



Water Quality Standards Human Health Criteria Technical Workgroup Meeting #2

Alaska Department of Environmental Conservation
Division of Water- Water Quality Standards
September 2015



Webinar instructions:

- 💧 For audio please dial: **1-800-315-6338**
- 💧 Access code: **51851**
- 💧 Note that all lines will be muted during the presentations

- 💧 Public testimony will be taken at the end of the meeting

PLEASE BE RESPECTFUL OF ALL PARTICIPANTS

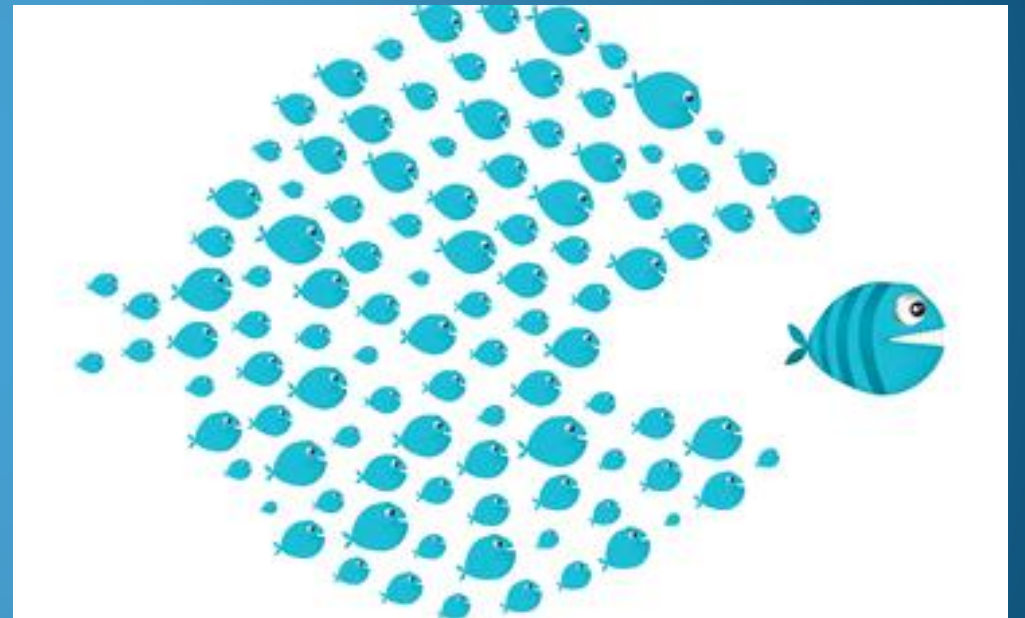
Purpose of Technical Workgroup

- Provide technical feedback on issues associated with development of human health criteria (HHC) in state water quality standards

 - Develop a Summary Report**

- Identify key sources of information that may be applicable to the process

- Ensure a variety of stakeholder voices are heard



Meeting Outcome

Give DEC feedback on

1. How should we use various fish consumption information?
2. Should Alaska use consumers only or non-consumers too?
3. What are the population and subpopulations of concern?

Questions to be considered by the Workgroup

- 💧 Issue #1: What information about fish consumption and fish consumption rates is available to inform the HHC process?
- 💧 Issue #2: What options does DEC have for developing criteria on a statewide/regional/site specific basis?
- 💧 Issue #2a: What modeling approach(es) should DEC consider (Deterministic v. Probabilistic)?
- 💧 **Issue #3: What is the appropriate level of protection for Alaska and its residents?**
- 💧 Issue #3a: How should DEC apply bioconcentration v. bioaccumulation factors?
- 💧 Issue #3b: How should DEC address concerns about its carcinogenic risk value?



Questions to be considered by the Workgroup

- 💧 Issue #4a: What species should Alaska include for deriving a fish consumption rate?
 - 💧 Marine Fish (i.e., salmon?;)
 - 💧 If we include- Can we adjust FCR values based on lipid content?
 - 💧 Marine Mammals (Alaska would be the only state that considers this issue)

- 💧 Issue #4b: What is the role of Relative Source Contribution (RSC) in relation to fish consumption rates and what are Alaska's options?

- 💧 Issue #5: What are Alaska's options for implementing the proposed criteria?
 - Existing tools (compliance schedules) and new tools (variances, intake credits)

Workgroup Schedule

How are HHC derived?

💧 The HHC **formula** determines the degree of risk

$$\text{Risk} = \text{Toxicity} * \text{Exposure} * \text{Uncertainty}$$

-Science provides us with basic information

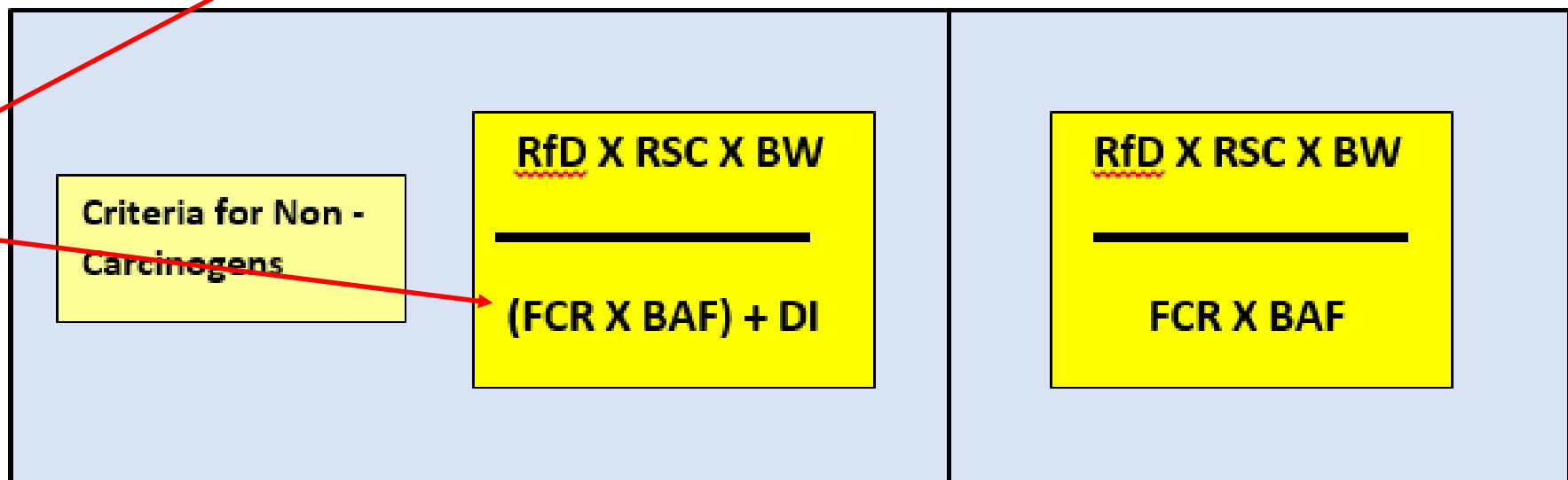
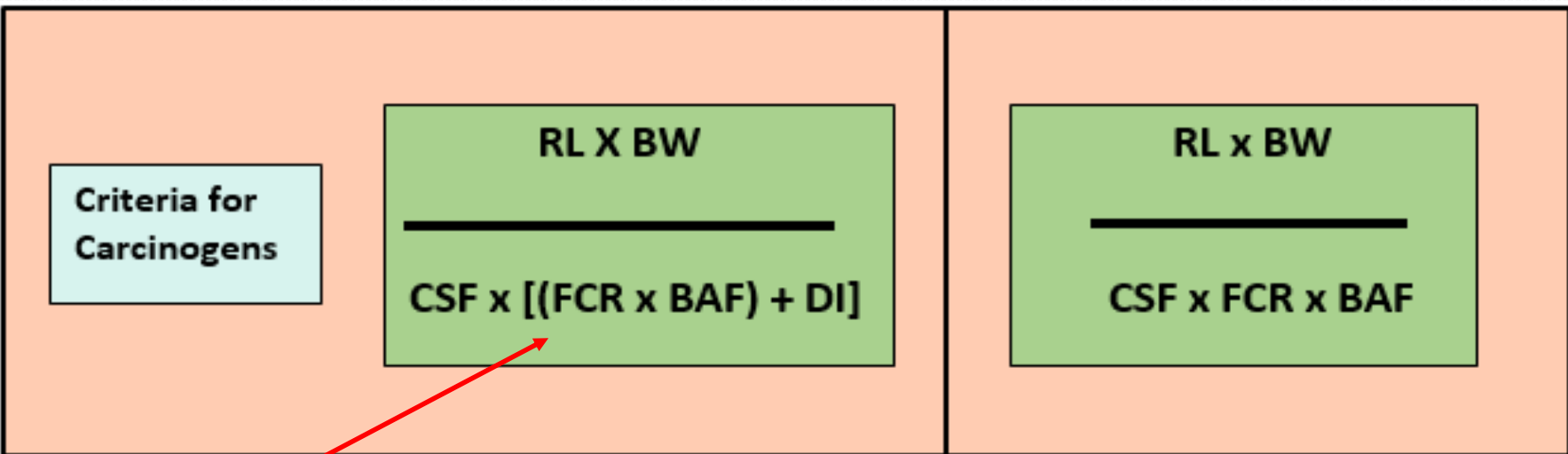
-Policy tells us how to apply that information

-Risk Management is a matter of publicly weighing options and making a decision

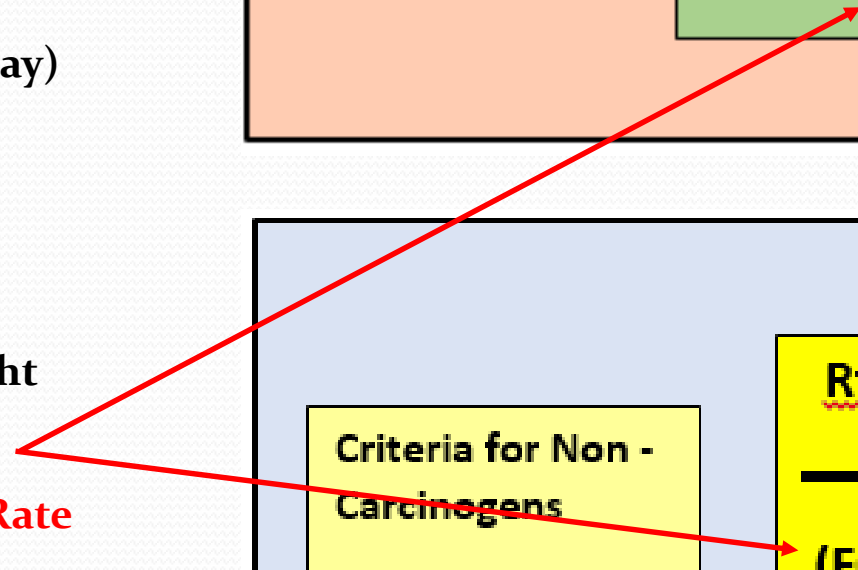
HHC Equation(s)

Freshwater Criteria
Consumption of Organisms **and** Water

Marine Criteria
Consumption of Organisms
Only



- RfD: Reference Dose (mg/Kg-day)
- RSC: Relative Source Contribution
- BW: Body Weight
- FCR: Fish Consumption Rate
- BAF: Bioaccumulation
- DI: Drinking Water



What information about fish consumption rate is available to inform the HHC process?

Group Discussion

Discussion: Fish Consumption Information

1. Fish Consumption Literature Review
 - Should this be a one time review or an ongoing catalog?
2. Ongoing dietary surveys
 - Should DEC develop a recommended survey methodology?
 - Should DEC develop a rating system to weight survey data?

Discussion: Fish Consumption Information

3. ADF&G community surveys
 - What limitations should be considered for using ADFG surveys for human health criteria?
 - How do we use in combination with local dietary surveys?
4. How do we use other related studies not developed specifically for HHC?



What is the appropriate level of protection for Alaska?

“Because of data gaps, as well as uncertainty and variability in the available data, risk cannot be known or calculated with absolute certainty.” (EPA 2004)

Today’s conversation is going to focus around **exposure issues (i.e, FCR)**



Who are you trying to protect?

- 💧 EPA 2000: States and authorized Tribes may use either high-end values (such as the 90th or 95th percentile values) or average values for an identified population that they plan to protect (e.g., subsistence fishers, sport fishers, or the general population).
- 💧 EPA 2013 (FAQ) In general, EPA considers protection of the general population to be represented by the 90th percentile of a total exposure distribution utilizing a “per capita” fish consumption distribution. If present in the state, subsistence fishers should be considered on a site specific basis.



Fish consumption data needed for water quality standards development

1. **Representative of population of interest**
2. Data required for general population and high consumers
3. Characterizes consumption of desired groups
4. Rates not suppressed due to environmental contamination-perceived or real



HHC Population of interest: Consumers or Non-Consumers

- 💧 Concept: All populations will have different consumption habits
 - 💧 Just because you're a low consumer doesn't mean that you're a non-consumer
 - 💧 Misclassifying low consumers as non-consumers can lead to over-estimation of FCR mean and median values- shifts the mean and median when you trim out non-consumers.

- 💧 Question #1: Why should Alaska either include or exclude **non-consumers**?

Who is a non-consumer?

- 💧 Someone who reports never eating fish or simply someone who reports not eating fish on a regular basis?
- 💧 Over what time frame? If you ate fish a year ago but not since, are you a consumer?
- 💧 What assumptions are we making and how do you manage the statistics?

- 💧 How do we know?
 - 💧 Dietary surveys
 - 💧 Food frequency approach
 - 💧 Short-term dietary recall

Example

- 💧 Two hypothetical distributions
 - 💧 10% self-identified non-consumers
 - 💧 10 % self-identified non-consumers and 15% consumers mis-identified as having an FCR of 0
- 💧 Sample size of 100 individuals

Hypothetical Distribution #1, 10% of the observations at zero (nonconsumers)

Median = the middle of
the data set = 17.5

0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
0.5	0.5	0.5	0.5	0.5	1	2	4	5	6	7	7	9	9	10	10	10	11	11	12
13	13	13	14	14	15	15	16	16	17	18	18	20	22	22	24	27	28	30	33
34	37	39	42	43	45	48	51	53	54	57	58	59	63	65	66	69	75	77	80
86	88	91	97	99	108	112	120	125	127	135	151	164	169	174	188	210	248	298	345

Mean = $\frac{\text{sum of observations}}{\text{number of observations}} = \frac{4751.5}{100} = 47.515$

90th percentile = 90% of data below and 10% above = 127.8

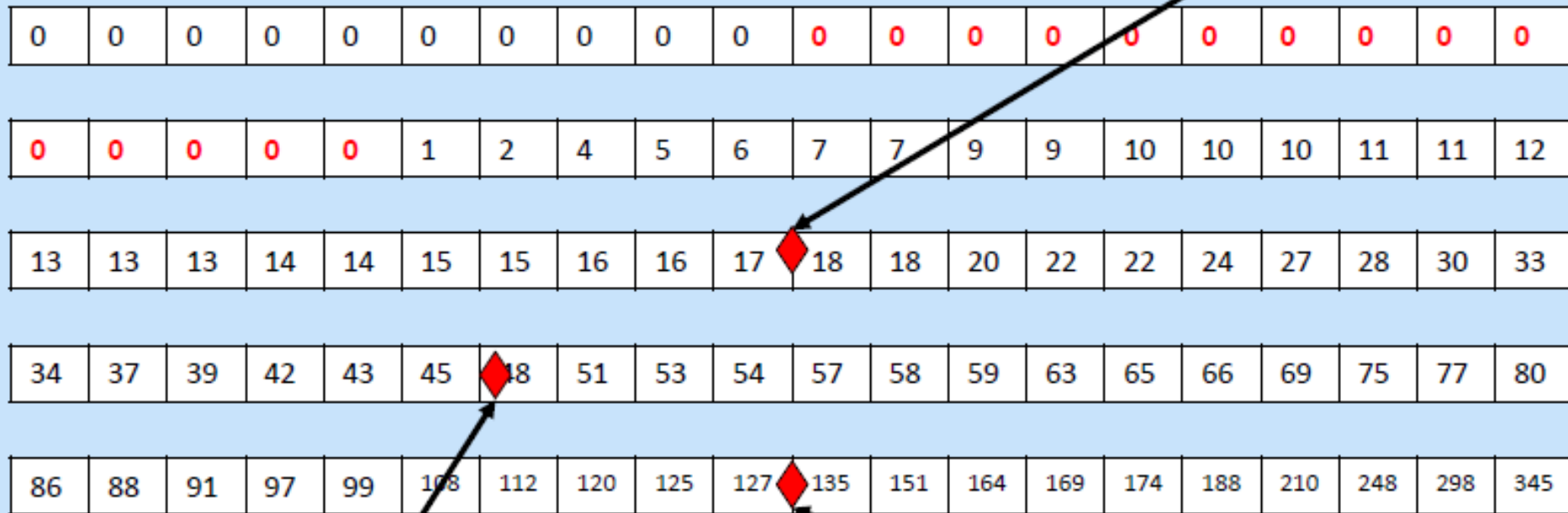
Credit: Cheryl Niemi, WADOE



Hypothetical Distribution #2,

10% nonconsumers + 15% of previous consumers with mistaken FCR=0

Median = the middle of the data set = 17.5



Mean = $\frac{\text{sum of observations}}{\text{number of observations}} = \frac{4748}{100} = 47.48$

90th percentile = 90% of data below and 10% above = 127.8

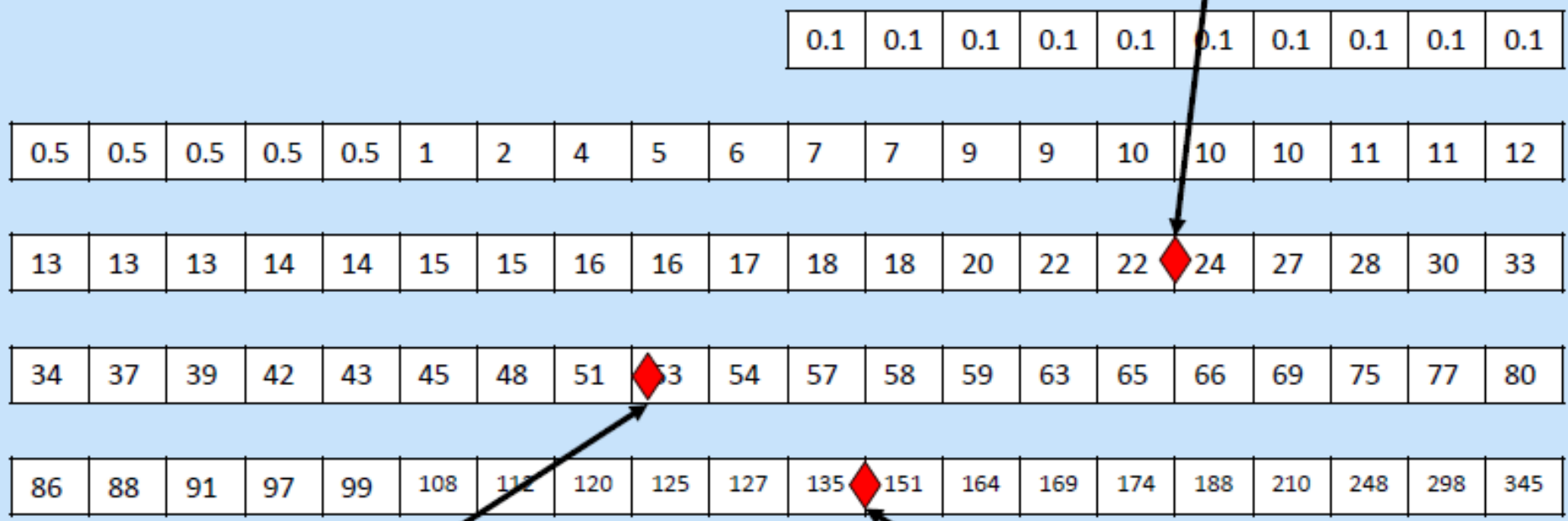


Hypothetical Distribution #1, without zeros

This is what we would have if removing the nonconsumers from our data

90 remaining observations used in statistics

Median = the middle of the data set = 23.0



$$\text{Mean} = \frac{\text{sum of observations}}{\text{number of observations}} = \frac{4751.5}{90} = 52.8$$

90th percentile = 90% of data below and 10% above = 136.6



Hypothetical Distribution #2, without zeros

This is what we would have if removing the nonconsumers and the consumers with an estimated FCR = 0

Median = the middle of the data set = 39.0

75 remaining observations used in statistics

1	2	4	5	6	7	7	9	9	10	10	10	11	11	12					
13	13	13	14	14	15	15	16	16	17	18	18	20	22	22	24	27	28	30	33
34	37	40	42	43	45	48	51	53	54	57	58	59	63	65	66	69	75	77	80
86	88	91	97	99	108	112	120	125	127	135	151	164	169	174	188	210	248	298	345

$$\text{Mean} = \frac{\text{sum of observations}}{\text{number of observations}} = \frac{4748}{75} = 63.0$$

90th percentile = 90% of data below and 10% above = 158.8



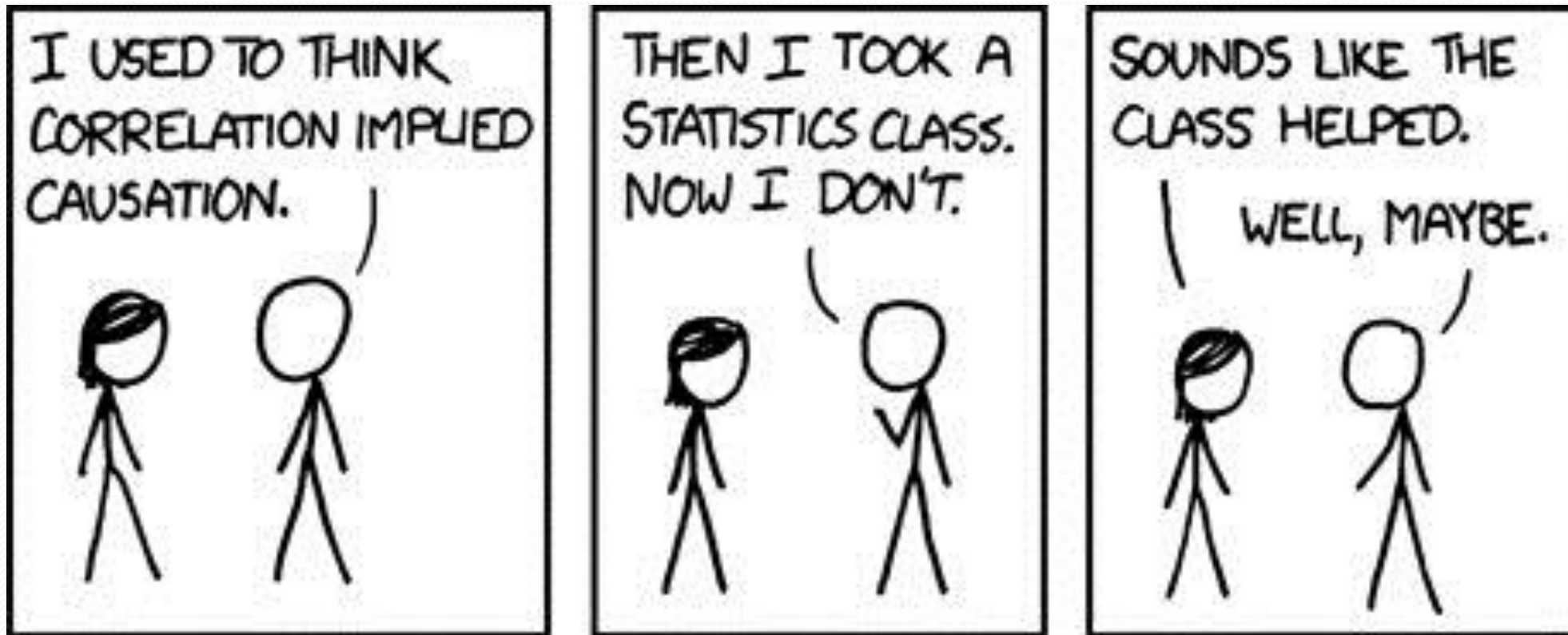
Tabulated Statistics

Distribution 1 (True)

Distribution 2 (15% Misidentified Nonconsumers)

	Entire Population	Trimmed		Entire Population	Trimmed
Median	17.5	23.0	Median	17.5	39.0
Mean	47.515	52.8	Mean	47.480	63.3
90th %tile	127.8	136.6	90th %tile	127.8	158.8

Discussion: Consumers or Non-consumers?





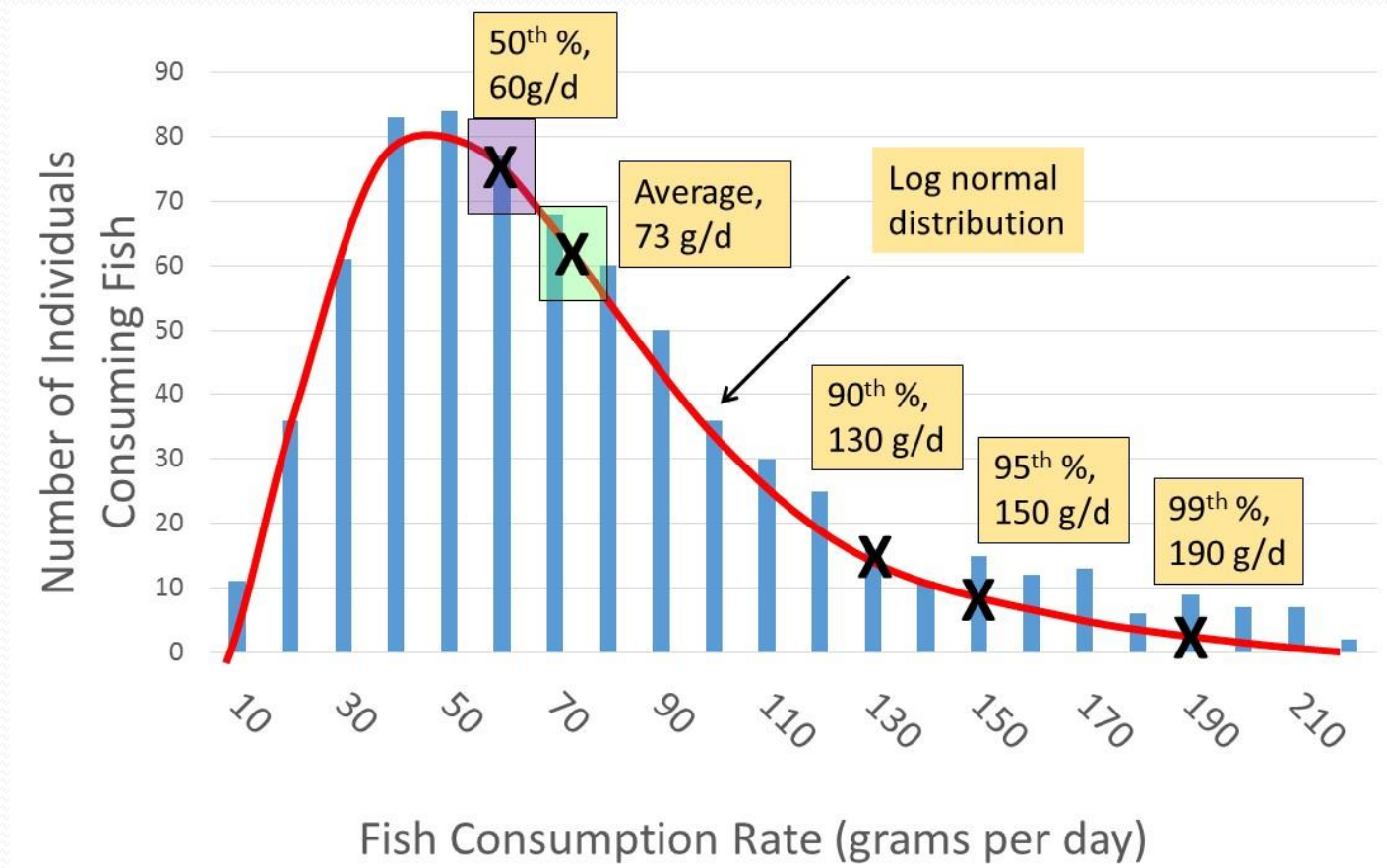
Population of Interest

Question #2: Should Alaska be focusing its resources on identification and development of an FCR for the general or a subset(s) of the general population?

HHC: Population of interest: General or subset?

💧 The fish consumption rate (FCR) in the HHC should reflect the rate of consumption by the **population of concern**

💧 (Mean, 90th, 95th, 99th)





Different populations may have distinctly different values to choose from

- 💧 General population: Includes everyone
- 💧 Per capita: Population that is sampled for a particular parameter;
 - 💧 May include all people sampled for fish consumption, sex, yearly income...
 - 💧 For the purposes of FCR/dietary studies, per capita data may be divided into region, sex, consumer v. nonconsumer, etc...
- 💧 Consumer-only intake rates refer to the amount of aquatic life (fish and shellfish generally) that would be consumed during a specified sampling period
- 💧 Highly exposed sub populations: Specific groups (e.g., recreational fishers, subsistence users).

Who are “Highly Exposed” populations/consumers

- 💧 How do we know who are “high” consumers?
 - 💧 Dietary studies conducted as part of HHC Literature Review
 - 💧 ADF&G Harvest Database
 - 💧 Studies conducted in other Northwest states
 - 💧 We just know...

- 💧 Questions:
 1. Is it appropriate to only look at the high consumer values to establish a “general” FCR and statewide criteria?
 2. How high is high enough?

General v. Subpopulation Concerns

General Population

- 💧 Similar to a census- all parties are questioned in a similar manner
- 💧 Every member of the population has the potential to be surveyed
- 💧 Methodology allows data to be “trimmed” at a later time-

Targeted Subpopulation

- 💧 Targets a specific subset of population
- 💧 Targets *suspected* high consumers
- 💧 Numerous site-specific factors may influence the outcome.

General Population Distribution

Advantages

- 💧 Ability to select a rate that is representative of the population as a whole
- 💧 Ability to determine the level of protection that the state wants to achieve

Disadvantages

- 💧 Possible that high or extremely high consumers may not be protected at an acceptable rate (i.e., 10^{-4})
- 💧 Requires that the survey is designed to address potential biases (e.g., mislabel non-consumers or high consumers)

Targeted Subpopulation Distribution

Advantages

- 💧 Ability to demonstrate protection for all consumers regardless of level
- 💧 Demonstrates importance of protecting high-consuming population(s)

Disadvantages

- 💧 Difficult to apply results to the general population- including high consumers within the general population.
- 💧 Requires the survey to accurately identify high-consumers prior to sampling to ensure representativeness

What have other states done?

Washington

- 💧 Is basing protection on consumers-only
- 💧 Is using a 175 g/day value which is ~ mean of three tribal surveys

Idaho

- 💧 Is basing protection on consumers-only
- 💧 Considering the 90th of general population following statewide survey and the mean of higher consuming subpop. values

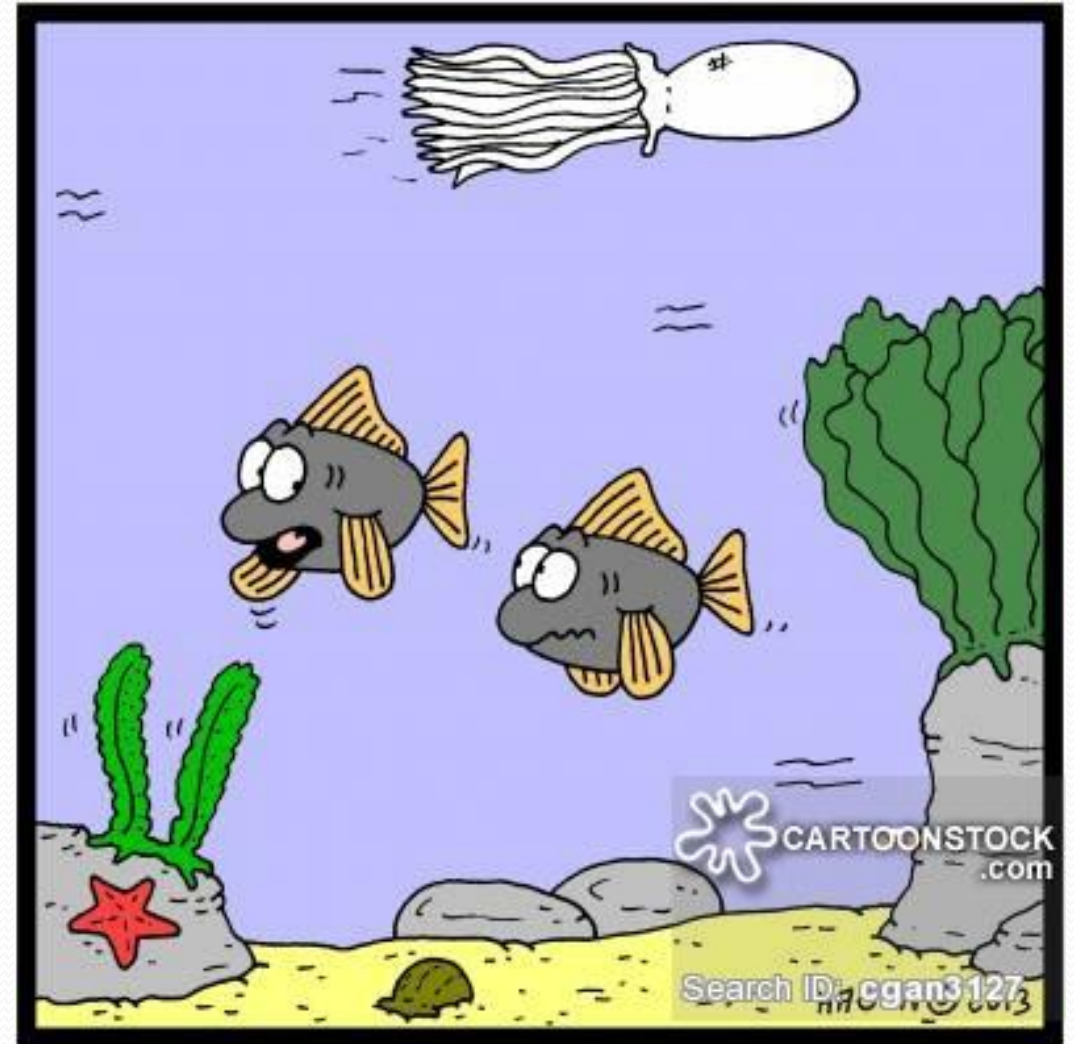


Where does EPA stand?

- 💧 EPA recommends “ensuring that the fish intake level chosen is protective of **highly exposed** individuals in the population
- 💧 EPA also believes that the criteria based on a 10^{-5} risk level are acceptable for the general population as long as States and authorized Tribes ensure that the risk to more highly exposed subgroups (sport fishers or subsistence fishers) does not exceed the 10^{-4} level or 1 in 10,000
- 💧 Essentially- you need both sets of data to make an accurate comparison

Discussion

- Population of Interest?
- Subpopulations?
- What percentiles?
- Regional HHC?



Yes, there's safety in numbers, but only when the number is large: Right now, we have only a 50% chance of surviving a deadly attack...

Public Comment



Next Technical Workgroup Meeting

- 💧 October 30th following the HHC Public Workshop
- 💧 3-5 pm
- 💧 Voth Hall, Anchorage
- 💧 Teleconference will be available.

- 💧 **Topic: Issue 4a: What should Alaska include when deriving a Fish Consumption Rate?**
 - 💧 Sources of fish and shellfish
 - 💧 Local v. commercial
 - 💧 Role of salmon- what OR/WA/ID did and didn't do
 - 💧 Role of marine mammals- *May be tabled for a later discussion*