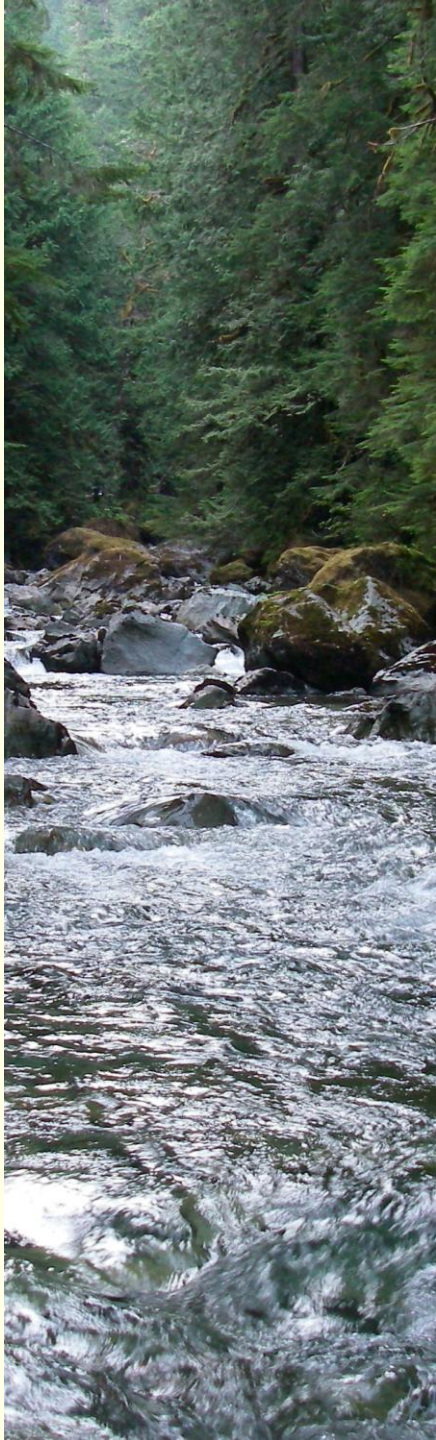
Department of Ecology Water Quality Standards

Rule-Making General Informational Meeting

November 6, 2013

Lacey, WA



DEPARTMENT OF ECOLOGY
State of Washington

Purpose of Meeting

To share our current thinking on rule alternatives for the update to the Water Quality Standards:

Human Health Criteria

Implementation Tools

Challenging Chemicals: Mercury, PCBs, Arsenic

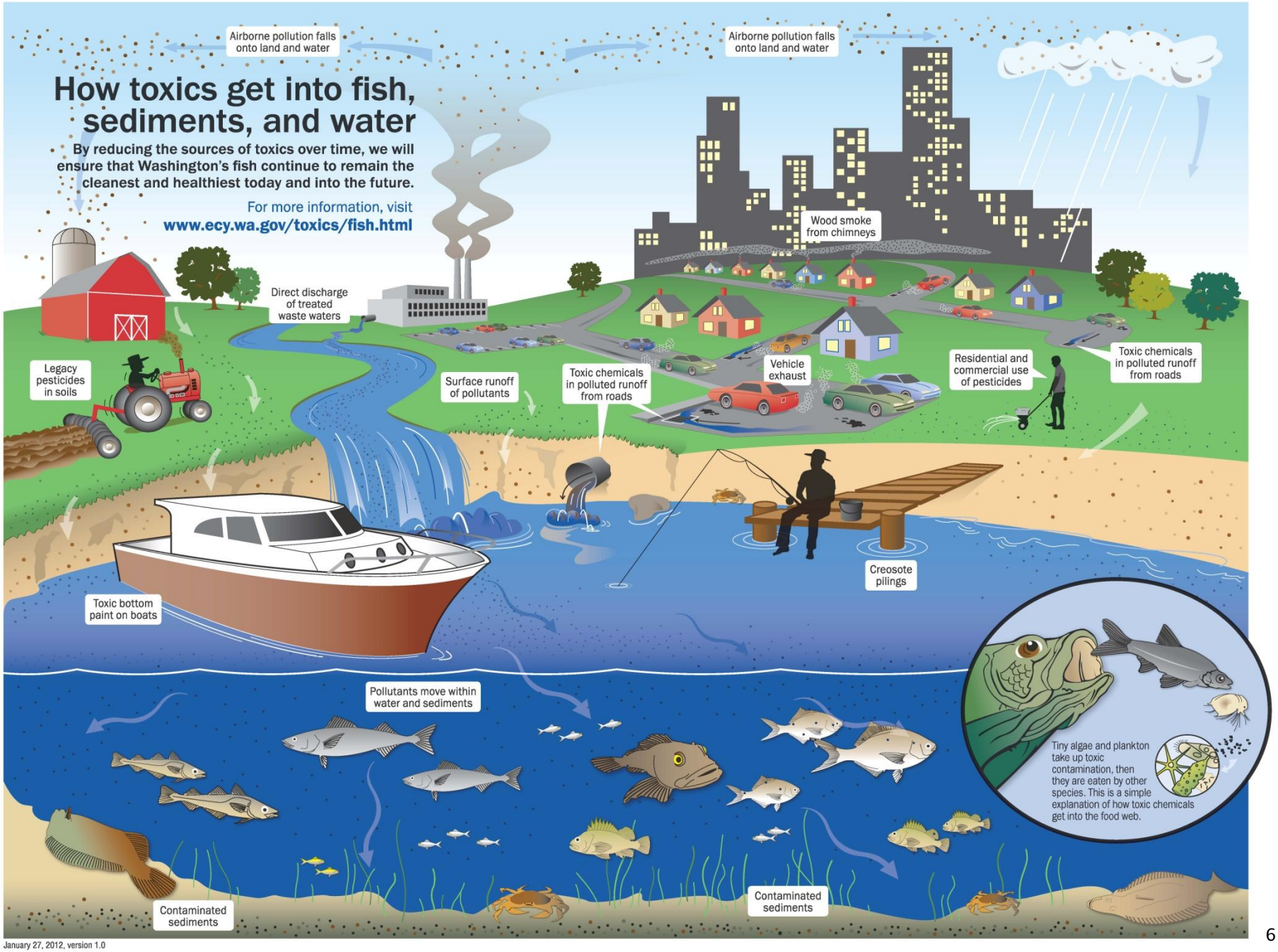
** This is not a formal public hearing

Why Do People Care About This Rule?

- Existing standards not based on current data
- Concern about impacts because old data.
- Concern about whether the rule update can really address the big toxic pollution sources.
- Concern about impacts on dischargers:
  - Cost to get to standards
  - Ability to get to standards
  - Liability if regulated entity cannot meet new criteria

Some Environmental Challenges?

- Many chemicals are pervasive in our environment.
- Clean Water Act programs can only push so far to reduce toxic threats and improve human and environmental health:
  - We only have numeric criteria for a small group of the chemicals in use.
  - Not all sources of chemicals of concern have numeric criteria under the CWA.
  - There are limited solutions through point source (NPDES) permittees.
  - The sources of some chemicals are not under the purview of Clean Water Act regulations.



January 27, 2012, version 1.0

Water Quality Standards

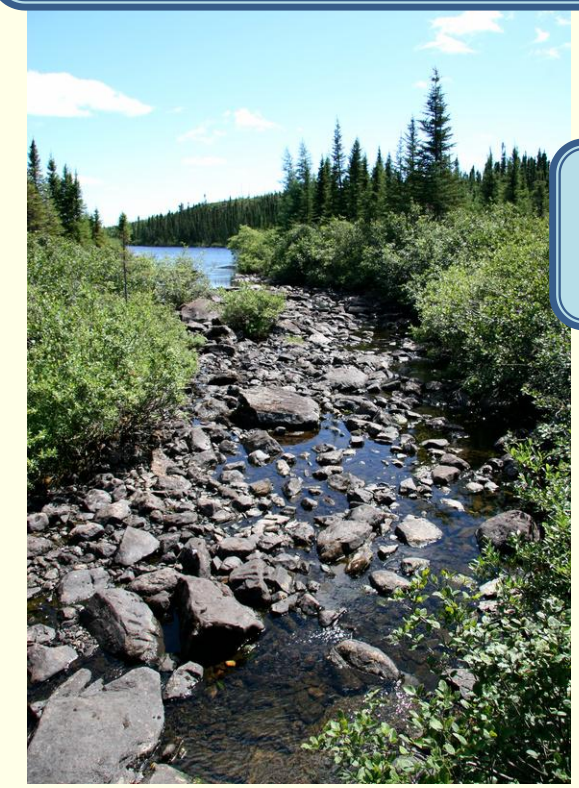
- **Purpose**
  - The Water Quality Standards (WQS) are the foundation of water pollution control programs under the federal Clean Water Act. Standards are required to protect public health and welfare.
- **What do WQS do?**
  - Identify designated uses (aquatic life, drinking water, recreation, etc) and the numeric criteria to protect those uses.
  - For example –human health criteria for Endrin of 0.76 micrograms/liter to protect individuals consuming water or resident fish from surface waterbody.
- **How are they used?**
  - Permit development
  - Identifying polluted waters
  - Setting allocations to cleanup already polluted waters.

Regulatory Landscape for Water Quality Standards

- Federal Clean Water Act (CWA) dictates all states must develop water quality standards.
- Submitted to the Environmental Protection Agency for review and approval (or disapproval).
- The EPA is required to promulgate water quality standards for states that do not adopt standards.

Numeric Criteria in WA Surface Water Quality Standards

Criteria for the protection of
Aquatic Life
(for survival and propagation)



Criteria for the protection of
Human Health
(for consumption of fish, shellfish and water)

Criteria for the protection of
Swimming and Recreation
(exposure to bacteria and pathogens)

Numeric Criteria in WA Surface Water Quality Standards

Criteria for the protection of

Aquatic Life

(for survival and propogation)

Conventional Parameters

Turbidity,
pH,
Dissolved Oxygen,
Temperature,
Total Dissolved Gas

Toxic Pollutants

Ammonia,
Parathion,
Chloride,
Chlorine,
Chlordane

Numeric Criteria in WA Surface Water Quality Standards

Criteria for the protection of
Aquatic Life
(for survival and propogation)

Criteria for the protection of
Human Health
(for consumption of fish, shellfish and water)

Conventional Parameters

Turbidity,
pH,
Dissolved Oxygen,
Temperature,
Total Dissolved Gas

Toxic Pollutants

Ammonia,
Parathion,
Chloride,
Chlorine,
Chlordane

Toxic Pollutants

Antimony, Thallium, 2378-TCDD, Acrolein, Benzene, Bromoform, Carbon Tetrachloride, Chlorobenzene, Chlorodibromomethane, Acrylonitrile, Dichlorobromomethane, 1,2-Dichloroethane, 1,1-Dichloroethylene, 1,3-Dichloropropene, Ethylbenzene, Methyl Bromide, Methylene Chloride, 1,1,2,2-Tetrachloroethane, Tetrachloroethylene. Toluene, 1,1,2-Trichloroethane, Trichloroethylene, Vinyl Chloride, 2,4-Dichlorophenol, 2-Methyl-4,6-Dinitrophenol, 2,4-Dinitrophenol, Phenol, 2,4,6-Trichlorophenol, Anthracene, Benzidine, α-BHC Benzo(a)Anthracene, Benzo(a)Pyrene, β-BHC, γ-BHC Benzo(b)Fluoranthene, Benzo(k)Fluoranthene, Bis(2-C Chloroethyl)Ether, Bis(2-Chloroisopropyl) Ether, Bis(2-Ethylhexyl) Phthalate, Chrysene, Dibenzo (a,h) Anthracene, 1,2Dichlorobenzene, 1,3-Dichlorobenzene 1,4-Dichlorobenzene, 3,3'-Dichlorobenzidine, Diethyl Phthalate, Dimethyl Phthalate, Di-n-Butyl Phthalate, 2,4-Dinitrotoluene, 1,2-Diphenylhydrazine, Fluorene Fluoranthene, Hexachlorobenzene, Hexachloroethane, Hexachlorobutadiene, Hexachloro-cyclopentadiene, Indeno (1,2,3-cd) Pyrene, Isophorone, Nitrobenzene, N-Nitrosodimethylamine, N-Nitrosodiphenylamine, Pyrene, Endrin Aldehyde, etc.

Numeric Criteria in WA Surface Water Quality Standards

Criteria for the protection of
Aquatic Life
(for survival and propogation)

Criteria for the protection of
Human Health
(for consumption of fish, shellfish and water)

Conventional Parameters

Turbidity,
pH,
Dissolved Oxygen,
Temperature,
Total Dissolved Gas

Toxic Pollutants

Ammonia,
Parathion,
Chloride,
Chlorine,
Chlordane

Toxic Pollutants

some toxics have numeric limits for both

Aldrin, Dieldrin
Arsenic, Cadmium
Chromium, Copper
Cyanide, DDT
Endosulfans, Endrin
Heptachlor, Lead
Mercury, Nickel, PCBs
Pentachlorophenol,
Selenium, Silver
Toxaphene
Zinc

Antimony, Thallium, 2378-TCDD, Acrolein, Benzene, Bromoform, Carbon Tetrachloride, Chlorobenzene, Chlorodibromomethane, Acrylonitrile, Dichlorobromomethane, 1,2-Dichloroethane, 1,1-Dichloroethylene, 1,3-Dichloropropene, Ethylbenzene, Methyl Bromide, Methylene Chloride, 1,1,2,2-Tetrachloroethane, Tetrachloroethylene. Toluene, 1,1,2-Trichloroethane, Trichloroethylene, Vinyl Chloride, 2,4-Dichlorophenol, 2-Methyl-4,6-Dinitrophenol, 2,4-Dinitrophenol, Phenol, 2,4,6-Trichlorophenol, Anthracene, Benzidine, α-BHC Benzo(a)Anthracene, Benzo(a)Pyrene, β-BHC, γ-BHC Benzo(b)Fluoranthene, Benzo(k)Fluoranthene, Bis(2-C Chloroethyl)Ether, Bis(2-Chloroisopropyl) Ether, Bis(2-Ethylhexyl) Phthalate, Chrysene, Dibenzo (a,h) Anthracene, 1,2Dichlorobenzene, 1,3-Dichlorobenzene 1,4-Dichlorobenzene, 3,3'-Dichlorobenzidine, Diethyl Phthalate, Dimethyl Phthalate, Di-n-Butyl Phthalate, 2,4-Dinitrotoluene, 1,2-Diphenylhydrazine, Fluorene Fluoranthene, Hexachlorobenzene, Hexachloroethane, Hexachlorobutadiene, Hexachloro-cyclopentadiene, Indeno (1,2,3-cd) Pyrene, Isophorone, Nitrobenzene, N-Nitrosodimethylamine, N-Nitrosodiphenylamine, Pyrene, Endrin Aldehyde, etc.

Which Chemicals To Address?

Ecology's preference at this time is to adopt all priority toxic pollutants with national recommended criteria developed by the Environmental Protection Agency.

What Are Human Health Criteria?

A human health criterion is the highest concentration of a pollutant in surface water that is not expected to pose a significant risk to human health.

What Uses do Human Health Criteria Protect?

1. The "**fishable**/swimmable" goal of the CWA
2. The **drinking water** designated use

History of Washington's Toxics Criteria

Pre-1992

Washington does not adopt state specific human health criteria.

1992

EPA promulgates the National Toxics rule (NTR)

(includes national criteria to protect for human health)

1992

EPA places Washington under the NTR for human health criteria

Human Health Criteria in Other Pacific Northwest States

2004

Oregon updated human health criteria.

FCR = 17.5 grams/day

2006

Idaho updated human health criteria.

FCR = 17.5 grams/day

2010

EPA disapproved Oregon's updated human health criteria.

2011

Oregon updated human health criteria.

FCR = 175 grams/day

Risk Level = 10^{-6}

Added language on intake credits and variances for implementation.

EPA approved updated human health criteria.

2012

EPA disapproved Idaho's updated human health criteria because regional data were not considered.

Idaho is currently in a rule-making to update human health criteria .

Washington's Current Human Health Criteria are in Federal Rule

1992 National Toxics Rule

Currently contains criteria for 85 chemicals

Criteria are based on the national default assumptions used in early 1990's:

Assumption	National 1992 value
Drinking water intake	2 liters per day (= approx. 2 qts)
Average body weight	70 kg (= 154 lbs.)
Fish consumption rate	6.5 g/day (=0.23 oz./day = approx. 5.2 lbs/year

How are Human Health Criteria Calculated?

Human health criteria (HHC) are calculated using equations with complex inputs. The calculations address chemicals that cause cancer *(carcinogens)* and chemicals that show effects other than cancer *(non-carcinogens).*

The equations used to calculate HHC are for:

1. **Carcinogens in freshwater**
2. **Carcinogens in marine water**
3. **Non-carcinogens in freshwater**
4. **Non-carcinogens in marine water**

NOTE: Just over half of the chemicals are carcinogens (e.g. DDT and PAHs).

Inputs to the Equations

- Almost every input to the equations represents a decision on a policy issue.
- Unlike Idaho and Oregon we do not have existing criteria in state rule to revise; rather we will be developing criteria for the first time.
- Need to make sure public understand factors that go into the development of the criteria

Example Equation Used to Develop Human Health Criteria

Risk Level: risk of additional cancer occurrence.

- Current risk level = risk of one additional occurrence of cancer in one million people.
- The risk level will be reviewed during the rule.

* Organism only equations (marine water criteria)

Carcinogens

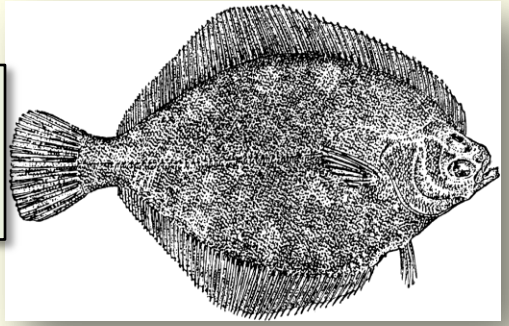
$$HHC^{*} = \frac{RL \times BW}{CSF \times FCR \times BCF}$$

Body weight: adult = 70 kg = 154 lbs

Bioconcentration Factor: describes the *amount of pollutant in the water* compared to the *amount in the fish tissue*. EPA provides this number

Cancer Slope Factor: a measure of the how strong a carcinogen a chemical is. EPA sets this number.

Fish Consumption Rate: the consumption rate that the risk level is tied to.

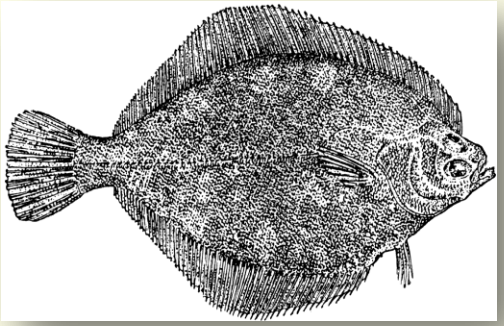


Example Equation Used to Develop Human Health Criteria

These two other inputs are implicit in the equations

- Life Span is 70 years
- Duration of Exposure is 70 years – this is the time an individual is assumed to be eating locally caught fish on a regular basis.

LS/DE = 1



Example Equation Used to Develop Human Health Criteria

Risk Level: risk of additional cancer occurrence.

- Current risk level = risk of one additional occurrence of cancer in one million people.
- The risk level will be reviewed during the rule.

* Organism only equations (marine water criteria)

Carcinogens

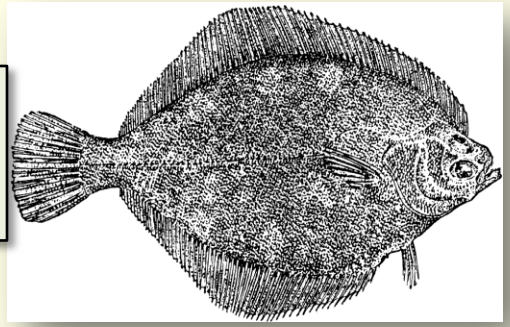
$$HHC^{*} = \frac{RL \times BW}{CSF \times FCR \times BCF}$$

Body weight: adult = 70 kg = 154 lbs

Bioconcentration Factor: describes the *amount of pollutant in the water* compared to the *amount in the fish tissue*. EPA provides this number

Cancer Slope Factor: a measure of the how strong a carcinogen a chemical is. EPA sets this number.

Fish Consumption Rate: the consumption rate that the risk level is tied to.



Risk Level

10^{-6} – means there is **a risk of one additional occurrence of cancer, in one million people, at the given exposure assumptions** (this is compared to an unexposed population).

Numeric	What it means, under specified exposure assumptions
10^{-6}	…risk of one additional occurrence of cancer, in one million people
10^{-5}	…risk of one additional occurrence of cancer, in one hundred thousand people
10^{-4}	…risk of one additional occurrence of cancer, in ten thousand people

Increasing protection

For Washington's current NTR human health criteria, the exposure assumptions are:

–for a **154 lb.** person with **70 years** of daily exposure to:

- **6.5 g/day** of fish and shellfish, and
- **2 liters/day** of untreated surface waters

Risk Level Policy Options

Ecology is still weighing the risk levels. Each of these options will include default language that preserves states the ability to set new criteria risk rates in future rule efforts.

- Option 1
  $1X10^{-5}$ – 1 in 100,000 risk of getting cancer beyond existing risk level from eating fish from the same location for 70 years.

- Option 2
  $1X10^{-6}$ – 1 in 1,000,000 risk of getting cancer beyond existing risk level from eating fish from the same location for 70 years.

Simplified Equation Used to Develop Human Health Criteria

Risk Level: risk of additional cancer occurrence.

- Current risk level = risk of one additional occurrence of cancer in one million people.
- The risk level will be reviewed during the rule.

* Organism only equations (marine water criteria)

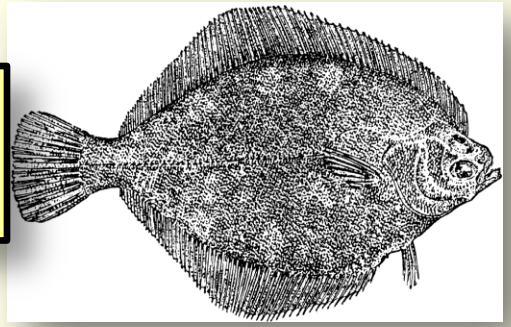
Body weight: adult = 70 kg = 154 lbs

Carcinogens

$$HHC^{*} = \frac{RL \times BW}{CSF \times FCR \times BCF}$$

Bioconcentration Factor: describes the *amount of pollutant in the water* compared to the *amount in the fish tissue*.

Fish Consumption Rate: the consumption rate that the risk level is tied to.



Cancer Slope Factor: a measure of the how strong a carcinogen a chemical is. EPA sets this number.

Fish Consumption Rate Policy Options (simplified)

- What group of fish consumer to protect?
  - Per Capita (everyone = consumers & non-consumers)
  - Consumers only
- What population to apply protection level to?
  - General population
  - Highly exposed population
- What data to use?
  - National data
  - Local data

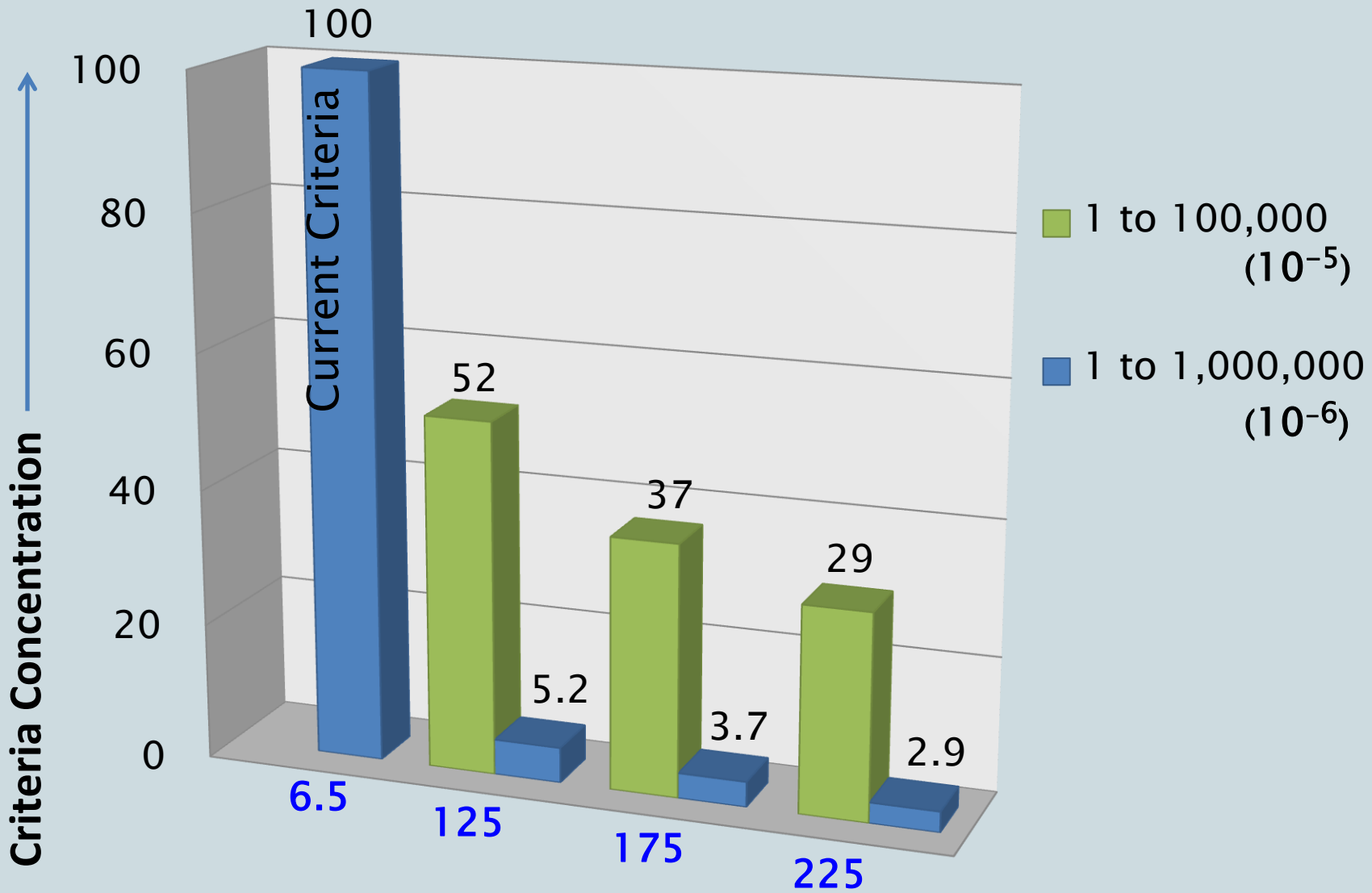
Red Text indicates Ecology's position

Overview of FCR Preliminary Alternatives

	Current	Alternative1	Alternative 2	Alternative 3
Fish Consumption Rate	6.5 grams/day	225 grams/day	175 grams/day	125 grams/day
Basis	Mean of the per capita national data set.	Mean of highest highly exposed fish consumption study and recreation fish consumption.	Negotiated value used in Oregon's updated Human Health Criteria. Based on 90-95th percentile of Oregon Fish Consuming populations.*	Mean of the fish consumption rate surveys of 3 Puget Sound tribes

* October 6, 2008 DEQ Memo

Comparison of Alternatives



Proposed Alternative Fish Consumption Rates (grams/day)

Organism only
Marine criteria

Example Equation Used to Develop Human Health Criteria

Risk Level: risk of additional cancer occurrence.

- Current risk level = risk of one additional occurrence of cancer in one million people.
- The risk level will be reviewed during the rule.

* Organism only equations (marine water criteria)

Carcinogens

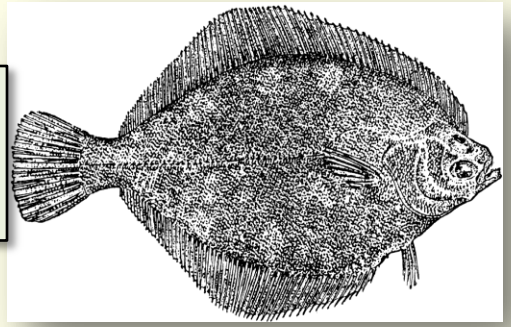
$$HHC^{*} = \frac{RL \times BW}{CSF \times FCR \times BCF}$$

Body weight: adult = 70 kg = 154 lbs

Bioconcentration Factor: describes the *amount of pollutant in the water* compared to the *amount in the fish tissue*. EPA provides this number

Cancer Slope Factor: a measure of the how strong a carcinogen a chemical is. EPA sets this number.

Fish Consumption Rate: the consumption rate that the risk level is tied to.



Simplified Equation Used to Develop Human Health Criteria

Risk Level: risk of additional cancer occurrence.

- Current risk level = risk of one additional occurrence of cancer in one million people.
- The risk level will be reviewed during the rule.

* Organism only equations (marine water criteria)

Body weight: adult = 70 kg = 154 lbs

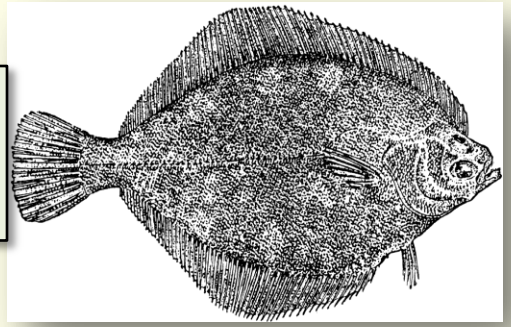
Carcinogens

$$HHC^{*} = \frac{RL \times BW}{CSF \times FCR \times BCF}$$

Bioconcentration Factor: describes the *amount of pollutant in the water* compared to the *amount in the fish tissue*.

Cancer Slope Factor: a measure of the how strong a carcinogen a chemical is. EPA sets this number.

Fish Consumption Rate: the consumption rate that the risk level is tied to.



Simplified Equation Used to Develop Human Health Criteria

Risk Level: risk of additional cancer occurrence.

- Current risk level = risk of one additional occurrence of cancer in one million people.
- The risk level will be reviewed during the rule.

* Organism only equations (marine water criteria)

Body weight: adult = 70 kg = 154 lbs

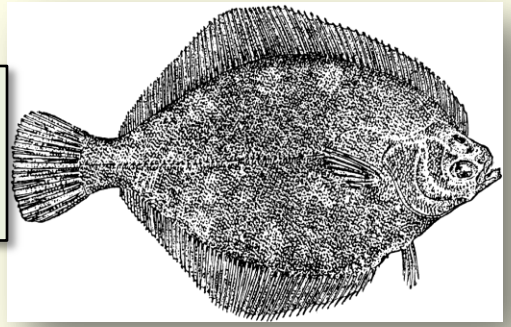
Carcinogens

$$HHC^{*} = \frac{RL \times BW}{CSF \times FCR \times BCF}$$

Bioconcentration Factor: describes the *amount of pollutant in the water* compared to the *amount in the fish tissue*.

Cancer Slope Factor: a measure of the how strong a carcinogen a chemical is. EPA sets this number.

Fish Consumption Rate: the consumption rate that the risk level is tied to.



Simplified Equation Used to Develop Human Health Criteria

Reference Dose: Maximum acceptable dose of a toxic substance

Relative Source Contribution: Contribution of a toxic substance from fish and surface water sources.

* Organism only equations (marine water criteria)

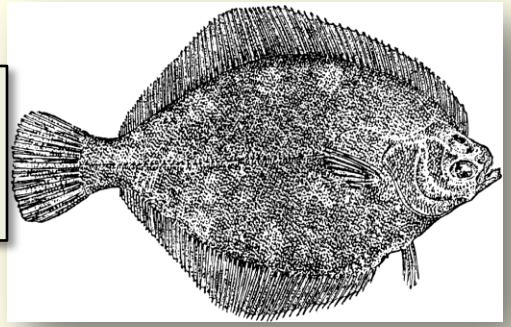
Non-carcinogens

$$HHC^{*} = \frac{RfD \times RSC \times BW}{FCR \times BCF}$$

Body weight: adult = 70 kg = 154 lbs

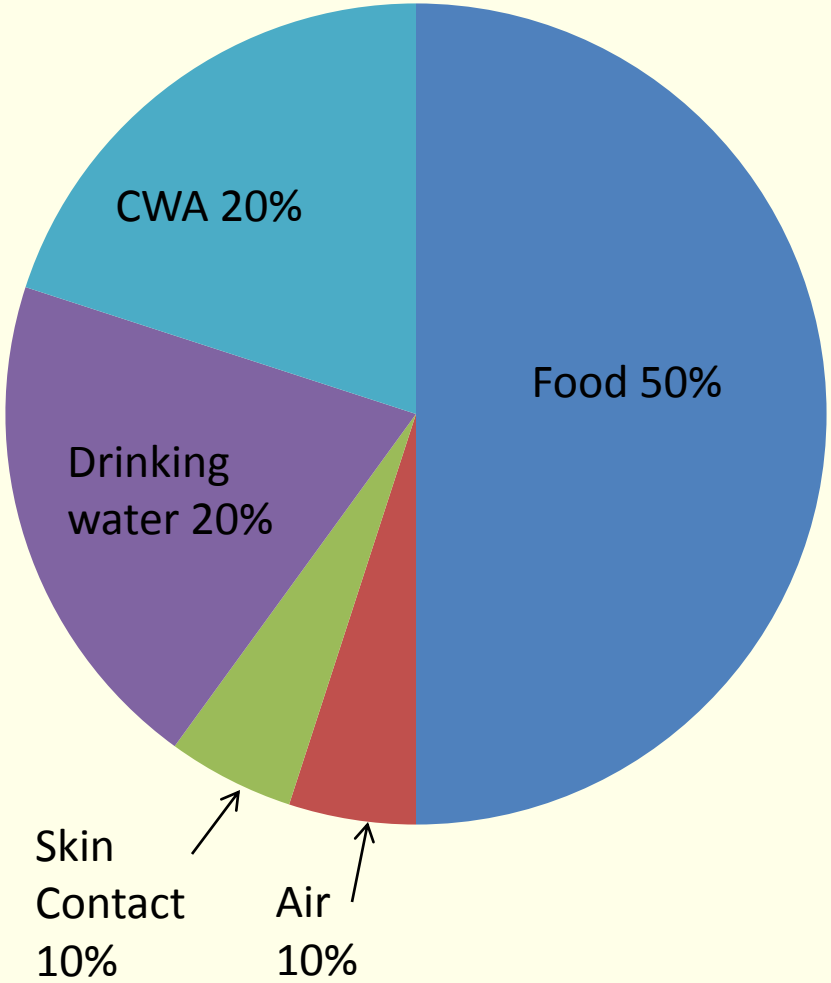
Bioconcentration Factor: describes the *amount of pollutant in the water* compared to the *amount in the fish tissue*. EPA provides this number

Fish Consumption Rate: the consumption rate that the risk level is tied to.



Cancer Slope Factor: a measure of the how strong a carcinogen a chemical is. EPA sets this number.

Relative Source Contribution

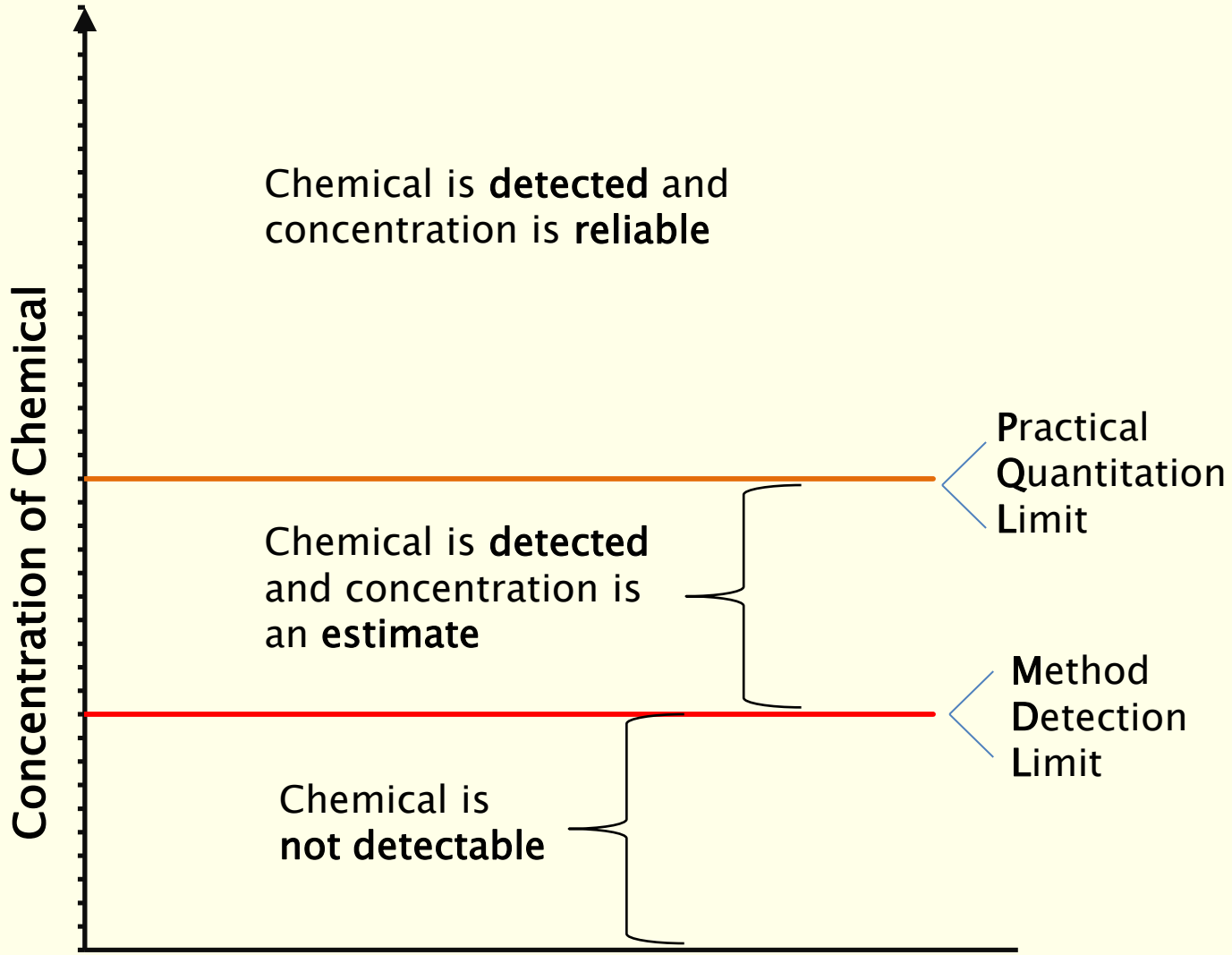


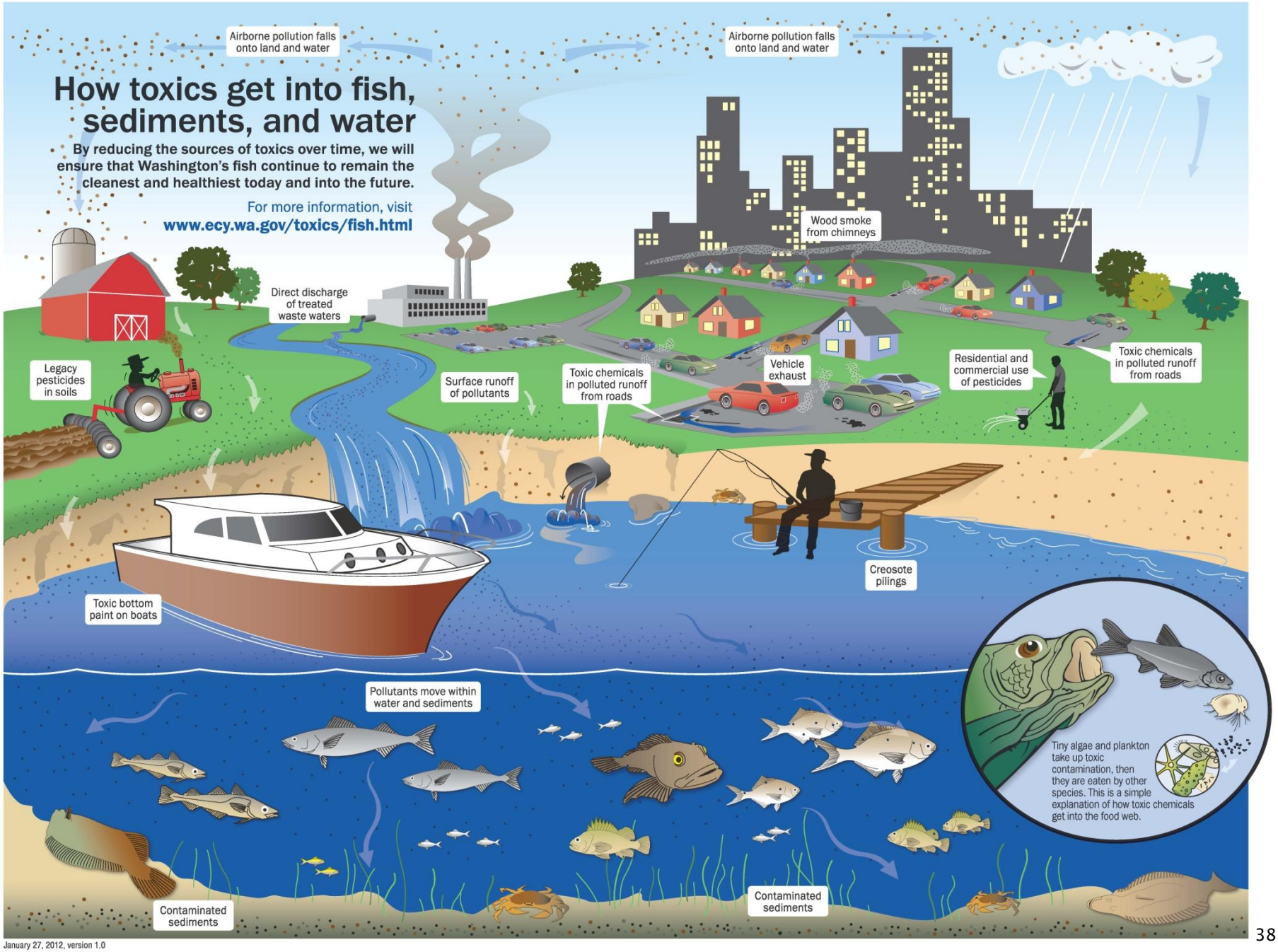
MID MORNING BREAK

Why Develop New Implementation Tools?

- May take a long time to achieve some new standards.
- Need a compliance pathway for dischargers that are doing all the actions possible to remove toxics but cannot get there.
- Technology capability
- Non-permitted sources are a significant part of the problem. We need tools to address unpermitted sources.

Detection Levels





January 27, 2012, version 1.0

Permit Specific Challenges

- Current tools are limited to 5 and 10-year time frames.
- Some situations will need more than 10 years to attain compliance with WQS.
- Would like to encourage toxic reduction activities versus the other option of changing a use on the waterbody – giving up.

Steps for Implementing Human Health Criteria

- Is a mixing zone in place?
- Does facility have a reasonable potential to discharge toxic?
- Can we measure the pollutant in the discharge?

Tools to Help With Implementation

Ecology already has a number of tools that we use when issuing permits (e.g. mixing zones).

We are looking at expanding those tools:

- Language around intake credits
- Additional language around compliance schedules
- Variances

All Tools Will

- Require facilities to **address** their contribution
- Provide **timelines and measurable outcomes** to the NPDES facility that lead to reduction of pollutant.
- Provide clear **accountability**
- Involve **public review** process

How to Choose Implementation Tools

- Use existing process and permit tools (monitoring, use of mixing zones, etc.)
- Can standards be met within the timeframe of a compliance schedule?
- Does the situation meet federal requirements for a variance? Will standards be met within the timeframe of the variance?

Intake Credits

- Accounts for pollutants already present in intake water
- When the mass and concentration of effluent is the same or less than intake water
- "No net addition" of the pollutant
- Add language to Water Quality Standards to clarify conditions allowing intake credits to be used for water quality-based effluent limits (similar to Oregon and Great Lakes Initiative)

Compliance Schedules

- Applies to existing discharges.
- Up to 10 years if needed.
- Requires final limits based on WQ criteria and interim limits that are either numeric or non-numeric (e.g., construction of facilities by a specific date; source identification and controls by specific dates).

Compliance Schedule Rule Alternatives

- Option 1 – Delete the 10 year time limit. Require shortest timeframe possible on a case specific basis.
- Option 2 – Add language to allow 20 year compliance schedule for facilities where there has been a TMDL to address a specific pollutant (2010 legislative language).
- Option 3 – Add language to provide 20 year compliance schedule for areas that do not have a TMDL (goes beyond 2010 legislative intent).

Variance

- Temporary waiver from meeting existing water quality standards
- Applicable to dischargers or waterbodies based on specific evaluations.
- Currently issued for up to 5-years. May be renewed.
- A variance requires a WQS rule modification and USEPA CWA review and approval (including ESA consultation for ESA-applicable rule changes).
- Must meet existing federal conditions

Variance Alternatives

- Would expand timelines for how long a variance would be in effect
- Would specify source control requirements
- Would look at a variety of variance situations
  - Facility Specific
  - NPDES Sector Specific (multi-disharger)
  - Waterbody specific (statewide)
- Options for addressing non-permitted sources

Ecology will seek EPA approval of a "programatic variance recipe". This would allow the state to issue variances if they were following this specific recipe.

Variances – Timelines–Duration

- Option 1 – Specific to the specific variance being proposed
- Option 2 – Set in rule the expectation that variance could not exceed a specific time period (eg. 40 years or some other specified duration)
- Option 3 – do not specify in rule how long a variance can be in effect.

Variances – Timelines–Review

- Option 1– When specific permit comes up for renewal
- Option 2 – the actual variance sets a specific time/process for review
- Option 3 – put into rule a specific review schedule and process.

Other Ideas

- We have reviewed other implementation options in detail.
- We are only proposing options that meet CWA rules
- Open to other ideas that comply with Clean Water Act

Challenging Chemicals

- Very pervasive—see them everywhere
- Will take many years to get them out of the environment even while dischargers doing all possible actions
- Air deposition is a big source

Arsenic

Specific Challenges

- Naturally occurring metal
- We see it everywhere – but it is also a human influenced pollutant

Alternative

- Look at the risk level similar to Oregon
- Consider basing criteria on Safe Drinking Water Act levels for fresh water

PCBs

Specific Challenges

Some level PCBs are present in nearly all fish we test – even in undeveloped areas.

Alternatives

- Waterbody-wide variance or statewide variance (does not preclude the option of individual discharger variances) at another rule process.
- Look at a different risk level for PCBs. Base criteria on health effects vs. cancer effects.

Mercury

Specific Challenges

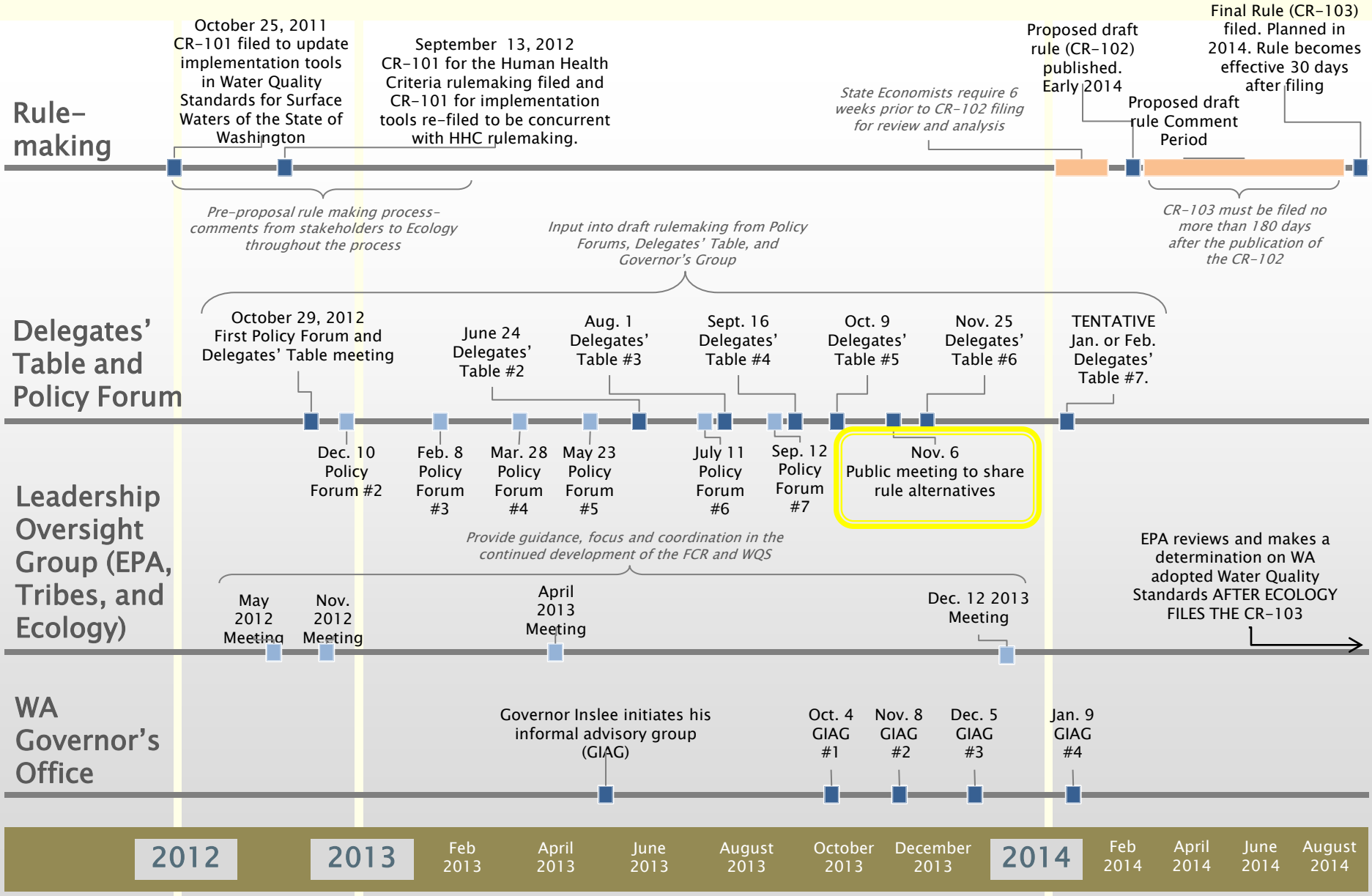
- Extra challenge for methyl mercury–how to translate tissue values into effluent limits

- Atmospheric deposition significant source

- **Alternatives**:
  - Statewide variance
  - Move forward with mercury criteria calculated as other HHC
  - Wait to adopt methyl mercury criteria

Timeline for Washington Water Quality Standards Rule Making

DRAFT 10/14/2013



Schedule for Formal Draft Rule Making Effort

Ecology plans to propose draft rule language in early 2014.

The draft rule package will include State Administrative Procedures Act materials:

- Code Reviser (CR) 102 Form
- Cost Benefit Analysis
- Small Business Economic Impact Statement
- State Environmental Policy Act (SEPA) Checklist
- Focus sheets, hearing announcements and other related documents

Important Steps to be Aware of after Washington Adopts New Rules

- EPA federal approval is required before the rules become effective for federal actions.
- If EPA issues a disapproval for HHC – WA has 90 days to resubmit or EPA will start federal promulgation.

Thanks- Afternoon Session

- Everybody is welcome.
- We will go into much more detail and is geared to people that have been following these issues more closely.
- Assumes that the audience already has an understanding of the key issues