Welcome!

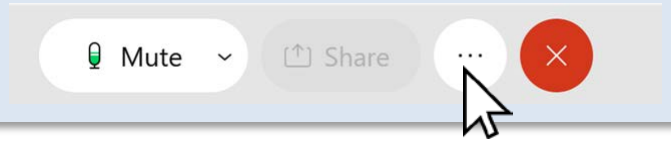
We will get started soon

No sound? Connect your audio and listen for a sound check before we start.

Please connect your audio.

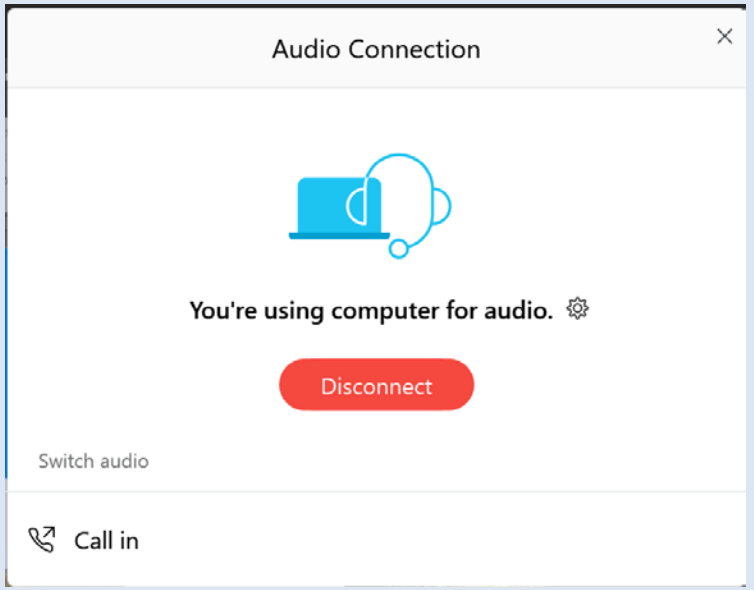
1 ➡ 2 ➡ 3

1 **Move your cursor to the WebEx controls at the bottom of your screen**



2 **Select the ellipses, then "Change audio Connection"**

3 **Select Audio Connection**



If you select "Call in"

- Call US Toll: +1-415-655-0001 **--OR--**
- Call U.S. Toll (Seattle): +1-206-207-1700
- Enter Webex-generated codes followed by "#"

Still can't hear us? Send the WQ Program host a chat through the chat box.

Salmon Spawning Habitat Protection Rule

Water Quality Program

October 8, 2020

DEPARTMENT OF ECOLOGY
State of Washington

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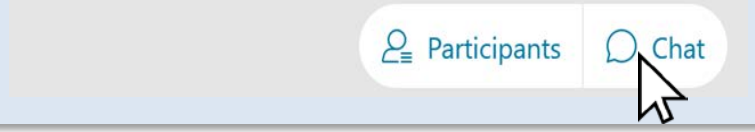
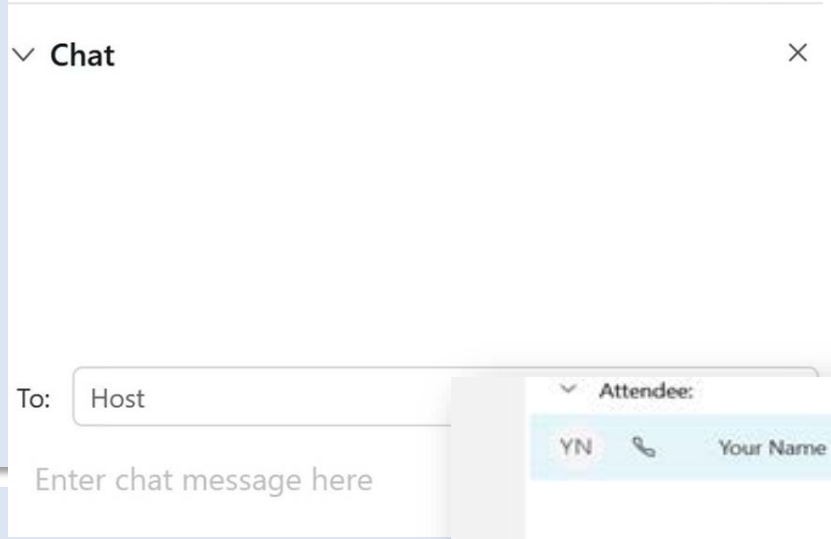
How to Participate

You can ask questions via the chat function





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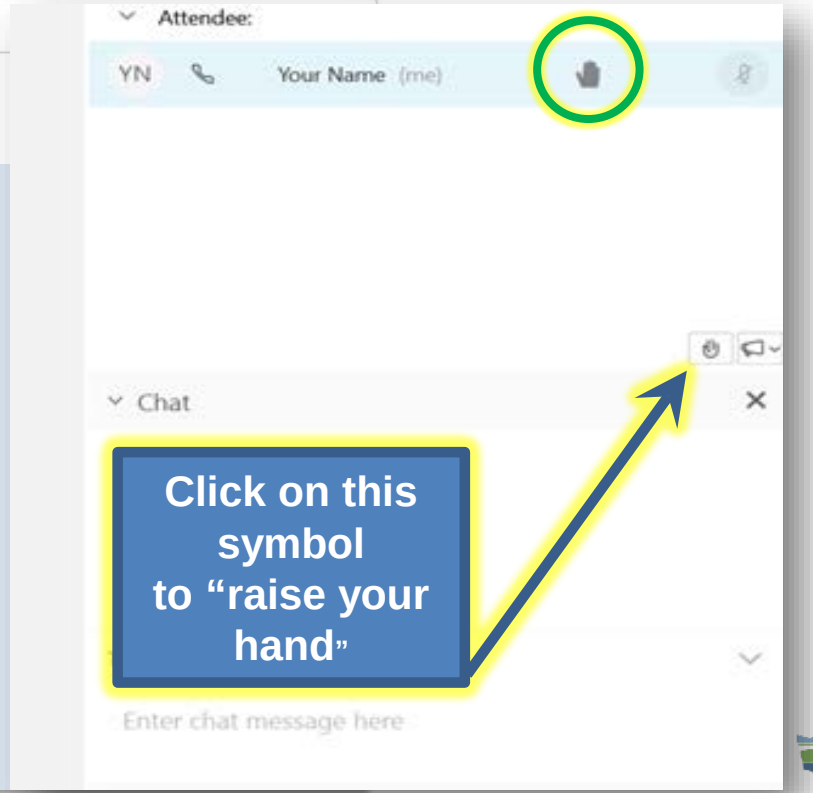
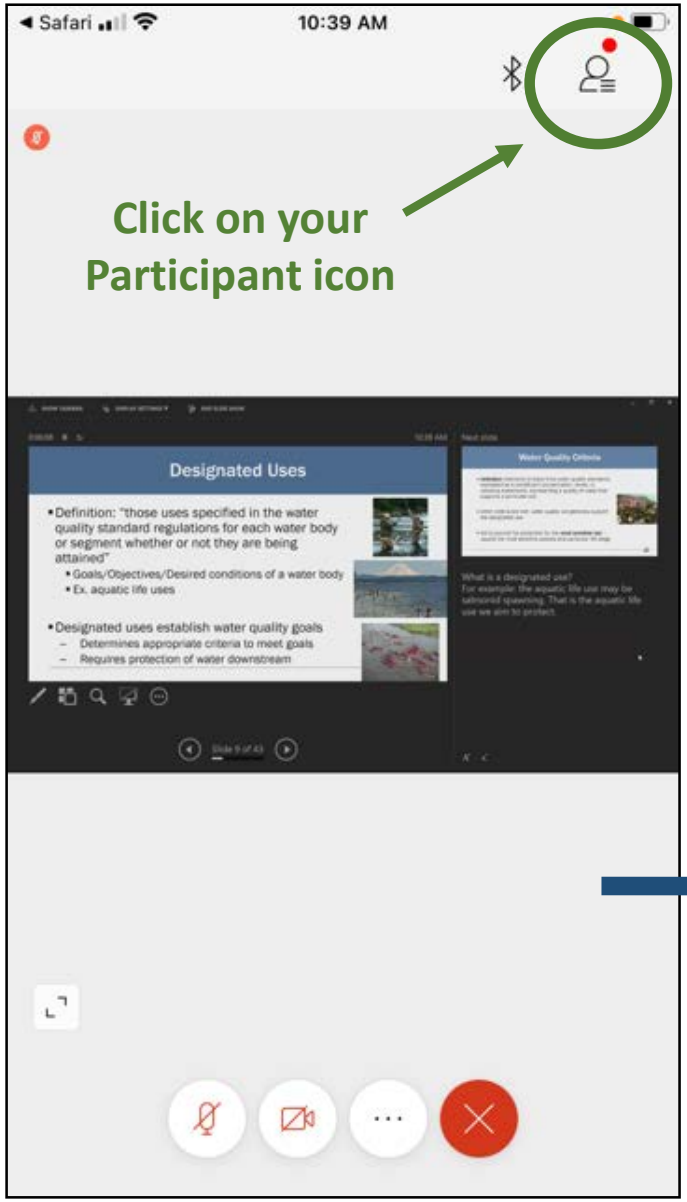
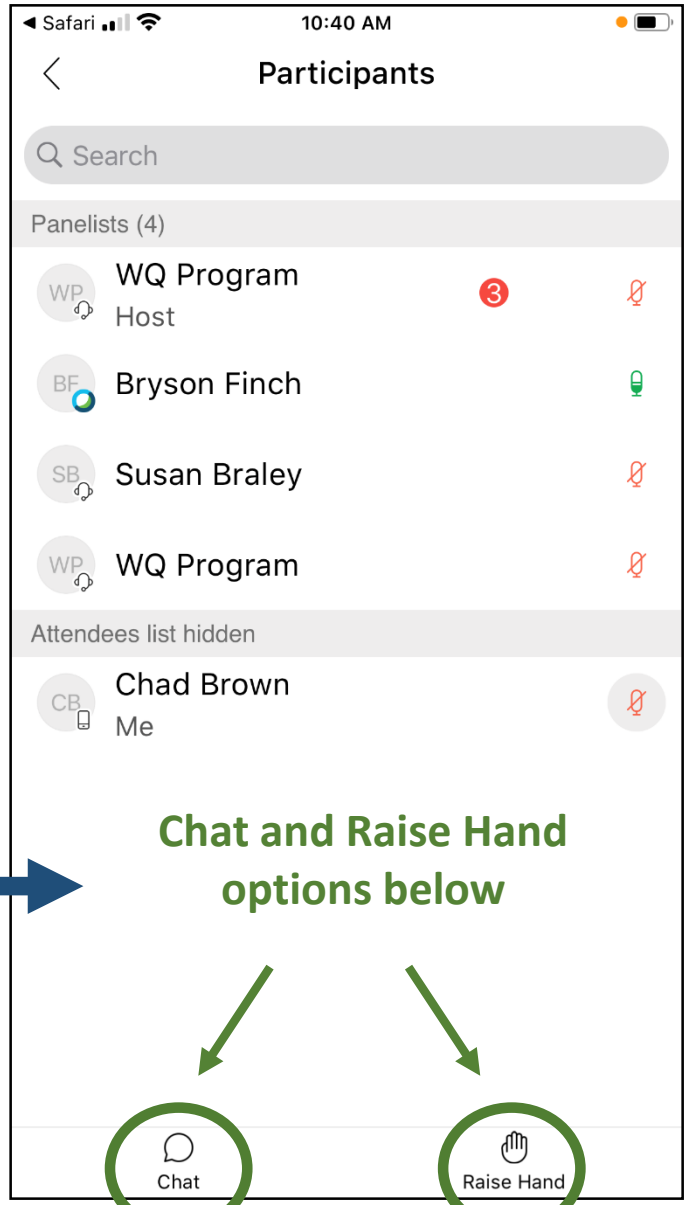
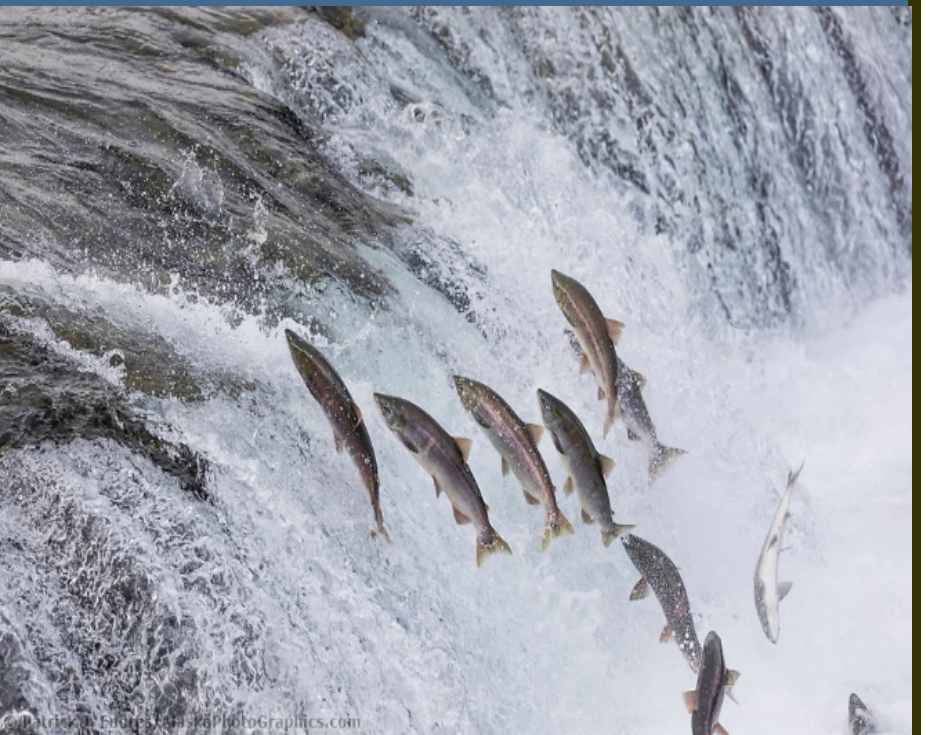


For those joining WebEx via phone or tablet





Outline



1. Introduction to water quality standards
2. Revisions to the freshwater dissolved oxygen standard
3. Development of a fine sediment standard
4. Science Advisory Group
5. Timeline and rule process
6. Questions

Rule and Purpose

- We are considering amendments to the surface water quality standards (WAC 173-201A):
  - Revisions to the freshwater dissolved oxygen criteria (WAC 173-201A-200)
  - Development a new fine sediment criteria
- **Purpose**:
  - Improve rules that protect salmonid spawning habitat
    - Ensure sufficient oxygen levels in spawning gravel
    - Ensure sediment can support spawning fish and development of early life stages

Introduction to the Surface Water Quality Standards

DEPARTMENT OF ECOLOGY
State of Washington

Surface Water Quality Standards

Three Parts

Designated Uses
Management objectives for surface waters.

Criteria
Numeric values (or levels) and narrative statements that protect water quality and support the designated use.

Antidegradation policy
Framework for maintaining and protecting water quality that has already been achieved.

Designated Uses

- Definition: “those uses specified in the water quality standard regulations for each water body or segment whether or not they are being attained”
  - Goals/Objectives/Desired conditions of a water body
  - Ex. aquatic life uses

- Designated uses establish water quality goals
  - Determines appropriate criteria to meet goals
  - Requires protection of downstream uses

Water Quality Criteria

- **Definition**: Elements of state/tribe water quality standards, expressed as a constituent concentration, levels, or narrative statements, representing a quality of water that supports a particular use

- When criteria are met, water quality will generally support the designated use

- Criteria are set to provide full protection for the **most sensitive use** – usually the most sensitive species and particular life stage

Components of Criteria

- **Magnitude**
  - How much of a pollutant or measure of a condition (e.g. concentration)
  - Example: 9.5 mg/L dissolved oxygen
- **Duration**
  - Period of time over which the concentration is averaged
  - Example: 7-day mean concentration
- **Frequency**
  - How often the average concentration can be exceeded
  - Example: no more than one exceedance every three years

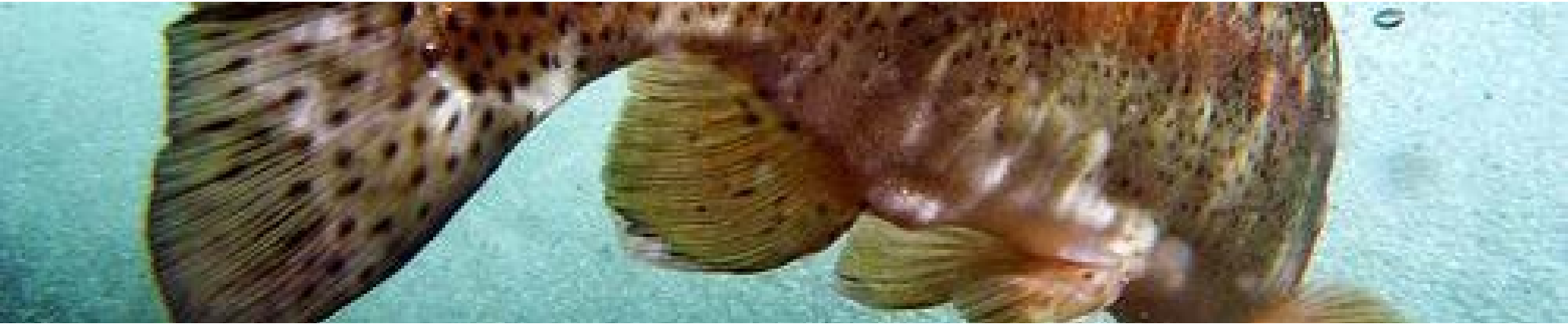
Narrative Criteria

States and tribes can establish narrative criteria or criteria based on biomonitoring methods where numerical criteria cannot be established or to supplement numeric criteria

- Example:
  - Aesthetic values must not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste.

Antidegradation

- Tier I: protection and maintenance of existing and designated uses
  - Applies to existing dams
- Tier II: protection of waters of higher quality than the standards
  - Applies to new dams
- Tier III: protection of outstanding resources
  - Pristine waters where no pollution is allowed



Freshwater Dissolved Oxygen

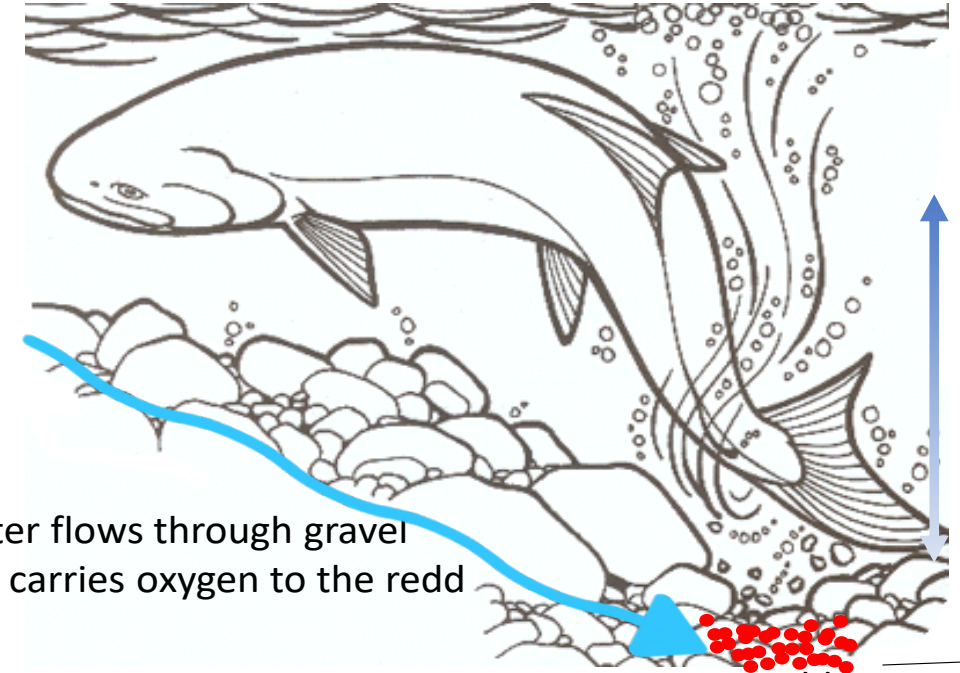
DEPARTMENT OF ECOLOGY
State of Washington

Background

- **What is Dissolved Oxygen (DO)?**
  - Measure of the amount of oxygen dissolved in water
- **Sources**
  - Diffusion from the atmosphere
  - Photosynthesis
- **Importance**
  - Essential for aquatic life respiration
- **Reductions in DO levels**
  - Nutrients, temperature, and respiration

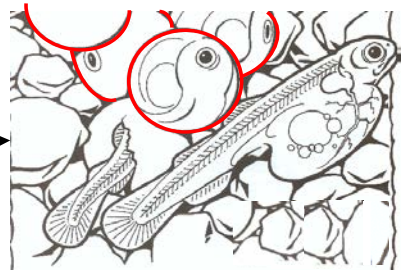
Dissolved Oxygen (DO) Requirements

Salmon eggs and larvae need oxygen to breathe



Dissolved oxygen (DO) moves between the water column and gravel bed.

Redds have lower DO levels than water column.



Images: https://www.fws.gov/sacramento/es_kids/Chinook-Salmon/Images/redd_fws.gif

Current Freshwater DO Criteria

Use Category (Designated Use)	1-Day Minimum
Char Spawning and Rearing	9.5 mg/L*
Core Summer Salmonid Habitat	9.5 mg/L*
Salmonid Spawning, Rearing, and Migration	8.0 mg/L*
Salmonid Rearing and Migration	6.5 mg/L
Non-anadromous Interior Redband Trout	8.0 mg/L*
Indigenous Warm Water Species	6.5 mg/L

***Salmonid spawning protective levels: 8.0 – 9.5 mg/L**

Why Revise Freshwater DO Criteria?

- Federal concerns that WA freshwater DO criteria is not fully protective of incubating salmonid embryos
  - Addressed some concerns in 2009 (Publication 09-03-039)

- EPA's recommendation for full protection: **11.0 mg/L**
  - WA standards for salmonid spawning: **8.0 – 9.5 mg/L**

- EPA assumes **3.0 mg/L reduction** in DO from the water column to interstitial spaces of gravel
  - Intragravel DO of 8.0 mg/L fully protective

Preliminary Ideas for DO Criteria

- Revise freshwater DO to match EPA recommendations
  - **11.0 mg/L** DO in the water column is considered fully protective

- Apply a seasonal freshwater DO criteria during spawning periods
  - Map spawning periods for salmonids in water bodies and apply more restrictive DO criteria during spawning periods

Preliminary Ideas for DO Criteria

- Develop and implement intragravel DO criterion
  - Direct measurements of intragravel DO
  - Set intragravel DO criteria to 8.0 mg/L
- Add a percent saturation component to the freshwater DO criteria
  - 90 or 95% DO saturation common among states
- Some combination of the above
  - **Example:** Set a 11.0 mg/L water column DO criterion coupled with a percent DO saturation criterion

Freshwater DO Implementation

- **Permitting**
  - Anticipating limited impacts to how permit limits are written
  - Potential that there will be additional monitoring needs

- **Total Maximum Daily Loads**
  - DO impairments (nutrient vs. temperature)
  - May need to incorporate other measurements (e.g. % DO saturation) into effectiveness monitoring
  - Water Quality Assessment: potential refinement to DO impairments

- **Non-point**
  - Will possibly add another tool to characterize DO and nutrient related impairments (e.g. % DO Saturation)

Questions?

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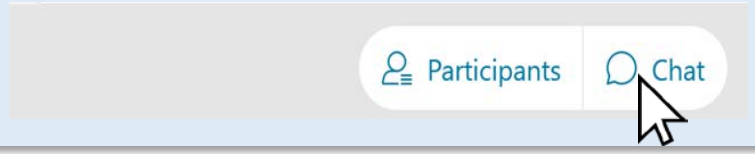

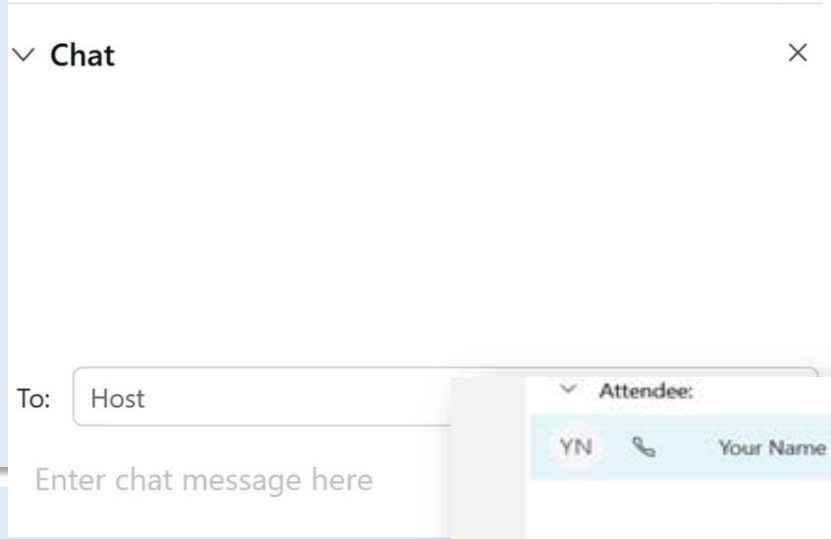

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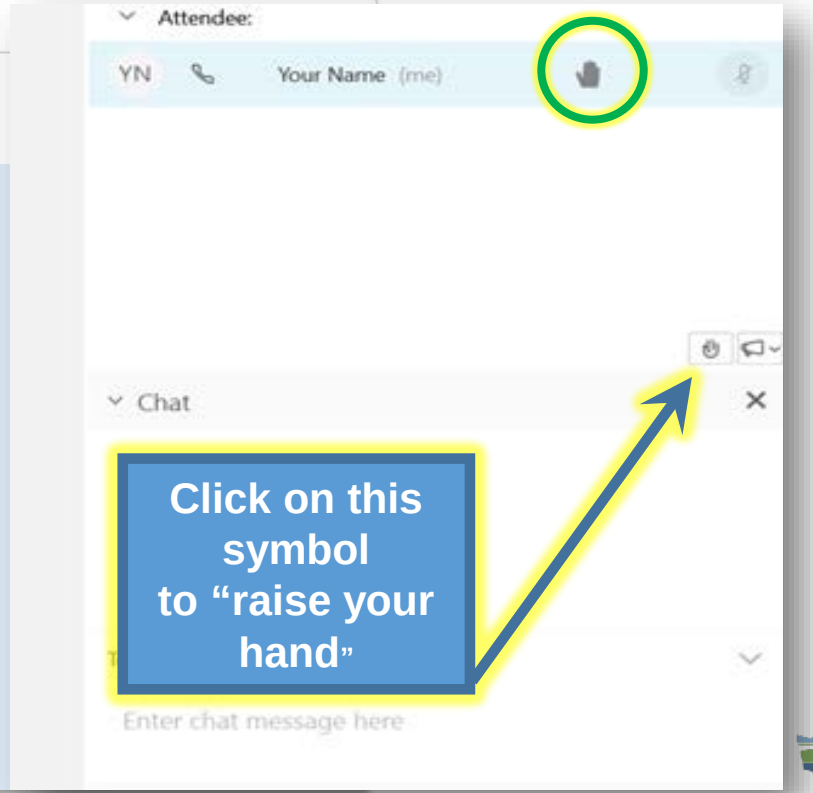


Fine Sediments

Background

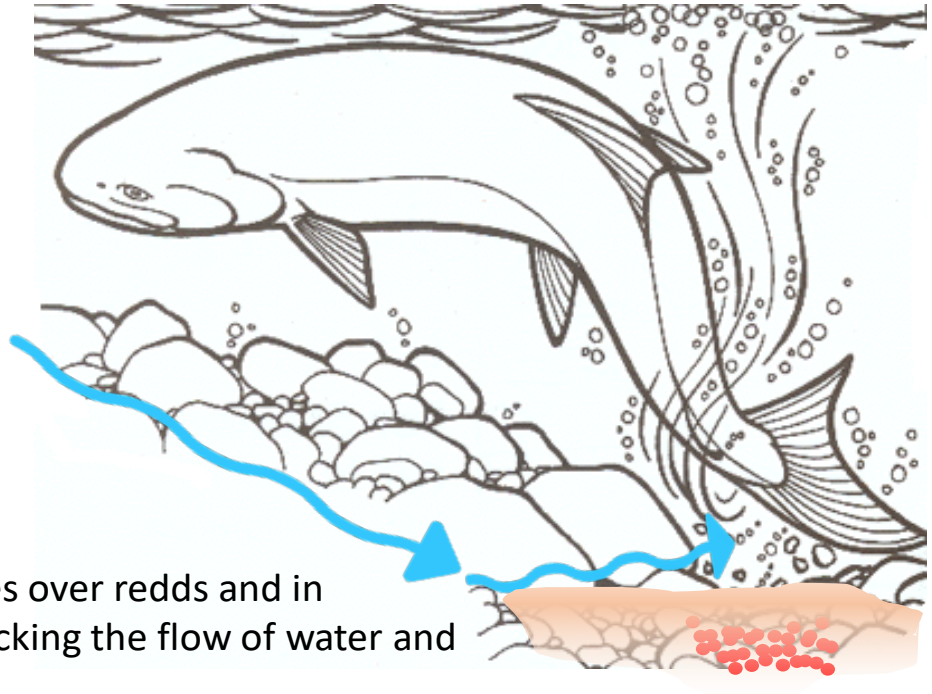
- What is Fine Sediment?
  - Generally particles less than 2 mm
- Sources
  - Erosion, runoff, flooding, land development, in-water activities, and natural stream hydrology
- Importance
  - Excess fine sediment can result in:
    - Loss of habitat
    - Poor water quality
    - Reduced oxygen
    - Reduced embryo hatching success
    - Behavioral changes
    - Mortality

Low in fine sediment

High in fine sediment

Background

Fine sediment is **not** suitable spawning habitat



Fine sediment settles over redds and in between gravel, blocking the flow of water and oxygen.

Sediment covers eggs and reduces hatching success

Why a Fine Sediment Criterion?

1. **Fine sediment is the Nation's #1 pollutant** (according to EPA)
2. Better protect salmonid spawning habitat
3. Meet obligations in a 2018 US District Court Stipulated Order of Dismissal between EPA and an environmental organization
4. Current narrative criteria does not specifically address fine sediment

Why a Fine Sediment Criterion?

- **Current narrative criterion:** "*no deleterious materials…*"
  - Narrative criterion can be used to address fine sediment but…
  - Narrative criterion does not address how to measure fine sediment or implement cleanup of waters

- **Current turbidity criteria**
  - Turbidity measurement considers all particles contributing to reduce light penetration in the water column (**not specific enough**)
  - Reduced turbidity could be attributed to the breakdown of leaf matter or natural occurrence of phytoplankton

Fine Sediment Considerations

- **Narrative** or **numeric** criterion?
  - Flexibility in evaluating fine sediment
  - Feasibility of a single numeric value
  - Combination of measurements

- **Best measures** for quantifying and assessing fine sediment
  - Several options and combinations available to assess fine sediment
  - Feasibility of implementing fine sediment measures
  - Comparing site-specific characteristics to a reference site

Ways to Measure Fine Sediments

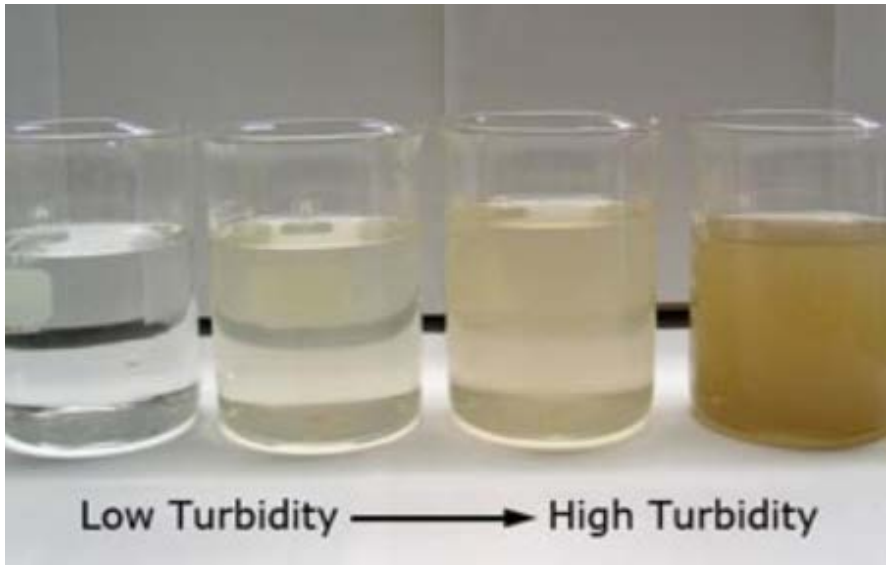
There are many approaches to measuring fine sediment and their effect on spawning gravels.

Ways to Measure Fine Sediments

Suspended solids

$$\text{TSS (mg/L)} = \frac{(A - B)}{V}$$

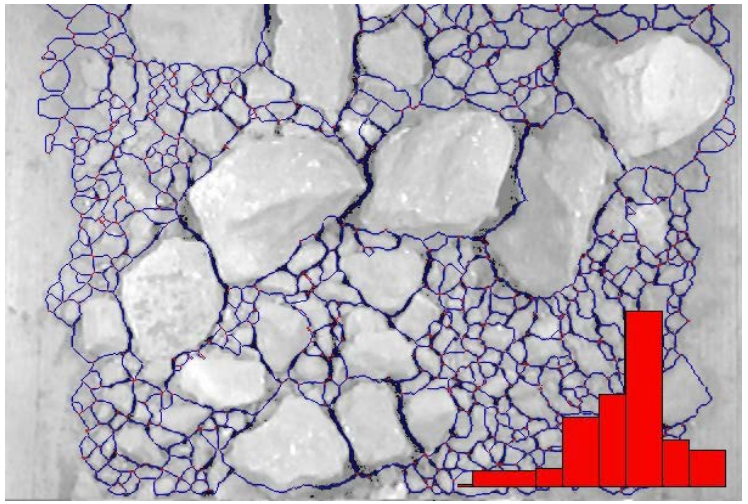
A = mass of filter + dried residue (mg),
B = mass of filter (tare weight) (mg), and
V = volume of sample filtered (L)

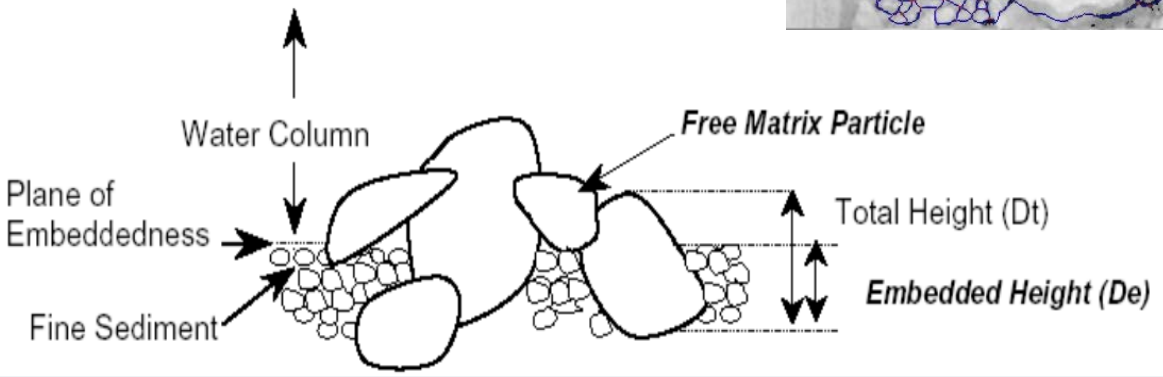


Turbidity / light penetration

Ways to Measure Fine Sediments

Percent fines
(by weight or volume)





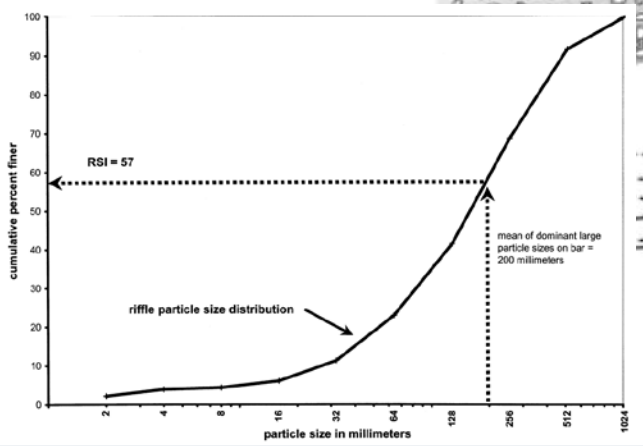
Embeddedness

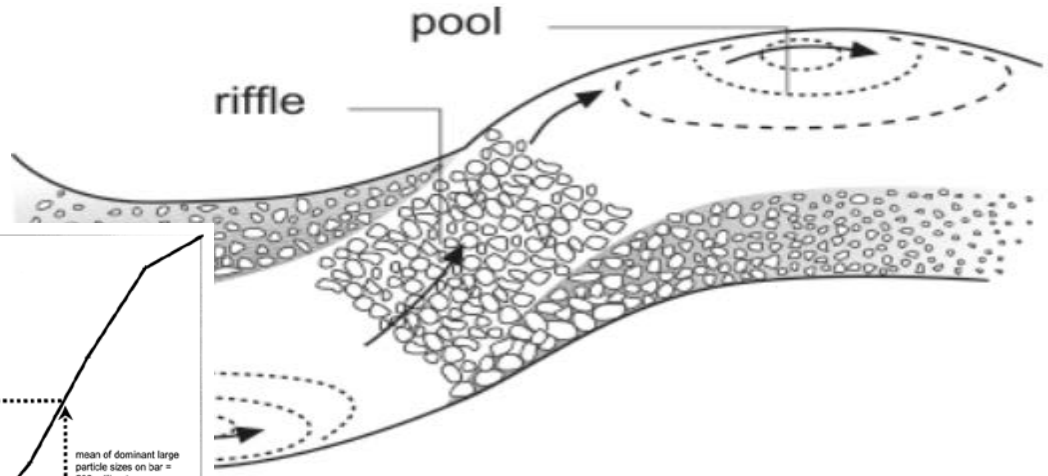
Ways to Measure Fine Sediments

Relative bed stability

RBS = D50 or DGM /D_CBF
D50 = Substrate median diameter as evaluated by a modified pebble count
DGM = Substrate geometric mean as evaluated by a pebble count
DCBF = The diameter of particles just beginning to move at bankfull
= (0.61RS)/τ*c
R = Bankfull hydraulic radius
S = Bankfull slope

τ*c = Shield's parameter for critical shear stress for incipient motion

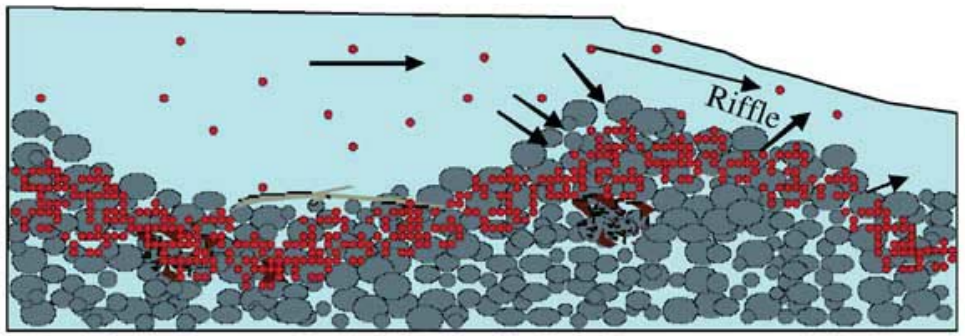




Riffle stability

Ways to Measure Fine Sediments

Geometric mean diameter of sediment



Measure of subsurface sediment in riffles

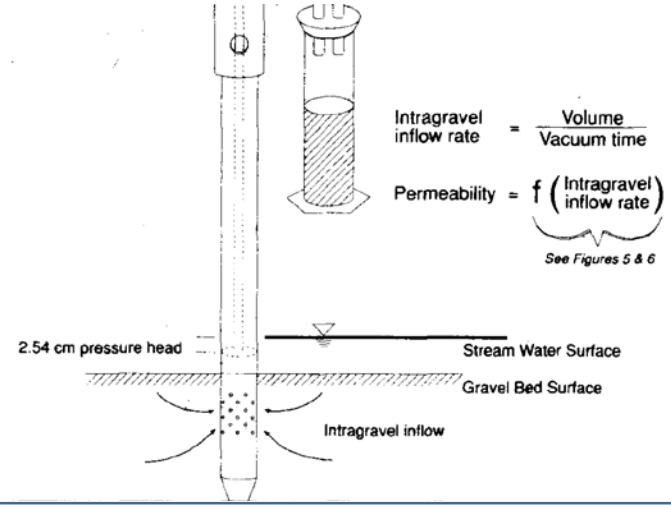
Ways to Measure Fine Sediments

Benthic Macroinvertebrate Index

Ecology MMI

Wash. State Dept. of Ecology Multi-Metric Index

Score	1	3	5
Taxa Richness	[0, 24)	[24, 33]	(33, ∞)
Ephemeroptera Richness	[0, 4]	(4, 6]	(6, ∞)
Plecoptera Richness	[0, 3)	[3, 5]	(5, ∞)
Trichoptera Richness	[0, 4)	[4, 6]	(6, ∞)
Clinger Percent	[0, 26)	[26, 47]	(47, 100]
Long-Lived Richness	[0, 3)	[3, 5]	(5, ∞)
Intolerant Richness	[0, 2)	[2, 2]	(2, ∞)
Percent Dominant	(70, 100]	[54, 70]	[0, 54)
Predator Percent	[0, 11)	[11, 19]	(19, 100]
Tolerant Percent	(19, 100]	[11, 19]	[0, 11)



Intragravel D.O. concentration

Fine Sediment Implementation

- **Permitting**
  - What would a new impairment listing mean for dischargers to that water?
    - Possibly more monitoring and new methods for dischargers
    - Update during the 5 year reevaluation of permits
- **Total Maximum Daily Loads**
  - Possibly more monitoring and new methods used in evaluating sediment and in effectiveness monitoring
  - Don't anticipate any changes to currently approved TMDLs
- **Non-point**
  - Another tool to examine the discharge of pollution but does not change the "no discharge" regulation

Questions?

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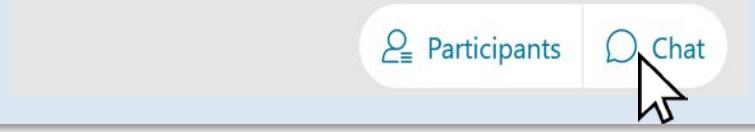

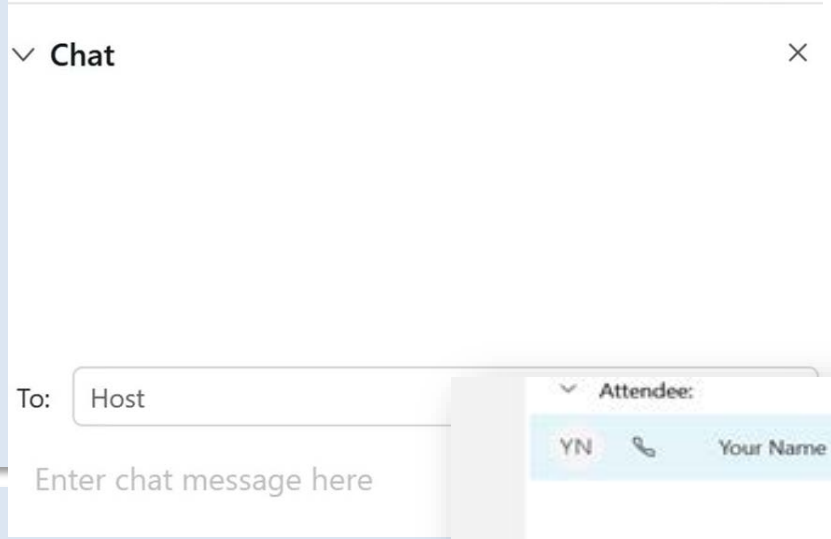

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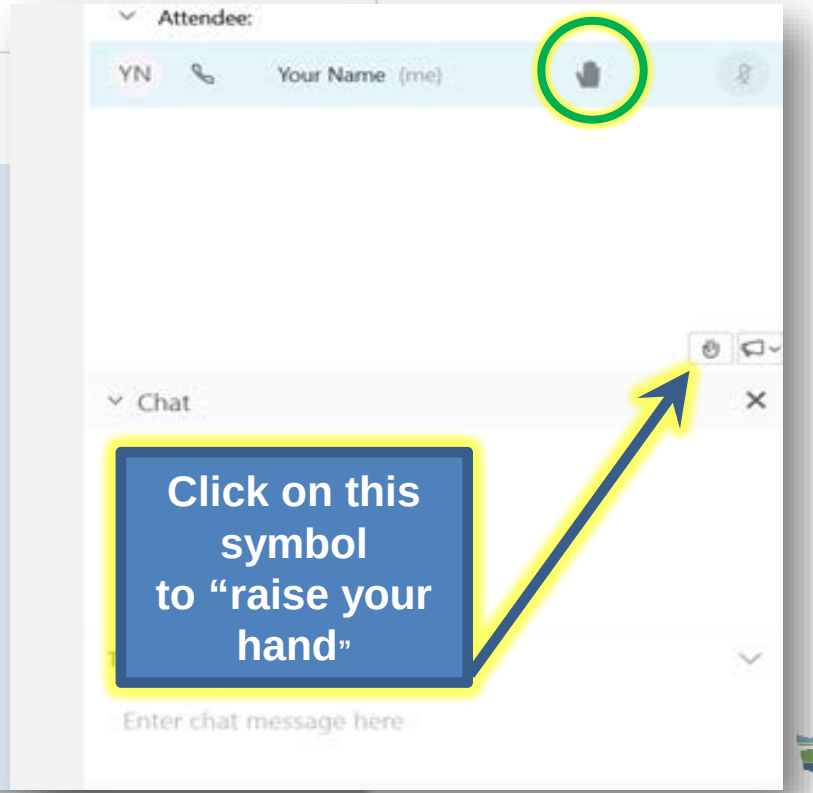

Science Advisory Group

DEPARTMENT OF ECOLOGY
State of Washington

Science Advisory Group

- Seeking members for science advisory group:
  - **Expertise:**
    - Scientific background in water quality, fish biology, or biogeochemistry
  - **Parameters of Interest:**
    - Fine sediment, fish habitat requirements, dissolved oxygen
  - **Focus:**
    - Methods used to characterize fine sediment and feasibility of implementation
    - Water quality and habitat requirements of early life stages of fish
    - Dissolved oxygen dynamics in lotic systems

- **Deadline to respond: October 15**

Timeline and Rule Documentation

DEPARTMENT OF ECOLOGY
State of Washington

Rulemaking Timeline

Dec 2019

Begin rulemaking

- Public outreach
- Tribal notification
- Advisory meetings
- Develop rule documents
- Economic analysis

Summer 2021

Rule Proposal

- Hold public hearings
- Public comment period
- Modify language if needed

Fall 2021

Decision on rule adoption

Draft Rulemaking Documents

- Technical Support Document
- Draft Rule Language
- Implementation Plan
- SEPA Documentation
- Small Business Economic Impact Assessment
- Preliminary Regulatory Analyses

Questions

Bryson Finch

Bryson.finch@ecy.wa.gov

End of Presentation