



CORPORATE HEADQUARTERS

September 25, 2013

SENT VIA EMAIL TO: paula.wilson@deq.idaho.gov
Original TO FOLLOW VIA CERTIFIED MAIL #7009 0080 0001 0391 7294
RETURN RECEIPT REQUESTED

Paula Wilson
Idaho Department of Environmental Quality
1410 N. Hilton
Boise, ID 83706

Re: Comments on the Proposed IDEQ Fish Consumption Survey

Dear Ms. Wilson,

Enclosed are comments from the J.R. Simplot Company (Simplot) regarding the proposed statewide fish consumption survey to be conducted to identify and characterize the fish consumption habits of Idaho residents. These comments have been prepared by scientists with Arcadias, Inc. These individuals have been involved in fish consumption studies and related technical work associated with water quality standards. Simplot and Arcadias are willing to work closely with the State and the Boise State University researchers to assure development a robust dataset that will lead to defensible information to be used in setting water quality standards.

Please call me at 208.389.7365 if you have any questions.

Sincerely,



Alan L. Prouty,
Vice President, Sustainability & Regulatory Affairs

Enclosure

Cc: Paul Anderson, Arcadias
Ellen Ebert, Arcadias
Nancy Bonnevie, Arcadias

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J.R. Simplot Company

**Comments on the Proposed IDEQ
Fish Consumption Survey:
September 11, 2013 Negotiated
Rulemaking Presentation Materials**

September 25, 2013



A handwritten signature in black ink that reads "ellen ebert".

Ellen Ebert
Technical Specialist

A handwritten signature in black ink that reads "Paul Anderson".

Paul Anderson, Ph.D.
Vice President/Principal Scientist

A handwritten signature in black ink that reads "Nancy Bonnevie".

Nancy Bonnevie
Principal Scientist

**Comments on the Proposed
IDEQ Fish Consumption
Survey: September 11, 2013
Negotiated Rulemaking
Presentation Materials**

Prepared for:
J.R. Simplot Company

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Our Ref.:
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Attachment

- 1 Author's Biographical Sketches and Summary of Key Experience and Publications

Acronyms and Abbreviations

g	gram
IDEQ	Idaho Department of Environmental Quality
kg	kilogram
USEPA	United States Environmental Protection Agency
WQC	water quality criteria

1. Introduction

ARCADIS staff participated by webinar in the September 11, 2013, Negotiated Rulemaking Meeting hosted by the Idaho Department of Environmental Quality (IDEQ) concerning the proposed statewide fish consumption survey to be conducted to identify and characterize the fish consumption habits of Idahoans. Since that time, ARCADIS has reviewed both the slide presentations given during the September 11 Negotiated Rulemaking Meeting and the draft survey instrument. We wish to commend the State of Idaho and IDEQ for recognizing the critical role that State-specific fish consumption rate information can play in developing protective yet practical water quality criteria (WQC) and the need to develop such fish consumption rate information specific to Idaho. We also recognize that developing and implementing a fish consumption rate survey is time consuming, complex, and that the State's resources are limited. Based on our review, we offer several general comments followed by more specific comments for consideration by IDEQ with the goal of maximizing the efficacy of Idaho's fish consumption rate survey.

2. General Comments

2.1 Definition of Specific Goals for the Survey

The goals for the proposed survey, the data to be collected, and the way that those data will be used in establishing water quality criteria are not clear. IDEQ needs to define its target population for regulatory purposes and then develop a sample size, approach, and survey instrument that will best collect the necessary and most reliable information representative of that population.

The most important consideration in survey design is the designated use for the data. It is our understanding that the primary goal of the survey is to provide reliable support for the development of WQC in Idaho. Thus, as a first step, it is critical to consider how those WQC will be developed. Currently, chemical-specific WQC that include the ingestion of organisms are based on an estimate of long-term fish consumption by the general population (in grams per day), chemical-specific bioconcentration factors, an adult body weight, and a lifetime of exposure. If this is the approach that IDEQ intends to continue to use in developing its WQC, then it is critical to collect data representing the full range of long-term consumption rates by adult Idahoans. If, however, IDEQ intends to modify its approach to be based on a particular subpopulation of adults or children, a particular percentile of the target population, or on fish obtained from a particular source or area, it will be important to identify the size and constitution of the sampling regime and design the survey instrument to ensure that the survey will collect

an adequate number of responses from the population targeted and adequate detail on their consumption habits to provide reasonably reliable estimates of their long-term consumption behaviors.

2.2 Selection of the Most Appropriate Survey Method to Attain the Identified Goals

During the presentation of the survey instrument, Dr. Lindquist reported that it has not yet been decided whether the survey will be conducted as a telephone, mail, or internet survey. While any of these survey methods could be used, it will be important (as discussed above) to establish the goals for the survey as they relate to the target population(s), sources of fish, and required level of detail, and then to select a method that will best attain those goals.

Based on the draft survey instrument and discussions during the Negotiated Rulemaking Meeting, it appears that Dr. Lindquist is leaning toward the use of a telephone survey, largely as a cost savings. It is important to recognize, however, that telephone surveys do not always provide the most reliable data and, because of length considerations, generally cannot collect as much detailed information as a mail survey. As currently designed, if a survey respondent and family members are fish consumers who have eaten multiple meals during the previous week, the survey is likely to require substantially more than 15 minutes to be completed. Ideally, a telephone survey should not take more than about 10 minutes. If it does take more time, respondents may not be willing to complete the entire survey, resulting in partial data. In addition, because a respondent cannot prepare for an unanticipated telephone call, that individual may not have time to think about and accurately recall the necessary information. To address this concern, when detailed information is required, most survey efforts do not use a telephone survey alone but instead couple it with a pre-mailed questionnaire, to allow adequate time for the respondent to consider his or her responses.

In fact, the United States Environmental Protection Agency (USEPA 1992) recommends that telephone interviews only be used as a follow-up to collecting information using other approaches, that they not be used to contact low-income people, that the number of questions be limited, and that combined mail/telephone techniques be used to provide questions, visual aids and other information before interviews are conducted. Low income households may not have telephones and so those individuals will be missed in a telephone survey. In addition, the use of "caller ID" features in many households enables people to easily screen and avoid survey calls, resulting in "self selection" bias. Finally, many households only have cell phones. This is particularly true of younger households. Thus, if cell phones are excluded from the random dialing, results may be biased toward older households, resulting in an

unrepresentative sample of the population. At the same time, however, the inclusion of cell phones in the sample will add to the cost of sample selection and, because people who change households often retain their cell phones at multiple locations, the result may be phone survey calls to individuals who no longer reside in Idaho. If this approach is to be used, it will be important to determine at the beginning of the call whether the individual resides in Idaho.

Given the limitations of a telephone survey, when used in isolation, and the need to collect detailed information about fish consumption habits, we recommend that a mail survey be used instead of or in combination with telephone interviews. A mailed survey can provide a random sample of the populations of interest, and can collect more detailed data because individuals who participate will have more time to consider questions and recall information at their leisure. While mail surveys can be costlier to implement, they are likely to provide more reliable and detailed information and, if combined with telephone interviews, can address non-response bias and any respondent's confusion about survey questions.

An internet survey could be conducted at lower cost than a mail survey. This approach may, however, introduce age bias, because older segments of the population may not be as comfortable with computer usage, and income bias, because lower socioeconomic groups may not have access to computers. In addition, such a survey may not capture the targeted individual within a given household. Thus, an internet survey is not recommended for this purpose.

Finally, while comments have been requested on the survey instrument introduced during the September 11 Negotiated Rulemaking Meeting, and that survey was designed as a telephone survey, the actual survey method has not yet been established. Dr. Lindquist stated that the survey might be conducted instead as a mail survey and that questions would need to be modified if this was the case. In fact, substantial revisions to the survey design would be needed if it were to be conducted as a mail survey. It is not adequate to take comments on a telephone survey and assume that the survey, as designed, will achieve the stated purpose as either a telephone or mail survey. Once IDEQ has decided on the type of survey to be conducted, a survey instrument that best meets those needs will need to be developed. It will also be important to carefully review the survey instrument and sampling design to ensure that the stated goals are attainable.

2.3 Individuals Targeted for Participation in the Survey

The individuals to be targeted for participation in the survey are unclear. The survey instrument indicates that the oldest individual living in each household will be targeted for participation. During the September 11 Negotiated Rulemaking Meeting, it was stated that if the first household contacted resulted in an interview with the oldest male in the household, the interviewer would attempt to interview the oldest female in the next household called. Using this approach reduces the random nature of the survey and potentially biases the results. It is not critical that an equal number of men and women respond to the survey. In addition, given that the person interviewed will be asked about all other household members, this approach is not necessary or recommended because that person may not be most knowledgeable about the consumption habits of the other members of the household.

At the same time, the person who is being interviewed is being asked to provide specific information about the meals consumed by him or her and also being asked to recall specific meals consumed by other individuals in the household. If the goal is to obtain information about all individuals in the household, then a better approach would be to target the individual in the household who has primary responsibility for meal preparation for the household, regardless of gender. This is the individual who is most likely to recall specific meals, in terms of the species consumed, the source of each fish meal, the individuals who shared in the meal, and the sizes of the portions consumed by each.

2.4 Collection of Information about Other Household Members

As discussed in more detail in the specific comments below, the current survey instrument will not collect information of sufficient detail about the consumption habits of others in the household to be able to provide reliable estimates of their long-term consumption rates. As a result, as currently designed, the responses provided to these questions will require that assumptions about their specific behaviors be made during data entry or analysis. Given that developing reliable estimates of long-term consumption is a primary goal of the survey, these questions need to be redesigned to produce more reliable data that will not require the data analyst to make assumptions about the consumption behavior of the survey respondent.

Alternatively, if more detailed questions about other household members are not to be incorporated, we recommend that many of those questions be eliminated, as they add to the length of the survey without providing robust information about consumption habits. For example, as currently designed, these questions will require that

assumptions be made during data entry or analysis about actual portion size (see the specific comment on Question 20). Thus, if more specific information is not to be collected (e.g., specific number of meals, specific sizes of those meals), then it may be adequate to simply record the other individuals who shared fish meals with the survey respondent (recognizing that the information cannot be used to develop quantitative fish consumption rate information for other household members) rather than other generic information that requires substantial assumptions on the part of the survey analysts to develop estimates of the fish consumption rate.

2.5 Understanding Long-Term Variation in Consumption Rates

Variations over time in the consumption habits of individuals can be substantial for certain individuals, particularly those who practice recreational fishing, because consumption rates may depend on the availability of preferred species of fish, and that availability can be affected by a number of factors including fishing regulations, weather, and time-limited availability of preferred species. Thus, the rate of consumption reported by an individual during a one-week period is not necessarily representative of all one-week periods throughout the year for that individual.

This issue was discussed during the Negotiated Rulemaking Meeting and Dr. Lindquist indicated that they planned to capture long-term variations by interviewing other households at other times of the year and then combining the results to derive long-term estimates. Thus, it appears that the currently proposed approach is to use data collected across multiple individuals to capture long-term consumption rather than capturing long-term consumption by individuals. This is not a supportable approach for capturing the full range of long-term consumption behaviors within the population of interest.

The proposed approach might be acceptable if all that is needed for regulatory purposes is a measure of the central tendency of the rates of consumption by the general population. It is not appropriate, however, if some other, higher percentile of the fish consumption rate distribution is selected instead. The proposed approach incorrectly presumes that consumption characterized over a short recall period is representative of long-term consumption behavior, and that an upper-bound consumer during a one-week period is always an upper-bound consumer. These are inaccurate assumptions for many consumers and the approach is not supported by USEPA (2011) as it recognizes that short-term recall surveys do not provide reliable long-term estimates of high-end consumption. The telephone survey approach provides only a snapshot in time. The 90th percentile consumer during a single one-week period may

not consume fish at the same rate during subsequent weeks of the year. To assume that this individual always consumes fish at the 90th percentile rate has no basis.

We recommend that the survey attempt to capture the full range of long-term consumption behaviors by all survey participants so that the general population will be adequately characterized. A key factor in achieving this will be to capture intra-individual variability (a single person's fish consumption variation) over time as well as inter-individual variability (variation between people). Thus, instead of using the approach that is currently being proposed, we recommend that the same individuals be interviewed more than once during the survey period to provide information on the variability in their behaviors over time. This will allow a reliable and representative distribution of individual, long-term consumption rates to be developed.

2.6 Selecting the Sample for Repeat Interviews

The current survey design indicates that interviewers will attempt to re-interview individuals who reported that they consumed fish within the previous day or week in order to collect additional information on long-term behavior, but that there is no intention to re-contact other survey participants who did not eat fish during that period. This is inappropriate as it presumes that the individuals who ate during the previous week are the only consumers of interest and, presumably are the highest consumers. This may not be the case and may bias the results because many of the individuals who didn't consume during a specific 7-day period may actually be regular fish consumers. If IDEQ plans to re-interview fish consumers a second (or more) time(s), they need to select the group of individuals to be re-sampled at random from all individuals who reported that they ate fish within the last year (or, ideally from all previously interviewed respondents, even those reporting they ate no fish in the past year) in order to minimize bias and randomize results.

2.7 Limitations in Question Design

As discussed in more detail below, poor question design will require that many assumptions be made in deriving fish consumption rates for individuals. The current survey design requires that the responses to many of the questions be recorded as falling within a certain range. It would be better to allow specific responses to be recorded so that fewer assumptions need to be made when analyzing the data. For example, when asking about the consumption by other household members besides the individual interviewed, Question 20 asks what size portion they ate and gives as options "about the same as you", "more than you", or "less than you". This information is not specific enough to allow for a reasonable estimate of portion size for these

individuals. If, for example, the survey respondent ate 8 ounces of fish at a meal, and a child ate “less than” the respondent, an assumption would have to be made as to the portion size for the child even though the actual portion size might be as little as a single bite or nearly as much as the adult consumed. Without more specific information, any assumption (for example, assuming the portion size is 4 ounces) may over- or under-estimate their actual consumption rates.

In other cases, there is inadequate follow-up to provide accurate information. For example, Question 10 asks whether the respondent had fish for more than one meal during the past week. However, there is no follow-up question provided to indicate how many times during the past week fish has been eaten. The draft instrument provides a table in which responses are to be recorded. This seems to have a place to record the number of times that someone eats per time period and to record the portion size. These are critical pieces of information and must be collected. However, currently there is no opportunity to record different portion sizes for different meals, so that it would be necessary to assume the same portion size for all meals. This is likely not appropriate because a lunch portion of fish (2 ounces of canned tuna for example) may be substantially different from a dinner portion (8-ounce tuna steak). We recommend that this section be reorganized to collect information in a more streamlined and meal-specific manner (as discussed in specific comments below).

2.8 Survey Script and Protocol Development

During the discussion of the survey instrument, many questions were asked about how certain responses would be clarified. Dr. Lindquist stated that interviewers would be trained to ask follow-up questions but no protocol has yet been developed for how these follow-up questions will be worded or responses recorded. It is not possible to clearly understand the survey approach or to critique specific questions without having the script that the interviewers will follow. It will be necessary to develop and distribute this specific information to reviewers before the survey methodology can be critically evaluated and the approach finalized.

2.9 Limited Detail on the Proposed Tribal Survey

The presentation given by Mary Lou Soscia of USEPA Region 10 discussed the tribal survey effort that is underway. She discussed coordination among the tribes, discussions about survey design, USEPA’s interest in gathering information about suppression, and the effort to protect the confidentiality of tribal members and encourage their participation in the survey. It was not clear from her discussion whether a single survey would be implemented for all tribal populations or whether those efforts

would vary in design based on input from individual tribes. Nor was it clear how much coordination there will be between the survey effort conducted by IDEQ and the survey effort for the tribes.

It will be important to understand the approaches of these two efforts so that the degree to which the data collected are comparable can also be understood. Different survey methods may yield very different results. For example, short-term recall periods are likely to result in higher consumption rate estimates than will longer recall periods. Thus, just because the two surveys may report different consumption rates for tribal members does not mean one survey is more representative than the other; an understanding and comparison of survey methods is necessary before reaching conclusions about the representativeness of the surveys.

3. Specific Comments on Draft Survey Instrument

This section of the report provides more detailed comments on the proposed survey instrument. The specific portion of the survey the specific comment refers to is noted at the start of each comment and also underlined.

Introduction – It would be helpful to clarify the purpose of the fish consumption survey and the specific information sought. As it is currently worded, it is likely to deter people who eat a lot of fish or fish in Idaho because it sounds like they are going to be on the phone for an extended period of time. Thus, they may decline to participate. As this group is a population of interest, we recommend that the introduction be changed as follows:

Hello, I am calling from [implementation agency] on behalf of the State of Idaho. We are conducting a survey of Idahoans to gain a better understanding of the types of fish they consume and where they obtain those fish, and would like to get your help with this. All of the information gathered in the survey will remain strictly confidential. Would you be willing to participate in the survey?

Then, if they ask how long the survey is likely to take, the response would be:

For most people, the survey will only take a few minutes. For people who eat a lot of fish, it may take up to 15 minutes. Would you be willing to help us out?

Summary response matrix – It is not clear why a matrix is needed up front for the interviewer to complete other than indicating the date and time of each phone effort and whether the survey was completed or call terminated. All of the additional

information is captured in the survey questionnaire itself so is not necessary here and adds unnecessarily to the time required for the interviewer to complete the input form. In addition, it appears that the intent is to terminate the call if the individual has not eaten fish within the previous year (“no” response to question 2). We recommend that demographic characteristics be recorded for all respondents before the call is terminated to ensure that profile information is available for non-consumers as well as consumers.

Question 1 – The survey is asking for the oldest member of the household to complete the survey. However, the oldest member may not be the best individual to respond to many of the questions asked. Instead, it is likely to be the individual who prepares the majority of meals for the household who is most likely to know the type of fish consumed, the source of those fish and the portion sizes. We recommend that the survey focus on meal preparers instead of the oldest household member.

Question 2 – It appears based on the draft instrument that prompts are going to be used two times if the individual responds “no” to the question. We recommend that the question be asked (to receive a “yes” or “no” answer) and if the answer is “no”, the following single prompt be used.

Sometimes people forget about things like pizza with anchovies, bagels and lox, tuna or other fish sandwiches, including fast-food fish sandwiches, fish and chips, clam chowder, frozen fish sticks, seafood casseroles, sardines, pickled herring, smoked fish, seafood salad, and the like when they are asked about fish consumption. Have you eaten any of these at breakfast, lunch or dinner within the last year?

We then recommend that this simply be indicated as “yes” or “no”. The matrix provided is not likely to provide any particularly helpful information. The respondent might say that they didn’t think about clam chowder or pizza with anchovies, but that doesn’t mean that there aren’t other things on the list that they have also consumed. Unless the list is going to be asked specifically (and we don’t recommend that), it is not helpful. It is also not helpful information unless people are then asked how often and how much was consumed on each occasion. Thus, we recommend that the matrix be removed along with the subsequent, associated “Note”.

Question 3 – The response options to Question 3 are not adequate to derive a reliable estimate of consumption and their use in deriving fish consumption rates would require that assumptions be made during data analysis concerning the intent of the respondent. For example, “once a week or more” would be the response given by all

individuals who consume fish at least once per week. This group would include individuals who only eat fish one time per week but would also include individuals who consume fish three meals per day every day of the week (21 meals per week). At the same time, the respondent who eats fish every other week has no option for this and must choose between “once a week or more” and “once a month,” which will either over-estimate or under-estimate his or her consumption. These categories create a high level of unnecessary uncertainty in the data collection.

At the same time, this question does not allow for intra-individual variation over time to be taken into account. This is a critical piece of information, particularly for sport-caught local fish, as individuals may more frequently eat certain species based on their availability (e.g., limited by fishing season for resident species and spawning runs for anadromous species) but may eat almost no fish during the remainder of the year. This was discussed briefly during the September 11 Negotiated Rulemaking Meeting and it was stated that this seasonal variation would be captured by phasing the survey and interviewing different households throughout the year. This may be somewhat representative if the fish consumption metric selected for regulatory purposes is a central tendency estimate (mean, median) for the entire population. However, if high-end consumers are the focus for developing WQC (be those members of a specific subpopulation or simply a high-end consumer of the general population), then an upper percentile of the fish consumption distribution may be selected for regulatory purposes. Because the proposed approach cannot distinguish between seasonal, intra-individual, and inter-individual variability, the survey will not yield an accurate picture of the long-term consumption habits of those individuals.

To correct this, we believe it is most important to interview survey participants more than once to capture their personal variations in behavior (as discussed previously). We also recommend that the question about frequency of consumption be asked as an open-ended question and be followed-up with questions that attempt to characterize variations over time. An example of this might be:

On average, how often would you say you eat fish or seafood?

_____ *times per* _____

Does your frequency of consumption differ at different times of the year?

___ *yes* ___ *no*

If no, skip to next question. If yes, ask follow-up

When do you eat fish most frequently? _____

How often? ____ times per ____.

When do you eat fish least frequently? _____

How often? ____ times per ____.

Question 5 – As currently worded, this question only asks if fish was consumed during the previous 24 hours but provides no opportunity to record the number of fish meals (which may be more than one). We recommend that this question be changed to be more specific, as follows:

In the last 24 hours, at how many meals did you eat fish or seafood?

Questions 6 to 8 – The response matrices for Questions 6-8 are far more complicated and time-consuming than they need to be to collect the necessary information. In addition, they do not provide for individual fish meals to be easily recorded. We recommend that this information be recorded on a per meal basis, using open-ended questions. It is presumed that the interviewers for a phone survey will be inputting data directly so that they can easily use a checklist such as the one shown below. Such an approach can also be easily incorporated into a mail survey, if a mail survey is used. Additional information can be collected on a meal-specific basis to cut down substantially on the length of the survey (as shown below). The following format is recommended.

Meal	Type of Fish	Source of fish	Portion Size	Parts Eaten	Cooking Method
1	Trout	<input type="checkbox"/> Market <input type="checkbox"/> Restaurant <input checked="" type="checkbox"/> Sport-caught <input type="checkbox"/> In Idaho <input checked="" type="checkbox"/> Outside Idaho <input type="checkbox"/> Gift	<input type="checkbox"/> Card Deck <input checked="" type="checkbox"/> Checkbook <input type="checkbox"/> Pieces <input type="checkbox"/> Ounces <input type="checkbox"/> Cups <input type="checkbox"/> Cans __ oz	<input checked="" type="checkbox"/> Flesh <input checked="" type="checkbox"/> Skin <input type="checkbox"/> Guts <input type="checkbox"/> Whole	<input checked="" type="checkbox"/> Fried <input type="checkbox"/> Baked <input type="checkbox"/> Broiled/Grilled <input type="checkbox"/> Poached <input type="checkbox"/> Microwaved <input type="checkbox"/> Raw
2	Shrimp	<input checked="" type="checkbox"/> Market <input type="checkbox"/> Restaurant <input type="checkbox"/> Sport-caught <input type="checkbox"/> In Idaho <input type="checkbox"/> Outside Idaho <input type="checkbox"/> Gift	<input type="checkbox"/> Card Deck <input type="checkbox"/> Checkbook <input checked="" type="checkbox"/> Pieces <input type="checkbox"/> Ounces <input type="checkbox"/> Cups <input type="checkbox"/> Cans __ oz	<input checked="" type="checkbox"/> Flesh <input type="checkbox"/> Skin <input type="checkbox"/> Guts <input type="checkbox"/> Whole	<input type="checkbox"/> Fried <input type="checkbox"/> Baked <input checked="" type="checkbox"/> Broiled/Grilled <input type="checkbox"/> Poached <input type="checkbox"/> Microwaved <input type="checkbox"/> Raw
3					

Question 9 – This question is fine as worded but if the response is “no”, it skips to Question 14, which asks about other individuals living with the respondent. If there are no other individuals in the household, the skip pattern indicates moving to Question 26.

However, Question 26 pertains to individuals who eat fish but the individual who responded “no” to Question 9 has indicated that he/she is a non-consumer. It is expected that the skip should really be directed to Question 27, which asks about why people limit their fish consumption. However, this is not the only group who will answer Question 14 so it will be necessary to revisit and revise the skip pattern to ensure that the questions being asked of each group are relevant to them.

Question 10 – We recommend that this be modified to be more specific in the same way that Question 5 is modified.

Questions 11 to 13 – We recommend that a similar matrix format, as indicated above for Questions 6 to 8, be used to record this information.

Question 15 – Question 15 asks “how many people, in addition to you, are living in the home?” but there is no place to record that information. While the second part of Question 15 asks if the respondent will share the gender and age of each individual, the respondent may decline to do that. Thus, there should be a place to record the total number of individuals living in the home in case they are not willing to answer the second question. It can be asked in such a way to allow differentiation between adults and children in the household. Also, we recommend that the respondent who responds to the second question also be asked to indicate which of those individuals are fish consumers, as they may or may not all be consumers.

Question 17 – We recommend that Question 17 be re-worded in the same way as Questions 5 and 10.

Questions 18 to 20 – We recommend that the same matrix format be employed for these questions as we recommended for Questions 6 to 8 and 11 to 13. This information will need to be recorded on a per- individual and per-meal basis as was done for the survey respondent. We recommend that the portion size be recorded as indicated in that matrix rather than as asked in Question 20.

Question 20 – The possible responses to Question 20 add substantial uncertainty to fish consumption estimates. If the respondent has indicated that she or he eats 8 ounces at a meal and that one individual living in the home eats less than her or him, that individual may eat anywhere from a single bite to 7.9 ounces. Similarly, if they eat more than her or him, they could eat anything greater than 8 ounces (8.1 ounces to 16 ounces or more). Thus, to use this information, it is necessary to make assumptions about the intent of the respondent concerning meal size. It is critical to ascertain portion

sizes for each individual (as suggested above) rather than to ask such a generic question.

Questions 21 to 25 – Questions 21 to 25 seem to be repetitive of Questions 17 to 20. It is not clear what the difference is because both groups of questions ask about meal frequency and characteristics during the previous one week period. Perhaps Questions 17 to 20 are actually intended to be collecting information about the previous 24-hour period (as indicated in Question 17) rather than the previous week (as indicated in Question 18). If this is the case, the questions need to be revised to reflect this. If this is not the case, it appears that these questions are repetitive and can be removed from the survey.

It is also not clear why respondents are being asked to report separately on meals that were consumed during the previous 24 hours and meals that were consumed during the other six days of the previous one-week period. This information can be collected at the same time, thereby reducing survey length.

Question 22 – If retained, we recommend that Question 22 be re-worded in the same way as Questions 5, 10, and 17.

Questions 23 to 25 – If retained, we recommend that the same matrix format be employed for these questions as recommended for Questions 6 to 8, 11 to 13, and 18 to 20.

Question 26 – This question seems to indicate that the respondent eats more fish than others and so is a bit misleading and may put them off as they may say that they don't do that. It is assumed that the intent of the question is to find out why people eat fish, regardless of how much they eat. We recommend that response "i" be excluded as it is not necessary, especially if the question is reworded as recommended below.

What would you say are the important reasons that you eat fish or seafood?

If it is important to understand what the key reasons are, then it might be worthwhile to ask them what their top three reasons are. Otherwise, possible responses can be read as indicated and all pertinent reasons reported by the respondent recorded.

Question 27 – As with Question 26, this question as worded seems to indicate that the respondent is a certain type of fish consumer who tries to limit consumption. It would be simpler to reword the question to say:

*Do you limit your intake of fish or seafood for any reason? ___ yes ___ no.
(If no, skip to #29)*

*Some of the reasons that people give for limiting their fish or seafood
consumption are [read list], do any of these apply to you?*

One choice that is not provided in the list is “I don’t like it” even though this is a frequent reason that people do not choose to eat fish. We recommend that this reason be added to the list. Also, we recommend that response “j” be removed from the options as it is unnecessary if the question is re-worded as recommended.

Question 28 – We recommend that the following possible response be added to the list.

*If there was more variety (more or different species) available in the local
markets or restaurants.*

Question 29 – It is not clear why the age question is asked in this manner. While it was stated on the call that these groupings are consistent with census groupings, it is not necessary to group data at the data entry phase – this can be done during the analysis phase. It would be helpful to know the exact age of the participants. While some may hesitate to provide their age, they are usually willing to tell the interviewer the year in which they were born. This could be pre-tested to determine if this will provide the necessary responses.

Question 30 – It is not clear why there is a skip pattern for the first four responses to this question to ask if they are a member of a tribe. This appears to be putting words in their mouths. If they are members of a tribe, they will likely self-identify with response “e”. If they are of mixed background, however, there is no option for them. We recommend that a space be provided so that if they indicate “other,” or if they indicate more than one response, that can be recorded in the “other” category. Then Question 31 can be asked of only those individuals who indicate that they are “Native American or Alaska Native” or who have indicated either of those as part of their heritage in their response.

Question 33 – It is presumed that Question 33 is being asked for the purpose of being able to estimate a consumption rate based on grams per kilogram body weight per day. However, it is not particularly helpful for several reasons. First, it is very likely that individuals will give false responses. Second, recording weight using a range of weights adds uncertainty to the calculation. For example, if the respondent indicates a

body weight of 115 to 134 pounds (52 to 61 kg) and that individual eats fish at a rate of 30 g/day, the fish consumption rate on a per body weight basis could range from 0.58 to 0.49 g/kg-day with no means of determining the correct rate. This means that individual rates could be over- or under-estimated by nearly 20%. Finally, when developing WQC, typically fish consumption rate is expressed on a grams per day basis, not a grams per kilogram bodyweight per day. If this is the approach that will be used by IDEQ when developing WQC, then recording information on a g/kg-day basis is unnecessary.

In addition, no body weight information is being collected for other household members so it will not be possible to develop comparable consumption rates (g/kg-day) for them. We therefore recommend that this question be eliminated.

Question 34 – This question is very generic and does not provide any insight. If there is a need to understand who in the survey is a recreational angler, then this question should be asked earlier and on a per individual basis. In addition, just because someone holds a license does not necessarily mean that they eat sport-caught fish. Many people who buy licenses during a given year (especially combined licenses) never fish during the year; other people who hold licenses practice catch-and-release and so may be non-consumers of recreationally-caught fish. As information about sport-caught meals is collected in earlier questions, there is no need to ask this question in its current form.

Question 35 (misabeled on the draft as Question 34) – Question 35 indicates that people who have responded to eating fish in the last 24 hours (Question 4) or last week (Question 9) may be called again. Limiting the repeat calls to just those individuals who responded yes to one or both of those questions will bias the survey response because it presumes that individuals who didn't eat within the past 7 days are either non-consumers or consume with low frequency. This is an inappropriate assumption. People who consume fish regularly may not have consumed fish during a single 7-day period for many reasons. As stated above, to obtain a reliable and representative sample of long-term behavior, we recommend that the population targeted for repeat calls be, at a minimum, that group of survey respondents who indicated that they have eaten fish during the past year (Question 2).

Additional questions – We recommend that the zip code of each respondent be collected in this section to provide some insight about the geographic distribution of survey respondents.

Summary

We commend the State of Idaho and IDEQ for recognizing the critical role of State-specific fish consumption rate information in developing protective yet practical WQC and for deciding to conduct a survey of Idahoans to obtain Idaho-specific fish consumption rates. We have been involved in the development, implementation or use of many fish consumption rate surveys and appreciate the complexity and level of effort required to develop representative and robust fish consumption rate data. Therefore, we also understand that it is in everyone's interest to develop the best survey approach and instrument possible given available resource and time constraints. We have provided the above comments with those objectives in mind.

We believe that the current survey design is overly complicated and that some of the survey questions are not focused appropriately to obtain the required data. In some cases, extraneous information is being sought, making the survey unnecessarily lengthy. In other cases, not enough information is being collected to develop robust estimates of long-term fish consumption rates. As we understand it, the goal of the survey is to collect information about the range of long-term fish consumption habits of the general population of Idaho (including high-end, upper percentile consumers), the sources of the fish consumed, and the frequency with which fish is consumed. Based on discussions during the September 11 Negotiated Rulemaking Meeting and the placement of certain questions in the survey instrument, it appears that a second goal of the survey may be to collect information pertaining to specific subpopulations in order to determine whether their consumption habits differ from those in other segments of the population. However, the current survey instrument and sampling design is not likely to provide adequate information to attain these goals.

To assure that appropriate and robust fish consumption rate data are collected, we recommend that IDEQ clearly indicate the target population(s) of the survey and decide on the type of survey (e.g., phone, mail, combination of both). Definition of those goals will then allow for the selection of the necessary sample size and the survey approach and instrument that will best meet those needs. The comments presented in this report are offered to help ensure that the data collected during the survey will be robust, are collected efficiently, and will provide the necessary fish consumption rate information to inform the WQC rulemaking process.



4. References

USEPA. 1992. *Consumption Surveys for Fish and Shellfish, a Review and Analysis of Survey Methods*. U.S. Environmental Protection Agency, Office of Water. EPA 822/R-92-001. February.

USEPA. 2011. *Exposure Factors Handbook: 2011 Edition*. U.S. Environmental Protection Agency. EPA/600/R-090/052F. September.



Attachment 1

Author's Biographical Sketches
and Summary of Key Experience
and Publications



Ellen S. Ebert
Technical Specialist

Ms. Ellen Ebert has more than 25 years of experience in managing and guiding human health risk assessments, designing studies to evaluate site-specific exposure behaviors, participating in regulatory negotiations, and providing comments on environmental policy. Ms. Ebert specializes in the area of exposure assessment and has conducted numerous site-specific land use, recreational, and fish consumption studies to help guide the selection of potential receptors, and the development of site-specific exposure parameters and assumptions. She has worked extensively on numerous industrial and commercial projects and has been instrumental in the development of alternative water quality standards and site-specific fish consumption estimates for use in risk assessment and NPDES permitting for clients nationwide.

Paul Anderson, Ph.D.
Vice President/Principal Scientist

Dr. Anderson has over 25 years of experience in human health and ecological risk assessment. He has been involved in the derivation of state-specific ambient water quality criteria (AWQC) throughout much of the United States for much of his career including detailed review of all of the parameters that affect AWQC (for example, fish consumption rates, bioconcentration and bioaccumulation factors, losses of chemicals during preparation and cooking, toxicity factors, among others). Dr. Anderson has also been intimately involved in the development, implementation or interpretation of several state-wide or regional fish consumption rate surveys including surveys in Maine, Florida, Louisiana, West Virginia and several Great Lakes States. Some select fish consumption rate related projects are presented below. Dr. Anderson is also currently an Adjunct Assistant Professor in the Department of Earth and Environment at Boston University.

Nancy Bonnevie
Principal Scientist

Ms. Bonnevie has 23 years of experience in ecological and human health risk assessment. An environmental scientist specializing in aquatic ecology and sediment quality evaluations, she has effectively managed teams on tasks ranging from preliminary site characterizations to multi-tasked field sampling programs, ecological risk evaluations and environmental impact statements. She has participated in the development and implementation of several fish consumption surveys, and has conducted numerous evaluations focusing on potential risks posed by consumption of fish and shellfish. In addition, she has evaluated the potential impacts of constituents in floodplain soils and sediments on nearby subsistence populations. Ms. Bonnevie participated in the development of the ecological risk guidance for the American Society of Testing and Materials (ASTM) and has served as a peer-reviewer for Environmental Toxicology and Chemistry on issues related to ecological risk assessment and sediment quality evaluations. Ms.

Bonnevie has evaluated the potential ecological risks to aquatic and terrestrial receptors posed by persistent environmental contaminants such as polychlorinated biphenyls, dioxins and furans, polycyclic aromatic hydrocarbons, DDT, and several metals, particularly lead and mercury. She has designed and implemented a wide variety of field studies including sediment and surface water quality evaluations, benthic community analyses, and habitat assessments. In support of these investigations, she has critically evaluated varying approaches for deriving site-specific sediment quality criteria.

Key Experience

Comments on Florida Water Quality Criteria development, FPPAEA, Tallahassee, FL. Reviewed the basis for Florida's 2013 proposed human health water quality criteria. Florida's proposed methodology was ground breaking in its use of probabilistic methods to develop statewide criteria and has great potential to lead to protective yet practical water quality criteria. Testimony before the Environment Regulatory Commission reinforced Florida's use of probabilistic methods and urged adopting the overall methodology. Testimony also indicated that an appropriate fish consumption rate, representative of life-time consumption rates, not those reported directly from short-term surveys, be employed. Testimony also recommended the state adopt chemical-specific relative source contribution factors instead of using defaults.

Development of Probabilistic Methodology to Derive Water Quality Criteria, Clearwater Paper, Lewiston, ID. On behalf of Clearwater Paper, JR Simplot, the American Forest Products Association and other stakeholders, Dr. Anderson is overseeing the development of a software tool that can be provided to states to develop human health water quality criteria. Though the methodology will allow users to derive criteria using standard deterministic techniques, it also incorporates probabilistic methods and makes the derivation of criteria based on probabilistic methods simpler and transparent.

Fish Consumption Advisory Lifted, Buckeye Cellulose, Inc. (formerly Proctor and Gamble), Perry, FL. Assisted Buckeye Cellulose mill in collaborating with the Florida Department of Health (DOH) to lift an advisory banning consumption of fish from the Fenholloway River in Taylor County. The advisory warned the public against eating fish from the river, which at the time had high levels of dioxin contamination. The ban included the area of Fenholloway River located from the discharge point of the Buckeye Cellulose, Inc. (the former Proctor and Gamble) pulp mill to the mouth of the river. Samples of fish collected from three points in the river now show much lower dioxin levels in both types of fish likely to show dioxin contamination throughout the area previously covered by the advisory.

Relative Exposure Approach for Setting Fish Consumption Advisories, Florida Pulp and Paper Association, Tallahassee, FL. Developed an approach to setting fish consumption advisories that estimates the potential exposure to a chemical from several dietary sources, including recreational fish consumption, and then determines the need for an advisory by comparing exposures from different dietary sources. When a proposed advisory would substantially reduce overall exposure, the relative exposure approach suggests the advisory may be warranted. When the proposed advisory would not change overall

exposure, the advisory may not be warranted. Case studies using methyl mercury and PCB suggested concentrations currently used to set existing advisories may be appropriate because they do limit overall exposure. However, for dioxin, some of U.S. EPA's proposed concentration limits are not appropriate because they will not result in any measurable change in overall dioxin exposure.

Evaluation of State-wide Water Quality Criteria Development, Florida Pulp and Paper Association, Tallahassee, FL. On behalf of the association participated in the development of a methodology to derive state-wide water quality criteria for potentially toxic chemicals. Assisted in the interpretation and application of the results of a state-wide fish consumption survey, the use of probabilistic methods to derive water quality criteria, the development of inputs and assumptions used in the methodology (including duration of residence, absorption adjustment factors and bioconcentration factors).

Nationwide Dioxin Risk Assessment Using Monte Carlo Analysis, NCASI, Raleigh, NC. Used Monte Carlo Analysis to perform a national exposure and risk assessment of the potential risks associated with consumption of fish containing 2,3,7,8-TCDD downstream of bleach kraft mills for the National Council of the Paper Industry for Air and Stream Improvement. The assessment showed that the U.S. EPA had in an earlier risk assessment overestimated potential exposures and risks by as much as 1000-fold. This result suggests that reducing the levels of dioxin in the effluent of bleach kraft mills may not be a public health priority on either a national or local level.

Development of Alternative Dioxin Water Quality Standards. Developed scientifically defensible alternative dioxin water quality standards based on a critical review of the assumptions used in the US EPA Ambient Water Quality Criteria; demonstrated current science does not support several of the US EPA assumptions; and developed alternative assumptions based on more recent scientific and site-specific information. Presented those alternatives to federal and state regulators, legislators, and the public through private meetings, public meetings, informational workshops, and expert testimony in: Alabama, Arkansas, Florida, Georgia, Maine, Michigan, Mississippi, New Hampshire, North Carolina, Pennsylvania, South Carolina, Tennessee and Texas. Several states have now adopted the alternative dioxin standards.

Monte Carlo Analysis Based Water Quality Standards. Completed a statewide Monte Carlo Analysis in support of the existing dioxin Water Quality Standard and presented the results in an administrative hearing for the Alabama Pulp and Paper Mills. The analysis showed that the existing Standard provided ample protection for even people who eat much greater amounts of fish than assumed by the Standard. Demonstrated that the potential risk to the average Alabama resident is much lower than the level of risk assumed to be allowable by the dioxin Standard. Based upon the evidence presented in the hearing, the judge ruled to retain the existing standard.

Comparative Dietary Risks: Balancing the Risks and Benefits of Fish Consumption. Selected to be a member of the research team and one of the authors for this cooperative agreement between TERA and U.S. EPA. The project assessed the potential risks and benefits of eating contaminated fish. First some of

the well-documented benefits of eating fish were summarized followed by an evaluation of the potential cancer and non-cancer risks associated with contaminants in fish. A framework was then created that expressed both the benefits and risks on a common scale allowing for comparison of benefits to risk. To demonstrate the framework's utility, the final report used it to compare the coronary heart disease, stroke and arthritis benefits of eating fish to the potential risks from chlordane and methyl mercury in a hypothetical example as well as two case studies. At low to moderate consumption rates (up to about 50 grams per person per day, about two meals a week) benefits outweighed total (cancer and non-cancer) potential risks. At essentially all consumption rates benefits outweighed cancer risks, suggesting cancer risk should not be used to set fish consumption advisories.

Fish Consumption Rate Survey, LA. Directed the development and interpreted the results of a fish consumption rate survey designed to quantify the consumption rate of freshwater fish, shellfish, and saltwater fish from several parishes in Louisiana. The survey was unique in its ability to identify the relative contribution of different waterbodies to the overall consumption rate of the population and with regard to the rigorous methods used to establish the size of a fish meal, and area where little quantitative information had been available before.

Selected Publications

Ebert, E. 2012. Critical Interpretation of Fish Consumption Data for Establishing Water Quality Criteria. Platform presentation at the International Society of Exposure Science 2012 Conference, Seattle Washington. November 29.

Keenan, R.E. and E.S. Ebert. 2012. Overview of Human Health Water Quality Criteria (HHWQC). Invited presentation at the western regional meeting of the National Council for Air and Stream Improvement. Vancouver, WA. October 1.

Ebert, E.S. and R.E. Keenan. 2012. Fish Consumption Studies and How the Data are Used. Invited presentation at the western regional meeting of the National Council for Air and Stream Improvement, Vancouver, WA. October 1.

Keenan, R.E. and E. S. Ebert. 2012. Understanding Risk Levels Used to Develop Human Health Water Quality Criteria. Invited presentation at the western regional meeting of the National Council of Air and Stream Improvement, Vancouver, WA. October 1.

Louch, J., V. Tatum, P. Wiegand, E. Ebert, K. Connor, P. Anderson. 2012. A Review of Methods for Deriving Human Health-Based Water Quality Criteria with Consideration of Protectiveness. White paper prepared by the National Council for Air and Stream Improvement. August.

Ebert, E., N. Wilson, M. Wacksman, J. Schell, J. Loper, and A. Fowler. 2011. Utilization of a rural creek fishery in central Alabama. *Risk Analysis* 32: 416–432.

Ebert, E., A. Fowler, N. Wilson, M. Wacksman, and J. Loper. 2011. Results of the Choccolocco Creek Fish Consumption Survey. Poster presentation for the 50th Annual Meeting of the Society of Toxicology, Washington, DC, March 6-10.

Ebert, E.S., and R.E. Keenan. 2007. The Selection of Fish Consumption Rates as a Risk Management Decision. Poster presentation for the 2007 Contaminated Fish Forum, Portland, ME.

Bonnevie, N.L., W. Curley, D.G. Gunster, V. Cullinan, J. Word, T. Bernhard. 1999. Integrating site specific and regional issues for evaluating fish consumption in San Francisco Bay 20th Annual Meeting of the Society of Environmental Toxicology and Chemistry (SETAC), Philadelphia, PA, November 14-18.

Toxicology Excellence for Risk Assessment. 1999. Comparative Dietary Risks: Balancing the Risks and Benefits of Fish Consumption. Member of Research Team and author. August. Cincinnati, Ohio

Ebert, E.S., P.S. Price, and R.E. Keenan. 1996. Estimating exposures to dioxin like compounds for subsistence anglers in North America. In: *Organohalogen Compounds: Proceedings Dioxin 96*, 16th International Symposium on Chlorinated Dioxins and Related Compounds, Amsterdam, The Netherlands. 30:66-69.

Keenan, R.E., P.S. Price, J. McCrodden, and E.S. Ebert. 1996. Using a microexposure event analysis to model potential exposures to PCBs through ingestion of fish from the Upper Hudson River. In: *Organohalogen Compounds: Proceedings Dioxin 96* 16th International Symposium on Chlorinated Dioxins and Related Compounds, Amsterdam, The Netherlands, 30:61-65.

Ebert, E.S. 1996. Fish consumption and human health: Developing partnerships between risk assessors and resource managers. In: *Multidimensional Approaches to Reservoir Fisheries Management*, American Fisheries Society Symposium 16. L.E. Miranda and D.R. DeVries (eds.). Bethesda, MD: American Fisheries Society. pp. 261-270.

Ebert, E.S., T.J. Barry, M.N. Gray, and N.W. Harrington. 1996. Estimated rates of fish consumption by anglers participating in the Connecticut Housatonic River creel survey. *N. Am. J. Fish. Manage.* 16:81-89.

Ebert, E.S., S.H. Su, T.J. Barry, and M.N. Gray. 1995. Estimated rates of fish consumption by anglers participating in the Connecticut Housatonic River creel survey. *N. Am. J. Fish. Manage.* 16:81-89.

Ebert, E.S., P.S. Price, and R.E. Keenan. 1994. Selection of fish consumption estimates for use in the regulatory process. *J. Expos. Anal. Environ. Epi.* 3(3):373-393.

Ebert, E.S., N.W. Harrington, K.J. Boyle, J.W. Knight, and R.E. Keenan. 1993. Estimating consumption of freshwater fish among Maine anglers. *N. Am. J. Fish. Manage.* 13(4):737-745.

Anderson, Paul D. 1999. A framework for comparing the risks and benefits of eating contaminated fish. Annual meeting of the Society for Risk Analysis. Atlanta, GA.

Anderson P.D. and J.B. Wiener. 1995. Eating Fish. Chapter in: *Risk versus Risk Tradeoffs in Protecting Health and the Environment*, J.D. Graham and J.B. Wiener, eds. pp: 104-123.

Anderson, P.D., B. Ruffle and J. Unwin. 1994. Application of Monte Carlo analysis to the derivation of water quality criteria for the Great Lakes Water Quality Initiative. *Proceedings, TAPPI 1994 Environmental Conference*: 221-229.

Ruffle, B., D. Burmaster, P.D. Anderson, and H. Gordon. 1994. Lognormal Distributions for Fish Consumption by the General U.S. Population. *Risk Analysis*, 14:395-404.

Anderson, P.D., B. Ruffle, and B. Gillespie. 1992. A Monte Carlo Analysis of Dioxin Exposures and Risks from Consumption of Fish Caught in the Freshwaters of the United States Affected by Bleached Chemical Pulp Mill Effluents. *Proceedings, TAPPI 1992 Environmental Conference*. pp. 879-893.

Anderson, P.D. 1992. Human Health Risk Assessment: Revising the EPA Guidelines for Deriving Human Health Criteria for Ambient Water. The methodology is too conservative. *Water Quality Standards for the 21st Century*. U.S. EPA. Office of Science and Technology. 823-R-92-009. December 1992.

Anderson, Paul D. and Betsy Ruffle. 1992. A Monte Carlo Analysis of Dioxin Risk from Fish Consumption. *Society of Risk Analysis*. 1992 Annual Meeting. December.