RECREATIONAL USE CRITERIA REVISIONS

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Objectives of the Webinar

1. Review requirements and recommendations of 2012 Environmental Protection Agency (EPA) recreational water quality criteria
2. Present options for revising Washington State recreational criteria
3. Discuss implementation of proposed bacterial indicators
4. Describe rule-making process

Ecology has not made any decisions on draft language

Overview

- Basics of recreational use criteria
- Explanation of bacterial indicators
- History of recreational use criteria
- WA State current recreational criteria
- EPA recommended recreational criteria
- Evaluating risk
- Rule considerations (TMDLs/permits/laboratories)
- Next steps and timeline for this rulemaking

Recreation

- **What is recreational criteria?**
  - Water quality criteria that protect people from waterborne disease while they are enjoying recreational activities such as swimming, wading, boating, and surfing in state waters
- **Different routes people come in contact with water:**
  - Primary contact: direct contact with water to the point of complete submergence (e.g. swimming)
  - Secondary contact: activities where a person's water contact would be limited (e.g. wading or fishing)

Epidemiological Studies

- **What is epidemiology?**
  - Study of causes and patterns of disease in a defined population
- **Methods used in recreational criteria studies**
  - Defining what is an illness?
  - Select bathing beaches (2 sites)
  - Hand-out surveys for illnesses in swimmers and non-swimmers at a given location
  - Monitor indicators on days swimming occurred
- **Interpreting results**
  - Examine relationship between illness and presence of indicators

Bacterial Indicators Versus Pathogens

- **Currently do not measure the number of microorganisms that make you sick but rather a representative indicator also present in fecal waste**
- **Why measure indicators?**
  - Tells us the presence of bacteria and viruses that make you sick
  - Some indicators are harmful, while others do not cause illness
  - Tells us there is some fecal contamination in the water which may contain pathogens
- **Why don't we directly measure pathogens?**
  - Too many to measure and each has different infection rate
  - Routine monitoring for every pathogen is not feasible
  - Methods of detection are not developed for all pathogens

History of Recreational Use Criteria

U.S. Public Health Service Studies (1940-50s)

- **Study location:**
  - Monitored 3 locations– lake (Lake Michigan), river (Ohio River), and estuary (Long Island Sound)
- **Key findings:**
  - Lake Michigan: significant increase in illness at 2,300 colony forming units (cfu) of total coliform compared to those who swam in waters with 43 cfu of total coliform
  - Ohio River: significant increase in illnesses at 2,700 cfu of total coliform
- **Recommendation:**
  - 2,300 cfu/100 mL total coliform

Total Coliform to Fecal Coliform (1960s)

- **National Technical Advisory Committee recommendations:**
  - Convert total coliform bacteria criteria to fecal coliform
- **Conversion using U.S. Public Health Service study:**
  - About 18% of total coliform was found to be fecal coliform
  - 2,300 coliforms x 0.18 = 400 fecal coliforms/100 mL
  - Safety factor of 2 applied: 400/2 = 200 fecal coliforms/100 mL

EPA Epidemiological Studies (1970s)

- **Objective:**
  - Review relationship between indicators and illness from swimming events
- **Location:**
  - Marine studies (3 sites)
  - Freshwater studies (2 sites)
- **Results:**
  - Poor relationship between fecal coliform and GI illness
  - Strong relationship between E. coli & enterococcus and GI illness
- **Recommendations (1986):**
  - E. coli: 126 cfu (geometric mean)
  - Enterococcus: 33 cfu (geometric mean)

Water Type	Indicator	Correlation Coefficient
Marine	**Enterococcus**	**.96**
	E. coli	**.56**
	Klebsiella	.61
	Einterobacter/Citrobacter	.64
	Total coliform	.65
	C. perfringens	.01
	P. aeruginosa	.59
	Fecal coliforms	**.51**
	A. hydrophila	.60
	V. parahemolyticus	.42
	Staphylococci	.60
Freshwater	**Enterococcus**	**.74**
	E. coli	**.80**
	Fecal coliforms	**-.08**

EPA Epidemiological Studies (2000s)

- **Focus:**
  - Identify single freshwater and marine indicator
  - Reaffirm previous epidemiological results from 1970s
- **Changes in methods:**
  - Definition of GI illness was broadened & removed requirement of fever
  - Extended number of days assessed following a swim event (incubation time)
  - Studied 7 beaches in marine and temperate freshwaters
- **Results**:
  - Strong association between GI illness and enterococcus
  - Enterococcus functioned as both a marine and freshwater indicator

States' History

- Ecology assembled a technical workgroup in 1996 and proposed E.coli and enterococcus criteria in 2003
- **Ultimately, WA did <u>not</u> adopt these into rule due to:**
  - Concerns over the lack of epidemiological information
  - Lack of support from several key stakeholders
  - Concerns over protection of shellfish harvesting areas
  - Concerns over less stringent standards
  - Loss of continuous record of fecal coliform
  - Higher cost of new sampling methods
  - Draft economic analysis concluded higher costs due to increased illnesses
- Most states (38+) have moved from fecal coliform to E.coli and/or enterococcus

Why Now?

- 2012 EPA recreational criteria requirements
- EPA BEACH grant includes a clause requiring states to update their water quality standards
- Ecology's Agreement with EPA includes adopting new bacterial indicators
- Increased interest to update criteria

What are WA current recreational criteria and what are we proposing to change?

Current Recreational Criteria

FRESH WATER (Fecal Coliform):

Extraordinary Primary Contact	50/100 ml
Primary Contact	100/100 ml
Secondary Contact	200/100 ml

MARINE WATER (Fecal Coliform & Enterococcus):

Primary Contact (fecal)	14/100 ml
Secondary Contact (enterococcus)	70/100 ml

SHELLFISH CONSUMPTION (Fecal Coliform)

Shellfish Harvesting	14/100 ml

Not Recreational Criteria!

EPA Recommendations:

Criteria Elements	Estimated Illness Rate (NGI): 36 per 1,000 primary contact recreators			Estimated Illness Rate (NGI): 32 per 1,000 primary contact recreators	
	Magnitude			Magnitude	
Indicator	GM (cfu/100 mL)[a]	STV (cfu/100 mL)[a]	OR	GM (cfu/100 mL)[a]	STV (cfu/100 mL)[a]
Enterococci – marine and fresh	35	130		30	110
OR					
E. coli – fresh	126	410		100	320
Duration and Frequency: The waterbody GM should not be greater than the selected GM magnitude in any 30-day interval. There should not be greater than a ten percent excursion frequency of the selected STV magnitude in the same 30-day interval.					

[a] EPA recommends using EPA Method 1600 (U.S. EPA, 2002a) to measure culturable enterococci, or another equivalent method that measures culturable enterococci and using EPA Method 1603 (U.S. EPA, 2002b) to measure culturable *E. coli*, or any other equivalent method that measures culturable *E. coli*.

These options will be used as a starting point for discussing what is best for Washington State

Evaluating Risk

- **Setting a numerical limit suggests an acceptable level of risk**
  - Background level of bacteria, viruses, and microorganisms
  - Some strains of bacteria are harmful while most are not (e.g. E. coli)
  - People contract GI illnesses through various routes
    - Food, drinking water, infected animals
  - 32/36 GI illness rate per 1000 is equivalent to previous fecal coliform recommendations (definition of illness more protective)
- **Difficult to precisely predict illness from swimming**
  - Waters vary on a site-specific and daily basis
  - Individual resistance to illness
  - Don't directly measure pathogens
  - Self-diagnose illnesses

Why not Fecal Coliform?

- U.S. EPA will not approve revised standards based on fecal coliform
- Does not consistently correlate with illnesses
- Not specific to warm-blooded animals
- Klebsiella is counted and thus could overestimate health risks
- Survival in environment does not mimic viruses that cause disease

Proposed Indicators

- **E. coli**
  - Strong correlation with illness in freshwater
  - Analytical methods and testing costs are comparable to fecal coliform
  - Relationships are established between E. coli and fecal coliform
  - Highly specific to fecal sources and does not count Klebsiella
  - Meets EPA recommendations
  - Effective indicators of sanitation
- **Enterococcus**
  - Excellent indicator of sanitary quality of fresh and marine waters
  - Survival in the environment similar to pathogens of concern
  - Better simulates viral pathogens in regards to chlorine resistance
  - Meets EPA recommendations

What is not Changing?
Marine Shellfish Harvesting

- **Fecal coliform will remain the indicator regardless of state actions**
  - Based on Federal Drug Administration's National Shellfish Sanitation Program
  - Criteria of fecal coliform: *GM: 14 cfu/100 mL; STV: 43 cfu/100 mL*

- **Shellfish criteria applies to majority of WA marine waters**
  - Marine recreational use criteria based on the shellfish fecal coliform criterion (i.e. two uses, one criteria)
  - New recreational indicator forces a separation of recreational and shellfish harvesting designated uses (i.e. two uses, two set of criteria)

Current WQ Standards

FRESHWATER

Recreation

fecal coliform

Shellfish Harvesting

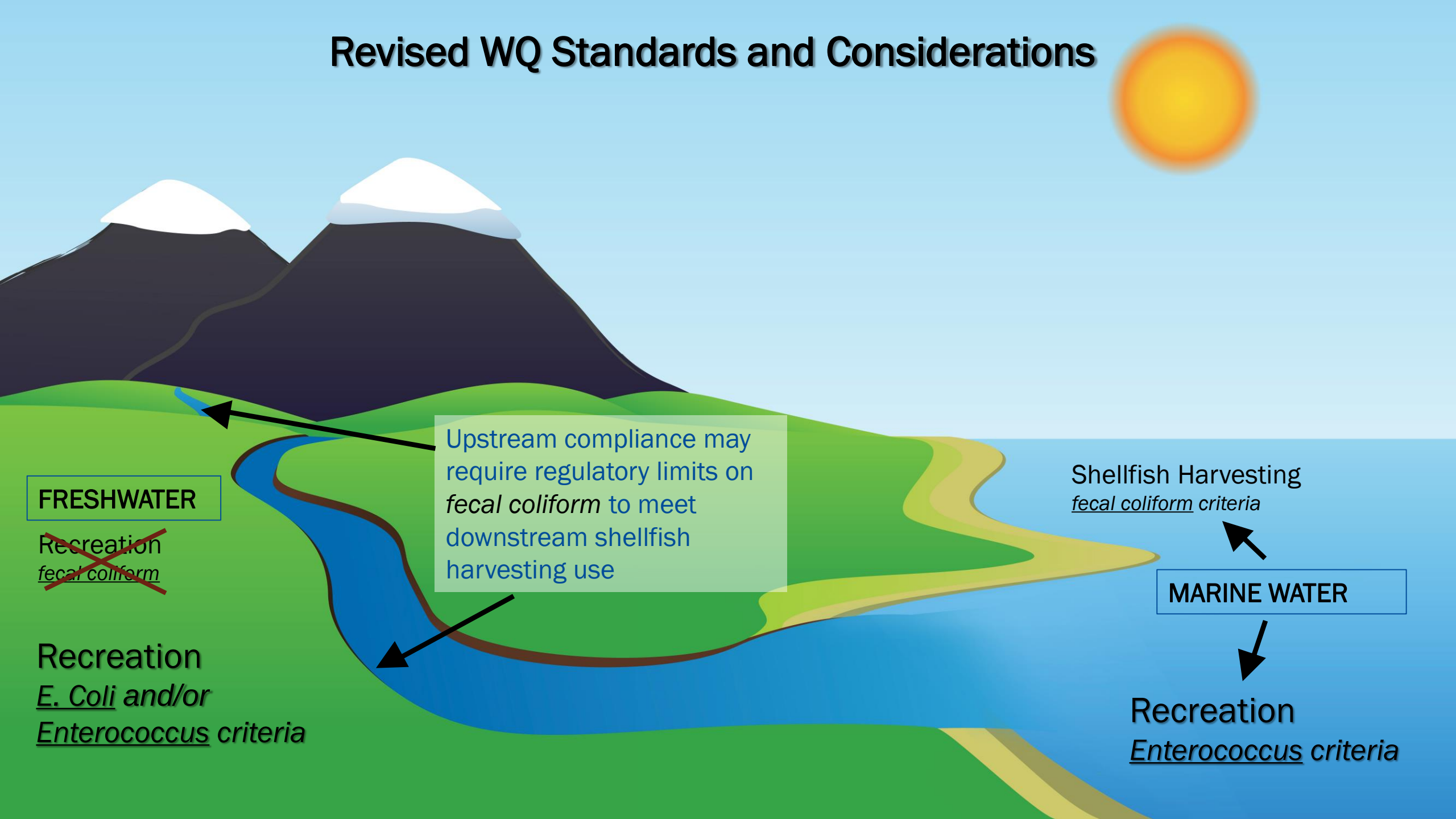
&

Recreation

fecal coliform criteria

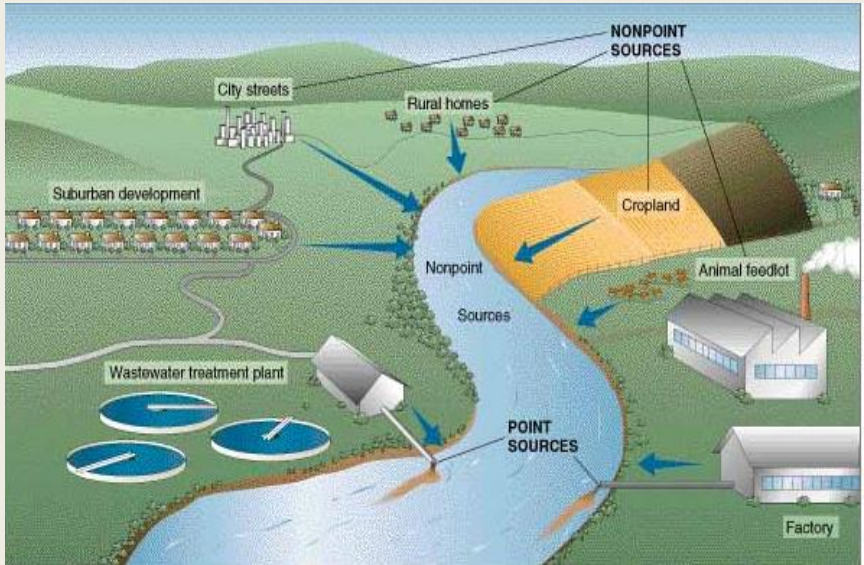
MARINE WATER

Revised WQ Standards and Considerations



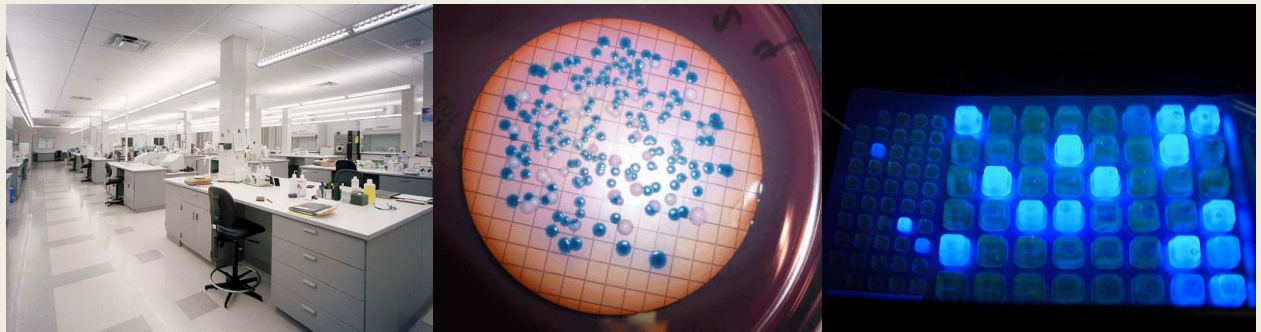
Clean-up Actions (TMDLs) and Permitting

- **TMDLs**
  - Freshwater TMDLs with a downstream shellfish harvesting will include fecal coliform
  - Old Cleanup Plans (EPA-approved)
    - Transition from fecal coliform to new indicator once sufficient site-specific data is collected
    - Existing TMDLs could remain unchanged if same effective endpoint
  - New Cleanup Plans: monitor for new indicator as well as fecal coliform (if shellfish use)
- **Permitting**
  - Measure 2 indicators and eventually transition to new indicator
  - Replace permits with new bacterial indicators during 5-year renewals
- **Continue talks with TMDL/permitting groups**



Laboratory Considerations

- E. coli: similar methods and equipment compared with fecal coliform
- Enterococcus: new methods, equipment, and upfront costs
- **Accrediting Laboratories:**
  - Several laboratories accredited for fecal coliform and E. coli but not enterococcus
  - Potentially impact 300+ laboratories
  - Training
  - Limited Ecology staff
  - May consider interim period as laboratories become accredited



Where are we now?

- Ecology announced rulemaking (CR-101): August 16th, 2017
  - Begin stakeholder/public process - educate public, gather information, develop draft discussion paper on relevant issues/concerns, modify language
    - Kick-off webinar
    - Develop preliminary draft criteria and rule language
    - Receive comments and hold stakeholder meetings to develop implementation strategies
    - Follow-up webinar: Ecology will propose preliminary draft rule language including the draft implementation plan (Early 2018)
- How can you provide ideas and comments to Ecology?

Surface Water Quality Standards:
E-Mail: SWQS@ecy.wa.gov

Future Outlook

- Publish proposed rule (CR-102): Spring 2018
  - Hold public hearings
  - Required to finalize rule within 6 months of proposal

- Adopt rule by September 2018 (tentative)

Questions?

- Contact Information:

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