Apr 6th, 8:45 AM - 9:00 AM

A watershed approach to recovering salmon in changing climate conditions

Beth LeDoux
King County (Wash.), beth.ledoux@kingcounty.gov

Jessica Engel
King County (Wash.), jessica.engel@kingcounty.gov

Morgan Schniedler Ruff
Tulalip Tribes, mruff@tulaliptribes-nsn.gov

Colin Wahl
Tulalip Tribes, cwahl@tulaliptribes-nsn.gov

Forbidden Glacier – North Cascades
Photos courtesy of Skagit Climate Science Consortium

CLIMATE CHANGE: CAN WE ADAPT?

Presented by: Colin Wahl – Tulalip Tribes

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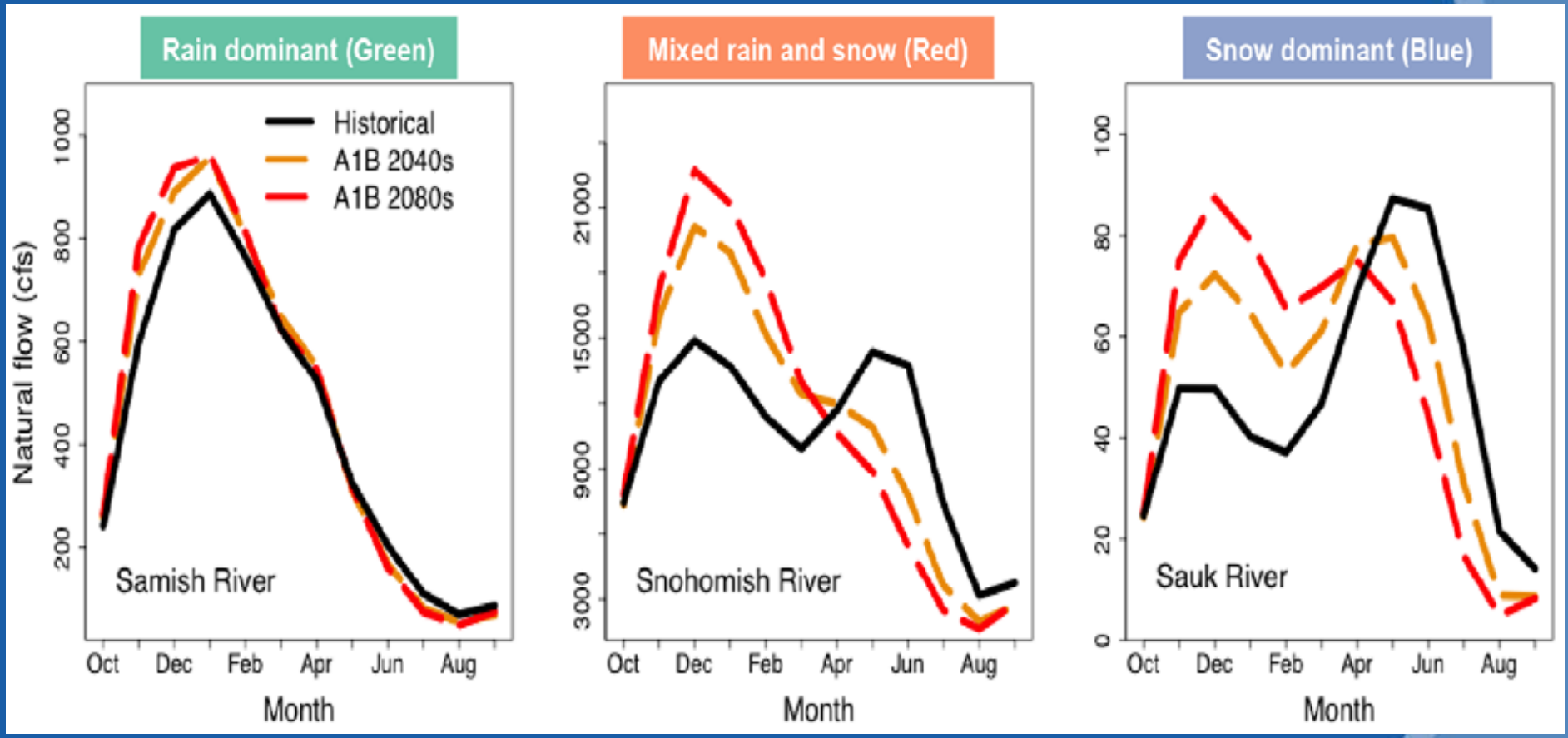
WRIA 7 Climate Change Impacts to Salmon Issue Paper
March 2017

Prepared for:
Snohomish Basin Salmon Recovery Technical Committee

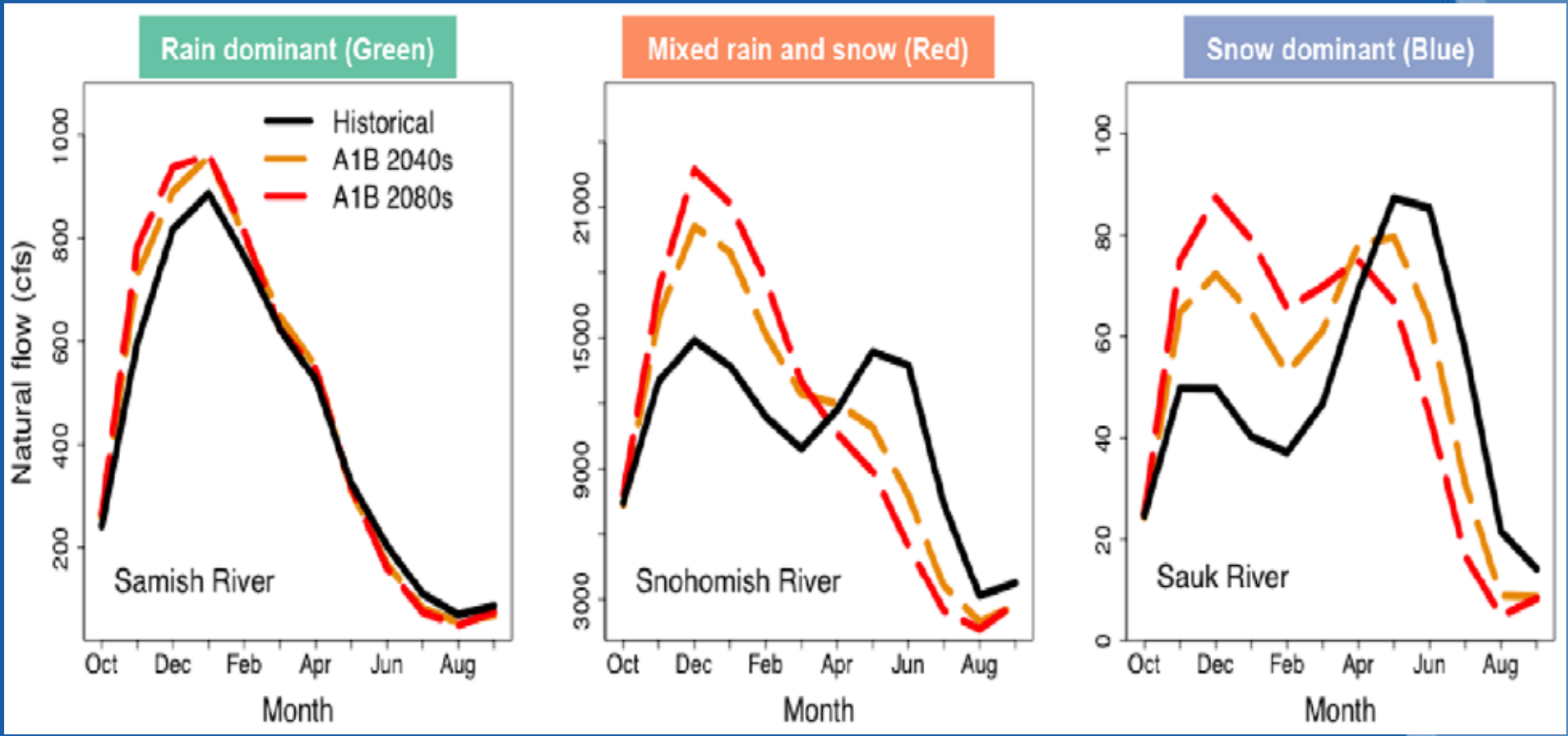
Prepared by:

Beth leDoux – Snoqualmie Watershed Forum
Jessica Engel – King County Department of Natural Resources and Parks
Morgan Ruff – Tulalip Tribes Natural Resources Department
Colin Wahl – Tulalip Tribes Natural Resources Department


BELLINGHAM
5
101
PT. ANGELES
EVERETT
2
SEATTLE
90
TACOMA
12
OLYMPIA



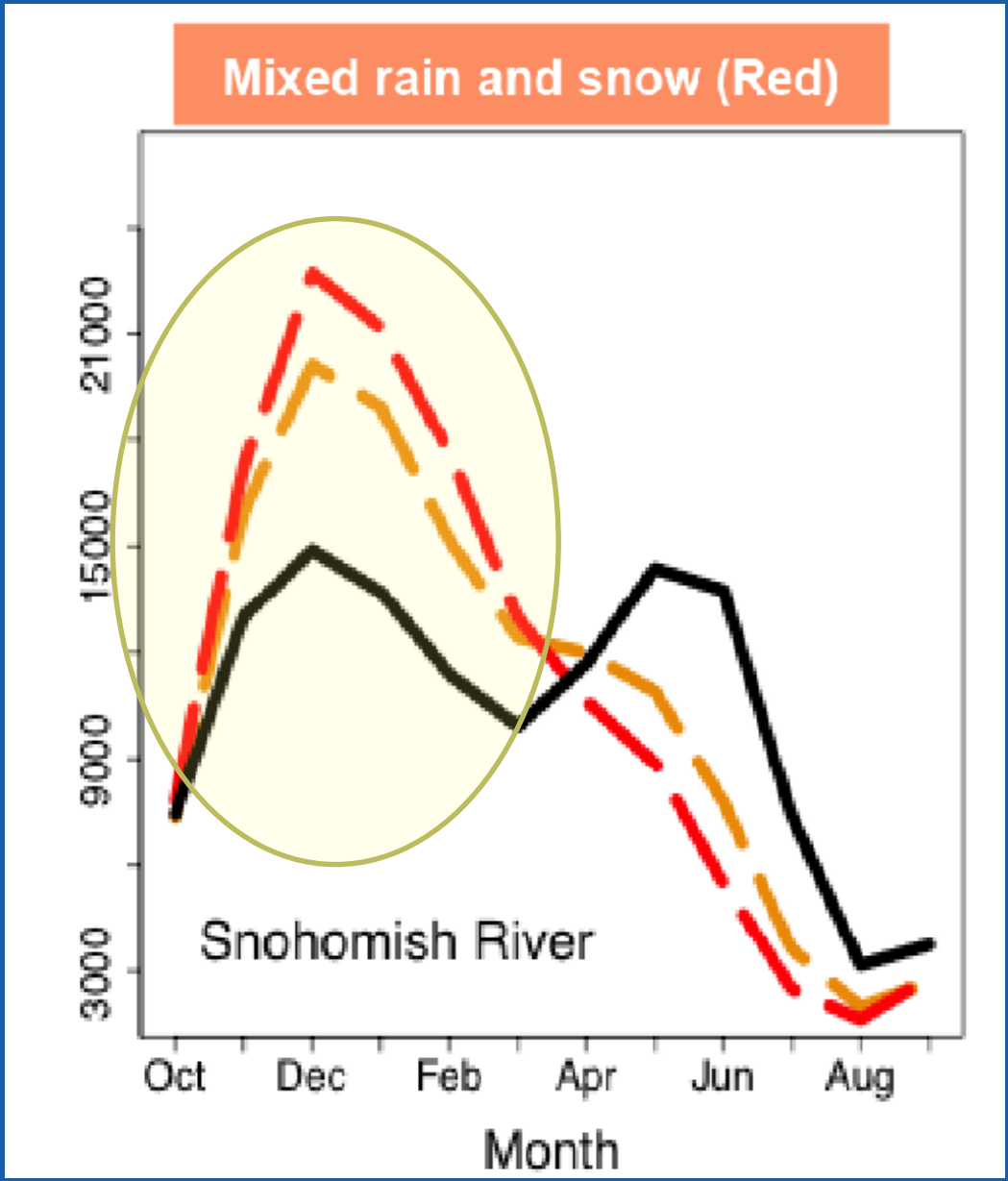
Mauger et al. , 2015



Mauger et al. , 2015

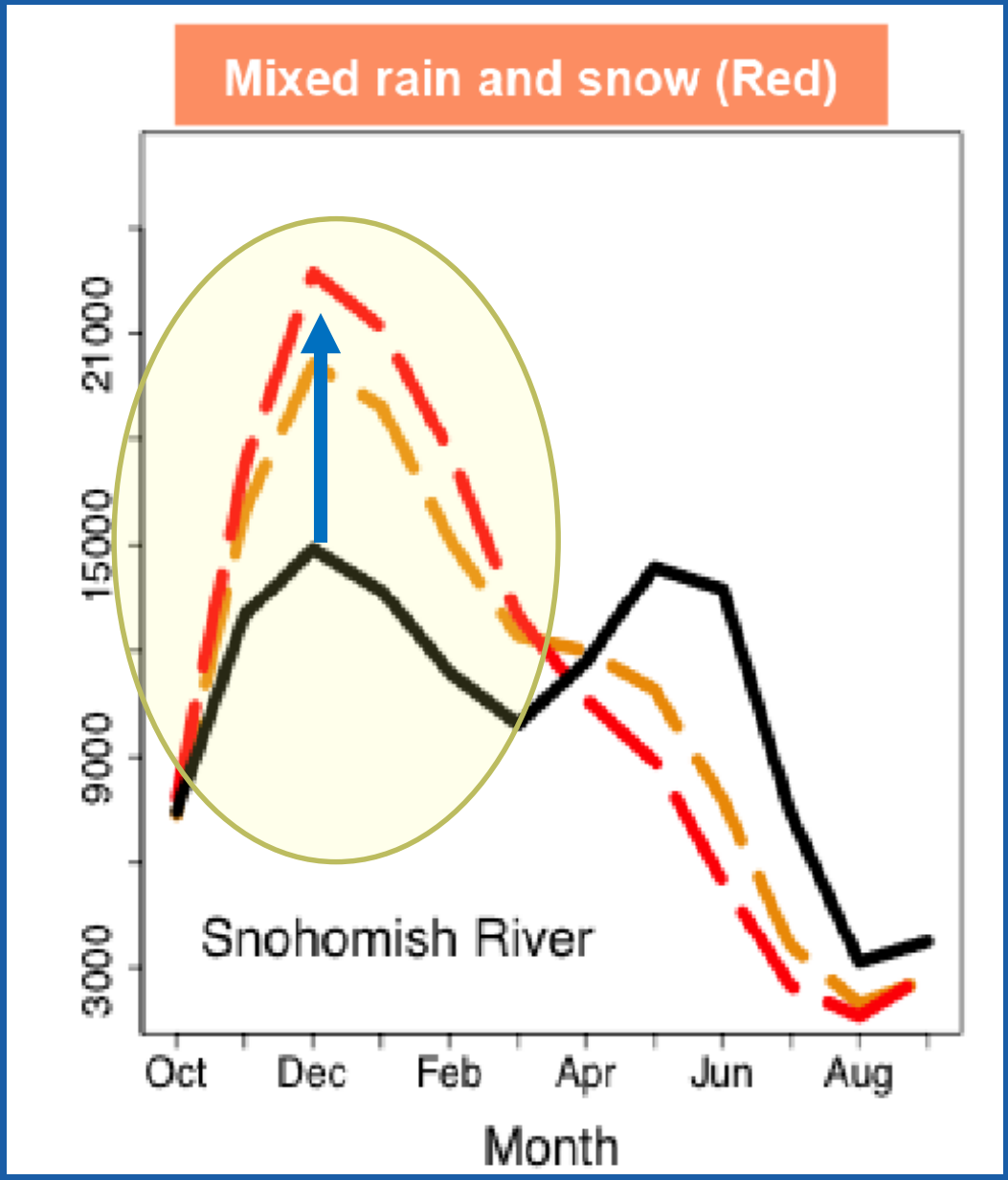
Climate Change

Winter



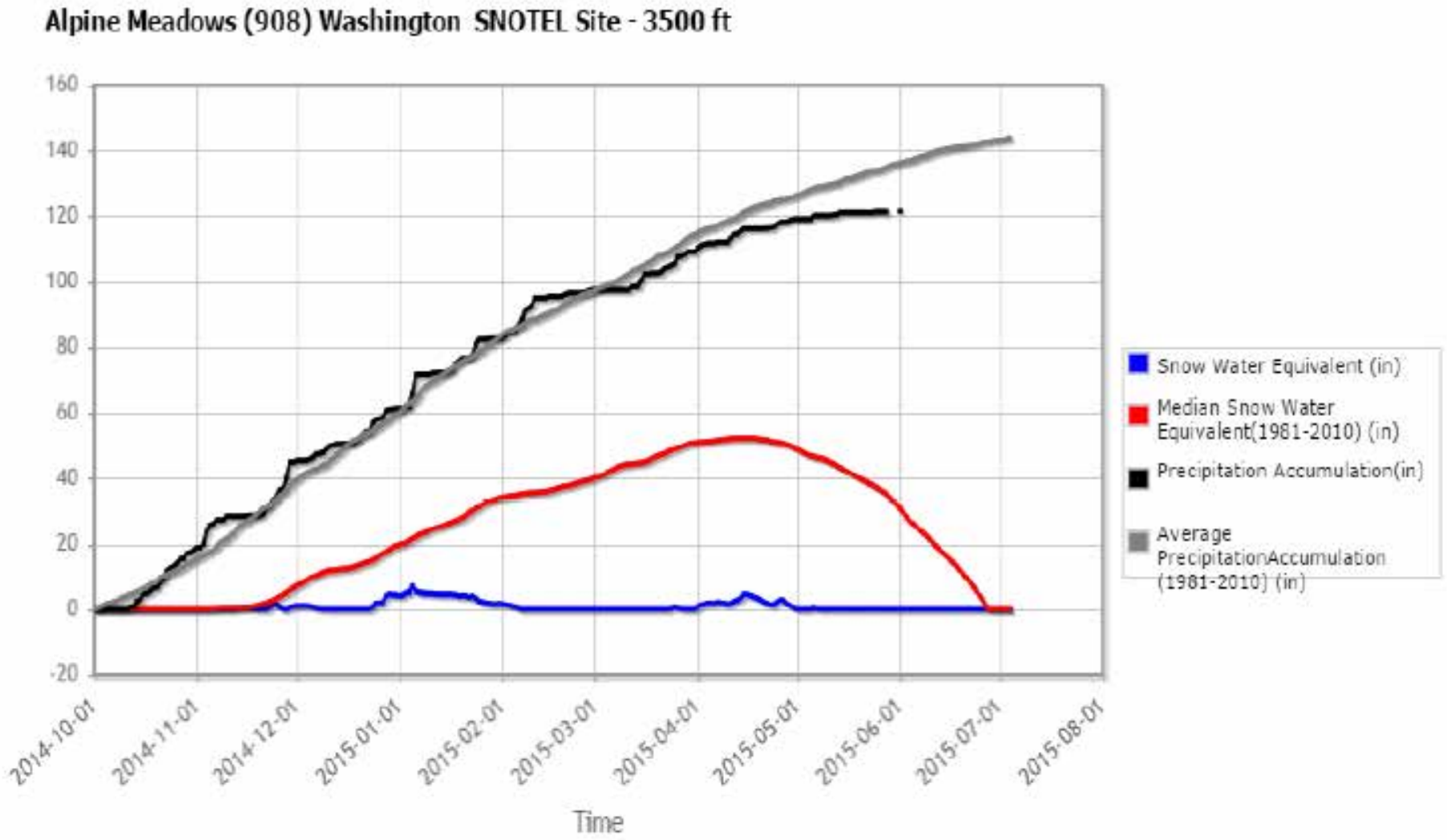
Mauger et al. , 2015

Winter

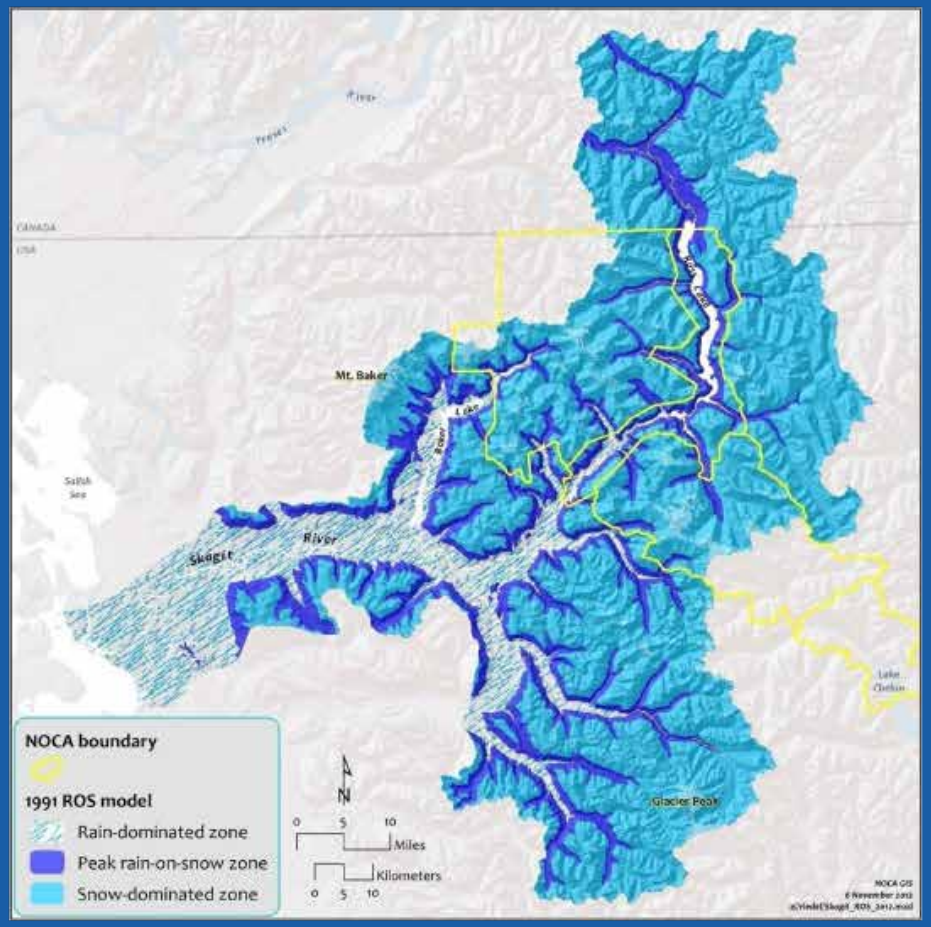


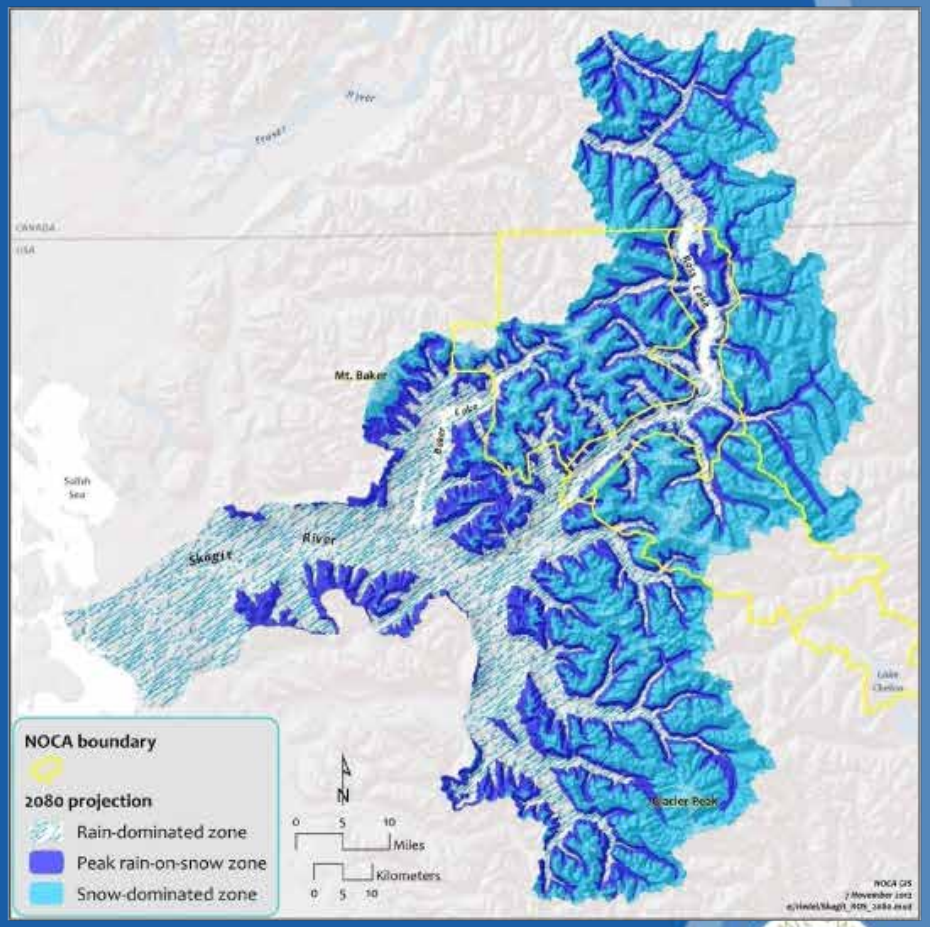
Mauger et al. , 2015

Winter


Alpine Meadows (908) Washington SNOTEL Site - 3500 ft
160
140
120
100
80
60
40
20
0
-20
2014-10-01
2014-11-01
2014-12-01
2015-01-01
2015-02-01
2015-03-01
2015-04-01
2015-05-01
2015-06-01
2015-07-01
2015-08-01
Time
Snow Water Equivalent (in)
Median Snow Water Equivalent(1981-2010) (in)
Precipitation Accumulation(in)
Average PrecipitationAccumulation (1981-2010) (in)

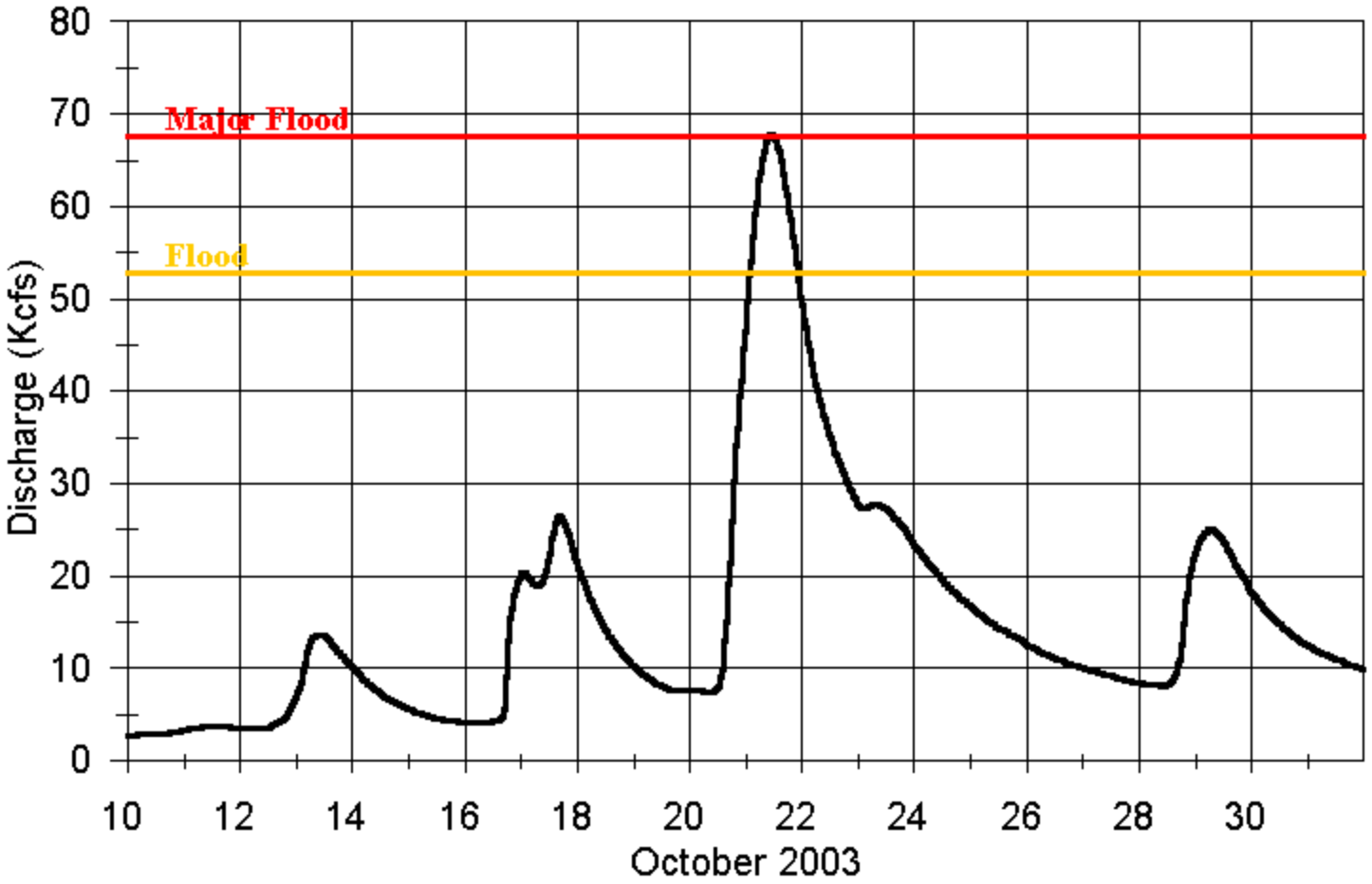
Winter





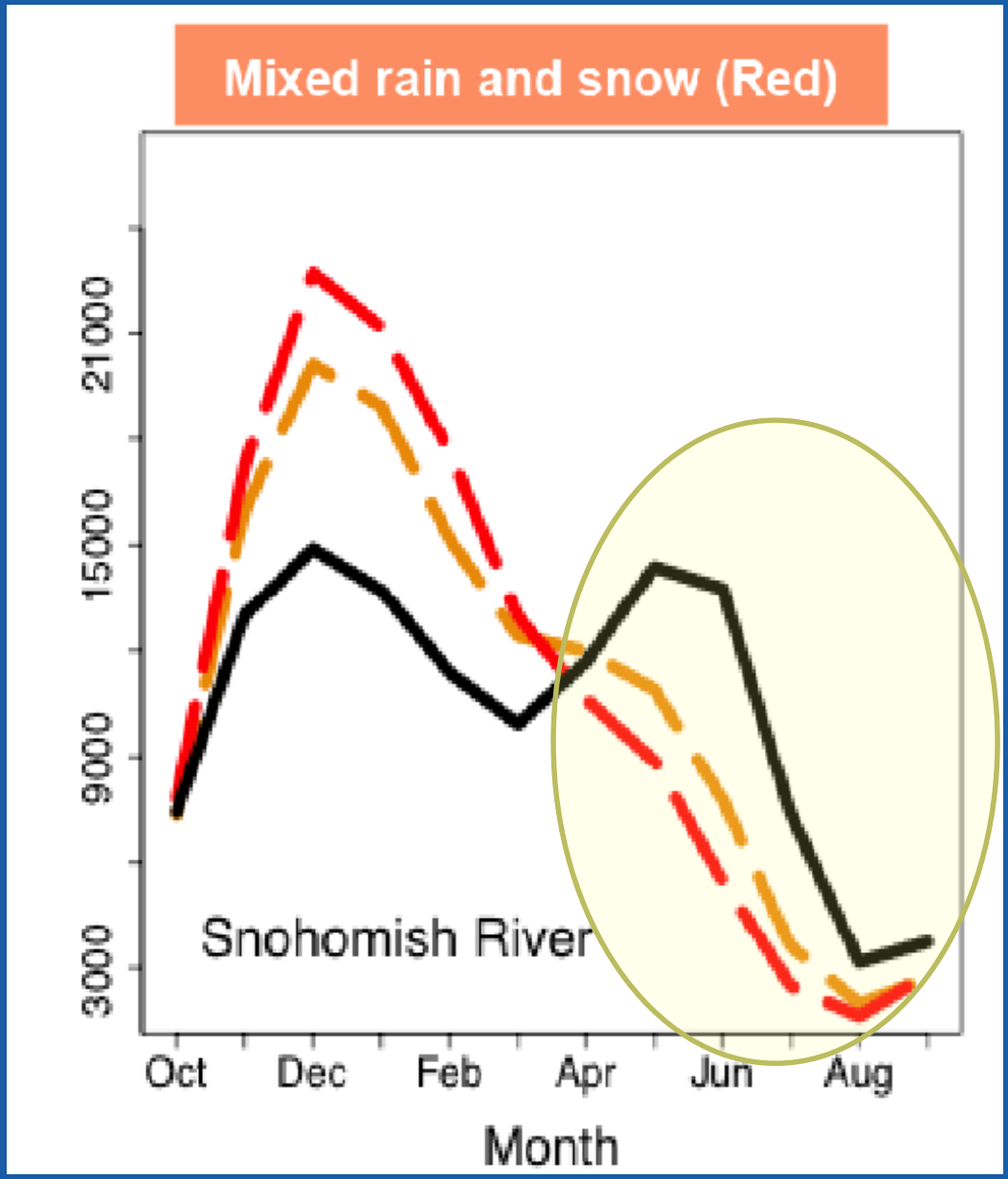
http://www.skagitclimatescience.org/wp-content/uploads/2014/07/basin-fig2.png

Snohomish River near Monroe



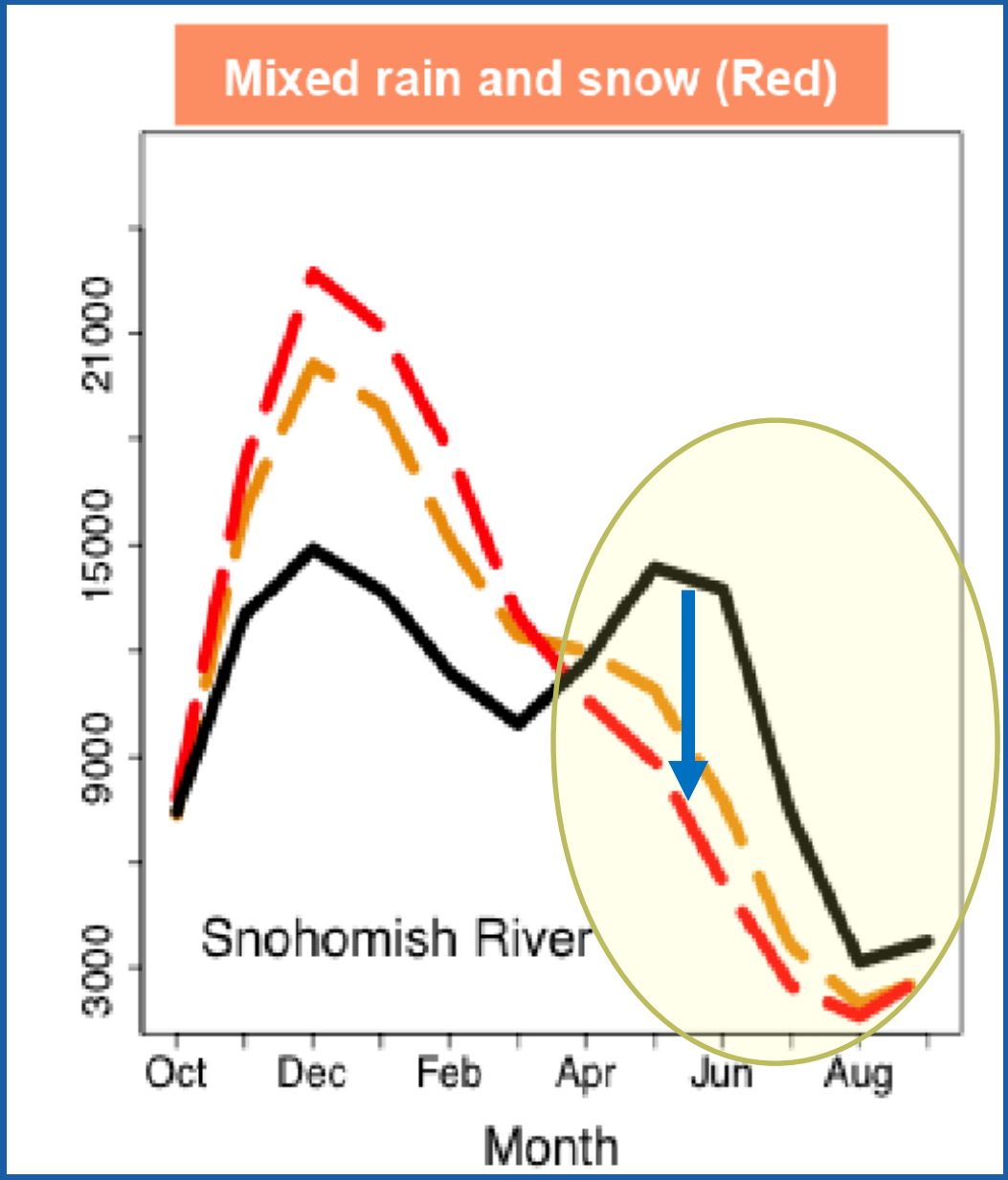

© Thomas Kline salmonography.com

Summer



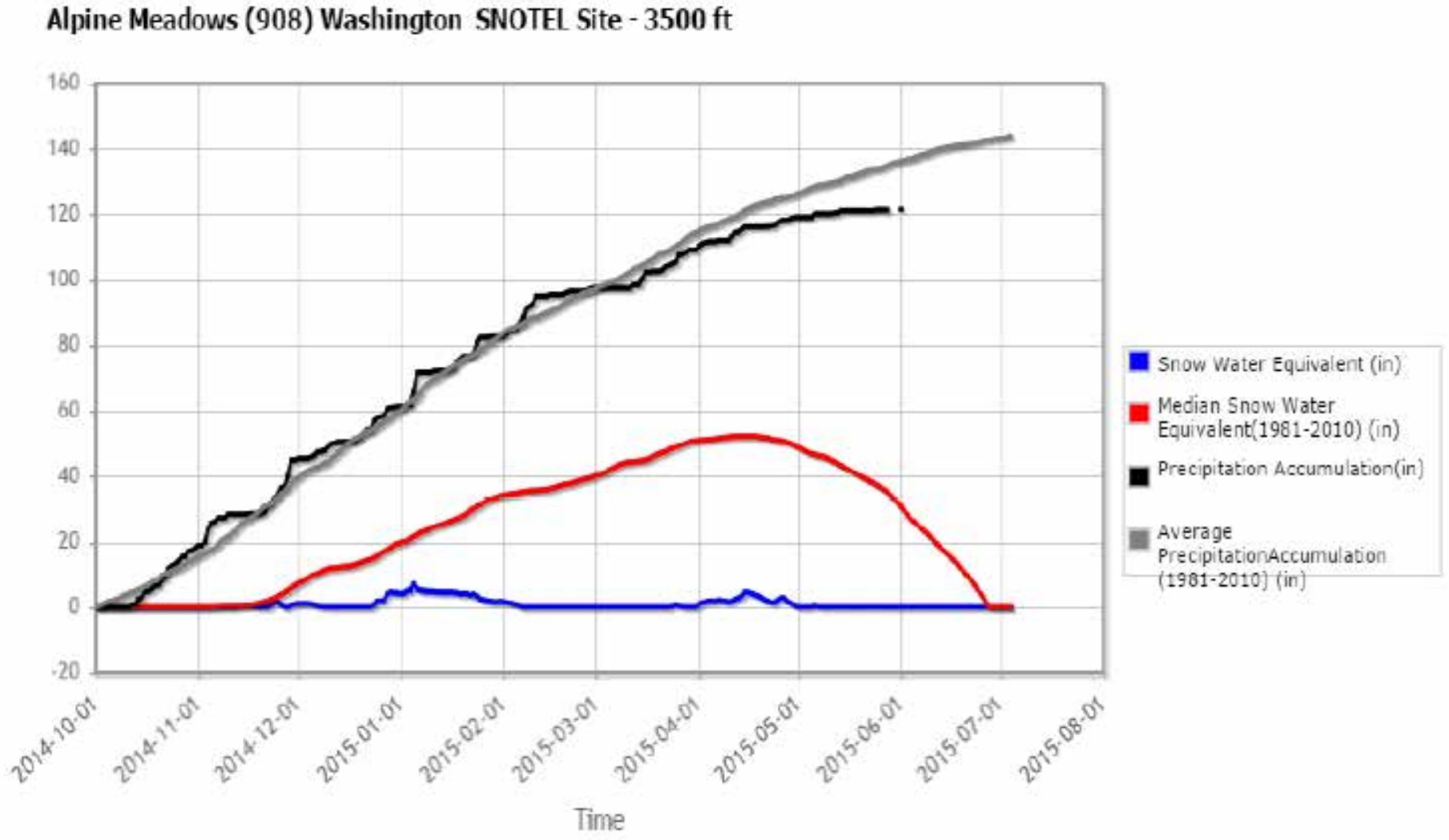
Mauger et al. , 2015

Summer



Mauger et al. , 2015

Summer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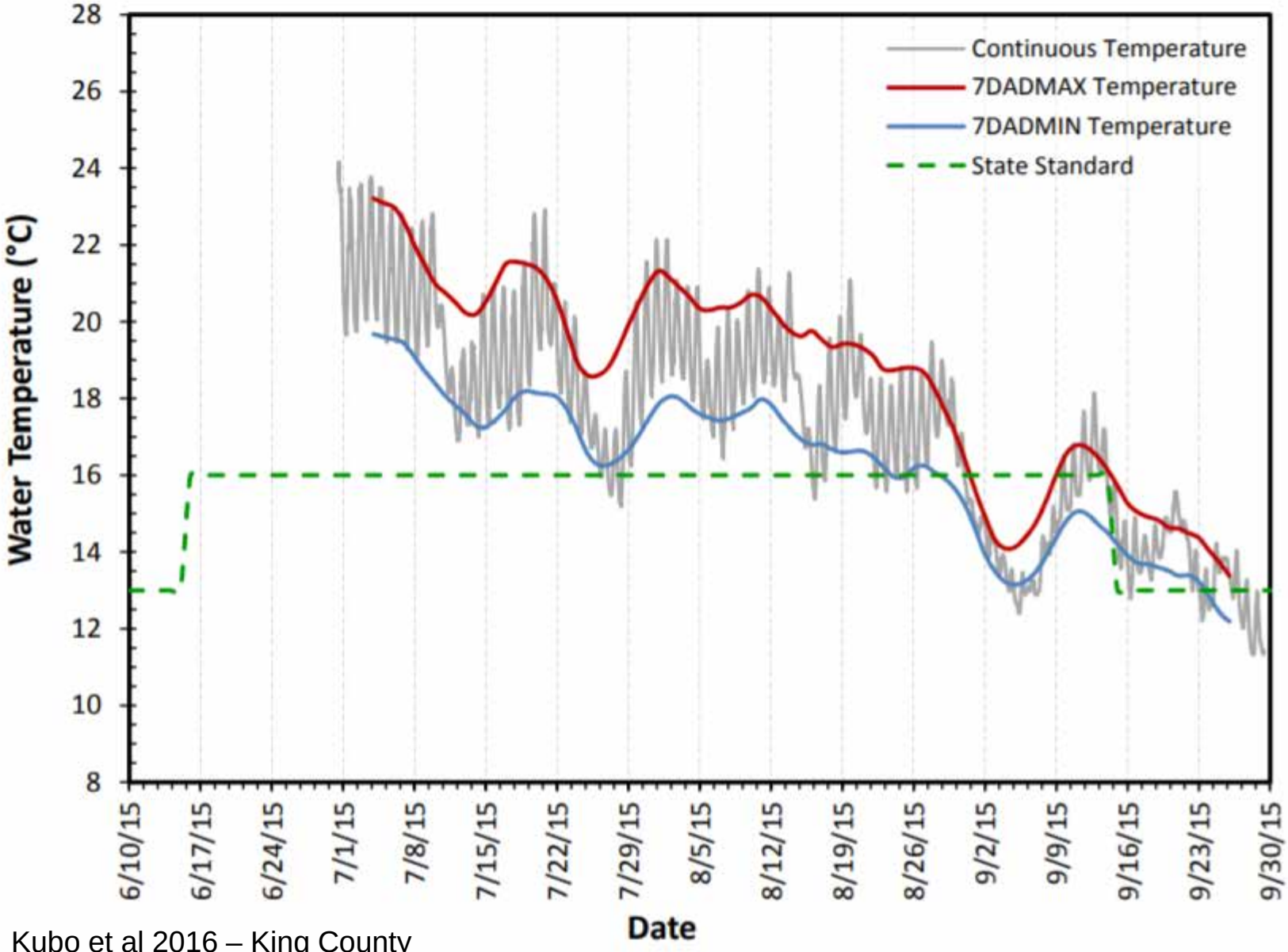
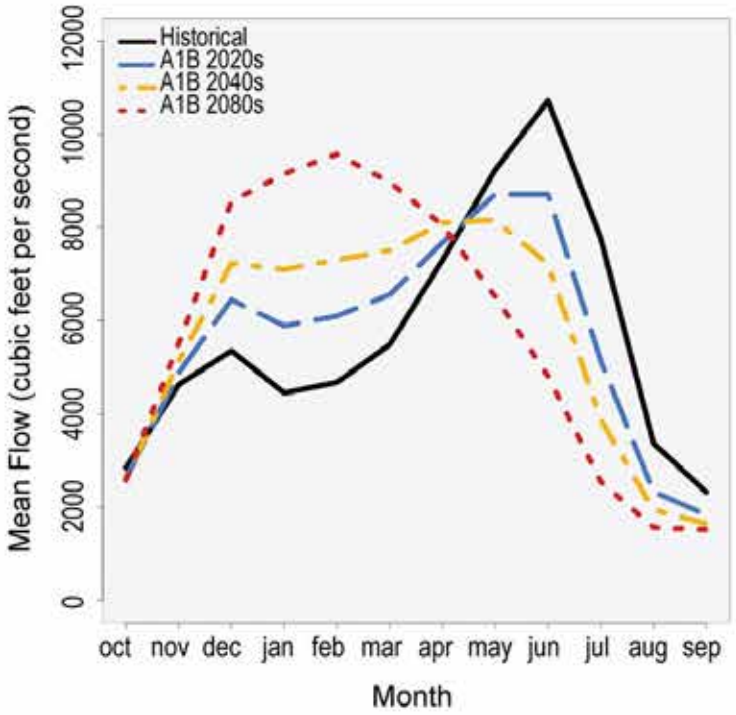
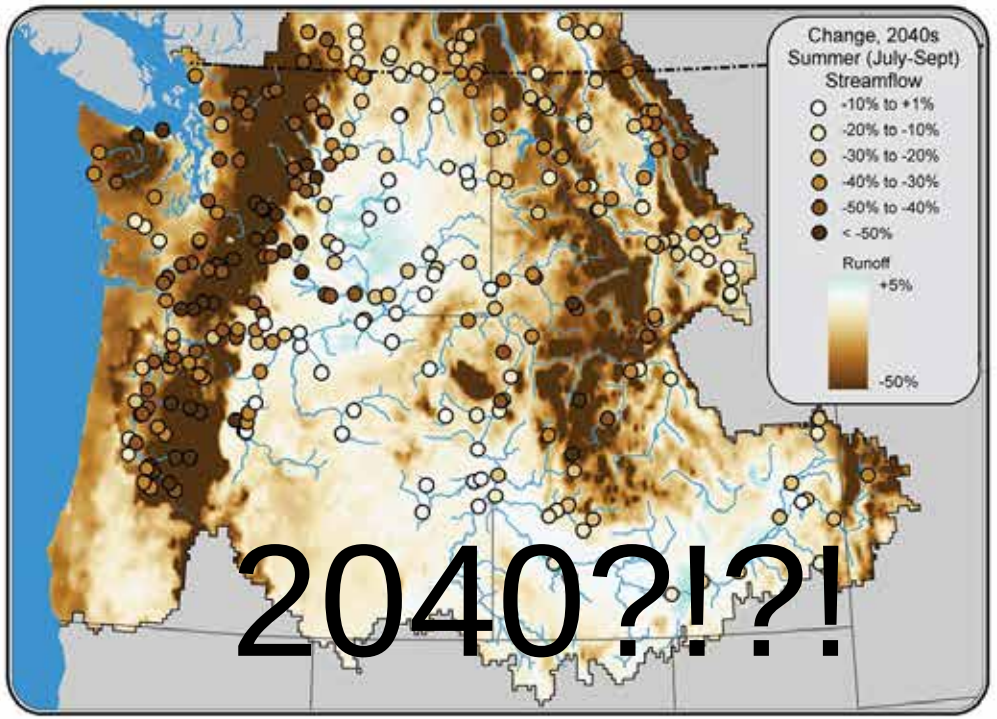


Kubo et al 2016 – King County

Future Shift in Timing of Stream Flows



Reduced Summer Flows



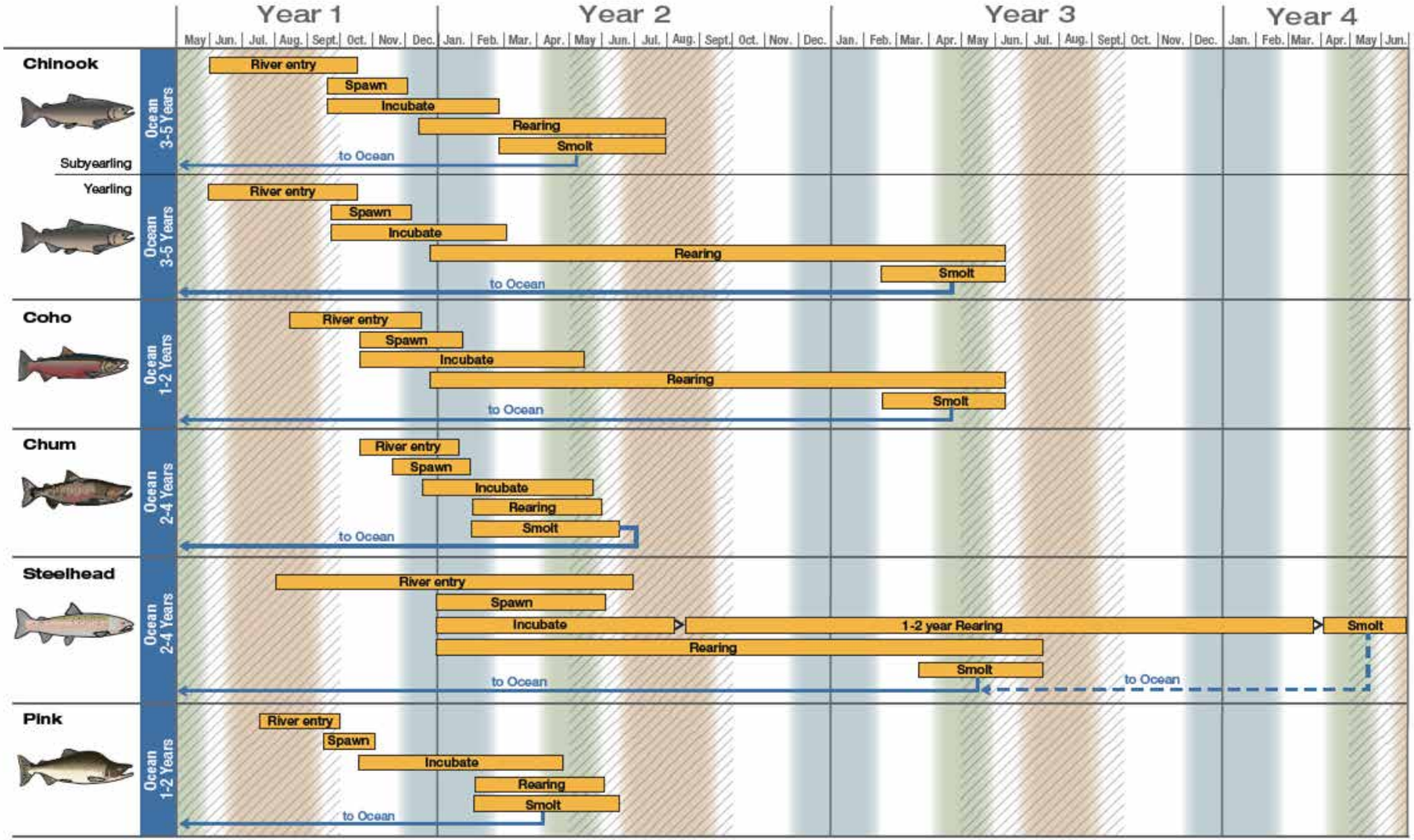
2040?!?!

Kubo et al 2016 – King County

Climate Change Impacts on Snohomish Basin Salmonids

Adapted from Beechie et al (2012) fish timing represents typical fish behavior

King County
Department of Natural Resources and Parks
Water and Land Resources Division
Rural and Regional Services Section



Increased summer temperature may decrease growth or kill juvenile salmon where temperatures are already high and block/delay migration. May also decrease spawning fecundity (e.g. Chinook).

Decreased summer low flow may contribute to increased temperature, decrease rearing habitat capacity for juvenile salmonids, and decrease access to or availability of spawning areas.

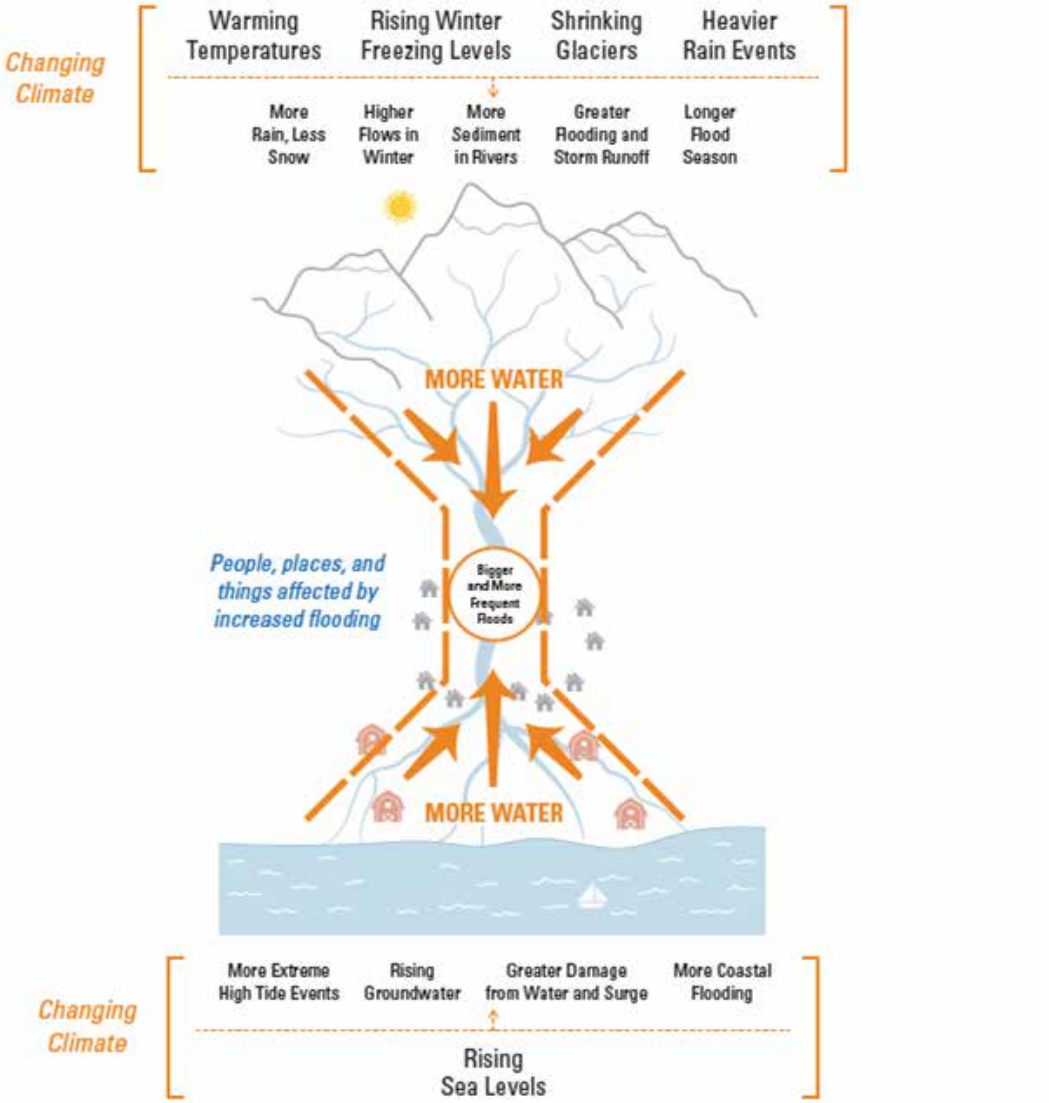
Increased winter floods may increase scour of eggs, or increase mortality of rearing juveniles where flood refugia are not available, displace juveniles to less desirable habitats.

Loss of spring snowmelt may decrease or eliminate spawning opportunities for steelhead, may alter survival of eggs or emergent fry for other salmonid species, cause early dewatering of off channel and side channel habitats, and reduce connectivity to the floodplain.

1701_8214L_W7_fish_ClimateImpacts.ai

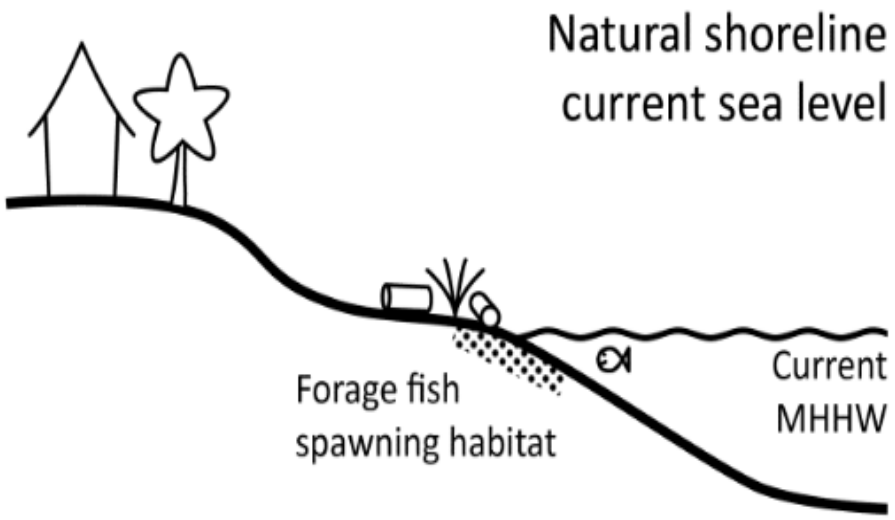
Moving downstream

Climate Change: Combining Forces



Source: Skagit Climate Science Consortium, www.skagitclimatescience.org

The Coastal Squeeze



SNOHOMISH BASIN PROTECTION PLAN

December 2015

Prepared by

Snohomish County Surface Water Management

King County Snoqualmie Watershed Forum Staff

Tulalip Tribes Natural Resources Department


Now
Later


Now
Later

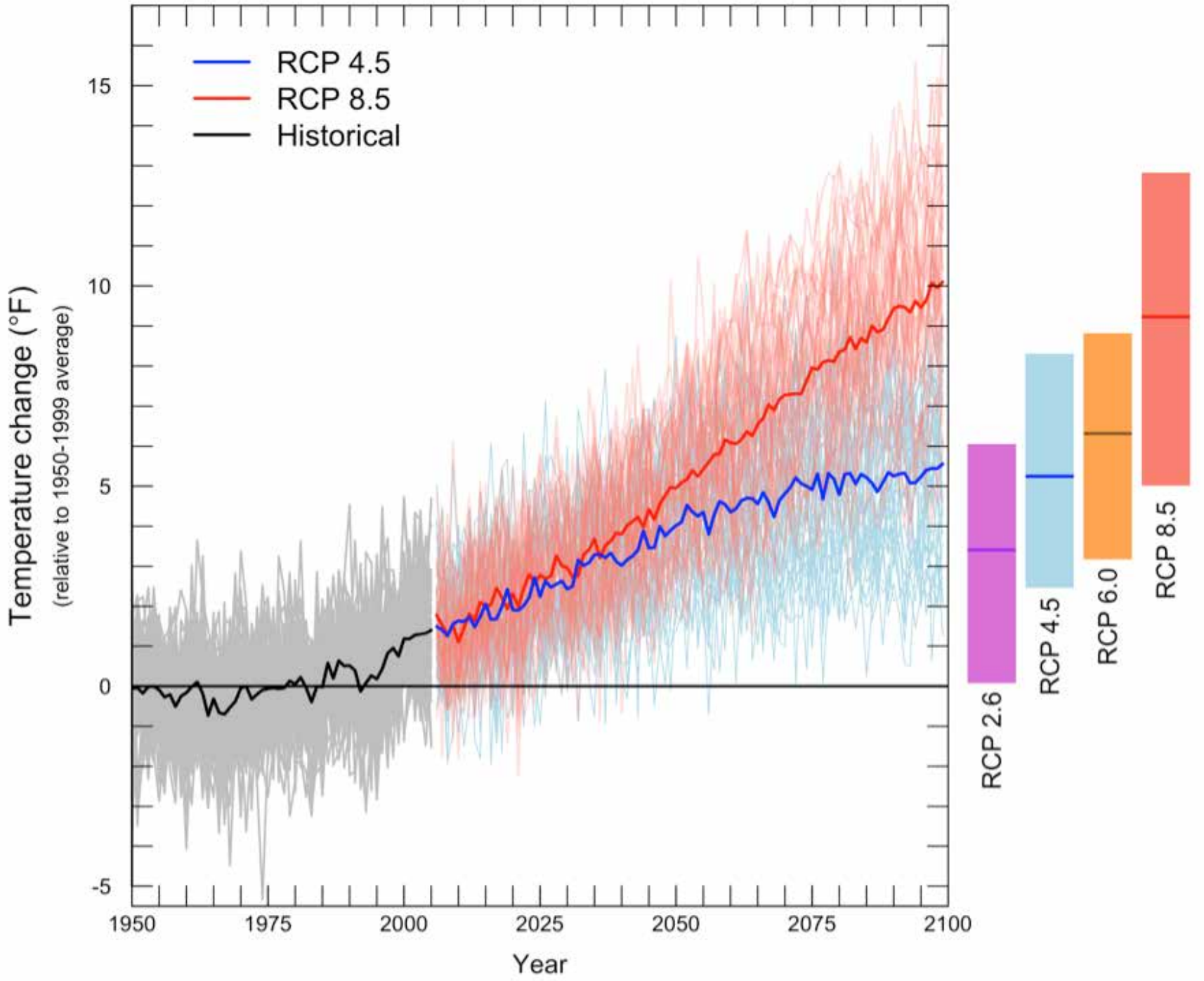

KOMATSU
KOMATSU


Stewardship
FOREST


cluster housing
Open space urban subdivision
bioswales
bioretention
areas
vegetation
retention
bioswales
open
space
narrow streets

PSAT, 2005

NOAA photo by Adam Obaza


RCP 4.5
RCP 8.5
Historical
Temperature change (°F)
(relative to 1950-1999 average)
15
10
5
0
-5
1950
1975
2000
2025
2050
2075
2100
Year
RCP 2.6
RCP 4.5
RCP 6.0
RCP 8.5


CHOOSE
to be optimistic,
it feels better.
~the Dalai Lama

Acknowledgements

- Jessica Engel – King County Department of Natural Resources and Parks
- Polly Freeman – Snoqualmie Watershed Forum Outreach Coordinator
- Kollin Higgins – King County Water and Land Resources
- Denise Krownbell – Seattle City Light
- Derek Marks – Tulalip Tribes
- Josh Meidav – City of Seattle
- Kurt Nelson – Tulalip Tribes
- Crystal Raymond – Seattle City Light
- Morgan Ruff – Tulalip Tribes
- Mike Rustay – Snohomish County Surface Water Management
- Brett Shattuck – Tulalip Tribes
- Jim Simmonds – King County Water and Land Resources
- Beth LeDoux – King County – Snoqualmie Forum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