



November 7, 2012

Paula Wilson
IDEQ State Office
Attorney General's Office
1410 N. Hilton
Boise, ID 83706

Clearwater Paper Corporation
601 West Riverside, Suite 1100
Spokane, WA 99201

**RE: Docket No. 58-0102-1201 - Negotiated Rulemaking
Idaho's Fish Consumption Rate**

Dear Ms. Wilson:

Clearwater Paper is pleased to offer this comment letter and attached technical memorandum on the subject rulemaking. We appreciate the Idaho Department of Environmental Quality's (IDEQ) work on this very important matter and look forward to participating as this rulemaking proceeds.

Relative to the six (6) fish consumption rate studies offered for review by IDEQ, we offer the attached technical memorandum as prepared by Exponent. Exponent is a highly regarded toxicology and risk assessment consulting company and uniquely qualified to offer technical guidance on this very important matter. We believe IDEQ will find their comments (prepared on our behalf) very useful.

In summary, our comments on the six (6) historical fish consumption studies are as follows:

- The four studies focused on high-end subpopulations situated near Puget Sound (Suquamish, Tulalip, Lummi, and API studies) were considered to have very low relevance to Idaho and were generally lacking in other technical areas. Therefore, these studies do not form an appropriate basis for identifying fish consumption rates for any populations in Idaho.
- The CRITFC study includes individuals from Idaho, but the Idaho specific data cannot be separated from the entire dataset, limiting the relevance of data from this study to application in Idaho. The CRITFC also has low ratings for survey methodology and data availability. Unless the relevant data could be extracted from this study database, overall, the CRITFC study would provide only limited use in Idaho regulatory decision making.
- The EPA (2002) study is based on nationwide fish consumption patterns in the general public and it is unclear if it includes Idaho residents. More recent national data are available that have been reanalyzed to provide a better estimate of general population fish consumption. Thus, EPA (2002) is not considered appropriate for use in the development of water quality standards in Idaho.

- There are no studies available that provide adequate characterization of usual fish consumption by Idaho residents. In the absence of an Idaho-specific study, the best available dataset for a general population study are provided in the reanalysis by the State of Washington of NHANES data, and this may provide an interim surrogate for general population consumption rates. Similarly, the CRITFC study (with anadromous fish excluded) may provide an interim value for high-end consumption.
- An Idaho-specific study would characterize fish consumption patterns for all Idaho residents, both general public and high-end subpopulations. A new study would answer the important question of how much locally caught fish is being consumed in Idaho and would be an essential underpinning for revising water quality criteria.

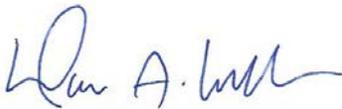
We support and endorse a new fish consumption survey that estimates how much and what type of fish is currently being consumed by all Idahoans.

We support the use of best available science in setting water quality criteria. Specifically, we believe the use of a probabilistic approach based on using real-world distributions of the parameters used to set the criteria (distributions of body weight, drinking water intake, fish consumption rate, etc.) is a perfect example of evolved science-based rule making. This approach is well supported in the scientific and regulatory community. There are also many examples where EPA and other state agencies have used probabilistic approaches in setting air, water and cleanup criteria that are protective of public health. We urge IDEQ to put the building blocks in place to use these tools in the subject rule making.

On behalf of Clearwater Paper, we appreciate the opportunity to provide comments on this important matter and look forward to participating with IDEQ as this rulemaking goes forward.

Please contact me at 509-344-5956 or marv.lewallen@clearwaterpaper.com with questions.

Sincerely yours,

A handwritten signature in blue ink that reads "Marv A. Lewallen". The signature is fluid and cursive, with the first name "Marv" and last name "Lewallen" clearly legible.

Marv Lewallen
Vice President – Environmental, Energy & Sustainability

C: Don Essig

Review of Applicability of Fish Consumption Studies for Water Quality Criteria Rulemaking in Idaho

As part of a Negotiated Rulemaking regarding local and regional fish consumption, the Idaho Department of Environmental Quality (IDEQ) has reviewed information on fish consumption rates, and has requested comments on the relevance of six specific fish consumption surveys that were given a high score for potential relevance by IDEQ.

The comments below are intended to provide feedback to IDEQ regarding the quality of these studies, potential limitations, and the applicability for the current rulemaking. Each of the six fish consumption studies identified by IDEQ was evaluated for:

- Relevance to application to water bodies and populations within the state of Idaho
- The methodology used in the study and whether it is robust for the purpose of defining fish consumption rates
- The availability of the raw data underlying the studies, and associated peer review
- The technical suitability of the studies for regulatory decision making in Idaho.

The table below summarizes our evaluation of these studies and is followed by a discussion of the findings and substantiation of our conclusions with regard to applicability of each study to regulatory decision making and application within Idaho. These comments are not intended to provide a detailed critique of each study, but rather are organized by the technical topics bulleted above, and components of each of the cited studies are discussed, as appropriate. The goal is to provide a conceptual framework for using information to develop a fish consumption rate and for consideration in developing future studies of fish consumption specifically for Idaho populations.

Table 1. Rating of fish consumption studies under consideration by IDEQ

| Study | Relevance to Idaho | Survey Methodology | Data Availability & Peer Review | Technical Suitability for Regulatory Decision Making |
|----------------------|--------------------|--------------------|---------------------------------|--|
| CRITFC 1994 | Low/Medium | Low/Medium | Low | Medium |
| Suquamish Tribe 2000 | Very low | Low/Medium | Low | Medium |
| Toy 1996 (Tulalip) | Very low | Low/Medium | Low | Medium |
| Lummi Nation 2012 | Very low | Low | Low | Low |
| U.S. EPA 1999 (API) | Very low | Low/Medium | Low | Medium |
| U.S. EPA 2002 | Low/Medium | Medium/High | Medium | Low |

Overall, our review of these studies indicates that few evaluate populations or provide data that are potentially relevant to fish consumers in the state of Idaho. The survey methodology for the regional studies generally imposes several limitations for interpretation of the data.

Additionally, although IDEQ has attempted to identify those studies that have undergone technical review, the lack of availability of the raw data underlying these studies limits the ability to conduct additional analyses that could improve characterization of fish consumption patterns among high-end fish consumers in the regions where those studies were conducted. Together, these issues impose significant limitations on using the information in these studies for application in the current Idaho rulemaking effort.

For each category, the following discussion: 1) identifies the specific issue and its importance; 2) provides specific examples from the studies and/or critical information that would be necessary to plan and conduct an Idaho fish consumption study; and 3) provides a conclusion with respect to how well the studies address the issue.

Relevance to Idaho

Issue

The most basic criterion for selecting a fish consumption survey or surveys for use in deriving Idaho-specific fish consumption rates is the relevance of the survey to fish consumers in Idaho. The selected studies should be representative of the range of all fish consumers in Idaho, their fish consumption patterns, and the types of fish they harvest and consume from state waters.

Evaluation

Ideally, Idaho-specific studies (or studies of populations reasonably similar to Idaho) would be used to set a fish consumption rate used for Idaho water quality standards. This would include characterization of both the general fish-consuming population in Idaho, as well as specific sub-

populations of potential interest (e.g., because of high fish consumption rates), and the nature of the fishery provided by the inland water bodies in the state. On this basis, four of the studies listed by DEQ for comments (Suquamish Tribe 2000 [Suquamish], Toy 1996 [Tulalip], Lummi Nation 2012 [Lummi], and EPA's 1999 evaluation of Asian and Pacific Islanders [API]) have very low relevance to Idaho, because they represent fish consumption patterns of individuals harvesting primarily from marine waters (Puget Sound), with a large proportion of seafood consumption coming from shellfish. People living in proximity to marine waters (i.e., in coastal states) generally consume more fish than people from inland states (Moya 2004).¹ In addition, the types of fish available (e.g., shellfish) and abundance differ significantly from inland freshwater bodies, thereby limiting the applicability of findings reported in these studies to populations in Idaho.

Among the studies listed for comment by DEQ, the U.S. EPA national survey data for the U.S. population (EPA 2002) provides the best data to estimate general-population fish consumption among fish consumers. However, it is not specific to Idaho; the study was designed to sample from and be representative of all 50 states and the District of Columbia in 1994–1996, but it is unclear whether any of the study centers were located in Idaho. There are methodological issues that limit the usability of this study (described in Section 2, below) and most likely will result in an overestimate of usual consumption by general population fish consumers. More recent general-population fish consumption estimates from the National Health and Nutrition Examination Survey (NHANES) for 2003–2006, using similar methodology, are available in EPA's Exposure Factors Handbook.² These data are likely more relevant for current consumption patterns. In addition, a recent statistical reanalysis³ conducted in support of the Washington State Department of Ecology (WDOE) Fish Consumption Rate Technical Support Document (TSD)⁴ improves the applicability of these data for deriving fish consumption rates for the general population (see Section 2 for more details). However, as with the EPA (2002) study data, the more recent NHANES data set also characterizes consumption rates among fish consumers throughout the U.S. and does not provide a specific analysis of data on Idaho residents.

While the NHANES data provide the best available estimate of consumption by fish consumers in the general population, it may not capture fish consumption patterns of high-end consumers, such as Native Americans. Among the studies being considered by IDEQ, the CRITFC study may provide the best available data for characterizing fish consumption patterns among high-end consumers. Elements of the CRITFC study make it potentially relevant to Idaho. First, the CRITFC study includes individuals from Native American tribes that reside along the Columbia River basin, including the Upper Columbia. And it specifically includes individuals from Idaho

¹ Moya, J. 2004. Overview of fish consumption rates in the United States. *Hum. Ecol. Risk Assess.* 10:1195–1211.

² EPA. 2011. Exposure Factors Handbook. U.S. Environmental Protection Agency.

³ Polissar, N.L., M. Neradilek, A.Y. Aravkin, P. Danahar, and J. Kalat. 2012. Statistical analysis of national and Washington State fish consumption data. Draft. Prepared for the Washington State Department of Ecology by The Mountain-Whisper-Light Statistics, Seattle, WA. July 22, 2012.

⁴ WDOE. 2012. Fish consumption rates technical support document. A review of data and information about fish consumption in Washington. Public review draft. Washington Department of the Environment. August 27, 2012. Version 2.0

(25% of the study participants were from the Nez Perce tribe in Idaho). However, the CRITFC study does not present rates for individual tribes; it includes only the pooled sample from all four tribes included in the study (Nez Perce, Yakama, Umatilla, and Warm Springs). An analysis of the variability among tribes was not presented, so it is unknown how well the overall rate represents the Nez Perce. Second, because the populations are located away from coastal waters, the fish in their diet consists primarily of freshwater fish. However, the fish consumption rate derived from the CRITFC study (and used by Oregon Department of Environmental Quality in their water quality program) includes both anadromous and non-anadromous fish and does not segregate consumption rates for the two, limiting the relevance of these data to purposes such as establishing ambient water quality criteria. This issue of whether anadromous fish consumption should be included in fish consumption rates for water quality criteria is discussed in Section 5.

Conclusions

The Suquamish, Lummi, Tulalip, and API studies have little to no relevance for fish consumption in Idaho, because their study populations are dissimilar to residents of Idaho and they have access to and eat fish and shellfish that are not present in Idaho. The CRITFC study has more relevance to Idaho, because the study population harvests and eats fish from inland fresh water. However, the relevance is considered low to medium, because although it includes individuals from Idaho, their consumption rates are not segregated from individuals from other areas. The EPA (2000) national survey may provide data that are similar to typical consumption patterns of the general population in Idaho, but more recent NHANES data are available. The relevance is considered low to medium, however, because the data are not specific to Idaho and include individuals from throughout the U.S.

Survey Methodology

Issue

Use of the most appropriate survey methodology is critical for developing reliable and accurate estimates of fish consumption.

Evaluation

The two basic survey instrument types used in the fish consumption studies listed by DEQ are:

- 24-Hour recall surveys — The participant is asked to recall specifically what fish and shellfish was eaten in the last 24 hours (typically from a pre-defined list) and how much.
- Food frequency surveys — The participant is asked to estimate the frequency at which they ate specific fish and shellfish species over a specified period of time in the past (i.e., meals per day, week, or year) and the portion size of the

typical meal. The frequency and portion size are combined and averaged over a year to yield an average daily intake rate for the individual.

The information is combined across the survey respondents to determine a distribution of fish consumption rates for the population. There are strengths and weaknesses with each of these survey methods. For example, food frequency surveys cover a longer period of time, so they may be able to reveal long-term patterns, but the accuracy of recall suffers over the longer period of time. The 24-hour recall is likely to more accurately reflect intake during the survey period (i.e., 24 hours), but may miss daily variation on an individual level, or seasonal variation on a population level. In addition, because fish consumption rate estimates used for regulatory decision making typically exclude non-consumers, anyone who did not happen to eat any fish type on the day preceding a 24-hour recall is treated as a non-consumer and excluded. This will typically, but not always, have the effect of overestimating actual fish consumption in the population.

Among the studies being considered by IDEQ, EPA (2002) used the 24-hour recall method and administered two surveys separated by 7 to 10 days. The Tulalip, Lummi, and API studies used food-frequency surveys. The CRITFC and Suquamish studies included both survey methods, but only the food frequency results were used to derive the final recommended consumption rates for these studies. The 24-hour recall data from the CRITFC and Suquamish studies were collected for comparison and validation.

In the Suquamish study, 55% of participants reported no seafood consumption in the 24 hours prior to taking the survey. When comparing the results of the two survey types (including the people who did not consume fish in the 24-hour recall survey), the mean consumption rate measured in the 24-hour recall portion of the study (1.5 g/kg-day) was nearly half the consumption rate estimated in the food frequency survey (2.7 g/kg-day). The lack of seafood consumption during the 24-hour recall survey period does not, however, indicate that those respondents are necessarily non-consumers, because the food frequency survey of the same population revealed that all participants consumed seafood during the 1-year period that participants were asked to include in their food frequency estimate. Study authors concluded that the “lower mean consumption rate based on [24-hour] dietary recall suggests that a brief set of questions does not uncover all forms of consumption.” However, this conclusion is not supported by scientific literature on dietary surveys. Although the 24-hour recall does not capture day-to-day variability on an individual level, on a population level, it may provide a more accurate account of the consumption rate than the food frequency survey method, because recall is more accurate for a recent, short period. This type of dietary assessment (i.e., the 24-hour recall) has been shown to accurately reflect dietary patterns.⁵ However, each participant should be surveyed two or more times, and ideally, the survey should be conducted over multiple seasons to capture seasonal variation.

Analyses indicate that retrospective diet history surveys, such as the Suquamish, Tulalip, API, and Lummi food frequency questionnaires that look back over a year or longer (in the case of

⁵ Witschi, J.C. 1990. Short-term dietary recall and recording methods, p. 52–68. In: W. Willett (ed). Nutritional epidemiology: Monographs in epidemiology and biostatistics. Oxford University Press, New York.

the Lummi study, 25 years), may be more likely to overestimate actual consumption.⁶ Therefore, studies using this type of study design (or interpreting results from existing studies with this design) should be validated by summing reported consumption for individual target food items, along with food groups not included in the survey, to determine whether reported intake is consistent with metabolic energy requirements.

Ideally, fish consumption estimates are developed from dietary intake data that have been generated from multiple, non-consecutive-day, 24-hour recall surveys administered to study participants over a longer period of time to capture seasonal and individual variability. For example, Nobmann et al. (1992) conducted a study on dietary intake in Native Alaskans from 10 communities throughout Alaska. Their approach included the use of multiple 24-hour recall surveys of all food groups consumed, completed during five seasons over an 18-month period. Nobmann et al. (1992) reported the typical caloric intake for native Alaskans as approximately 2,750 kcal per day for men and 1,950 kcal per day for women (Table 5-12; Nobmann et al. 1992). Caloric intake in the general U.S. population during that time period was approximately 2,550 kcal per day for men and 1,550 kcal per day for women (NHANES II, as reported in Nobmann et al. 1992).⁷ The CRITFC study did collect 24-hour recall data on all food and beverages consumed, but the study reports do not provide these data in a way that can be used to validate estimated fish consumption rates in the context of the total diet. Data from the CRITFC study indicate that typical daily caloric intake among members of the four tribes included in the study was approximately 1,800 kcal/day for men and 1,600 kcal/day for women⁸

Conclusions

The fish consumption rates from all of the regional surveys (the CRITFC, Suquamish, Tulalip, Lummi, and API studies) are based on food frequency surveys covering 1-year periods of time, or in the case of the Lummi study, 25 years. Scientific literature suggests that retrospective studies that ask the participant to look back over a long period of time may be more likely to overestimate actual consumption. In addition, none were validated with a complete diet survey to evaluate fish consumption in the context of total caloric intake. For this reason, the CRITFC, Suquamish, Tulalip, and API studies are given a rating of low to medium for survey methodology, and the Lummi study a rating of low because of the long survey window. The EPA (2002) study used 24-hour recall surveys, which provide a more accurate estimate of intake during the survey window (i.e., 24 hours). In addition, they administered two surveys to each participant, providing a somewhat better probability that consumers will not be misclassified as non-consumers. The EPA (2002) study is assigned a rating of medium to high.

⁶ Rasanen, L. 1979. Nutrition survey of Finnish rural children. VI. Methodological study comparing the 24-hour recall and the dietary history interview. *Am. J. Clin. Nutr.* 32(12):2560–2567.

⁷ Nobmann, E.D., T. Byers, A.P. Lanier, J.H. Hankin, and M.Y. Jackson. 1992. The diet of Alaska Native adults: 1987–1888. *Am. J. Clin. Nutr.* 55:1024–1032.

⁸ Rhodes, NAS. 2006. Fish consumption, nutrition, and potential exposure to contaminants among Columbia River Basin Tribes. A thesis presented to the Department of Public Health and Preventive Medicine, Oregon Health & Science University in partial fulfillment of the requirements for the degree of Masters of Public Health.

Data Availability and Peer Review

Issue

Peer review and open use of data are critical aspects of the scientific process, part of a system that maintains scientific rigor, supports reanalysis that advances the science, and creates transparency in the process.

Evaluation

The CRITFC, Suquamish, Tulalip, Lummi, and API studies have not received the benefit of a formal, external peer review and/or a public review-and-comment process to evaluate study design, results, and applicability for use in public health decision making, nor have they been published in a peer-reviewed journal. The available reports provide only summary data that limits full review. This lack of full review does not, in itself, disqualify these studies; they all have received, to varying degrees, scientific review by tribal, agency, and in some cases, independent scientists. However, it limits the reliability of these data for use in regulatory decision making, and precludes reanalysis for the purpose of validation or application to different geographic areas or populations.

The EPA (2002) study does not provide data suitable for reanalysis in the report itself, but such data can be obtained from the U.S. Department of Agriculture (USDA), the agency that administers the underlying study. Similarly, the more recent NHANES national fish consumption data described in Section 1 of these comments can be obtained for additional analysis. An example of such an analysis was conducted recently in support of the WDOE TSD⁹. Advanced statistical techniques were used to combine multiple results from 24-hour recall surveys after using the food frequency survey results to more accurately identify consumers and non-consumers. The resulting fish consumption rates, published in the WDOE TSD,¹⁰ more accurately reflects consumption among fish consumers in the general public.

For data that will be used as the basis of public health policy applicable to the general public, a transparent public review process is critical. Studies of tribal populations could be important to decision making in Idaho, but unfortunately, data from the tribal studies are not available to the public, limiting the ability of agencies to rely on them for regulatory decision making.

Conclusions

Data from the regional studies are not available for review and reanalysis. Thus, these studies are given a low rating for data availability and review. Conversely, although the raw data from

⁹ Polissar, N.L., M. Neradilek, A.Y. Aravkin, P. Danahar, and J. Kalat. 2012. Statistical analysis of national and Washington State fish consumption data. Draft. Prepared for the Washington State Department of Ecology by The Mountain-Whisper-Light Statistics, Seattle, WA. July 22.

¹⁰ WDOE. 2012. Fish consumption rates technical support document. A review of data and information about fish consumption in Washington. Public Review Draft. August 27, Version 2.0.

EPA's nationwide study (2002) are not available, data suitable for review and reanalysis can be obtained (although, as previously noted, more recent national data are available that provide updated estimates of consumption). The EPA (2002) study is given a medium rating. It is important to note, however, that the data from NHANES (i.e., those data that provide an update on the information reported in EPA 2002) can be requested through petition. Such a petition might provide details of the populations included in the survey, and the applicability of each to understanding fish consumption in Idaho, possibly even for subsets of the population.

Technical Suitability for Regulatory Decision Making

Issue

Fish consumption studies selected for use in regulatory decision making must collect, analyze, and present data in a way that fits the risk-based paradigm in which the water quality criteria are derived.

Evaluation

The risks of concern for chemical exposures from seafood ingestion focus primarily on those that might result from life-long exposure. Fish consumption intake rates that are used for calculating water quality criteria must therefore represent an average intake over a long time period, up to a lifetime, rather than information on short-term consumption. Although the intent of each of the fish consumption studies under consideration by IDEQ was to characterize usual consumption patterns, it is unclear how successful the survey instruments were at attaining that goal. In particular, the studies evaluating high consuming subpopulations (all but the EPA 2002 study) could have validated the sustainability of the fish diet both in terms of metabolic energy requirements in the context of total diet and in the context of harvest rates. How well the short-term rates (two 24-hour recall surveys per participant) estimated in the EPA 2002 study represent long-term fish consumption is also unclear. As EPA stated when presenting fish consumption data based on that same methodology in the Exposure Factors Handbook, "...it should be noted that the distribution of average daily intake rates generated using short-term data (e.g., 2-day) does not necessarily reflect the long-term distribution of average daily intake rates. The distributions generated from short-term and long-term data will differ to the extent that each individual's intake varies from day to day."¹¹ Thus, none of the studies under consideration have demonstrated that the estimated fish consumption rates are representative of long-term intake.

Policy and public health considerations dictate that water quality criteria are typically derived based on consideration of a reasonable maximum exposure (RME) scenario. The RME is designed to represent a high-end (but not worst-case) estimate of individual exposures. The RME is defined as "reasonable," because it is a product of several factors that are a mix of

¹¹ EPA. 2011. Exposure Factors Handbook. U.S. Environmental Protection Agency.

average and upper-bound estimates.¹² By convention, RME estimates typically fall between the 90th and 95th percentile of an exposure distribution. In other words, when all assumptions are taken together, the resulting exposure estimate should be in the range of the 90th and 95th percentile of exposure for the population of concern. **Therefore, each individual input (e.g., fish consumption rate, fish diet fraction, exposure duration) should not be at the high end of the distribution in order for the overall exposure estimate to be at the high end of the distribution.** For example, the FDA designates a high-end consumption rate as the 90th percentile from large national, 2- to 3–nonconsecutive-day surveys of food intake by thousands of individuals.¹³

The specific percentile(s) selected should be considered on a study-specific basis and will depend on such factors as the characteristics of the data distribution and the representativeness for the study population to which the fish consumption rate will be applied. In the case of the tribal and API studies, the study populations are high-end consumers relative to other fish-consuming populations. The intent of the RME approach is to ensure protection at the upper end of a distribution that includes the entire population (or in the case of fish consumption, all people who consume fish). As an example, the 95th percentile intake from the Suquamish study represents the high-end intake from one of the highest consuming groups. This rate (or even the 50th percentile consumption rate) represents well over the 99th percentile consumption rate for fish consumers among the general public in the U.S. (see Tables 4 and 8 in Polissar et al. 2012).¹⁴ Ultimately, the choice of specific percentiles of a population distribution, and on which population to base a RME estimate, is a policy decision that is not based solely on science. For example, public health policy makers have chosen to base soil cleanup levels on high-end soil ingestion estimates for a typical child rather than for children with pica, a significant subpopulation that ingests soil at a rate perhaps 10 times or more than the typical child.

Ideally, raw data from these studies would be available for evaluation of statistical cutoffs, or at a minimum, the studies should provide distributional data sufficient to conduct probabilistic analyses in the context of the entire water quality criteria risk equation. Although the original studies do not all provide adequate data in the study reports, Polissar et al. (2012) presents descriptive statistics, including percentiles, that along with assumptions about distribution type, would allow for probabilistic analysis of the CRITFC, Suquamish, Tulalip, and API studies. The analysis provided by Polissar et al. (2012) is focused on evaluating consumption rates for fish consumers in the general U.S. population, and so may not specifically provide data relevant to Idaho. EPA (2002) does provide adequate data to conduct probabilistic assessments, but as noted previously, the newer NHANES data reanalyzed by Polissar et al. (2012) provide a better estimate of general population exposure.

¹² U.S. EPA. 1989. Risk assessment guidance for Superfund. Volume I. Human health evaluation manual (Part A) Interim Final. EPA/540/1-89/002. U.S. Environmental Protection Agency.

¹³ U.S. FDA. 2006. Estimating dietary intake of substances in food. <http://www.fda.gov/food/guidancecomplianceregulatoryinformation/guidancedocuments/foodingredientsandpackaging/ucm074725.htm> Accessed January 13, 2012. Last updated August 2006. U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition.

¹⁴ Polissar, N.L., M. Neradilek, A.Y. Aravkin, P. Danahar, and J. Kalat. 2012. Statistical analysis of national and Washington State fish consumption data. Draft. Prepared for the Washington State Department of Ecology by The Mountain-Whisper-Light Statistics, Seattle, WA. July 22.

Conclusions

None of the studies under consideration adequately demonstrate that the fish consumption rates derived by those studies are representative of long-term fish consumption. Distributional data from the CRITFC, Suquamish, Tulalip, and API studies are available that would allow for probabilistic analysis. Thus, they are given a medium rating for technical suitability for regulatory decision making. Distributional data are also available for the EPA (2002) study, but the more recent NHANES data are a better choice for general-population fish consumption characterization, so the EPA (2002) study is given a low rating. The Lummi study does not have adequate data available and is given a low rating.

Additional Issue—Anadromous Fish

For the purpose of setting water quality criteria, it is appropriate to include consumption of only non-anadromous fish, because most anadromous fish accumulate the majority of their chemical body burden during the marine-water phase of their life cycle; local water quality has little impact on their total chemical body burden. For most salmon, body burden of bioaccumulative chemicals (e.g., PCBs, dioxins, mercury) derives mostly from marine waters.¹⁵ Based on this consideration, several other agencies have excluded anadromous fish from fish consumption rates used for setting water quality criteria or evaluating site-specific risks associated with fish consumption. For example, EPA Region 10 excluded consumption of anadromous fish when establishing the default seafood consumption rates in their fish and seafood consumption Framework document.¹⁶ In addition, as noted by Washington DOE in their analysis of the issue, “Most states have adopted human health-based water quality criteria that do not include anadromous salmon in the fish consumption rate.”¹⁷

If chemicals in the water or sediments of waterways in Idaho do not contribute significantly to the body burden of chemicals in anadromous fish such as salmon, these fish should be excluded from the fish consumption rate, in the same way that store-bought fish is excluded in determining the contribution to potential human exposure to chemicals from locally caught fish.

¹⁵ O’Neill, S.M., J.E. West, and J.C. Hoeman. 1998. Spatial trends in the concentration of polychlorinated biphenyls (PCBs) in Chinook (*Oncorhynchus tshawytscha*) and Coho salmon (*O. kisutch*) in Puget Sound and factors affecting PCB accumulation: Results from the Puget Sound Ambient Monitoring Program. Puget Sound Research ’98 Proceedings, Seattle, Washington, Volume 1, pp. 312–328 (as reported in WDOE 2012).

¹⁶ U.S. EPA. 2007. Region 10 framework for selecting and using tribal fish and shellfish consumption rates for risk-based decision making at CERCLA and RCRA cleanup sites in Puget Sound and the Strait of Georgia. U.S. Environmental Protection Agency, August 2007.

¹⁷ WDOE. 2012. Fish consumption rates technical support document. A Review of data and information about fish consumption in Washington. Public Review Draft. August 27, Version 2.0

Overall Conclusions

The six fish consumption studies identified by IDEQ for potential use in deriving water quality criteria were evaluated for applicability to regulatory decision making and application within Idaho. Our findings include:

- The four studies focused on subpopulations situated near Puget Sound (Suquamish, Tulalip, Lummi, and API studies) with high-end fish consumption rates were considered to have very low relevance to Idaho and were generally lacking in other technical areas. Therefore, these studies do not form an appropriate basis for identifying fish consumption rates for any populations in Idaho.
- The CRITFC study includes individuals from Idaho, but the Idaho-specific data cannot be separated from the entire data set, limiting the relevance of data from this study to application in Idaho. The CRITFC also has low ratings for survey methodology and data availability. Unless the relevant data could be extracted from this study database, overall, the CRITFC study would provide only limited use in Idaho regulatory decision making.
- The EPA (2002) study is based on nationwide fish consumption patterns in the general public, and it is unclear whether it includes Idaho residents. More recent national data are available that have been reanalyzed to provide a better estimate of general-population fish consumption. Thus, EPA (2002) is not considered appropriate for use in the development of water quality standards in Idaho.
- There are no studies available that provide adequate characterization of usual fish consumption by Idaho residents. In the absence of an Idaho-specific study, the best available data set for a general-population study are provided in the reanalysis by the State of Washington of NHANES data, and this may provide an interim surrogate for rates of fish consumption by the general-population. Similarly, the CRITFC study (with anadromous fish excluded) may provide an interim value for high-end consumption.
- An Idaho-specific study would characterize fish consumption patterns for all Idaho residents, both general public and high-end subpopulations, and would thereby provide a scientifically defensible basis for revising water quality criteria in Idaho.