Protection of Downstream Water Quality Standards in Washington

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2023 National Training Workshop on Water Quality Data Assessment & Plans

6/23/2023

Water Quality Standards Foundation

40 CFR 131.10(b)

"In designating uses of a water body and the appropriate criteria for those uses, the State shall take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters."

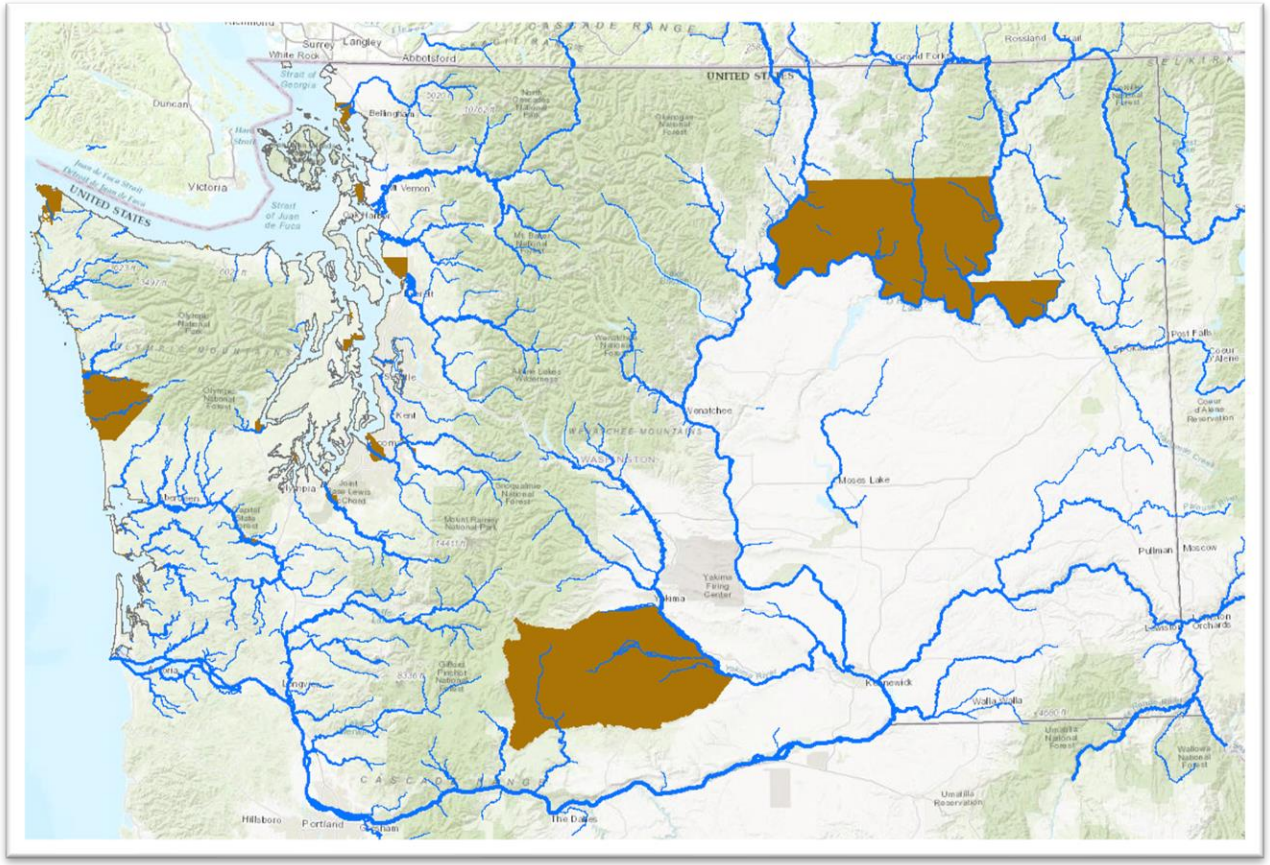
Water Quality Standards Foundation

WAC 173-201A-260(3)(b)

"Upstream actions must be conducted in manners that meet downstream water body criteria…the criteria associated with the most upstream uses designated for a water body are to be applied to headwaters to protect nonfish aquatic species and the designated downstream uses."

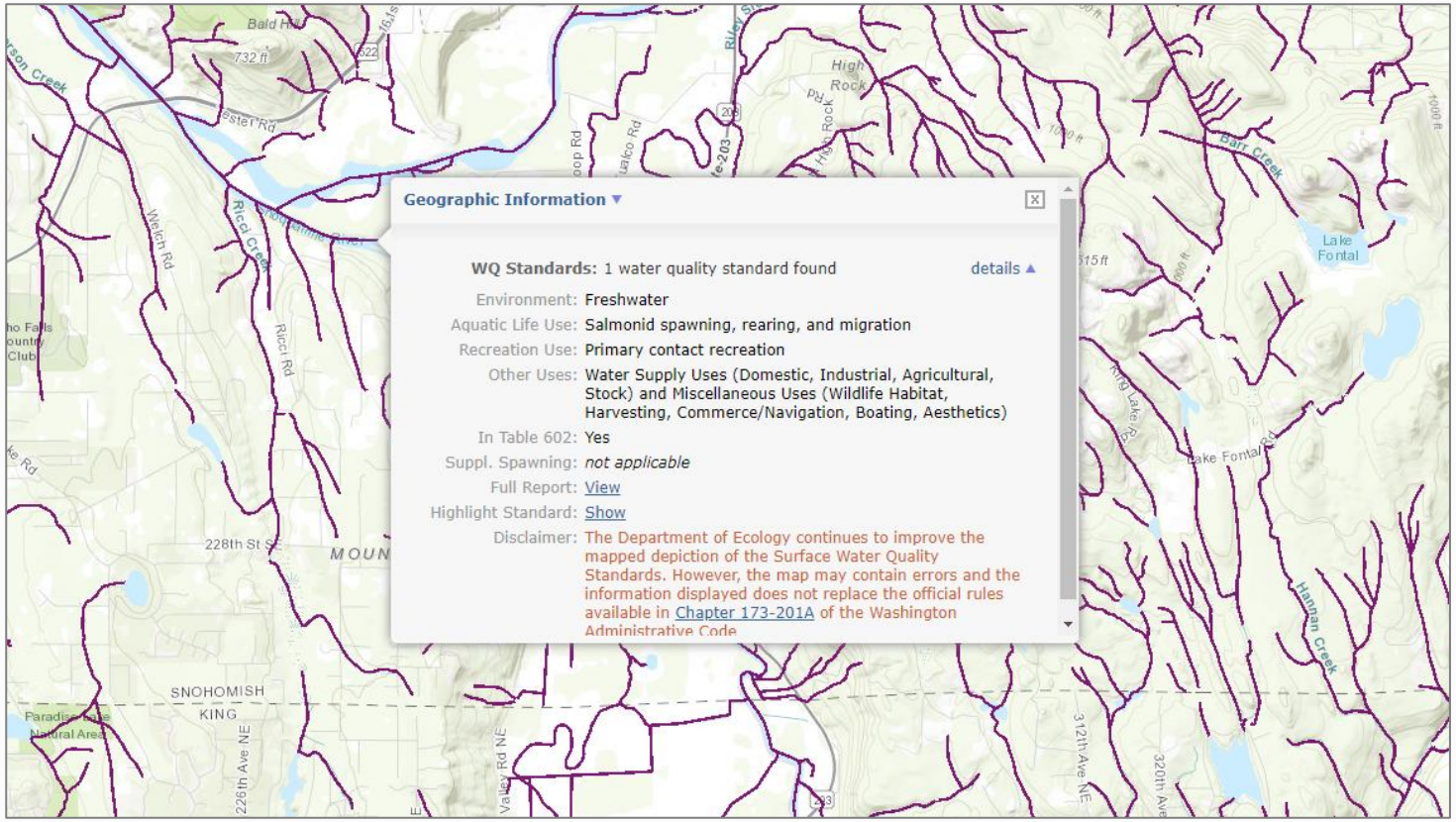
Downstream Protection Examples

- More stringent criteria downstream
- Downstream shellfish harvesting uses

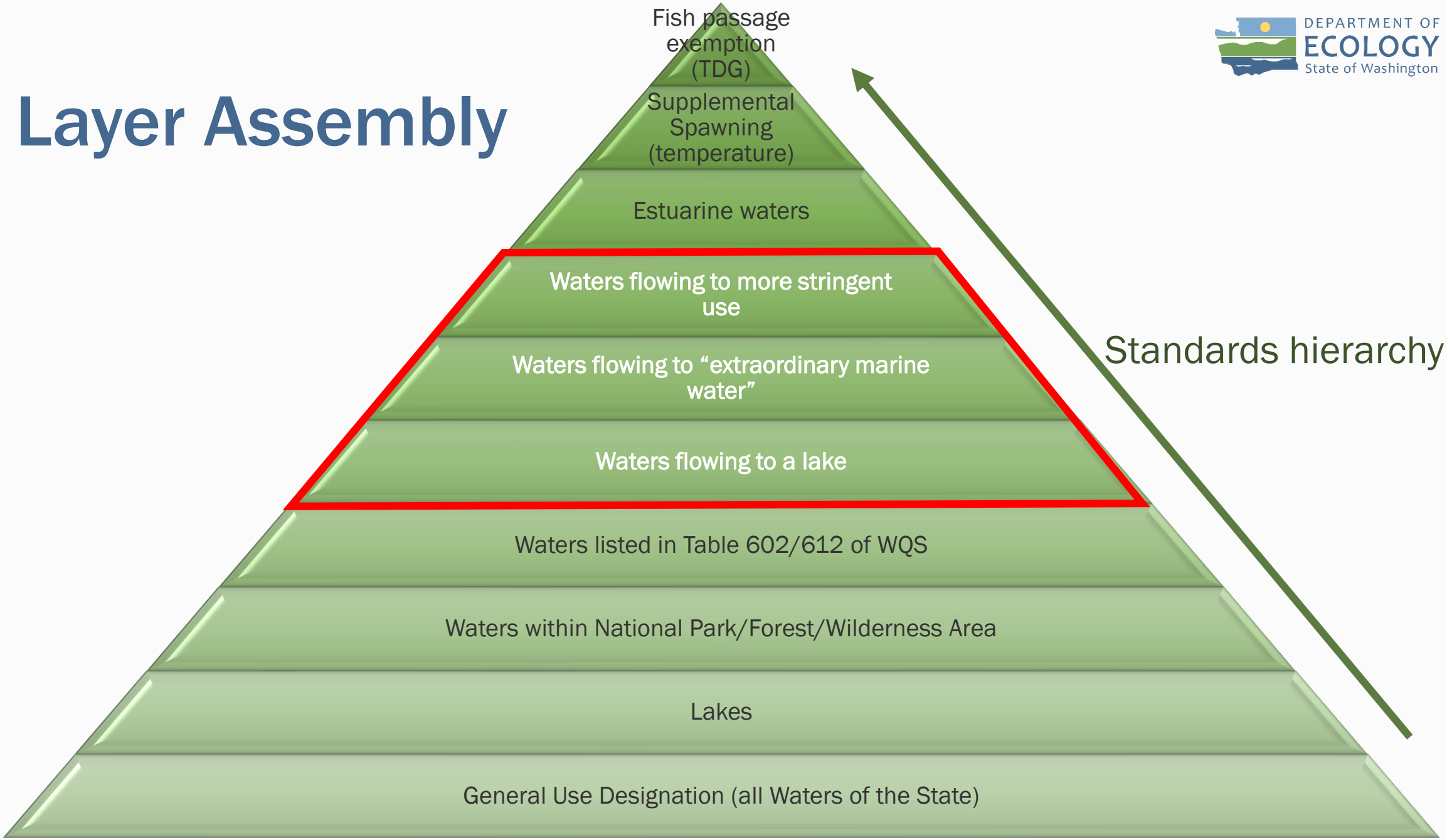


Water Quality Standards GIS Layer

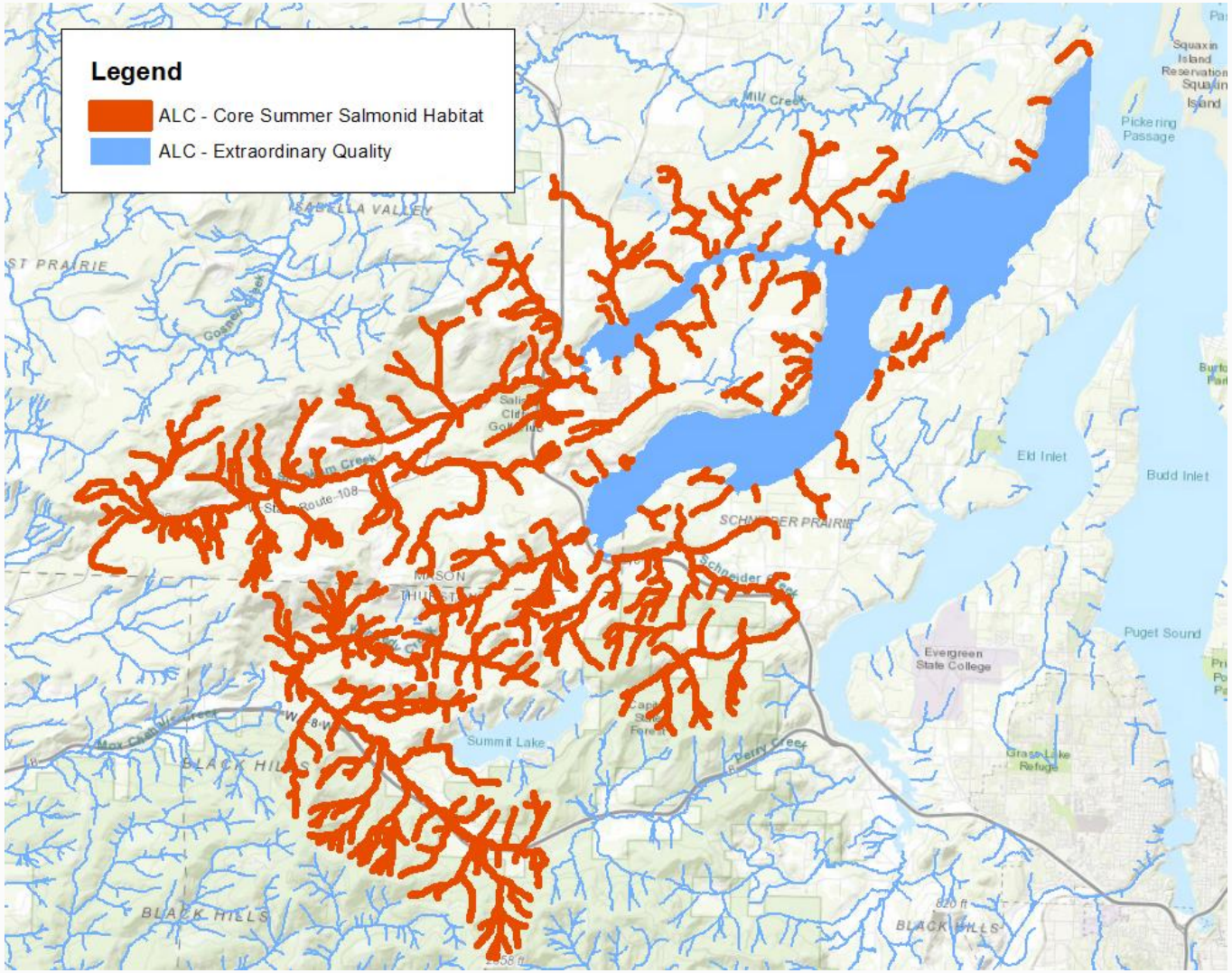
Defines what designated uses, use sub-categories, criteria apply to all Waters of the State



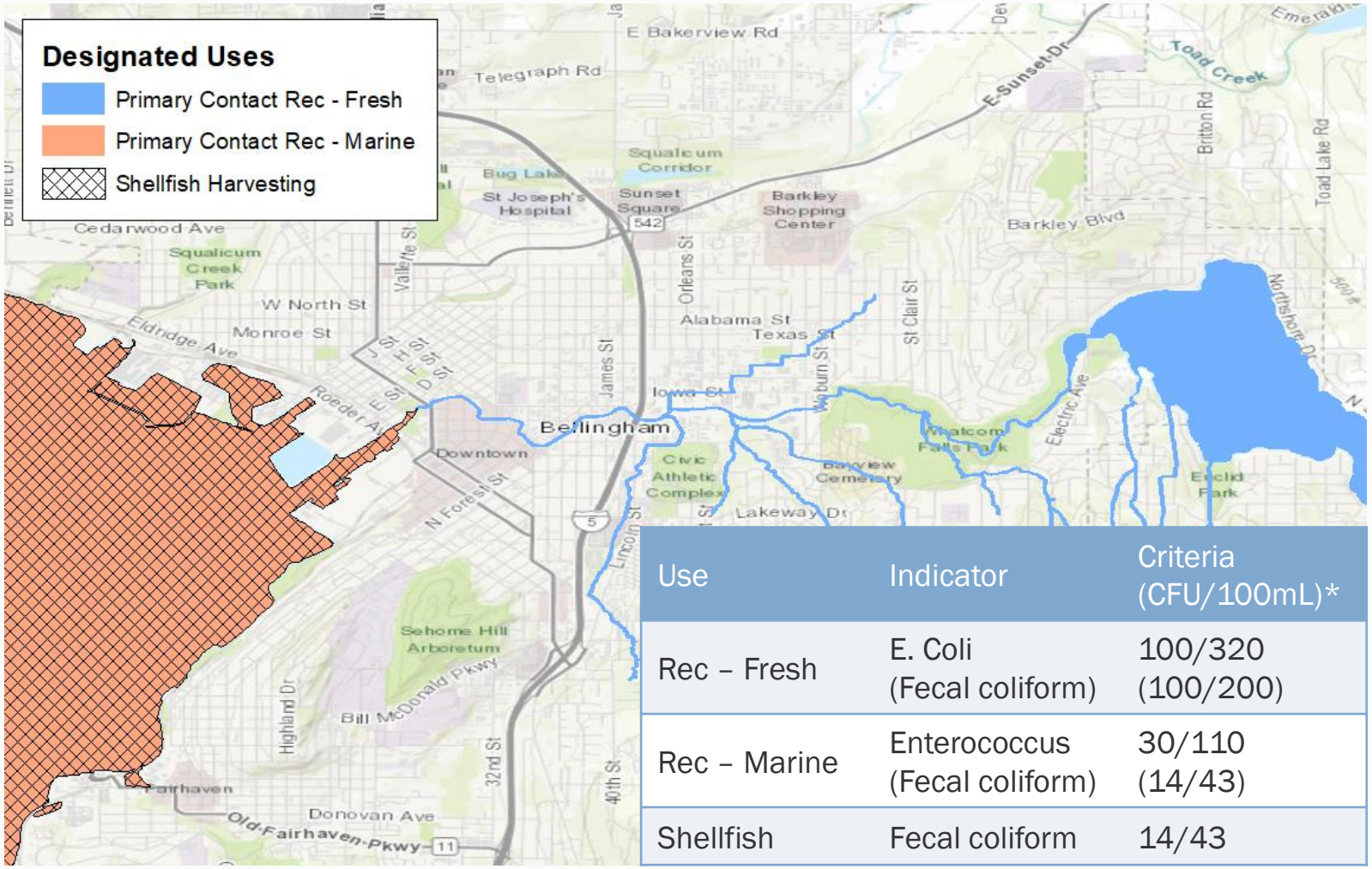
Layer Assembly



More Stringent Criteria Downstream



Related Indicators/Different Uses



Use	Indicator	Criteria (CFU/100mL)*
Rec – Fresh	E. Coli (Fecal coliform)	100/320 (100/200)
Rec – Marine	Enterococcus (Fecal coliform)	30/110 (14/43)
Shellfish	Fecal coliform	14/43

*geometric mean/90th percentile criteria

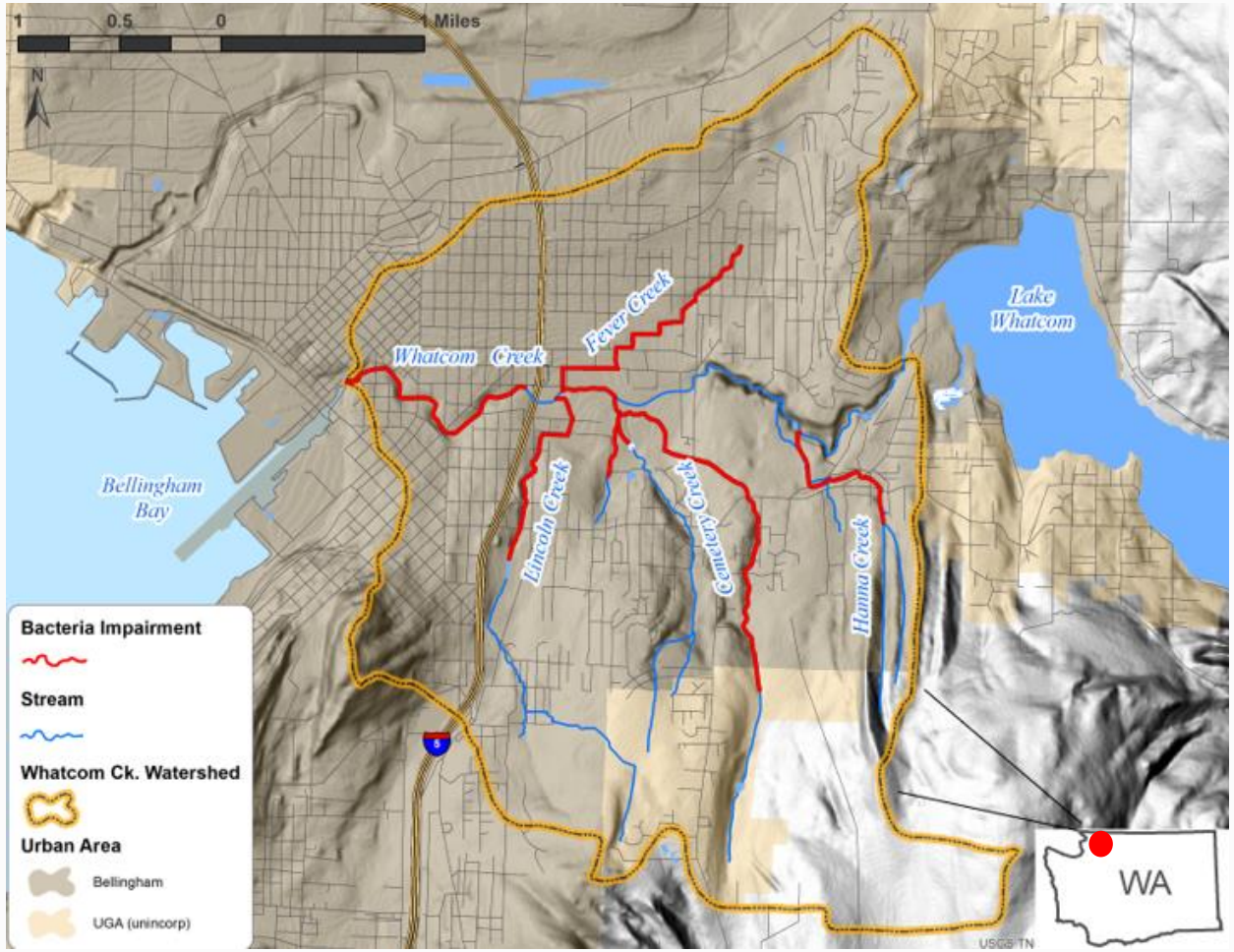
Whatcom Creek

303(d) list since 1996

- Contact recreation – fecal coliform

Downstream uses

- Contact recreation – marine
- Shellfish harvesting



Kardouni, 2023 (draft)

Establishing Targets to Attain Downstream Uses

Primary Contact Recreation – Marine Waters

- *E. coli* – all freshwater impairments

Shellfish Harvesting Use

- Fecal coliform – mouth Whatcom Creek
- Options for FC target reductions @ mouth:
  - Use shellfish numeric criteria
  - Monte Carlo simulation
  - **Statistical rollback analysis**

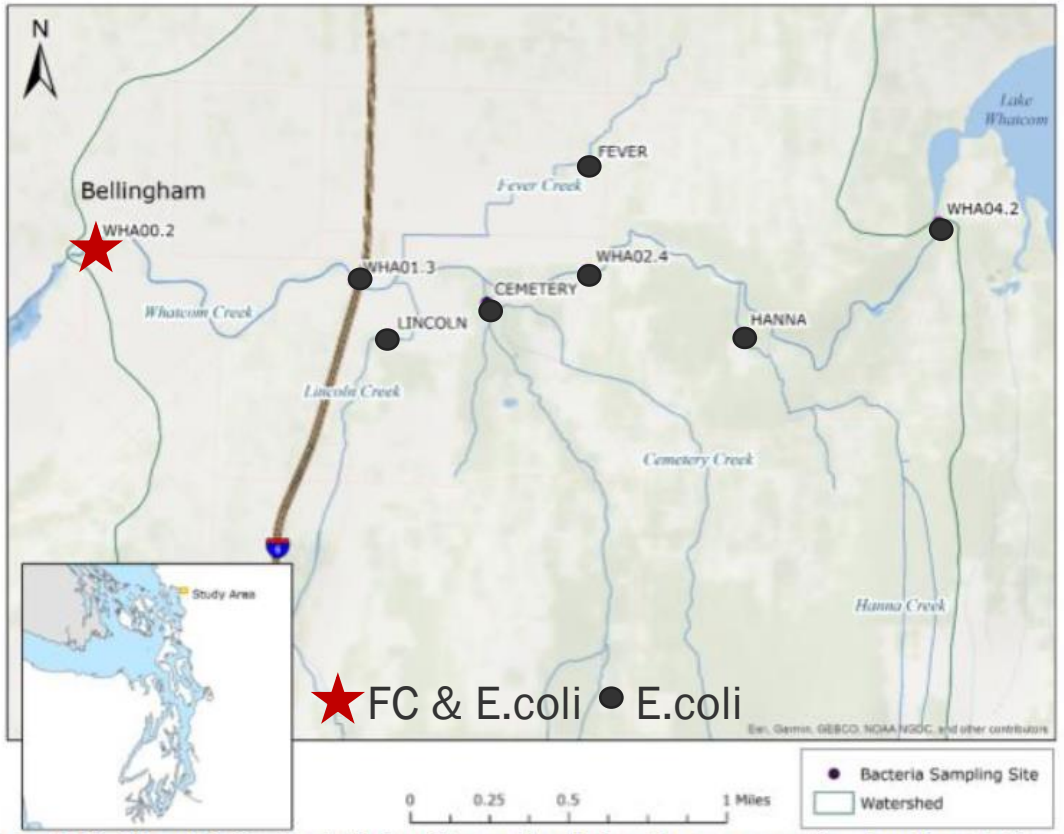


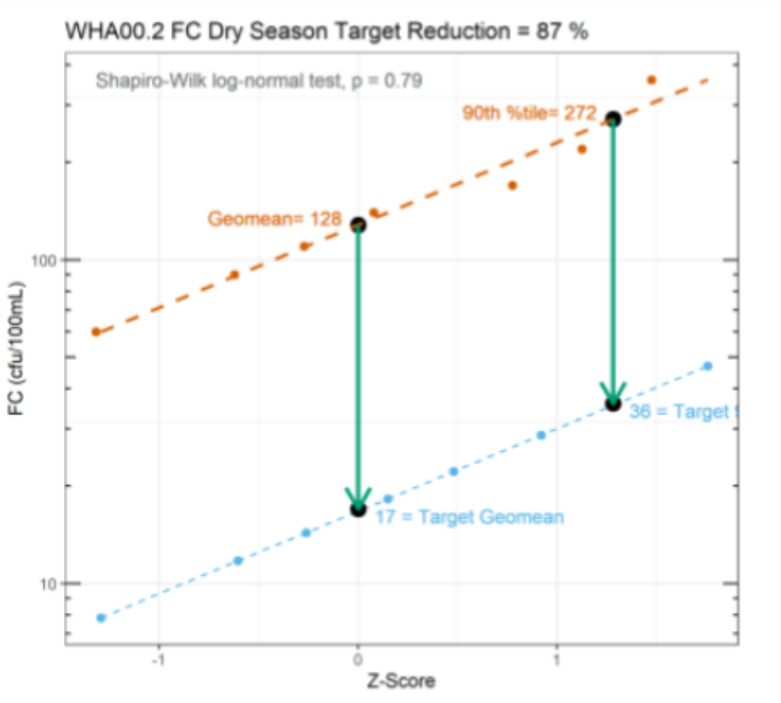
Figure A-13. City of Bellingham's Urban Stream Monitoring Program sampling locations in the Whatcom Creek watershed — data source: Shannahan et al. 2004

Roll-back Analysis for fecal coliform

1. Calculate GM and 90th percentile (STV) monitoring data
2. Calculate target GM and 90th percentile
3. Calculate difference between target and monitoring values
4. “Roll-back” distribution to meet more stringent target

$$Target_{GM} = \frac{WQS_{GM} - (Salinity_{MW} \times FC_{GM})}{Salinity_{FW}} \quad (17)$$

$$Target_{STV} = \frac{WQS_{STV} - (Salinity_{MW} \times FC_{90^{th}})}{Salinity_{FW}} \quad (18)$$



End Result

E. coli & fecal coliform targets and LA/WLAs that ensure attaining uses within and downstream of watershed

Don't lose site of what really matters

- BMP implementation
- Need for ongoing program and efforts
  - Identification of sources
  - Implementation of BMPs

Table 6. FC and *E. coli* descriptive statistics, and target percent reductions and concentrations (cfu/100 mL) necessary to attain the TMDL using 2017 through 2018 data separated by season (Dry = May — Sept., Wet = Oct. — Apr.)

Site	Season (n)	Geomean	Not-to-Exceed STV	90th percentile	Target Percent Reduction	Target Geomean	Target 90th percentile
WHA00.2[FC]	Dry (9)[FC]	128	78%[B]	272	87%[B]	17[B]	36[B]
	Wet (14)[FC]	31	25%[B]	111	40%[B]	18[B]	66[B]
WHA00.2	Dry (9)	119	11%	259	18%	97	212
	Wet (14)	27	0%	103	0%	27	103
WHA01.3	Dry (9)	50	0%	135	0%	50	135
	Wet (14)	10	0%	56	0%	10	56
WHA02.4	Dry (9)	20	0%	61	0%	20	61
	Wet (14)	7	0%	14	0%	7	14
WHA04.2	Dry (9)	28	0%	51	0%	28	51
	Wet (14)	4	0%	12	0%	4	12
CEMETERY	Dry (5)	107	0%	281	8%	99	281
	Wet (14)	66	7%	334	4%	63	320
FEVER	Dry (6)	1973	100%	3904	96%	76	320
	Wet (14)	196	21%	1030	69%	61	320
HANNA	Dry (5)	118	0%	261	17%	97	320
	Wet (14)	51	14%	471*	32%*	35*	320
LINCOLN	Dry (9)	215	33%	1526	79%	45	320
	Wet (14)	106	14%	441	27%	77	320

* Dataset not normally distributed, estimate may not be accurate

[FC] Fecal coliform dataset

[B] Brackish water mixing to protect downstream shellfish harvesting designated use

(n) Sample number

STV — Statistical threshold value

Thank you

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Draft Whatcom Creek TMDL available on our webpage!