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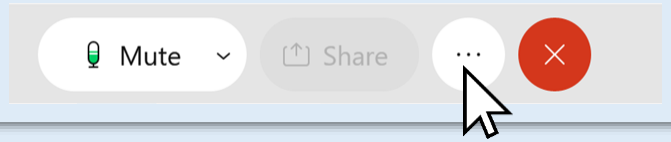

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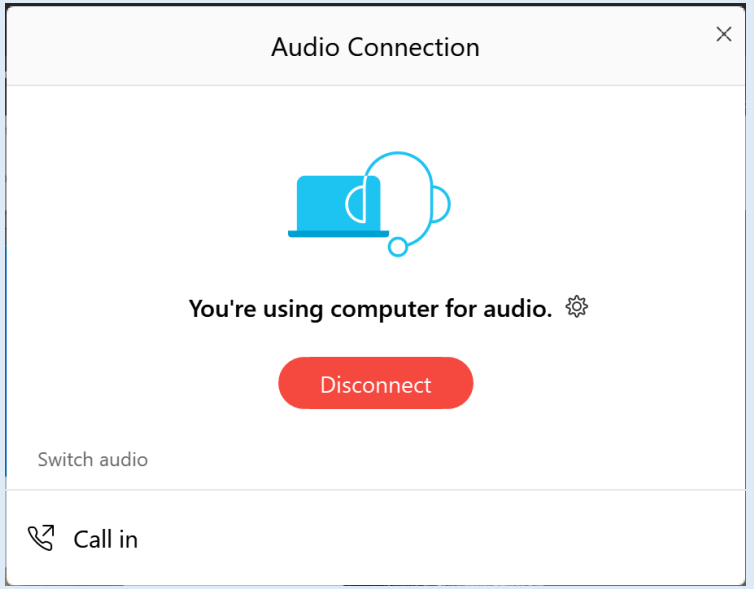

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Salmon Spawning Habitat Protection Rule

Science Advisory Group (SAG)
Meeting #4: Fine Sediment
February 3, 2021

DEPARTMENT OF ECOLOGY
State of Washington

Goals for Today's Meeting

- Receive feedback from SAG members on Ecology's preliminary decisions for dissolved oxygen and fine sediment criteria.
- If SAG members have concerns about feasibility or protection of the preliminary rule decisions, discuss suggested alternatives.

Ecology Standards Staff

Susan Braley

Webinar Facilitator

Susan.Braley@ecy.wa.gov

Bryson Finch

Water Quality Standards Scientist

Bryson.Finch@ecy.wa.gov

Marla Koberstein

WebEx Moderator

Marla.Koberstein@ecy.wa.gov

Chad Brown

Water Quality Management Supervisor

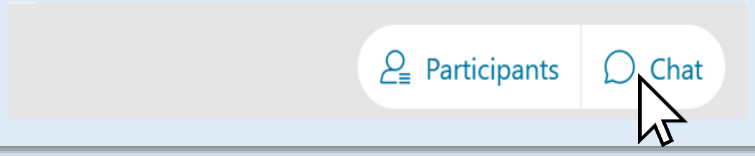
Chad.Brown@ecy.wa.gov

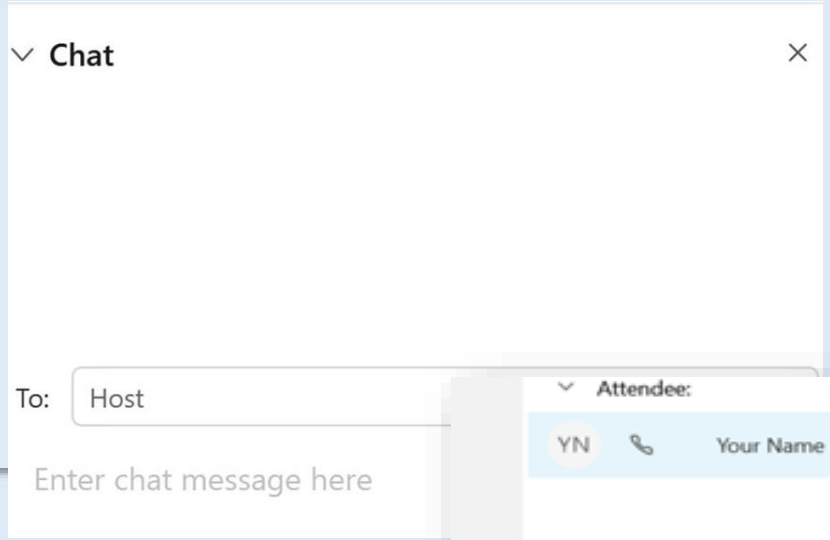
Introductions of SAG Members

Name and affiliation of members present

Using Webex features

You can ask questions via the chat function





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We ask that you:

1. **State your name** first before speaking.
2. **Mute your audio** unless speaking.
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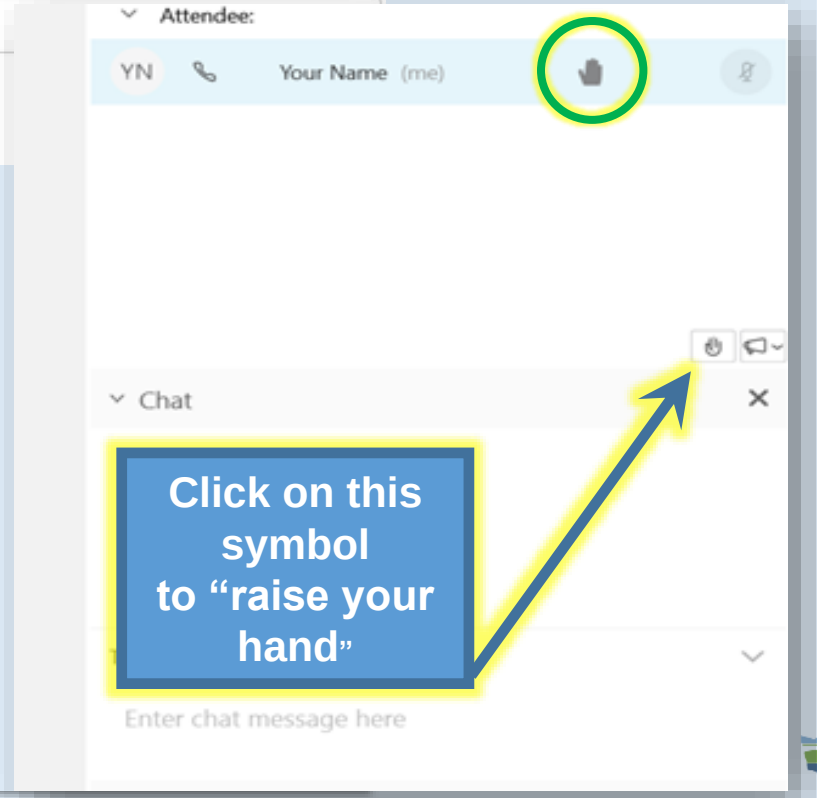

Today's Agenda

- Review preliminary revisions to dissolved oxygen criteria
- Review dissolved oxygen criteria justifications
- Questions
- Review proposed structure of fine sediment criteria
- Review weight of evidence approach to listing impairments
- Questions

Dissolved Oxygen

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WA Current Dissolved Oxygen Criteria

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

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

1986 EPA Recommendations

Salmonid Waters

a. Embryo and Larval Stages

- No Production Impairment = 11* (8)
- Slight Production Impairment = 9* (6)
- Moderate Production Impairment = 8* (5)
- Severe Production Impairment = 7* (4)
- Limit to Avoid Acute Mortality = 6* (3)

(* Note: These are water column concentrations recommended to achieve the required intergravel dissolved oxygen concentrations shown in parentheses. The 3 mg/l difference is discussed in the criteria document.)

Preliminary DO Criteria

Use Category	DO (mg/L) (1-Day Min)		Oxygen Saturation (instantaneous)
Char Spawning and Rearing	10 ~~9.5~~	OR	95%
Core Summer Salmonid Habitat	10 ~~9.5~~		
Salmonid Spawning, Rearing, and Migration	10 ~~8.0~~		
Salmonid Rearing and Migration	6.5		
Non-anadromous Interior Redband Trout	10 ~~8.0~~		
Indigenous Warm Water Species	6.5		

Dissolved Oxygen Criteria: Justifications

- EPA GoldBook (1986):
  - "If slight production impairment or a small but undefinable risk of moderate impairment is unacceptable, then one should use the no production impairment (11 mg/L) values as a mean, and slight production impairment (9 mg/L) as a minima."
- National Academy of Sciences (1972):
  - Suggests that oxygen criteria to protect eggs should be halfway between maximum (11 mg/L) and high protection levels (9 mg/L)

- Ecology preliminary decision is to use 10 mg/L as a minima
  - This decision is greater than EPA Goldbook recommendations and aligns with NAS recommendations

Dissolved Oxygen Criteria: Justifications

- EPA assumes a 1-3 mg/L depression in dissolved oxygen from the water column to gravels
  - EPA recommendation of 11.0 mg/L is predicated upon a minimum intragravel DO level of 8.0 mg/L and utilizes a 3 mg/L worst-case scenario DO depression value

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- Ecology is assuming a 2 mg/L depression in dissolved oxygen from the water column to gravels
  - **Optimal** spawning gravels and habitat should have a minimal DO depression (1-2 mg/L)
    - High DO depression values can often be attributed to outside variables in less than ideal conditions
  - Other variables contribute to depressions in dissolved oxygen such as fine sediment, water flow, water temperature, groundwater, nutrients, DO dynamics within redds, etc…
    - Washington has other WQ criteria to address the other variables contributing to depressions in DO
  - Literature is available to support the assumption of 2 mg/L
    - DO depression studies rarely account for all the contributing factors in DO depression
    - Literature suggests high DO depression occurs in the presence of high fine sediment and groundwater influences

Dissolved Oxygen Criteria: Justifications

- EPA does not have a oxygen saturation recommendation

- Ecology's preliminary decision is to use a 95% oxygen saturation value
  - EPA has approved 95% oxygen saturation values for several states
  - Oxygen saturation component is necessary to account for temperature and elevation related influences on DO
  - Davis (1975) recommends a 9.75 mg/L and a 98% oxygen saturation criteria
    - The difference between 98% and 95% saturation equates to about 0.2 mg/L DO which is within the instrument error (±0.2 mg/L)

Questions or Comments on preliminary DO criteria revisions ?

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Fine Sediment Criteria

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Preliminary Decisions: Fine Sediment

- Narrative criterion = Yes
- Weight of evidence approach = Yes
- Use of reference sites/background conditions = Yes
- Required monitoring:
  - Water column and bedded sediment based parameters
- Optional monitoring:
  - intragravel DO and benthos
- Approach:
  - Follow watershed monitoring sampling methods with some minor revisions (reach & transect approach)
  - Preferentially target locations of potential anthropogenic influence

Preliminary Decisions: Fine Sediment Criteria

- Current narrative criteria can be used to list a water body impaired for fine sediment
  - Current narrative does not address methods to characterize a fine sediment impairment

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- Ecology's preliminary decisions is to add a narrative criterion that specifically addresses fine sediment
  - Limited quantitative relationships between parameters used to quantify fine sediment and biological endpoints
  - A more holistic understanding of the water body is needed

Preliminary Fine Sediment Criteria: Structure

1. Anthropogenic influence determination - REQUIRED
    - Anthropogenic sources of fine sediment must be demonstrated
    - If a fine sediment impairment is suspected, then there must be an assessment of human disturbance and riparian habitat using existing watershed health monitoring methods as well as supplemental information (e.g. photographs, GIS)
    - Naturally occurring sources of sediments will not result in an impairment listing

Preliminary Fine Sediment Criteria: Structure

2. Water column measure (suspended sediments) - REQUIRED
   - **Turbidity** will be used to characterized the water column for sediment input into a water body
   - Turbidity will be compared to background/reference sites
   - Turbidity should be determined during average flow conditions and should include a temporal component

Preliminary Fine Sediment Criteria: Structure

3. Streambed measures (bedded sediments) – REQUIRED
   - **Percent substrate** including surface fines
   - **Embeddedness**
   - **Relative bed stability**

- These parameters are representative of both site-specific fine sediment conditions (percent substrate & embeddedness) as well as a catchment level assessment of geological processes (relative bed stability)
- Parameters will be compared to background/reference conditions

Preliminary Fine Sediment Criteria: Structure

4. Chemical measures (subsurface sediment) – OPTIONAL
   - **Intragravel dissolved oxygen depression**
   - Used in the weight of evidence approach if available

- IGDO depression will be determined by comparing water column DO concentrations to IGDO concentrations
- Median spatial DO depression should be <3 mg/L
- IGDO should be measured during average flow conditions

Preliminary Fine Sediment Criteria: Structure

5. Biological survey (stress-response relationship) - OPTIONAL
   - **Fine sediment sensitivity index/BIBI index/Hilsenhoff index**
   - Used in the weight of evidence approach if available

- Biological indexes should be compared to reference sites in similar ecoregions (this work is done)

Brainstorming: Weight of Evidence Approach

Weight of Evidence Approach:

Statistically Significant Impairment	Impairment Determination
1 out of 4 parameters	No impairment
2 out of 4 parameters	No impairment
3 out of 4 parameters	Impairment
4 out of 4 parameters	Impairment
3 out of 5 parameters	Water of concern
4 out of 5 parameters	Impairment
3 out of 6 parameters	Water of concern
4 out of 6 parameters	Water of concern
5 out of 6 parameters	Impairment
6 out of 6 parameters	Impairment

≥75% weight = impaired
≤75% weight = not impaired

Questions or Comments on preliminary decisions for fine sediment criteria?

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Next Steps

- Ecology will move forward with drafting rule revisions for dissolved oxygen and fine sediment criteria to start the formal public review process.
- Preliminary rule revisions public webinar
  Spring 2021
- Start of formal rule revisions public review
  Late Spring 2021
- Decision on final rule adoption
  Fall 2021

Thank you for your participation!