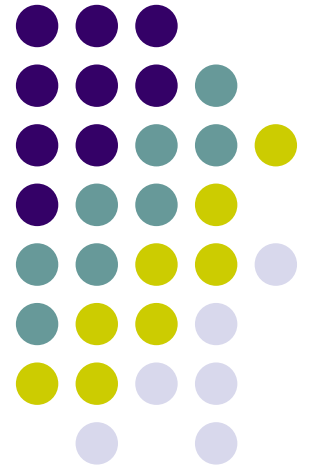


# Water Quality Standards Overview

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The role of fish consumption  
rates in water quality criteria

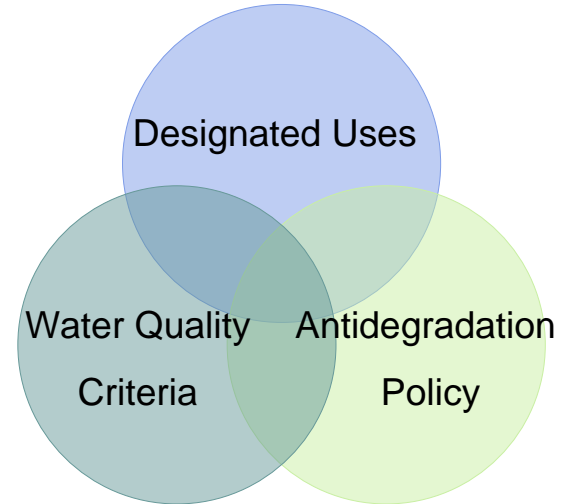


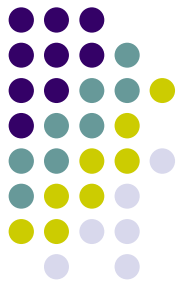
# What are Water Quality Standards (WQS)?



- WQS are the foundation of state/tribal water quality-based pollution control programs under the Clean Water Act.
- WQS are to protect public health or welfare, enhance the quality of the water and serve the purposes of the Clean Water Act.

WQS are composed of:

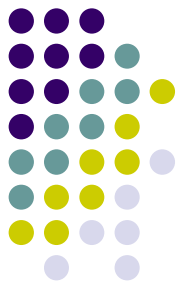




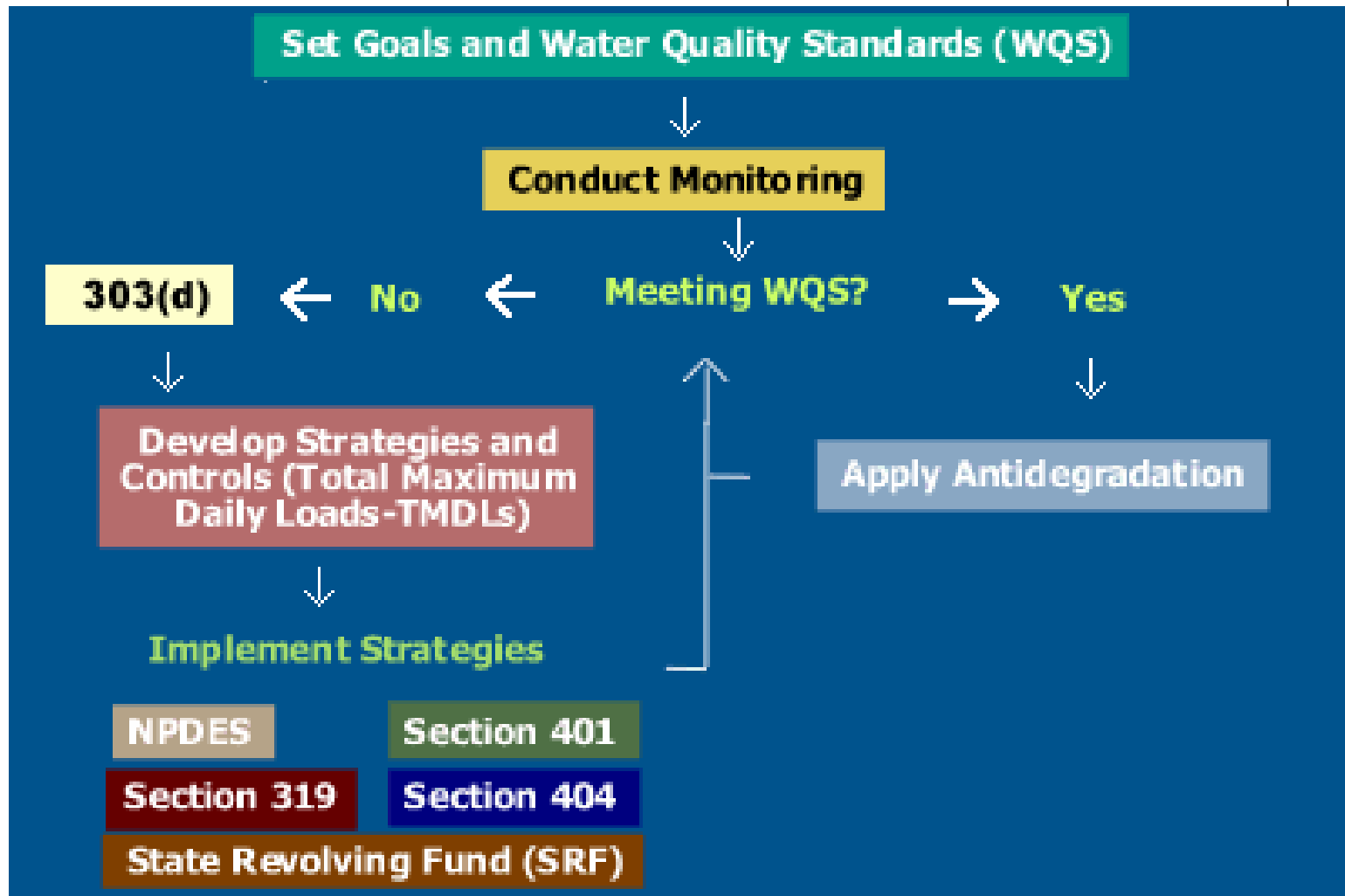
# What Are WQS Not?

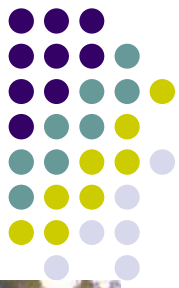
- WQS themselves are not a clean-up or remediation process;
  - When implemented, WQS are often used to set goals for restoring water quality to protect uses;
  - They can also be used in other regulatory programs, such as Superfund (CERCLA)





# What function do WQS serve?



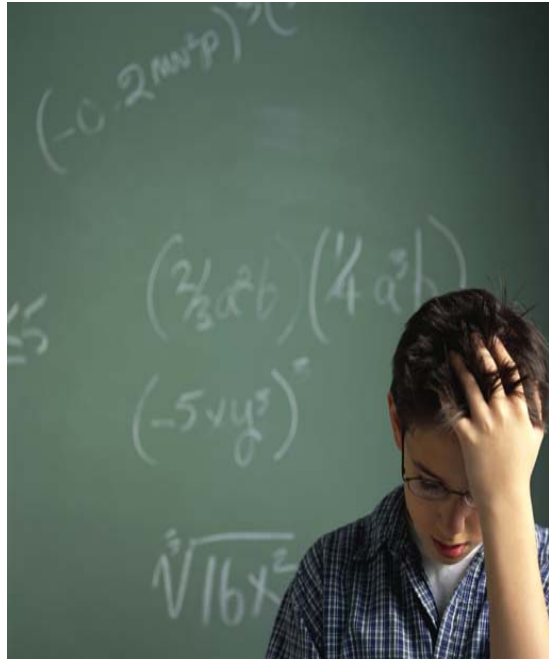
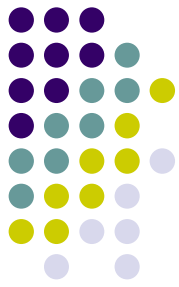


# Water Quality Criteria

- EPA publishes guidance values for two types of numeric criteria:
  - Criteria to protect aquatic life; and
  - Criteria to protect human health.
- Human health criterion: the highest concentration of a pollutant in water that is not expected to pose a significant risk to human health.
- EPA publishes two types of human health guidance values:
  - Those to protect individuals consuming fish and water; and
  - Those to protect individuals consuming fish only.



# Numeric Human Health Equations



## Carcinogen Equation (General)

(Risk Factor/**Cancer Toxicity**) \* Body Weight

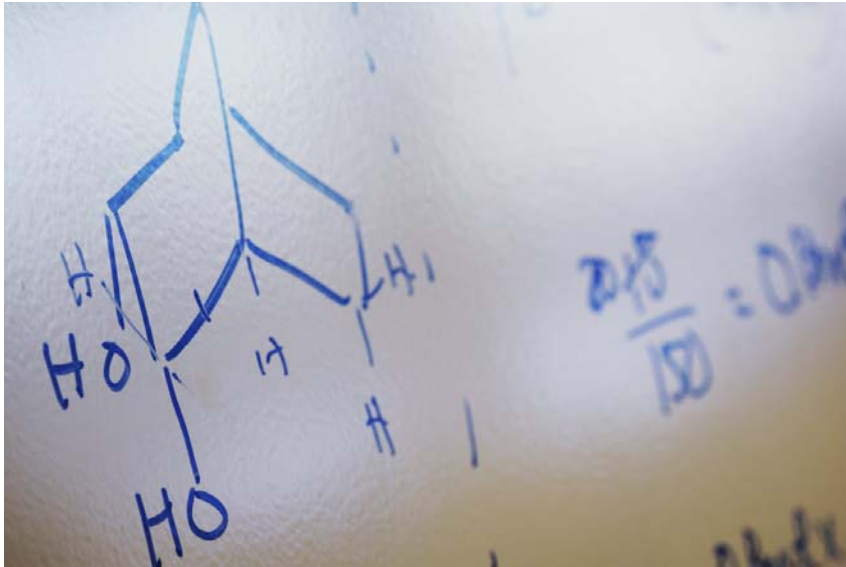
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Drinking Water + (**Fish Consumption Rate** /Bioconcentration Factor)

## Non-Carcinogen Equation (General)

((**Non Cancer Toxicity**) X (Body Weight /Drinking Water Intake) + (**Fish Consumption Rate** \*Bioconcentration Factor))

# Human Health Criteria: Toxicity



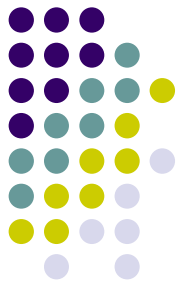
- EPA's guidance criteria values consider **toxicity** and **exposure**.

## CARCINOGENS:

- $q1^*$ , the cancer potency factor, generally used for cancer health assessments.

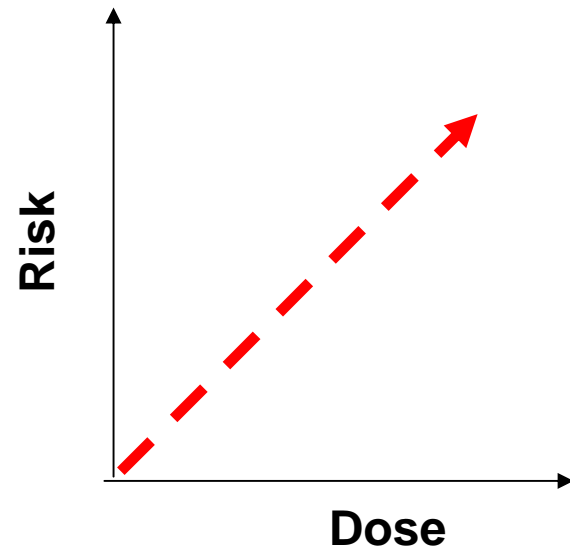
## NONCARCINOGENS:

- Reference Dose (RfD)- Estimate of exposure that is likely to be without an appreciable risk of deleterious effects during a lifetime.



# Non Threshold Effects

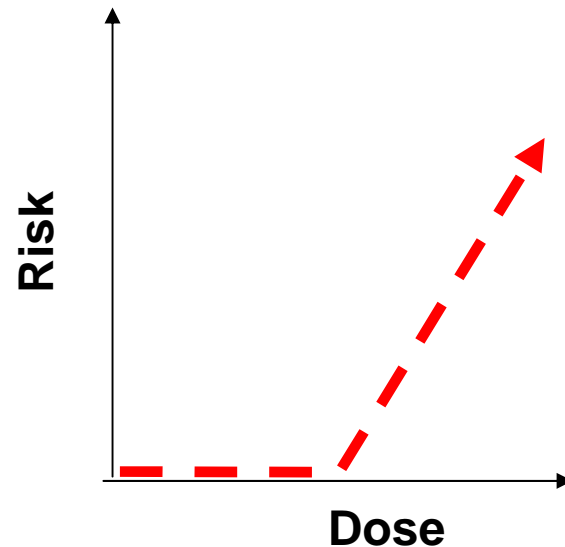
- Traditionally used for carcinogens in CWA Section 304(a) guidance.
- All levels of exposure pose some probability of an adverse response
- Incremental risk levels can be calculated
- EPA targets a risk level of one in one million ( $10^{-6}$ )



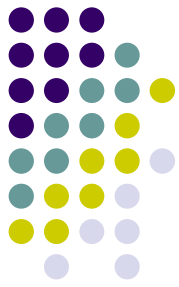


# Threshold Effects

- Traditionally used for noncarcinogens in CWA Section 304(a) guidance.
- Exposures to some finite value are expected to be without adverse effect on human health

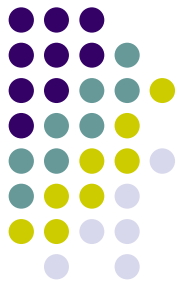


# Exposure: Human Health Criteria Parameter and Protection Goals



- EPA generally assumes daily exposure over the course of a lifetime.
- EPA generally assigns a mix of average values and high end values (e.g., 90<sup>th</sup> percentile) for exposure parameters such as ingestion rates and body weight.
- EPA's criteria are derived to protect the majority of the general population.

# Human Health Criteria: Exposure



- To assess exposure, EPA uses default exposure assumptions based on national data:
  - A drinking water intake of 2 liters per day;
  - An average body weight of 70 kg;
  - A fish intake rate of 17.5 g/day
- Most recent guidance also includes Relative Source Contribution.

**Average  
Exposure =**

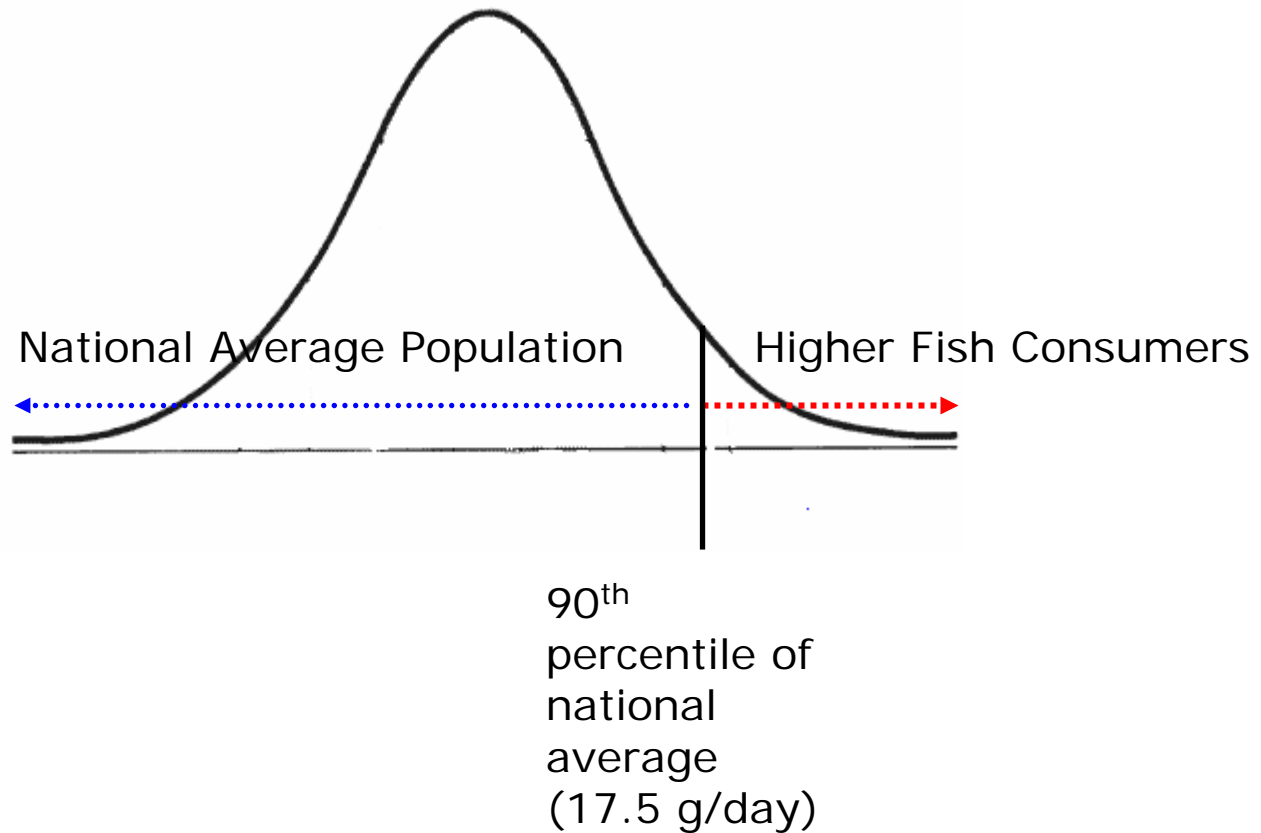
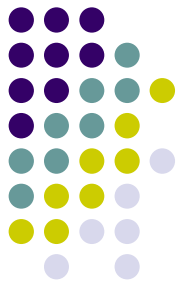


# EPA's Default Fish Consumption Rates

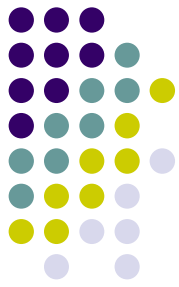


- EPA's uses default fish consumption rate 17.5 g/day in national guidance criteria values.
- EPA also has a default subsistence fish consumption value of 142.4 g/day
- Default fish consumption rates are not intended to reflect a limit of consumption- instead used to reflect actual consumption rates

# What does 'percentile' mean?

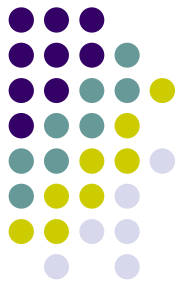


# EPA's Preference Hierarchy



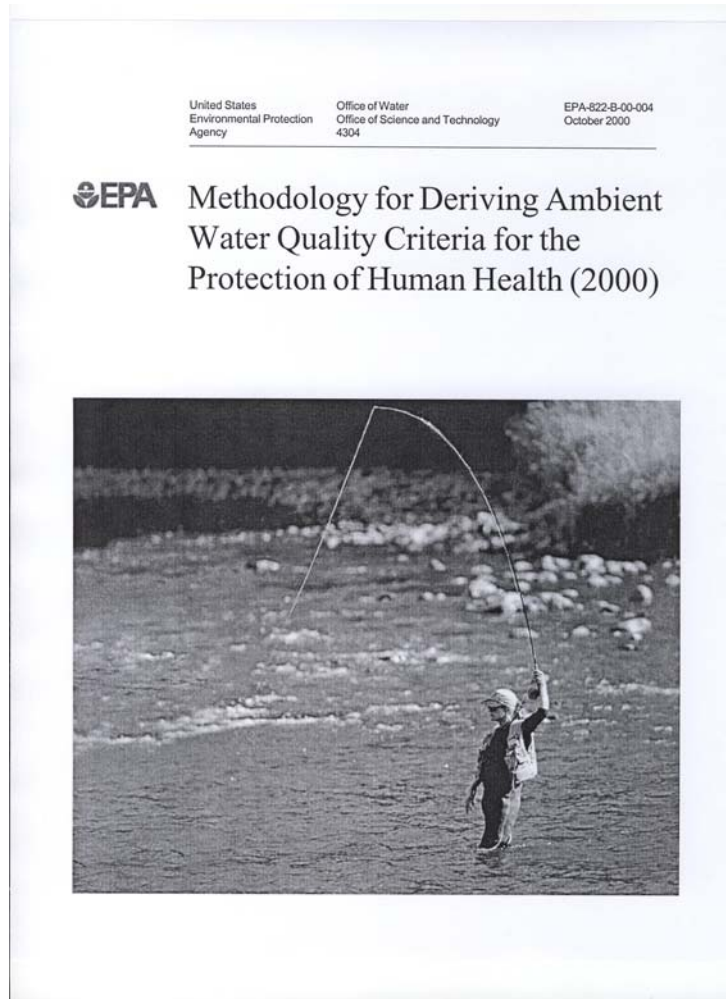
- As the level of fish intake varies with geographic location, EPA suggests a four preference hierarchy when deriving consumption rates to calculate water quality criteria:
  - (1) use of local data;
  - (2) use of data reflecting similar geography/population groups;
  - (3) use of data from national surveys; and
  - (4) use of EPA's default intake rates.
- OR adopted EPA's CWA Section 304(a) guidance values, which are based on EPA's default intake rate of 17.5 g/day.

# Summary



- WQS are the foundation of state/tribal water quality-based pollution control programs under the Clean Water Act.
- Water quality criteria are not clean up levels, but represent the level at which a chemical can be discharged into a waterbody while still protecting the use(s).
- Human health criteria have two components: toxicity of a chemical and exposure to that chemical.
- One exposure variable is the fish consumption rate.
- EPA's current guidance criteria values are based on a national fish consumption rate of 17.5 g/day; which represents the 90<sup>th</sup> percentile of fish consumers based on national data.
- EPA's preference hierarchy for choosing a fish consumption rate is: 1) use of local data, 2) use of data reflecting similar geography/population groups; 3) use of data from national surveys; and 4) use of EPA's default intake rates.

# Resources



- EPA's Human Health Methodology:  
<http://www.epa.gov/waterscience/criteria/humanhealth/method/method.html>
- EPA's Current CWA Section 304(a) Criteria Guidance Values:  
<http://www.epa.gov/waterscience/criteria/nrwqe-2006.pdf>



**Questions?**