Fish & Shellfish Consumption Rate Values for Public Review & Comment

Public Workshop

April 2, 2008

Pendleton, Oregon

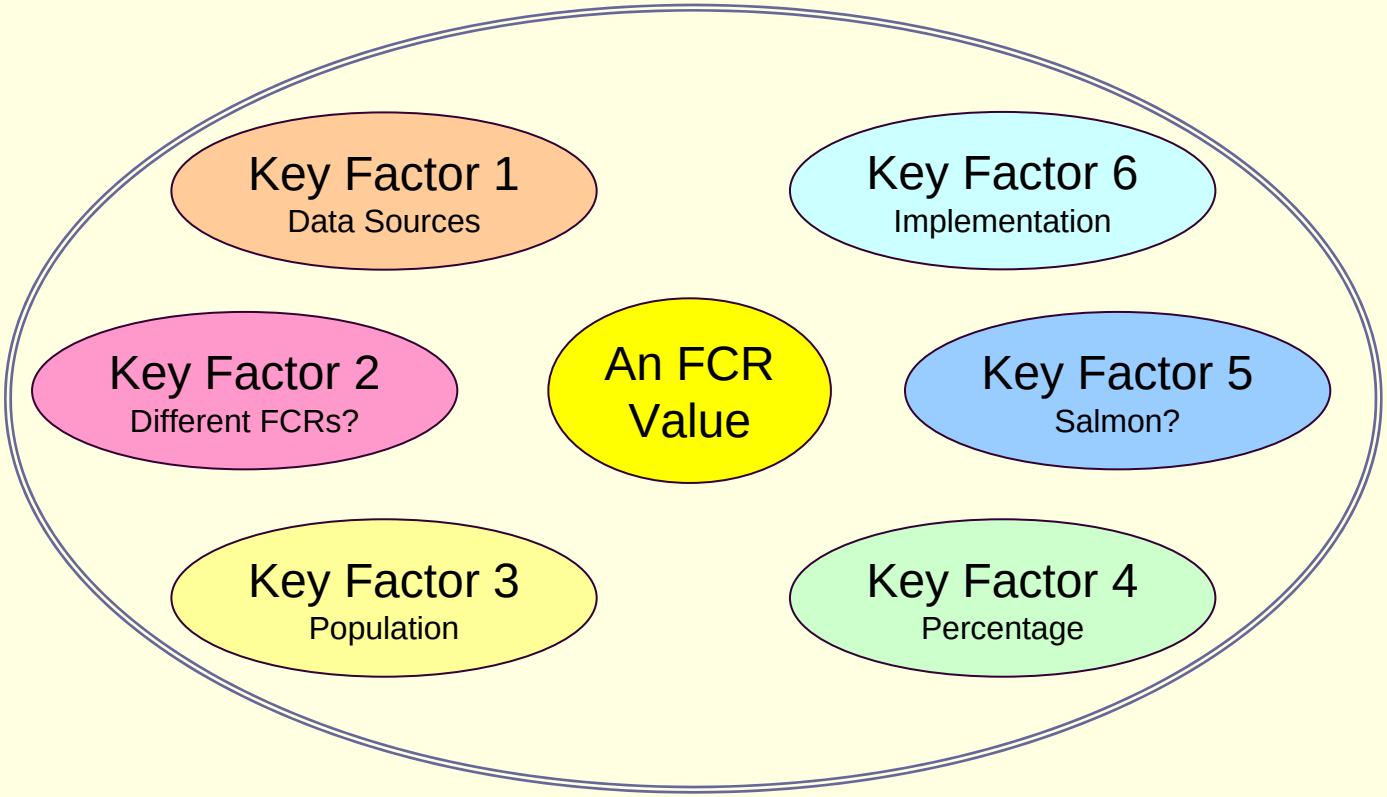
Background

- So far, workshops have covered background, background, introductory, and policy concept concept information
- Today, DEQ would like to:
  - Present a range of possible FCR values
  - Explain how we developed this range
  - Solicit your comments on these or other values
- Will inform the 3 government's October 2008 2008 recommendation to the EQC for an Oregon FCR

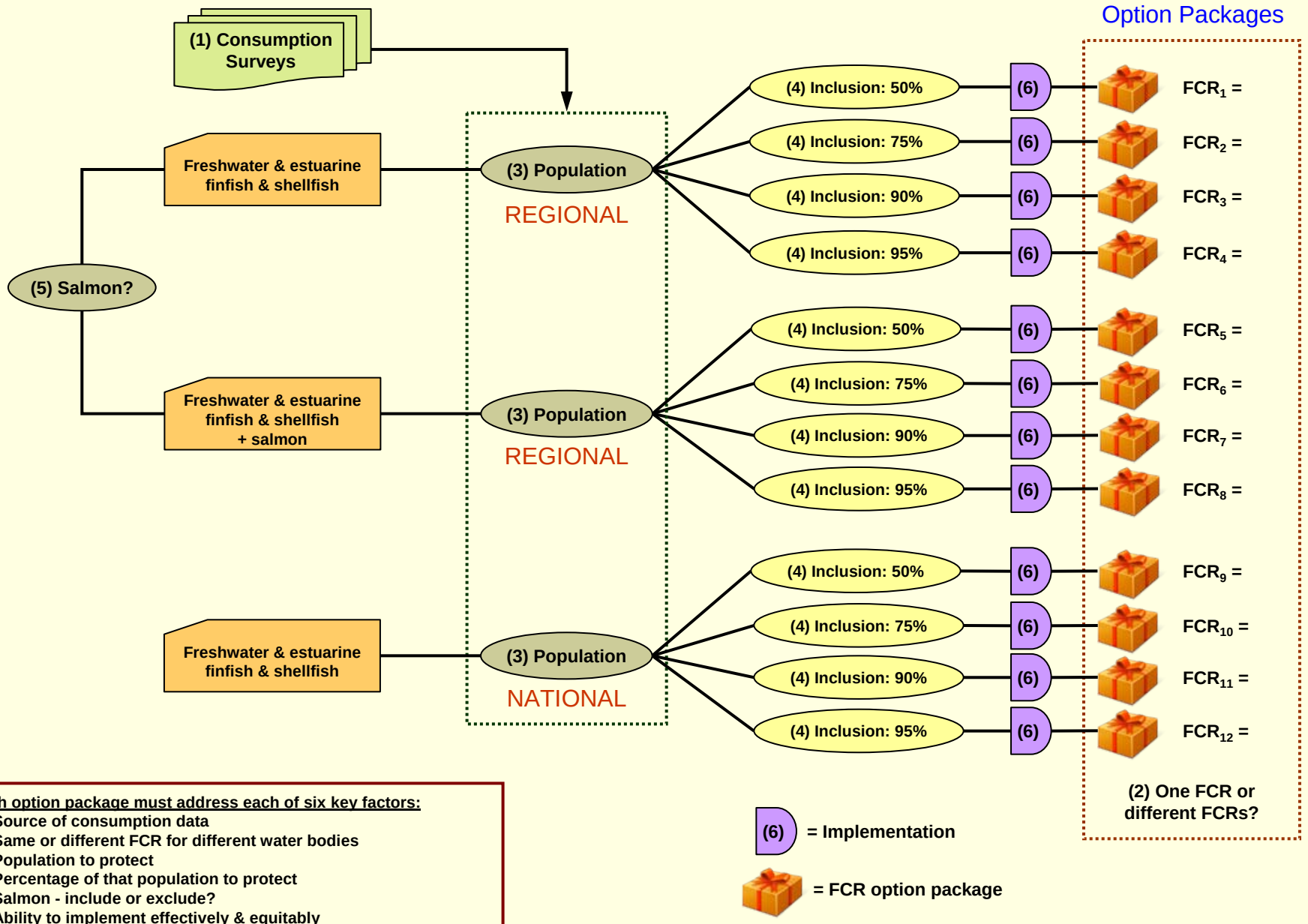
6 Key Factors

- The 3 governments identified 6 key factors associated with any FCR:
  - 1. Source of consumption data
  - 2. Different FCRs for different waterbodies?
  - 3. Population to protect
  - 4. Percentage of population to protect
  - 5. Salmon - include or not?
  - 6. Effective & equitable implementation
- Each FCR Option Package must (eventually) (eventually) address all 6 factors

An FCR Option “Package”

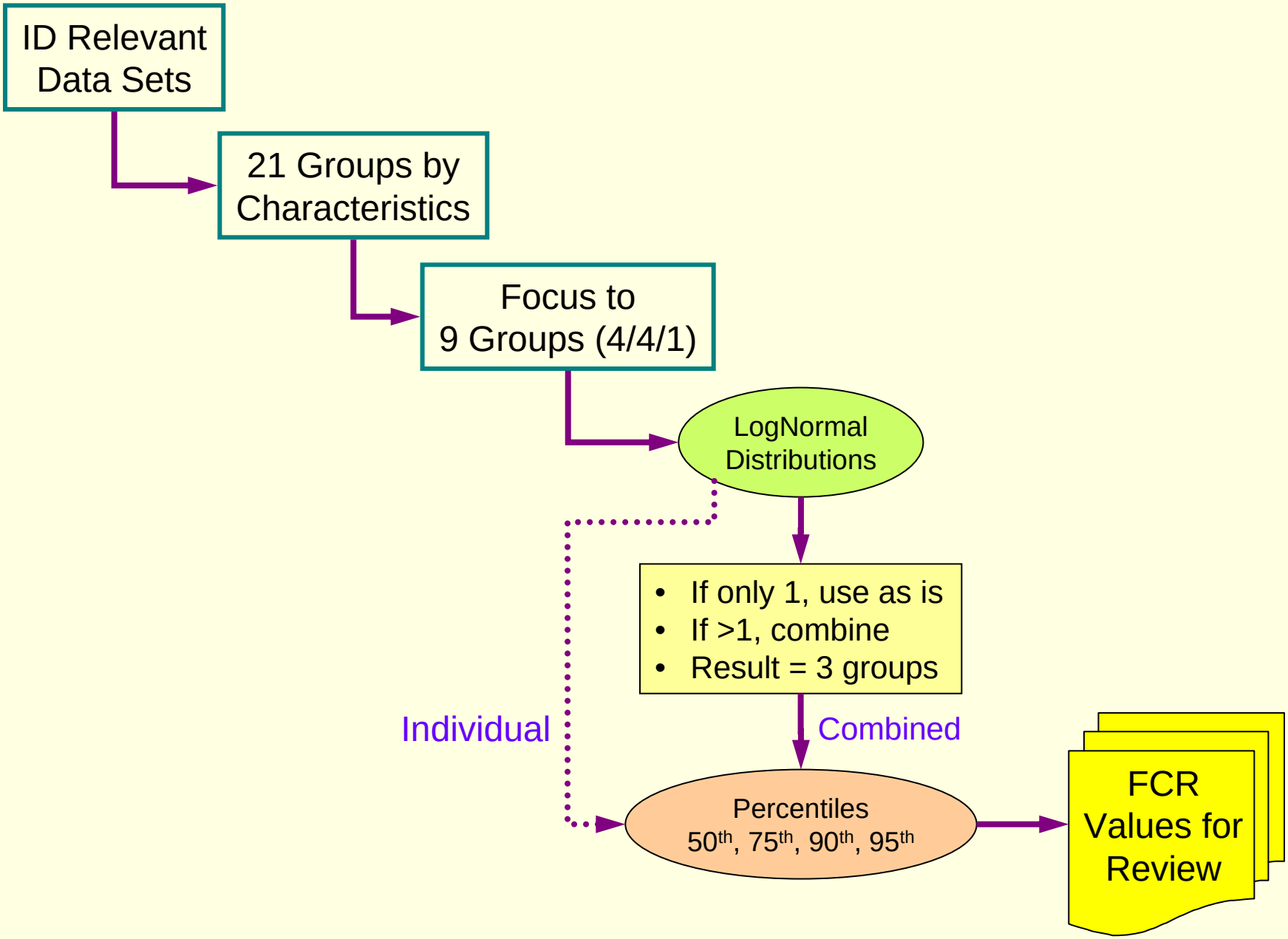


KEY FACTORS AND THE FCR OPTION PACKAGE DEVELOPMENT PROCESS



Each option package must address each of six key factors:
(1) Source of consumption data
(2) Same or different FCR for different water bodies
(3) Population to protect
(4) Percentage of that population to protect
(5) Salmon - include or exclude?
(6) Ability to implement effectively & equitably

OVERVIEW OF THE DEVELOPMENT PROCESS



FCR Survey Data

- Identify relevant sources of FCR data
  - “Relevant” with respect to Oregon
  - What we don’t have
    - Oregon-specific data for all the different populations in in Oregon that eat fish (or not)
  - What we do have
    - National EPA survey (general population)
      - Short-term recall, with limitations & uncertainties
    - Tribal surveys within Oregon (CRITFC)
    - Tribal surveys outside of Oregon, but in PNW
    - Values used in other states & jurisdictions
      - For comparison purposes only

Focusing the analysis (1)

- Children are covered by adult FCRs
- Only consumers of fish were included
  - We are ultimately seeking an FCR that protects people who actually eat fish
- Consumers of deep-water marine species were not included
  - Avoids likely disconnect with State WQS
    - Which are unlikely to impact species who spend much of of their lives in the open ocean
  - Consumers of near-shore species in state coastal coastal waters were included

Focusing the analysis (2)

- Suquamish Tribe was included
  - Very high consumers of shellfish in WA
  - Provides for possibility of similar population on the the Oregon coast
- Similar groups were combined
  - Combining multiple groups is a more robust (weight-of-evidence) and comprehensive (inclusive) approach
    - Compensates for uncertainty in any one survey
  - HHFG chose not to combine groups
    - Because it could mask important subtle differences

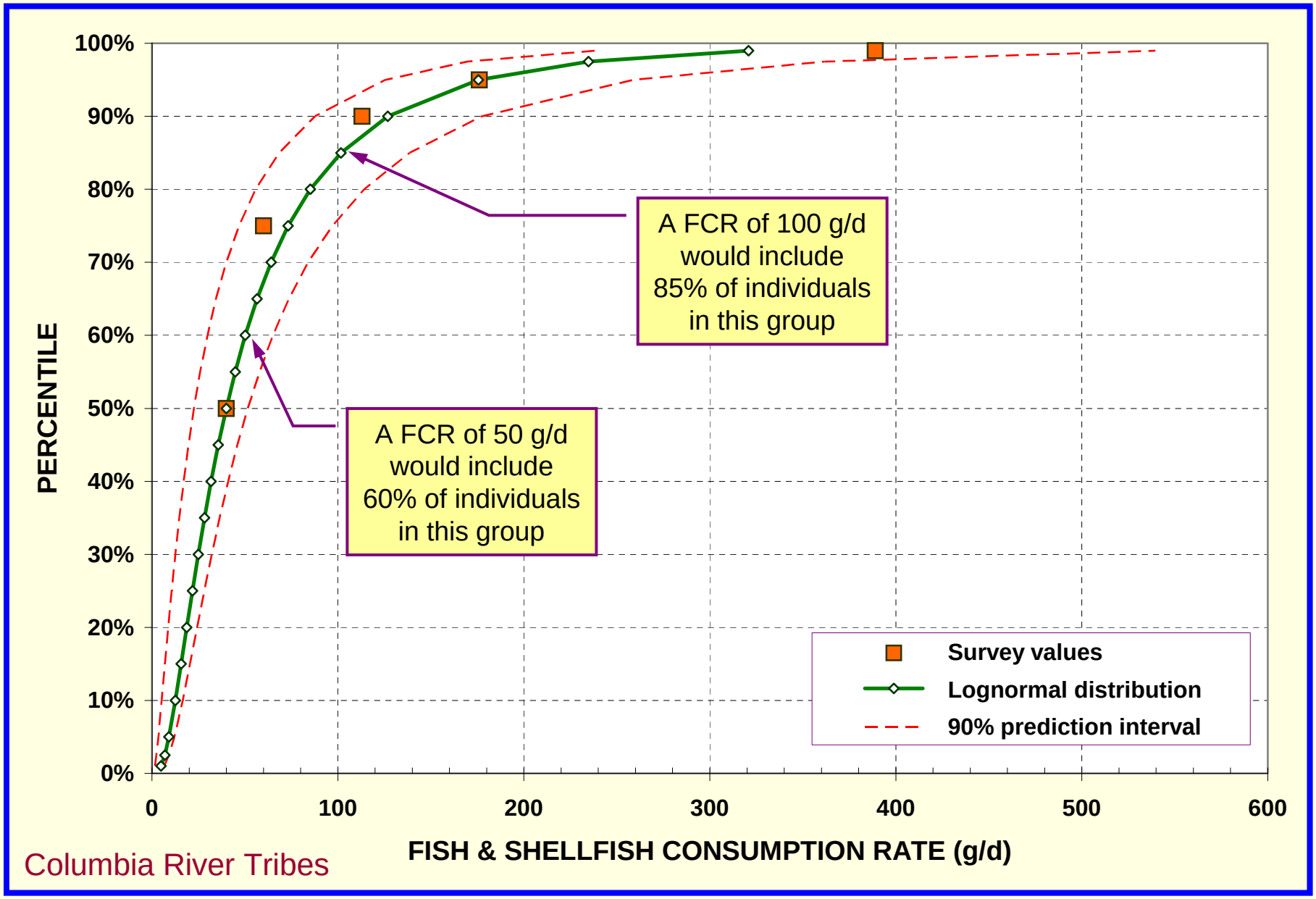
Demographic groups

- After adjusting for redundancy and non-consumers, 5 demographic groups emerged: emerged:
  - Regional, high-consuming populations
    - Tulalip Tribe, adult consumers
    - Suquamish Tribe, adult (16+yr) consumers
    - Columbia River Tribes, adult consumers
    - Asian & Pacific Islanders, adult consumers
  - National Population, adult consumers (F/E only)
- Results from the regional groups were combined in two ways relative to salmon

Consumption by groups (1)

- Determine how much fish and shellfish is consumed by each group
  - This was typically done by the survey itself and the the results summarized statistically
- This statistical summarization was often represented in different ways
  - Mean, median, 95th percentile, etc.
  - A lognormal distribution was used to establish a common basis for comparison
    - Fit considered close enough for practical purposes

FITTING A GROUP'S SUMMARY STATISTICS TO A LOGNORMAL DISTRIBUTION



Columbia River Tribes

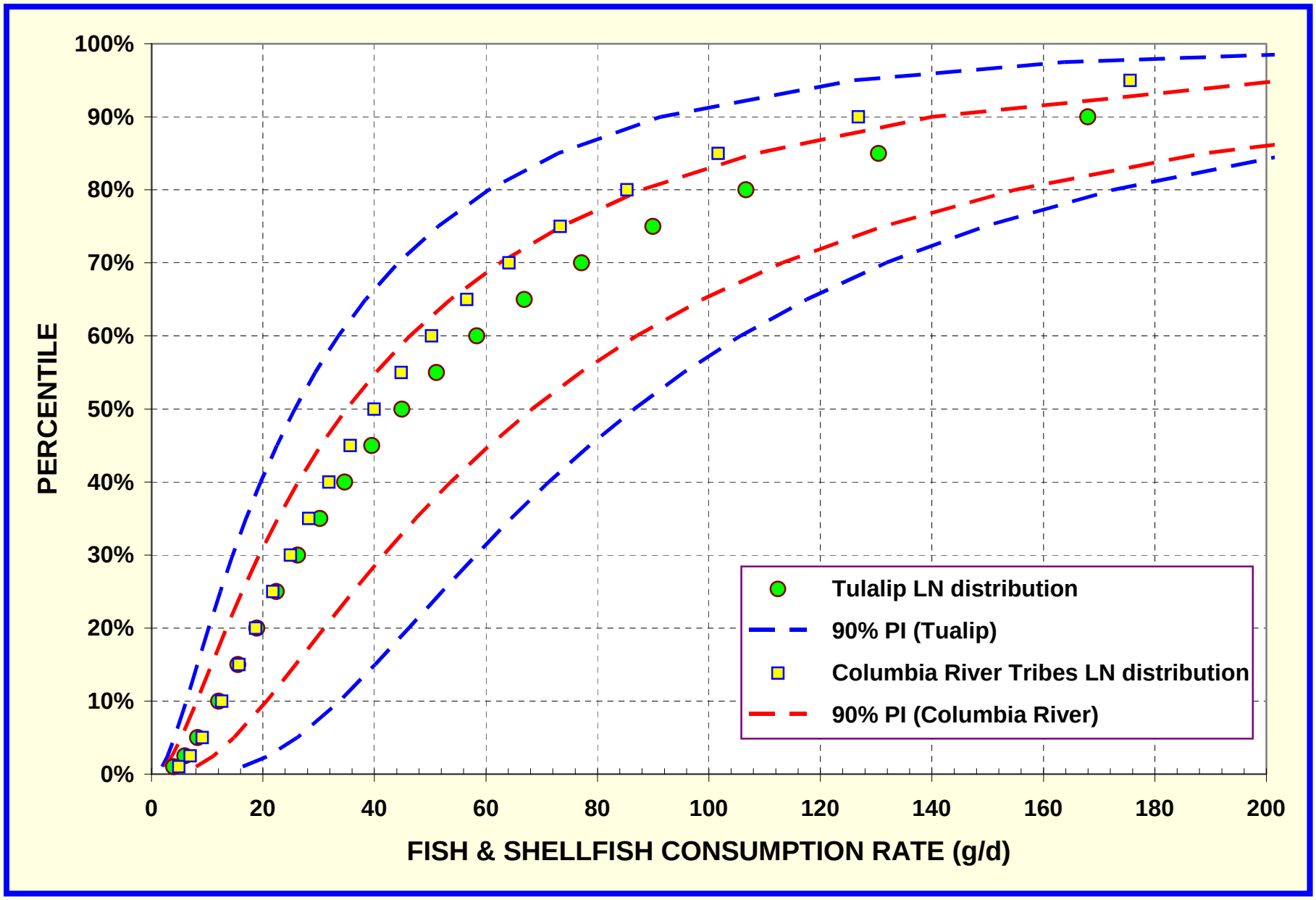
Consumption by groups (2)

- With this common basis, we can ask:
  - What percentage of a group eat fish at any particular consumption rate (FCR)?
- For Columbia River Tribes, for example, a FCR of:
  - 10 g/d includes about 5% of individuals
  - 50 g/d includes about 60% of individuals
  - 100 g/d includes about 85% of individuals
- Using this approach, we can also go from FCR to percentile or from percentile to FCR

Variability

- FCR estimates vary (±) due to differences in in survey groups, methods and results
- This can make it hard to say whether seemingly different FCRs are actually (statistically) different.
  - For example, intervals around the median
  - Columbia River: 40 {22 - 51} g/d
  - Tulalip Tribe: 45 {25 - 86} g/d
- Seeming differences between FCRs may not not be statistically meaningful

WITH UNCERTAINTY, SEEMING DIFFERENCES MAY OVERLAP



Inclusiveness

- Here, it's about "inclusion"
  - How many people are likely to be included at any any given FCR
- A FCR alone does not address safety, protection, or risk
  - What constitutes "protective" or "risky" will be be considered when calculating the WQS
- There is more to an AWQC than the FCR

An AWQC's other parts

$$AWQC = RfD \cdot RSC \cdot \left[\frac{BW}{DI + (FCR \cdot BCF)} \right]$$

- Non-Cancer
  - AWQC = Ambient Water Quality Criteria
  - RfD = Reference dose
  - RSC = Relative source contribution
  - BW = Body weight
  - DI = Drinking water intake rate
  - FCR = Fish consumption (ingestion) rate
  - BCF = Bioconcentration factor

Salmon

- At this point, different FCRs based on the treatment of salmon are offered
  - Included in the FCR
    - Allows for some uncertainty about where salmon are contaminated
    - Provides more accurate accounting for salmon portion of of an individuals diet than the RSC
  - Included in the RSC (marine fish)
    - Recognizes scientific evidence that bulk (95%) of contamination occurs outside Oregon waters
    - Avoids likely disconnect between State WQS & where non-resident fish become contaminated

Historical consumption patterns

- Pre-contact and pre-dam (for Columbia) FCR FCR estimates range from 540 - 1000 g/d
  - >1000 g/d is bioenergetically credible
- Current consumption rates by traditional high high consumers may be suppressed due to:
  - Reduced availability of fish
  - Changes away from a subsistence lifestyle
  - Changes in dietary preferences
  - Availability of alternative food items
  - Fear of contamination (fishing advisories)

Possible FCR Values (individual)

GRAMS / DAY

GROUP	Mean *	Percentile 50th	75th	90th	95th
TULALIP TRIBE	36§	18§	41§	116	132
Salmon Addressed with RSC	72	45	85	186	244
Salmon Addressed with FCR					
SUQUAMISH TRIBE	190	65	170	380	680
Salmon Addressed with RSC	214	132	260	489	710
Salmon Addressed with FCR					
COLUMBIA RIVER TRIBES	**43**§	30§	41	82	124
Salmon Addressed with RSC	63	40§	60	113	176
Salmon Addressed with FCR					
ASIAN & PACIFIC ISLANDERS	20§	7§	20§	54	72
Salmon Addressed with RSC	110	78	140	236	306
Salmon Addressed with FCR					
NATIONAL POPULATION ¶	81	47	97	199	278
				17.5	

See Slide #22 for key

BLUE underlined font = Value not reported by survey; estimated with lognormal distribution using median and 90th percentile from survey.

RED bold font = Value estimated as described in DEQ Table 1.

Possible FCR Values (individual)

MEALS / MONTH

GROUP	Mean *	Percentile			
		50th	75th	90th	95th
TULALIP TRIBE	5	2	6	16	18
Salmon Addressed with RSC	10	6	11	25	33
Salmon Addressed with FCR					
SUQUAMISH TRIBE	25	9	23	51	91
Salmon Addressed with RSC	26	18	35	66	95
Salmon Addressed with FCR					
COLUMBIA RIVER TRIBES	6	4	6	11	17
Salmon Addressed with RSC	8	5	8	15	24
Salmon Addressed with FCR					
ASIAN & PACIFIC ISLANDERS	3	1	3	7	10
Salmon Addressed with RSC	15	11	19	32	41
Salmon Addressed with FCR					
NATIONAL POPULATION ¶	11	6	13	27	37

Assuming a meal size of 0.227 kg (8 oz) per meal and an averaging period of 30.44 days per month.
Rounded to whole meal.

Possible FCR Values (combined)

GRAMS / DAY

GROUP	Mean *	Percentile			
		50th	75th	90th	95th
REGIONAL POPULATION Salmon Addressed with RSC	70	30§	70	155	250
REGIONAL POPULATION Salmon Addressed with FCR	120	75	140	250	360
NATIONAL POPULATION ¶	81	47	97	199 17.5	278
CRITFC (w/salmon) †	63	---	60	113 ‡	176

KEY

* U.S. EPA generally recommends that arithmetic mean values be the lowest values considered by States and Tribes when choosing intake rates for use in criteria derivation (USEPA 2000).

§ Below the mean of the CRITFC data.

‡ Rate suggested to Oregon DEQ in an August 2005 letter from U.S. EPA.

¶ From "Estimated Per Capita Fish Consumption in the United States", EPA-821-C-02-003, August 2002 (Page 5-43, Section 5.2.1.1., Table 4). Values for freshwater/estuarine fish consumption only.

† Includes all resident and anadromous fish.

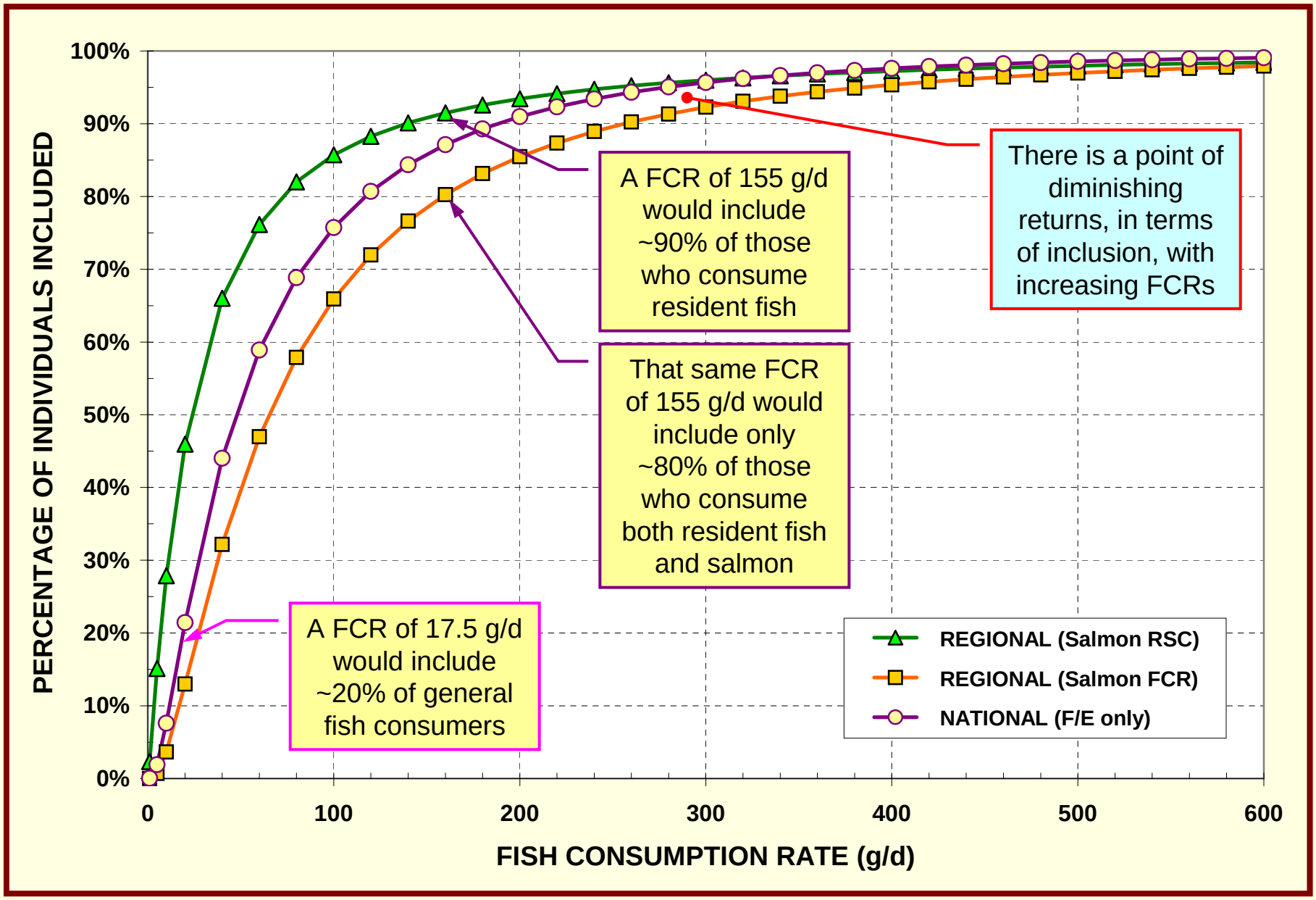
Possible FCR Values (combined)

MEALS / MONTH

GROUP	Mean *	Percentile			
		50th	75th	90th	95th
REGIONAL POPULATION Salmon Addressed with RSC	9	4	9	21	34
REGIONAL POPULATION Salmon Addressed with FCR	16	10	19	34	48
NATIONAL POPULATION ¶	11	6	13	27	37
CRITFC (w/salmon) †	8	---	8	15	24

Assuming a meal size of 0.227 kg (8 oz) per meal and an averaging period of 30.44 days per month. Rounded to whole meal.

READING THE FISH & SHELLFISH CONSUMPTION RATE CHART



THANKS FOR YOUR ATTENTION!