Demand Analysis Update

Presentation to

SCRD Board

06-July-2023

WATER | WASTE | ENERGY

Presentation Outline

Review Project History

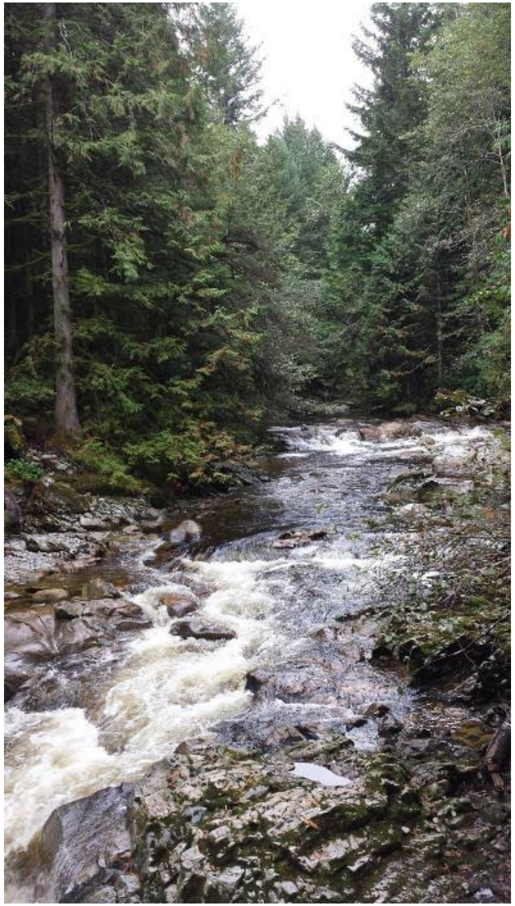
What is a Water Demand Analysis (WDA) and why do it?

What is it?

- A water budget to quantify current and future demand ***and*** supply
- Determine the gap between them

Why do it?

- For short and long term planning
- rationale to support capital projects and grant funding applications



Sunshine Coast Tourism 2014

Water Sourcing Policy, 2018

"The objective of the Water Sourcing Policy be that the SCRD's intent *is* to supply sufficient water at *no further restriction than current* Stage 2 levels throughout the year"

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SUNSHINE COAST REGIONAL DISTRICT

TOWN OF GIBSONS
RECEIVED
AUG 27 2018
Referred to: 9/4/18 Council

August 15, 2018

Mayor Milne, District of Sechelt
Mayor Rowe, Town of Gibsons
Chief Paull, *shíshálh* Nation
Chief Campbell, *Skwxwú7mesh* Nation
Lori Pratt, Chair, School District 46
Peter Luckham, Chair, Islands Trust

Dear Local Government Partners,

Re: Water Sourcing Policy and Regional Growth Strategy

Recently, the Sunshine Coast Regional District (SCRD) commenced regional policy development for two key initiatives as outlined below. This correspondence and attached reports serve as information and an invitation for future engagement in these important discussions for our community.

1. **Water Sourcing Policy**

The first initiative is the Water Sourcing Policy. This policy was developed to provide a guiding document outlining how the current and future long term water demand will be met using available sources. The Water Sourcing Policing was adopted at the May 24, 2018 regular SCRD Board meeting, as follows:

172/18 **Recommendation No. 1** *Water Sourcing Policy – Policy Framework*

THAT the report titled Water Sourcing Policy – Policy Framework be received;

AND THAT that the objective of the Water Sourcing Policy – Policy Framework be that the Sunshine Coast Regional District's intent *is* to supply sufficient water at *no further restriction than current* Stage 2 levels throughout the year;

AND THAT the Water Sourcing Policy – Policy Framework report as amended be forwarded to member municipalities and First Nations for their comments;

AND THAT a further report and Water Sourcing Policy be brought forward for consideration once all technical studies required for development are completed;

AND FURTHER THAT staff report to a Committee meeting with a review of the water capacity for fire-fighting, emergency situations and for agricultural water uses.

Community Climate Action Plan, April, 2023

Adaptation - Drinking Water

The Sunshine Coast is already witnessing how climate change is worsening summer droughts. With seven of the last eight years seeing less summer precipitation than on average what climate models predict for the year 2050, threshold events may already have been crossed where non-linear changes are to be expected.

Community Climate Action Plan, April, 2023

Goal 6: Water systems are resilient to increasing temperatures, recurring, and worsening drought	
Action 11	**Continue to develop understanding and mitigate against the impacts of climate change on water systems.**
Sub-Actions	Develop understanding of how temperature and precipitation may change in the coming decades.
	Determine impact of temperature, precipitation, and ecosystem loss on supply and demand.
	Support the integration of climate considerations into SCRD's Water Strategy and Town of Gibsons Natural Asset Plan with relation to Aquifer 560 and Aquifer 552.

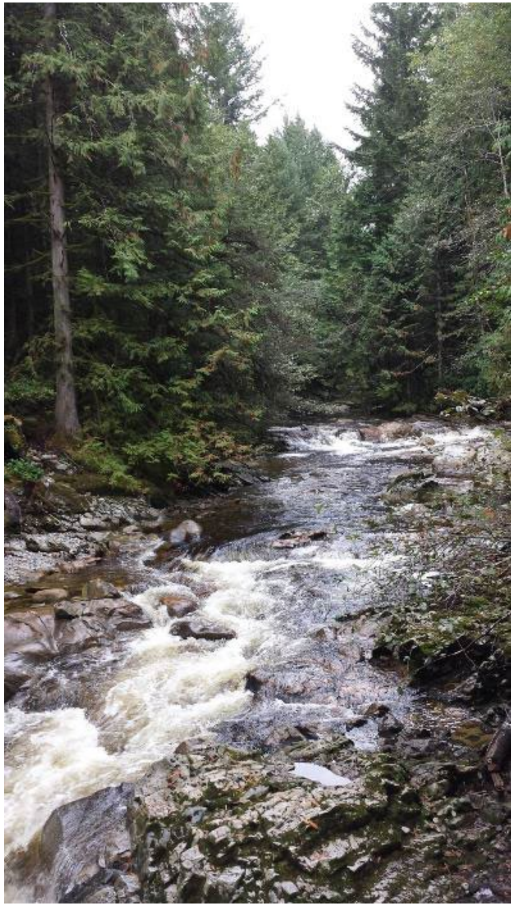
The WDA is trying to determine the severity and impact of a drought.

It is ***not*** trying to model the likelihood of it occurring.

Water Demand Analysis (2018)

Answer these questions:

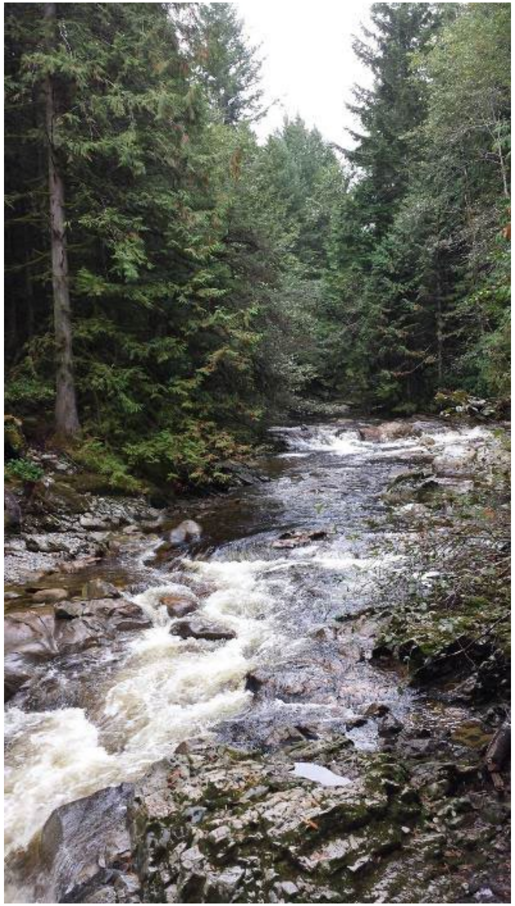
- How **long** is the summer drought period
- What is the potable water (**demand**) at Stage 2 levels?
- How does this **grow** with population?
- How much water is needed for Chapman Creek EFN?
- How much water **supply** does the SCRD currently have available?
- The shortfall is called the "Water Supply Deficit"



Sunshine Coast Tourism 2014

Population and Potable Demand

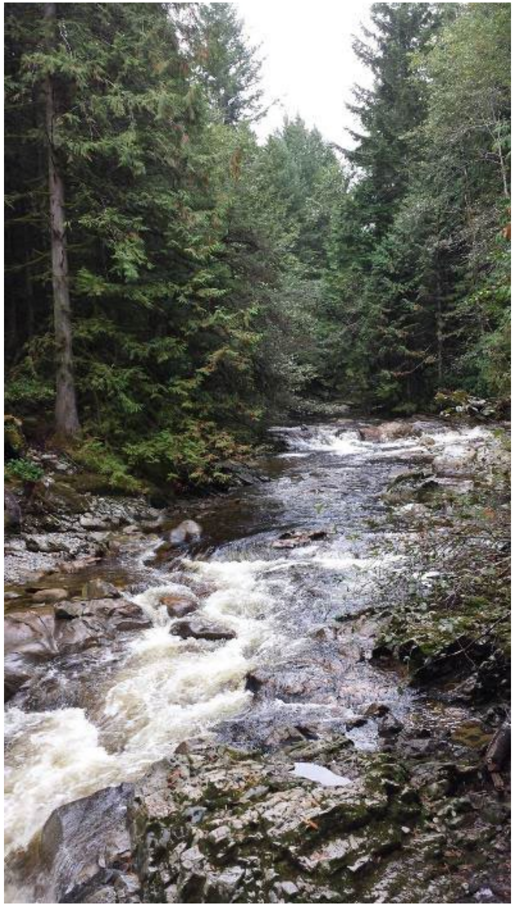
- Population modelled from Census data
- 2% annual growth rate
- Per capita demand modelled from Chapman water data from 2004 present
- Modelled as a 20% reduction from 2010 level
- 1.0m3/day/capita in July-Aug in Stage 1
- Stage 2 is modelled as an immediate 20% decrease
- Not modelling for Stage 3 and 4 as the goal is to stay in Stage 2.



Sunshine Coast Tourism 2014

Drought Period

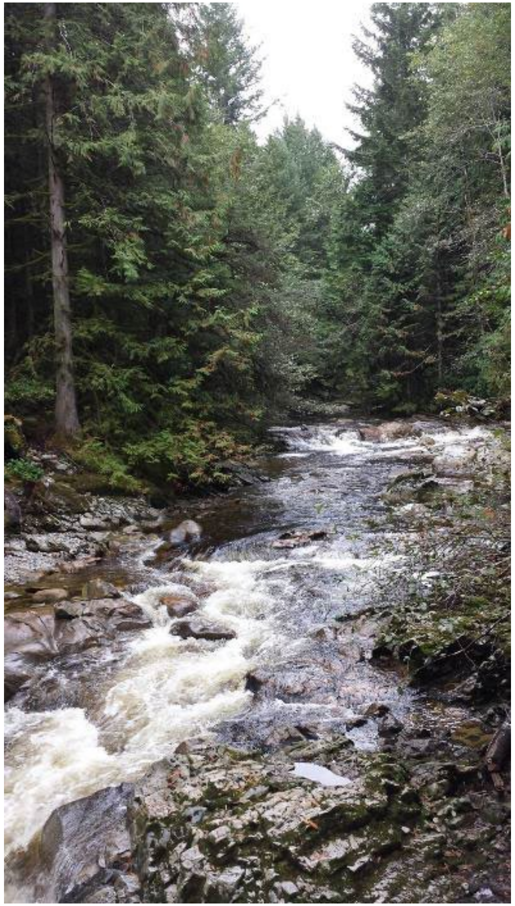
- Start is defined as the day when Chapman Lake stops overflowing, and Stage 2 is called
- Effectively, the end of snowmelt
- Earliest seen was in 2015, on June 8
- Mutual decision to model this as 1 May
- End of drought is when lakes refill from rain.
- At 2018, this has always happened by mid-October
- End date modelled as 31 October
- 184 days



Sunshine Coast Tourism 2014

EFN

- EFN to be maintained at 200L/s (17,300m3/day)
  - EFN must be made up ***before*** potable demand can be met
  - Applies all year round, but mainly an issue in summer
  - EFN deficit cannot be supplied from external groundwater - ***can only be supplied from storage*** (or District of Sechelt reclaimed water)



Sunshine Coast Tourism 2014

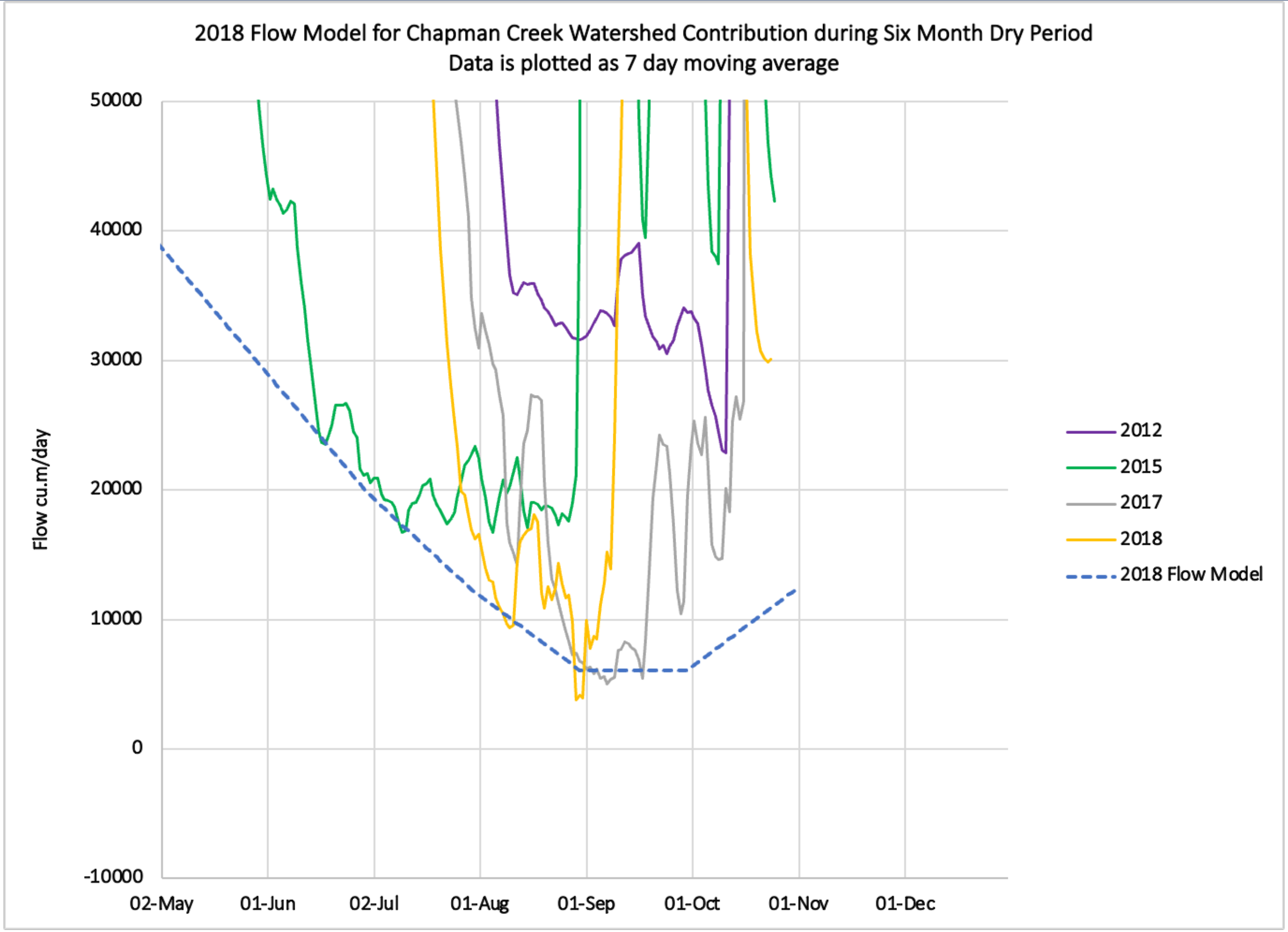
Water Demand Analysis 2018

Demand Reduction (conservation) Factor from 2010	**Supply Deficit (m³)**		
Demand Reduction	2025	2035	2050
Population	26,000	32,000	43,000
0% (zero reduction)	2,454,000	3,392,000	5,114,000
10% (minimal reduction)	2,002,000	2,837,000	4,366,000
20% (moderate reduction)	1,640,000	2,391,000	3,770,000
33% (high reduction)	1,245,000	1,811,000	2,988,000

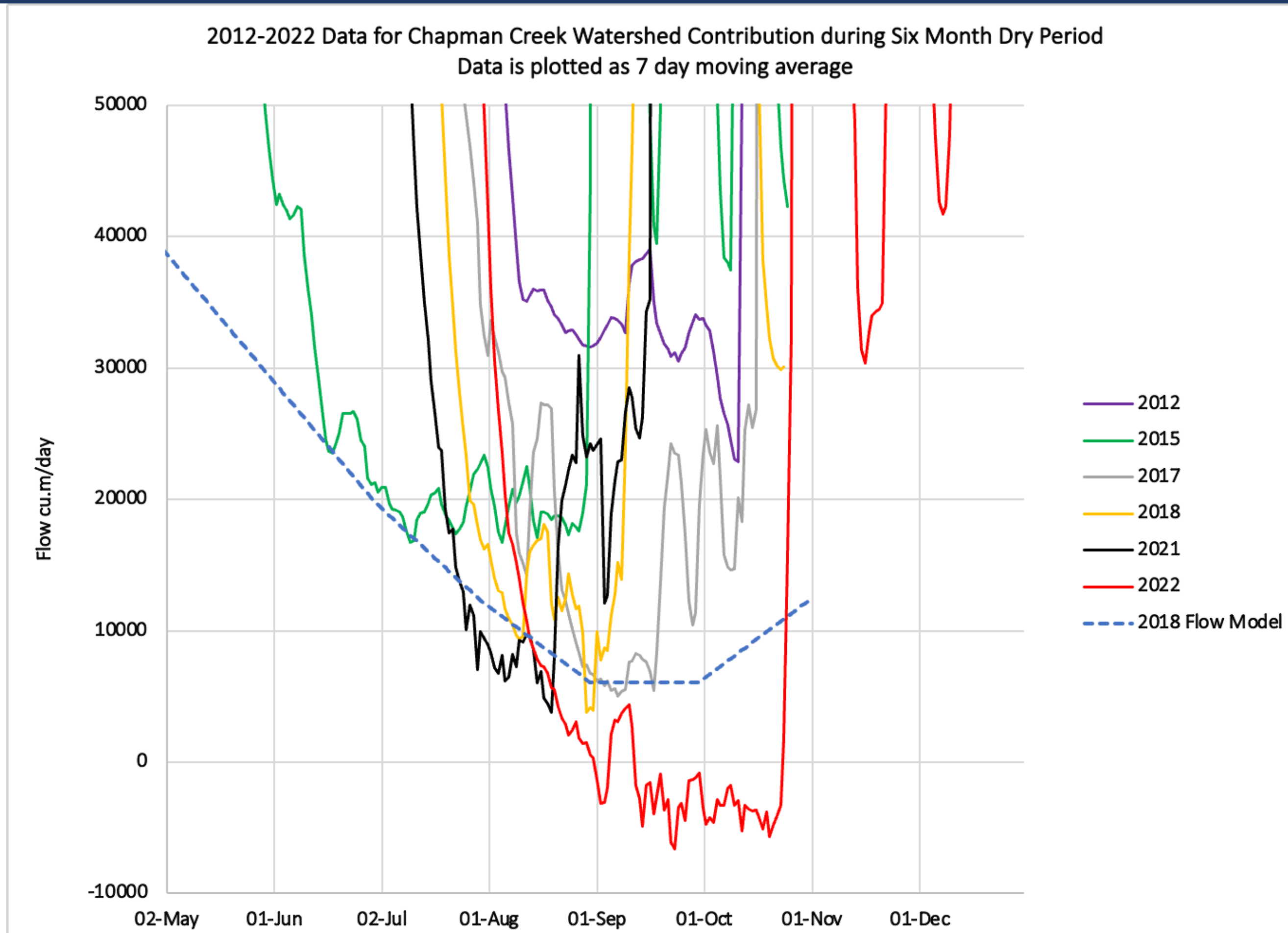
Water Demand Analysis 2018

	Supply Deficit (Mm^3)		
	2025	2035	2050
Population	26,000	32,000	43,000
Lake Storage	1.7	1.7	1.7
EFN Requirement	3.3	3.3	3.3
Modelled Watershed Contribution	3.1	3.1	3.1
Watershed EFN deficit	0.2	0.2	0.2
Total EFN Deficit	**0**	**0**	**0**
Potable Demand	3.3	4.0	5.4
Remaining Lake Storage	1.5	1.5	1.5
Groundwater Supply (Chaster)	0.184	0.184	0.184
Potable Water Deficit	**1.64**	**2.39**	**3.77**
Total Water Supply Deficit	**1.64**	**2.39**	**3.77**

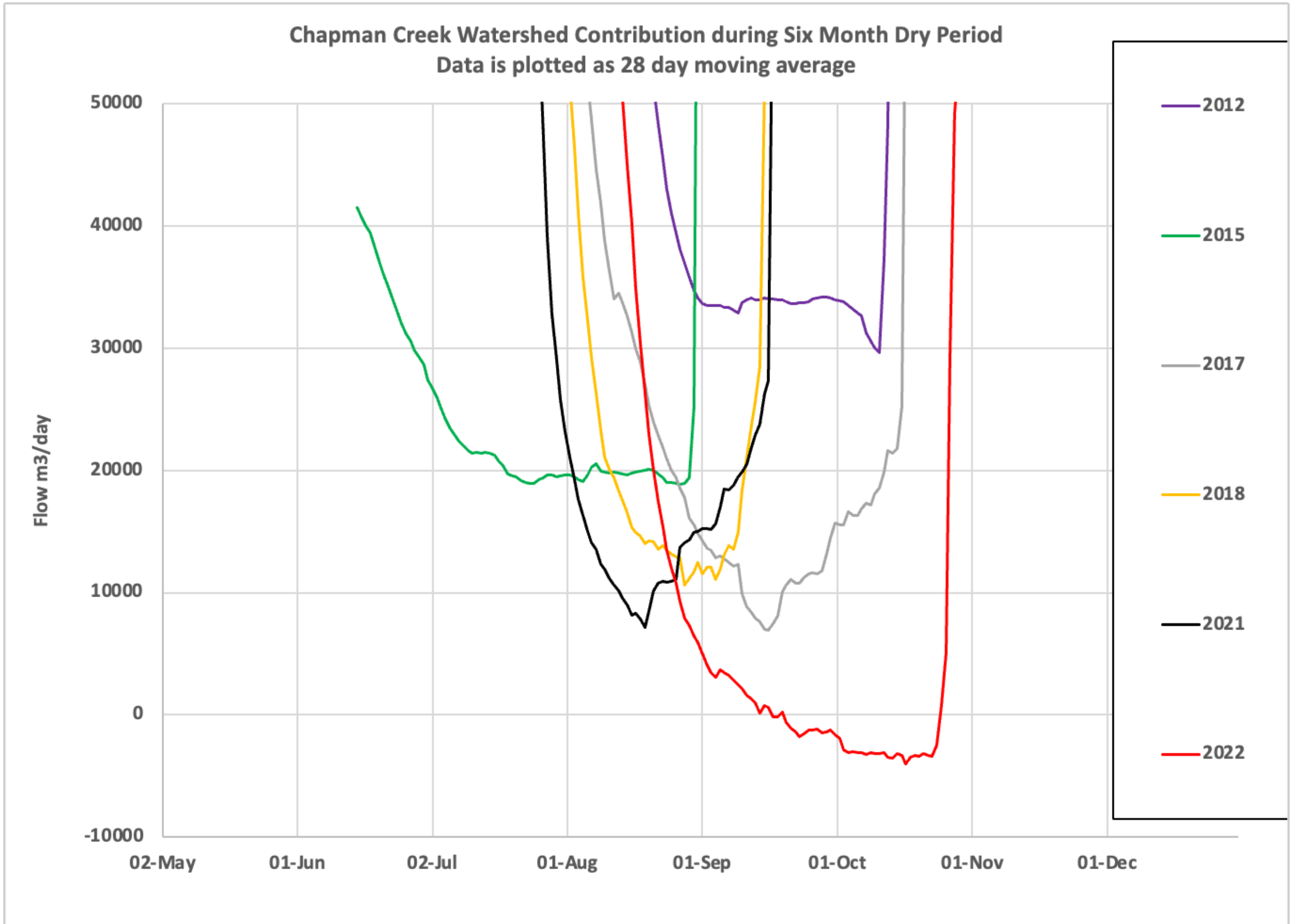
Drought years 2012-2018



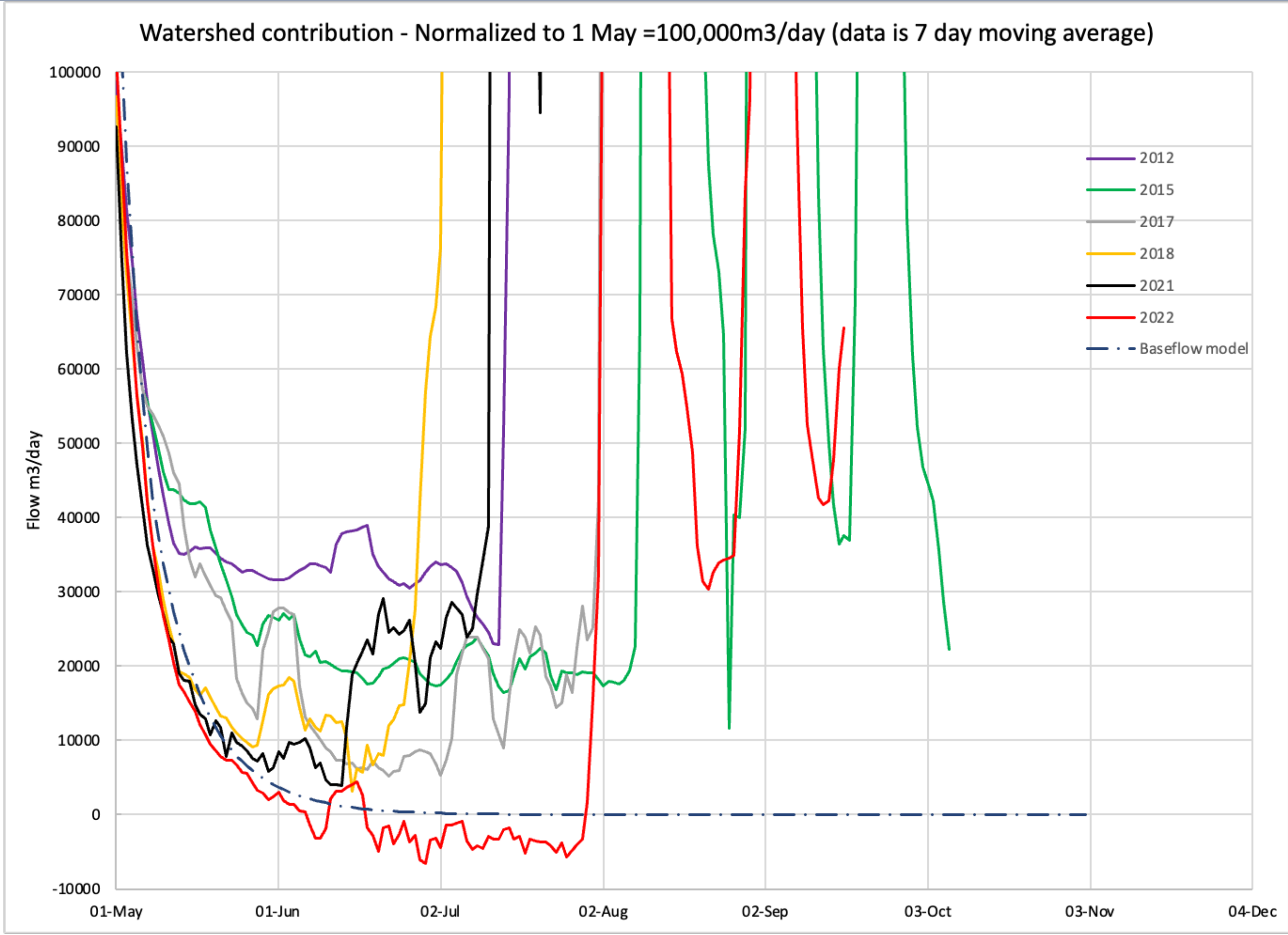
Drought years 2012-2022



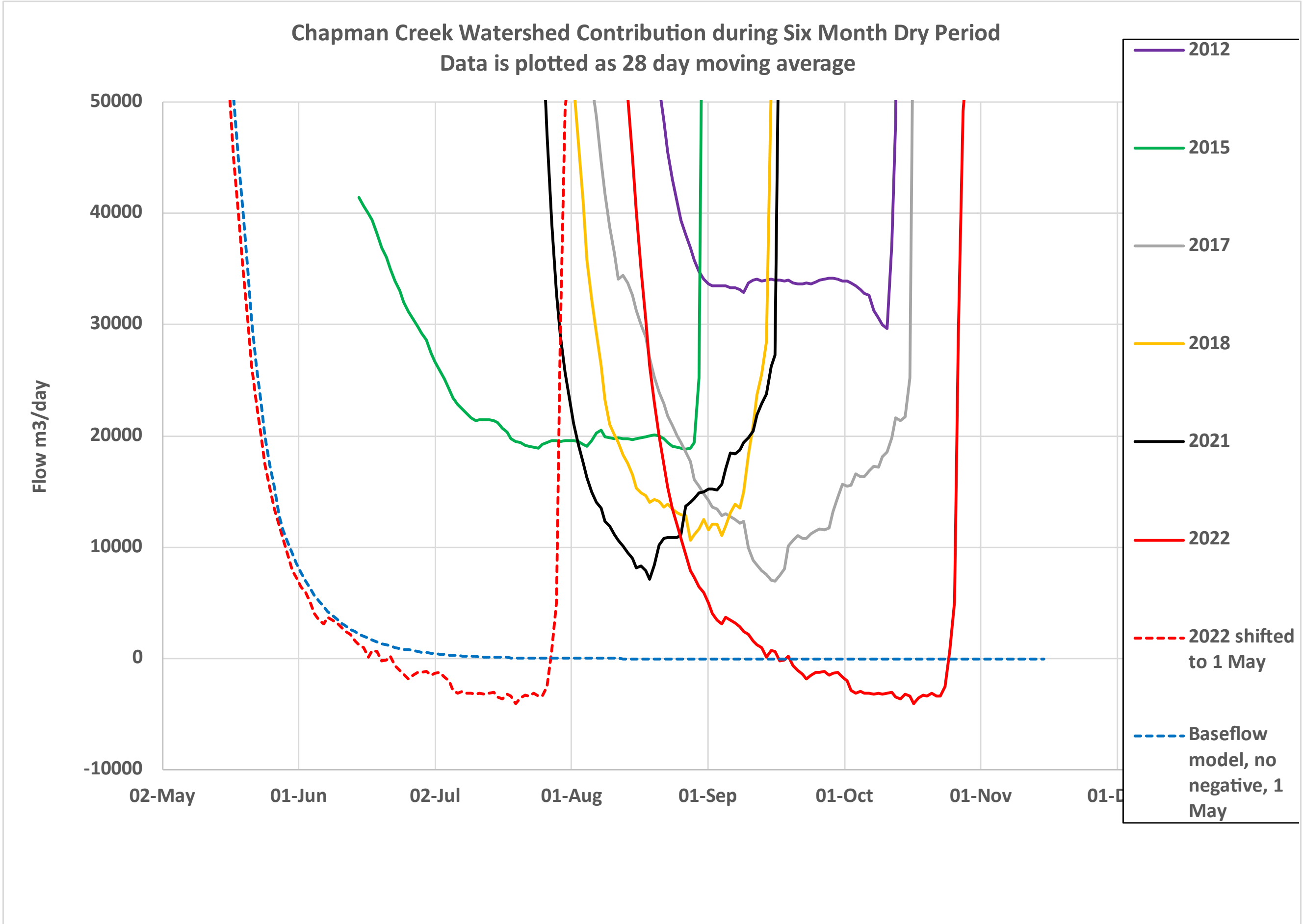
28 Day average to smooth the curves…



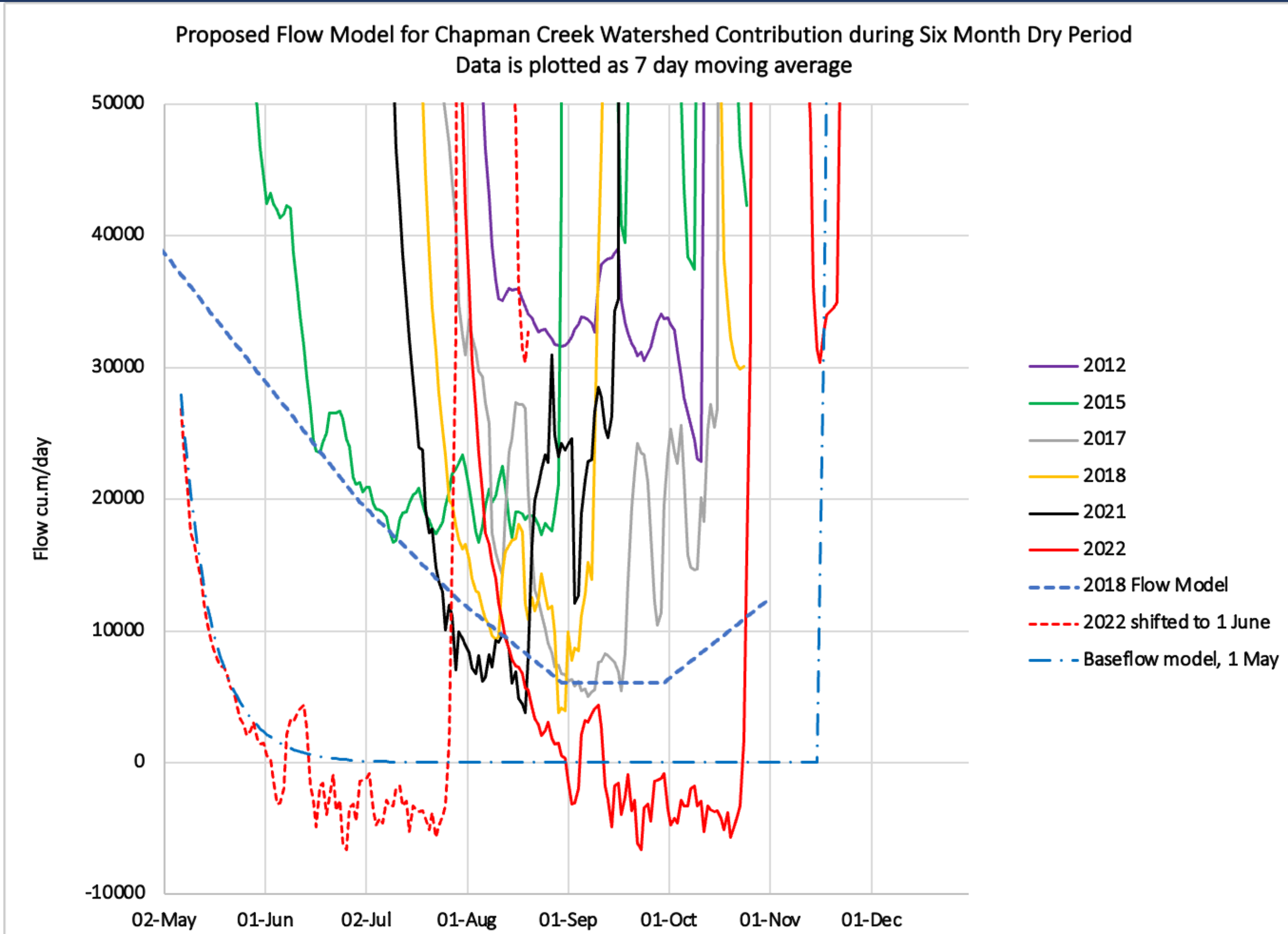
“normalize” the curves to a common starting point



New model curve



Put it back on the 7 day charts



Watershed Contribution

- Is the natural flow in the creek, without any augmentation from lake storage
- Dramatic reduction over successive years from 2012
- Regardless of when the snowmelt ends, the flow drops very quickly, from 100,000m3/day to less than 10,000m3/day in the first month
- The steady baseflow level has declined in every drought year since 2012
- In Sep-Oct 2022 the baseflow went ***negative*** by 3150m3/day
- This is from evaporative and infiltration loss in the 17km Chapman Creek Channel
- For modelling in 2023, have taken the 2022 curve, where drought (Stage 2) started on 28 July, and slide it sideways to start on 1 May
- Extend end of drought to 15 Nov to reflect end of drought in 2022.
- 200 day period

What has changed from 2018?

	2018	2023
Pop. growth rate	2%	2%
Town of Gibsons Zone 3	Incl.	Excl.
Groundwater Sources	Chaster	Chaster + Church Rd
Groundwater Vol (m3/day)	1000	5400
Drought start date	1 May	1 May
Drought End date	31 Oct	15 Nov
Drought Duration	184d	200d
Lake Storage (Mm3)	1.64	1.77
Lake siphons included?	No	No

Comparison of 2018 and 2023 models

All amounts in million m3	2018 model	2023 model
Population (2025)	26,000	24,100
Lake Storage	1.64	1.77
EFN Requirement	3.26	3.54
Modelled Watershed Contribution to EFN	3.05	0.38
Watershed EFN Deficit	0.21	3.16
Total EFN Deficit (to come from RWR)	**0**	**1.39**
Potable Demand	3.26	3.17
Potable Supply from Lakes	1.43	0
Potable Supply from GW	0.184	1.08
Net potable deficit	**1.64**	**2.09**
Total Water Supply Deficit	**1.64**	**3.51**

Water Demand Analysis 2023

	Supply Deficit (Mm^3)			
	2025	2035	2050	2075
Population	24,100	30,000	40,000	65,000
Lake Storage	1.77	1.77	1.77	1.77
EFN Requirement	3.54	3.54	3.54	3.54
Modelled Watershed Contribution	0.38	0.38	0.38	0.38
Watershed EFN Deficit	**3.16**	**3.16**	**3.16**	**3.16**
Total EFN Deficit (to come from RWR)	1.39	1.39	1.39	1.39
Potable Demand	3.17	3.95	5.23	8.48
Potable Supply from GW	1.08	1.08	1.08	1.08
Net Potable Deficit	**0.35**	**1.13**	**2.41**	**5.7**
Total Water Supply Deficit	**3.51**	**4.29**	**5.57**	**8.86**

In closing

- The WDA models the demand and supply required to stay in Stage 2 for an extended drought period
- A dramatic decrease in the natural summer creek flow over the last decade
- In a drought, the creek is effectively dry two months after the end of snowmelt
- This drought period is now 200 days, from 1May to 15 Nov
- The watershed EFN deficit is now 3.16Mm3, requiring the entire volume of the alpine lakes plus an additional 1.4Mm3 from the RWR

The overall Water Supply Deficit is:

3.5Mm3 for 2025

4.3Mm3 for 2035

5.6mm3 for 2050

Questions?

Thank you