



Western Washington University
Western CEDAR

Salish Sea Ecosystem Conference

2014 Salish Sea Ecosystem Conference
(Seattle, Wash.)

May 2nd, 10:30 AM - 12:00 PM

City of Anacortes Water Treatment Plant Climate Change Mitigation

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City of Anacortes Public Works

"Essential Services for our Community"



CITY OF ANACORTES

WATER TREATMENT PLANT

Climate Change Mitigation





Largest single source of potable water in Skagit County and Island County

•29 million gallons a day

Approximately 56,000 customers

Major customers :

Shell and Tesoro Refineries

City of Oak Harbor

NAS Whidbey

Town of LaConner

Shelter Bay Community

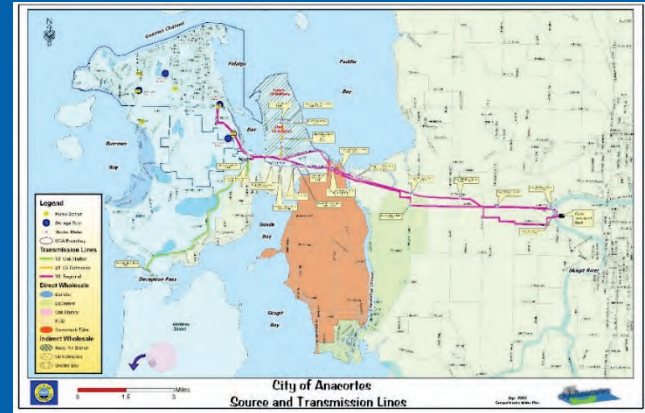
Skagit PUD

Swinomish Tribal Nation

March Point complex

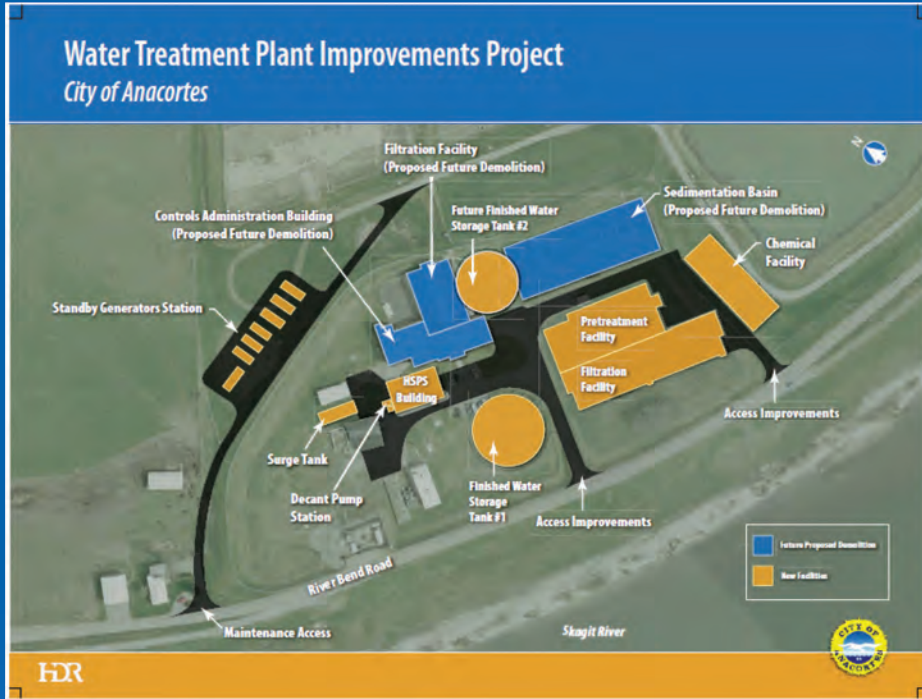
Anacortes

Del Mar Water Association, The Pointe

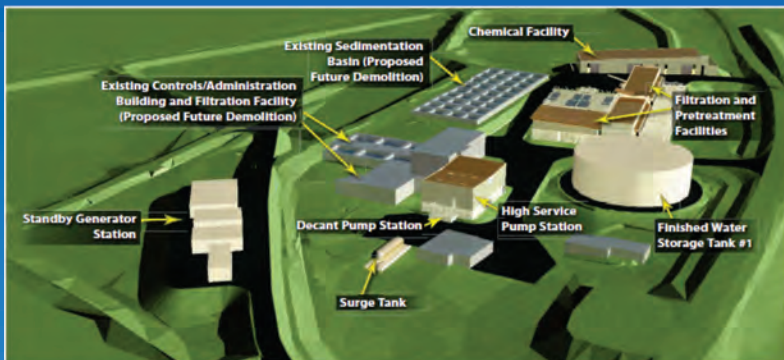




New Water Treatment Plant



- **\$ 56 million construction contract**
- **2 ½ year project**
- **Completed in March 2013**
- **2007 -2009 Project scoping**
- **2009 -2010 Design**
- **2010 -2013 Construction**





City of Anacortes Public Works

"Essential Services for our Community"



Eric Grossman PhD
Dr. Tarang Khangaonkar
Dr. Alan Hamlet
Larry Wasserman Swinomish Tribe
Carol Macilroy

The Skagit Climate Science Consortium is a group of research scientists from universities and federal, municipal, and tribal governments and agencies working in the Skagit Basin. SC² seeks to understand how the landscape, plants, animals and people may be affected by changes in the patterns of rain, snow, temperature, storms and tides.

Our vision is to reduce the vulnerability of human communities and ecosystems in the Skagit River basin to the impacts of a changing climate.



SKAGIT RIVER PREDICTIONS

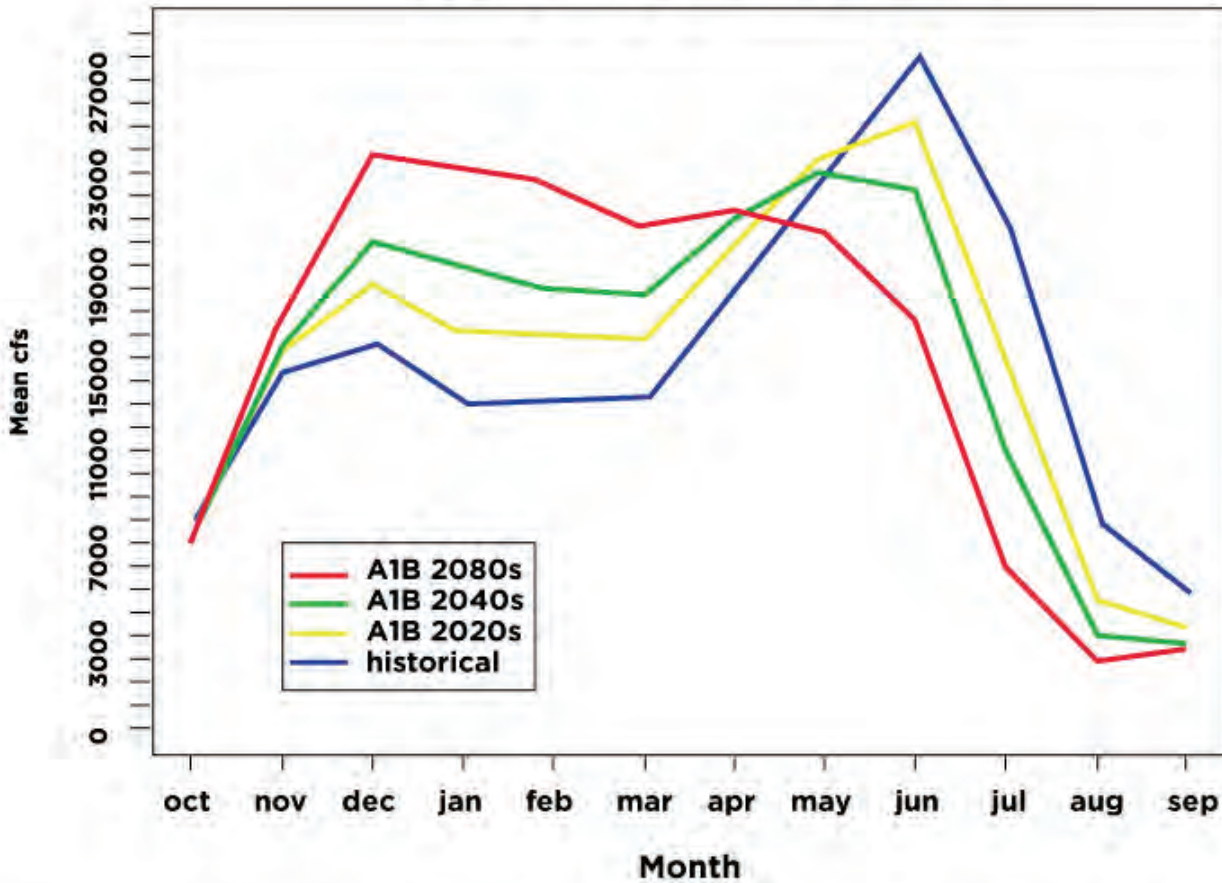
- ***REDUCTIONS IN SNOWFALL ARE EXPECTED DUE TO HIGHER TEMPERATURES (THE PRECIPITATION WILL FALL AS RAIN), NO CHANGE IN THE AMOUNT OF PRECIPITATION IS EXPECTED.***
 - ***ANNUAL FLOWS WILL PROBABLY STAY ABOUT THE SAME OR MAY EVEN INCREASE SLIGHTLY ON AVERAGE. BY THE 2080S, PEAK MONTHLY RIVER FLOW IS PROJECTED TO SHIFT FROM JUNE TO DECEMBER IN THE LOWER BASIN,***





Flood Interval

Mean Monthly Flow Skagit River at Mount Vernon



Hydrographs of projected monthly streamflows on the Skagit River at Mt. Vernon (starting in October). The lines represent simulations for the historical (blue), the 2020s (yellow), the 2040s (green) and the 2080s (red).





Skagit River Flooding





Flooding Issues





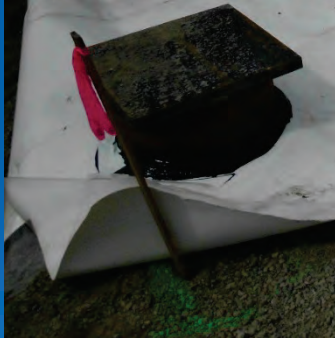
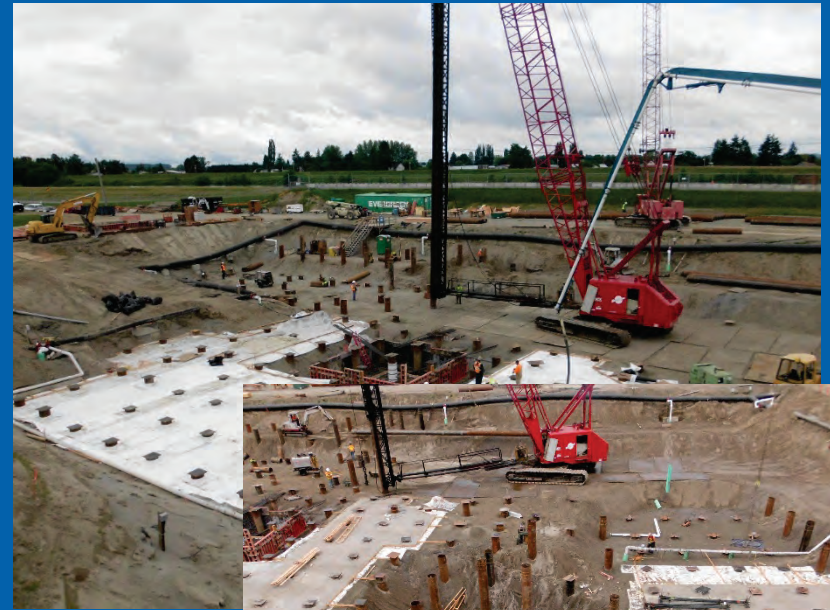
Flood protection

Climate change will increase the flood interval

- Existing measures
 - Ring dikes and dewater pump system
 - Significant sand bag effort, volunteers and Navy personnel
- New Design Elements
 - Elevated structures
 - Water tight construction
 - Water proof membrane below 40 foot elevation
 - No/minimal penetrations below 100 flood elevation
 - Electrical switch gear located above 100 year flood level



Waterproof Membrane



11/09/2011



Elevated Switch Gear

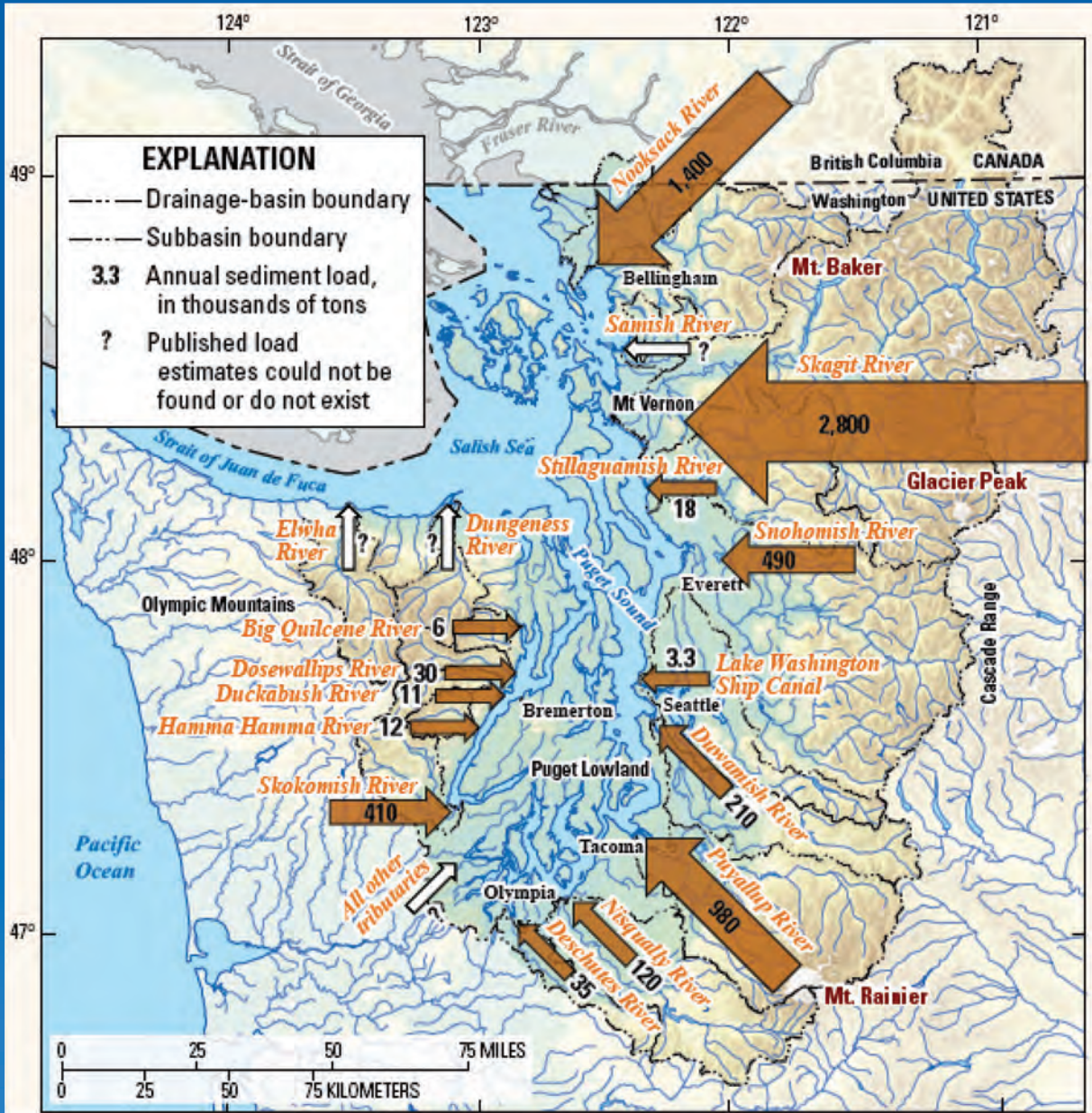


Watertight Construction





Sediment Load



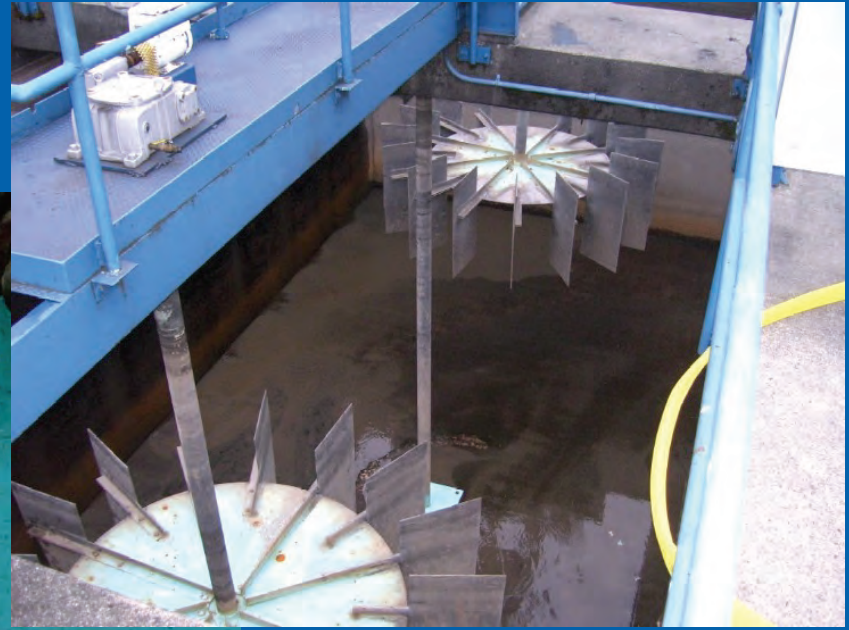


Sediment Load





Sediment Load





Sediment Load



**We remove more than
20,000 cubic yards of
river sediment every
year.**



Skagit River Sediment Load

Increase in sediment load is expected

- Existing treatment
 - Gravity based traditional sediment removal basin
- New treatment plant design elements
 - Specified a ballasted sand sediment removal system
 - Krueger "ACTI FLOW" system
- Constructed a dual train redundant sediment removal process



City of Anacortes Public Works

"Essential Services for our Community"



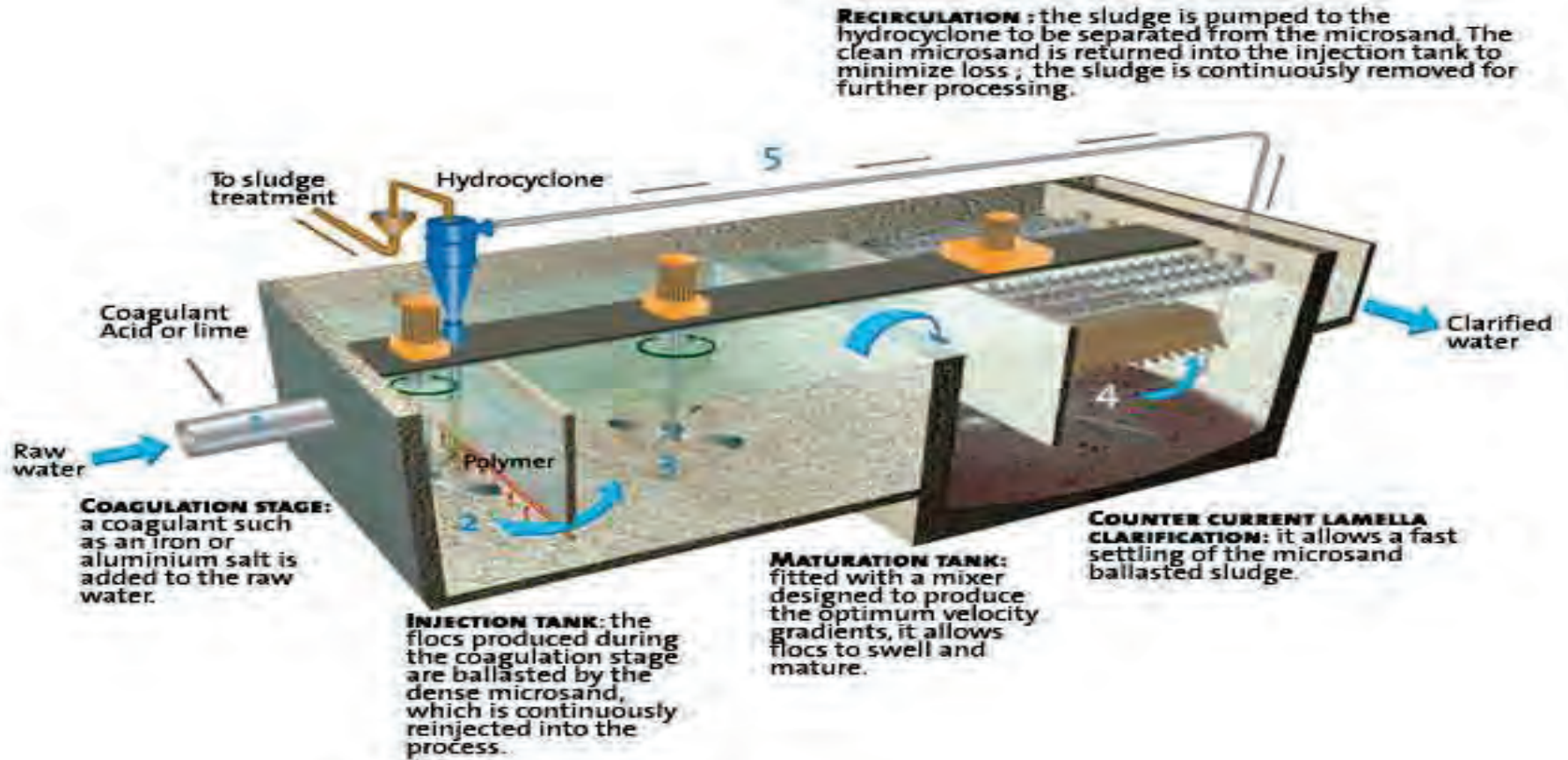
New
sedimentation
process

Old Sed.
Basin





Krueger "ACTI FLOW" system





City of Anacortes Public Works

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0.02
NTU



2000
NTU





Future issues

Sediment load composition

- We would like to have a better understand of the anticipated composition of the sediment.
 - Silt Sand Clay



Future issues

Salinity

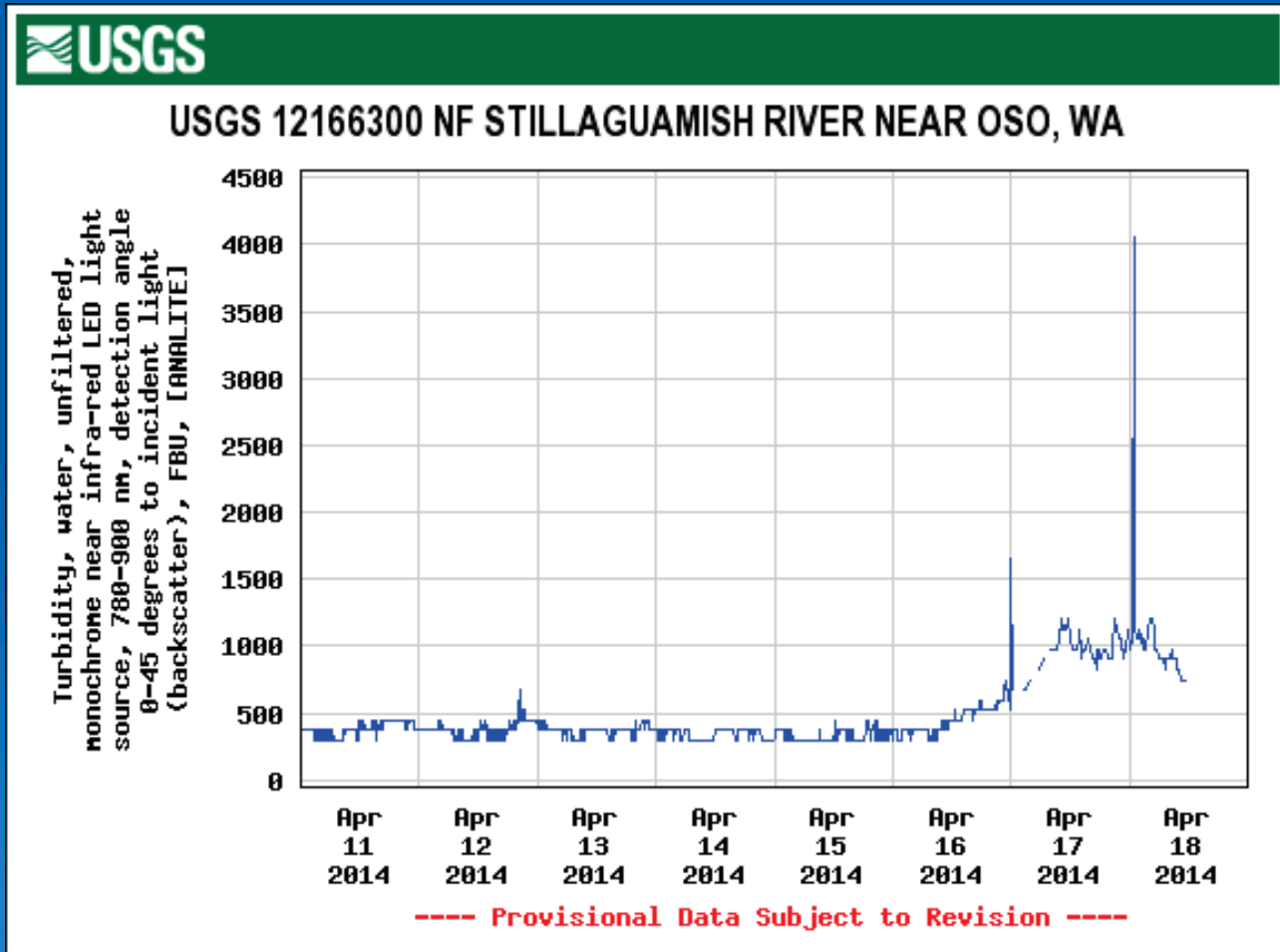
- Currently tidal influence on the Skagit River reaches upstream to Mount Vernon, near Blade Chevrolet.
- With combined pressures of sea level rise and predicted lower summer flows we were concerned about a salt water wedge reaching our raw water intake at some point in the future.

Dr. Tarang Khangaonkar recently completed preliminary modelling that indicates this is not an immediate concern.



Recent Experience

The recent landslide event on the Stillaguamish River
Resulting in increased turbidity for extended time
period





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Water Treatment Plant Completed March 2013

