Policy Discussion #1

Fish consumers and nonconsumers

Outline

- Introduction
- Who is a fish consumer or a nonconsumer?
- How do we know?
- What do we know about Idaho?
- A look at distributions and statistics
- What has EPA done with this question?
- Recommendations

Introduction

- Question is whether or not to include nonconsumers of fish in a calculation of a fish consumption rate
- Why exclude nonconsumers?
  - They are not at risk from fish borne contaminants
- Why include nonconsumers?
  - Measurement issues, may not exist
  - Messaging, what do resulting statistics tell us

Who is a nonconsumer?

- Is it someone who reports they eat no fish or shellfish?
- Over what timeframe?
- May not be the same as ‘not a fish consumer’

How do we know?

- We ask people in a survey
- What do we ask them?
  - Food frequency survey – How often do you eat … ?
  - Short-term dietary recall – Did you eat … in the past day, two days, week?
  - How much do/did you eat?

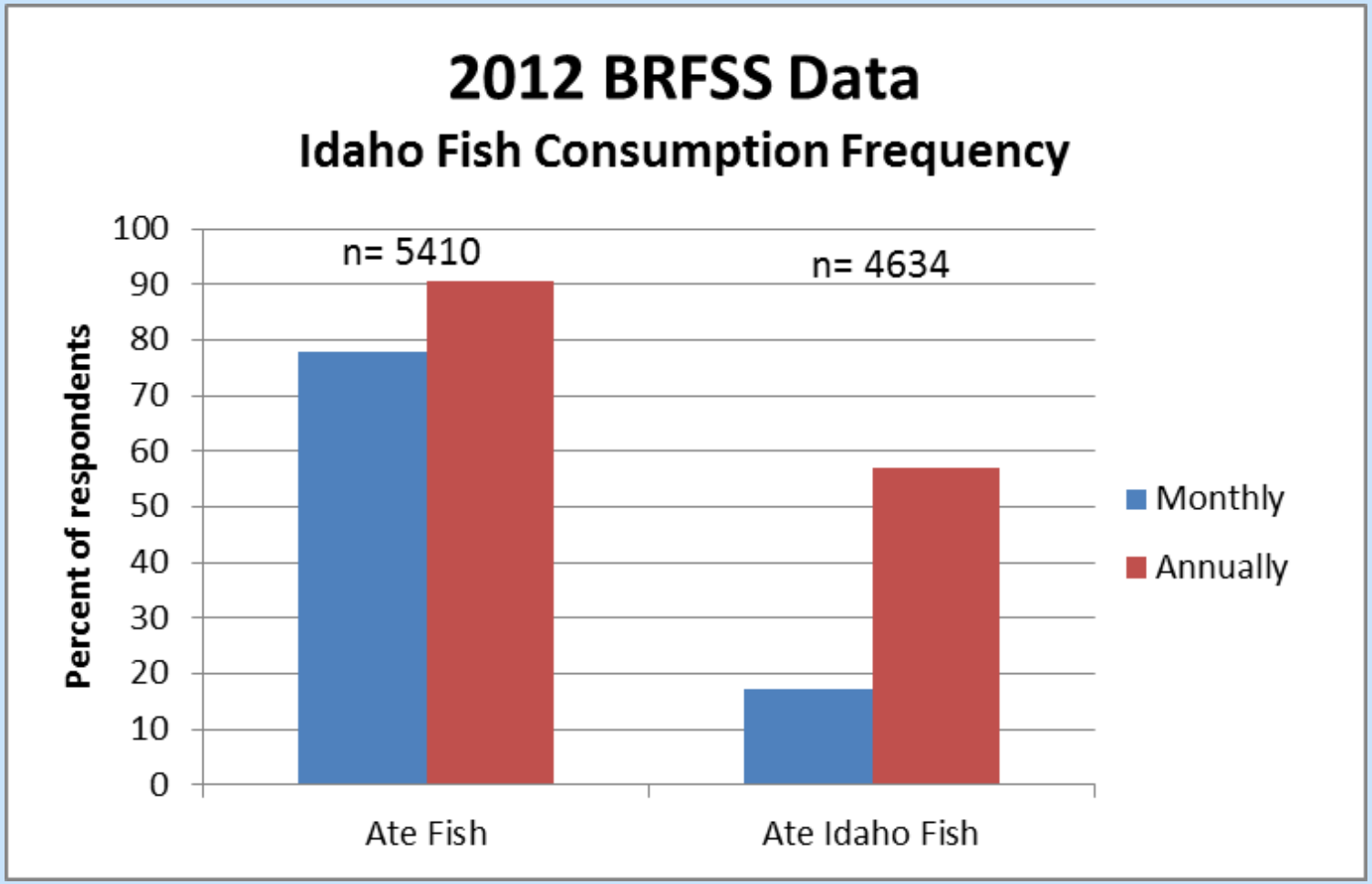
Measurement Issues

- Recall bias – aka memory frailty
  - How well do people remember minor components of their diet?
  - How far back is memory reliable, accurate?
- Episodic consumers can be missed
  - This also creates a bias
- There are ways to adjust for the latter
  - NCI Method – repeat dietary recall (Tooze 2006, 2010)
  - FFQ + Dietary recall (Keogh & White 2011, Subar 2006)

2012 BRFFS Data for Idaho

- Two questions were asked about fish consumption
  1. How often do you eat fish?
  2. How often do you eat fish that has been caught in Idaho waters?
- Respondents were allowed to answer in times per day, week, month or year.
- The Idaho Department of Health and Welfare analyzed these data recently.

2012 BRFSS Results



A Look at Calculated FCRs

- Two hypothetical distributions
  1. 10% nonconsumers
  2. 10% nonconsumers + 15% consumers misidentified as having an FCR of zero
- Will use a sample size of 100 people surveyed

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

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**

0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
0	**0**	**0**	**0**	**0**	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 = $\frac{\text{sum of observations}}{\text{number of observations}} = \frac{4748}{100} = \mathbf{47.48}$

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

What can we conclude from this?

- Misidentifying 15% of our sample (population) as nonconsumers makes:
  - Very little difference in mean FCR,
    47.515 vs 47.48 grams per day
  - And no difference in median and 90th percentiles

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**

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

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

What can we conclude from this?

- Trimming nonconsumers from the distribution:
  - Shifts all our statistics to substantially higher values
    - Median rises from **17.5** to **23.0**
    - Mean rises from **47.5** to **52.8**
    - 90th percentile rises from **127.8** to **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	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 = $\frac{\text{sum of observations}}{\text{number of observations}} = \frac{4748}{75} = \mathbf{63.0}$

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

What can we conclude from this?

- Misidentifying 15% of our sample (population) as nonconsumers AND then trimming the distribution:
  - Shifts the statistics even more to the right
    - Median rises from **17.5** to **39.0**
    - Mean rises from **47.5** to **63.3**
    - 90th percentile rises from **127.8** to **158.8**
  - Unlike statistics for the whole population, even percentiles are biased upward

Tabulated Statistics

	Distribution 1 (True)	
	Entire Population	Trimmed
Median	17.5	23.0
Mean	47.515	52.8
90th %tile	127.8	136.6

	Distribution 2 (15% Misidentified Nonconsumers)	
	Entire Population	Trimmed
Median	17.5	39.0
Mean	47.480	63.3
90th %tile	127.8	158.8

Conclusions

- Based on BRFSS data it is reasonable to assume that all Idahoans are likely consumers of some fish and shellfish in their lifetime

- Misclassification of some infrequent consumers of fish as nonconsumers will have little to no effect on whole population statistics

Conclusions

- If a regulatory fish consumption rate is based on just known fish consumers it is very important to take steps in survey execution and analysis to ensure that consumers and nonconsumers are accurately identified—or else large biases could result
- If only fish consumers are used, this will add a measure of conservatism—greater protection for the whole population

We would like your comments on these matters

Comment deadline is Nov. 8th