Appendix: Details on Studies Estimating the Total Economic Value of Changes in Abundance of Western US salmon

In chronological order, the first study is a consulting report by Jones and Stokes Associates (1990) supplying observations 1, 2, and 3 in Table 1. The same data was later used for a journal publication (Hanemann et al., 1991). Contingent valuation was used to query WTP for increases in river flow and associated increase in wild and hatchery Chinook salmon in the San Joaquin river system, from an average baseline run size of less than 100 to a total run of 15,000. The salmon increase was the third of three environmental attributes the survey considered, the others being a wetlands habitat and wildlife program, and a wildlife contamination control program, respectively. Three TEV estimates for the salmon increase were provided for three different survey geographies. The authors compared multiple models; here only results from the most statistically efficient model (as identified by the authors of the study) are included.

Next, Olsen et al. (1990) used contingent valuation to elicit willingness-to-pay for doubling the size of Columbia River basin salmon and steelhead runs, from 250,000 fish to 500,000 fish total. Whether wild vs. hatchery fish would be affected is not directly stated, but the background does note that the payment vehicle of hydropower sales would continue to go towards fish habitat and hatchery support. A subset of the results is published in Olsen et al. (1991). The authors compared WTP for improvements with willingness-to-accept to forego the improvement. The issue is the appropriate property rights, which is related to other issues such as the ability to elicit values in an incentive-compatible manner (see Knetsch, 2007). Here only the WTP value is tabulated for consistency with other studies. The authors also separated WTP values for households that were users (recreationalists) vs. non-users: these values were combined to reflect TEV for an average household. A single estimate is provided for a Pacific Northwest population frame, observation 4 in Table 1.

Loomis (1996) provides an estimate for increasing the salmon and steelhead run on the Elwha River of the Olympic Peninsula from dam removal. The survey states that this would be expected to yield a run increase of more than 300,000 salmon and steelhead; a baseline run of 50,000 can be approximated from a bar chart included in the survey background. It is not directly stated that the survey deals with wild fish in particular but there were no fish hatcheries on the Elwha at that time – the first one was completed in 2011. Three estimates are provided for three different surveyed populations, observations 5, 6, and 7 in Table 1.

Layton et al. (1999) prepared a report for the State of Washington Department of Ecology modeling several different fish improvement conditions for Washington State, based on a survey of Washington State residents. Increases in both Western Washington (including Puget Sound) migratory fish runs are modeled, as well as Columbia River migratory fish (including Eastern Washington). Separate attributes in their survey, not tabulated here, elicited values for increases in saltwater and resident freshwater fish. The survey does not specify whether hatchery and/or wild fish would be increased, but the brief material within the survey on how increases would be achieved does not mention hatcheries. They use a piece-wise model for improvements up to 5% and then a separate model for fish increases greater than 5%. The ranges above 5% that they consider are 5% to 100% for Western Washington fish, and 5% to 150% for Columbia River fish. Further, they also have separate functions depending on whether the respondent was given a low or high baseline value. From the high and low baseline models for each of the two migratory fish populations, observations were computed for the 5% improvement levels, the highest improvement levels considered (100% or 150%), and the middle improvement levels (50% or 75%) to capture the extent of the modeled function. This netted twelve observations total, 8 through 19 in Table 1.

Bell et al. (2003) investigate Coho run size increases for Grays Harbor and Willapa Bay, surveying high and low income populations within 30 miles of the resource. Both doubling and quadrupling the run were considered in separate survey treatments. The Willapa Bay run baseline was 64,000 fish, and the Grays Harbor run baseline was 128,900 fish. As is typical for most of the studies in Table 1 the issue of wild fish vs. hatchery fish improvements is not mentioned in the survey. There are eight observations numbered 20 through 27, one for each income level and each fish change within each watershed.

Last and most recent, Mansfield et al. (2012) provide estimates of increasing wild Chinook and Steelhead for the Klamath River. The survey also considered other attributes, such as change in endangered species status for Klamath Coho salmon and Lost River Suckers. The main mechanism for Chinook and Steelhead run increases was dam removal. The report provides an estimate for the change in salmon for a 30% to 100% population increase, and for a 30% to a 150% population increase (observations 28 and 29, respectively), for a US sample restricted to outside of OR and CA. The first estimate observation 28 is actually negative, an anomaly within the dataset. The authors note that both estimates suffer from low significance of the corresponding attributes in the model, and have broad confidence intervals which both include negative values (Mansfield et al., 2012: pg. 8-3 to 8-5). Although observation 28 is shown in Table 1, it is not used for analyses in this paper.