APPENDIX 4B

RECREATION VALUE ASSESSMENT

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Recreation Value Assessment

Purpose

The study documented in this appendix has two purposes. The first purpose is to estimate the current economic value of recreation activities to visitors in the Klamath Hydroelectric Project (Project) area and downstream using a benefits transfer approach. The second purpose is to assess the changes in the economic value of recreation resulting from the proposed changes in the Project and protection, mitigation, and enhancement (PM&E) measures.

Objectives

The objectives of this recreation value assessment are as follows:

- Define the relevant economic value concept (i.e., consumer surplus) and contrast with the other socioeconomic values included in the study plan (7.1).
- Describe the various recreation value estimation methods, including travel cost demand, contingent valuation and benefit transfer. Provide a justification for the selected approach.
- Coordinate with PacifiCorp's recreation study specialists on estimating the number of recreation visitor days per year in the Project area and by primary purpose activity.
- Obtain the best available information on river-based recreation activity levels along the Lower Klamath River and on ocean salmon recreational fishing in the Klamath Management Zone (KMZ).
- Estimate the value of a recreation visitor day using a benefits transfer approach for the identified primary purpose activities in these areas.
- Estimate the total value of current recreation opportunities in the Project area, along the Lower Klamath River, and for recreational salmon fishing in the KMZ.
- Estimate the proposed Project and PM&E-induced changes in recreation activity levels and the total change in the value of recreation activities in the Project area, along the Lower Klamath River, and for recreational salmon fishing in the KMZ.

Relicensing Relevance and Use in Decisionmaking

Study results will provide information to the Federal Energy Regulatory Commission (FERC) related to the influence of the proposed Project and PM&E measures on the value of recreation opportunities in the region. This information would assist FERC in balancing the

developmental and nondevelopmental benefits of the proposed Project and PM&E measures.

Economic Value

Economic theory suggests that recreation services provide economic value because individuals demonstrate a willingness to expend valuable resources (i.e., time and money) to participate in recreation activities. Net economic value of recreation services, or *consumer surplus*, represents the dollar amount an individual would be willing to pay over and above actual expenditures in order to engage in the recreation activity or to maintain a certain level of quality of the recreation experience. It is this change in consumer surplus, or net economic value of recreation, that this study attempts to measure. Consumer surplus is not observed, but it can be estimated using economic valuation methods. In addition, numerous factors affect the size of consumer surplus, including:

- Number and availability or proximity of substitute recreation sites and opportunities
- Type of recreation activity (e.g., windsurfing, fishing, boating, and picnicking)
- Attributes of the recreation experience (e.g., variety of experiences, safety, level of challenge)
- Cost of access
- Quality attributes of the sites (e.g., scenic beauty, unique landscape, fishing catch rates, wind conditions, boater safety, quantity of trail miles nearby, absence of congestion, behavior of other visitors, facilities)
- Visitor characteristics (e.g., experience, family status, talent, personal values, personal outlook)

This economic value represents a social benefit (negative benefits represent a social cost). The social benefits and costs of the action are aggregated within a benefit-cost analysis framework to determine the extent to which the action as a whole increases or decreases social welfare by allocating resources to a higher valued use. A separate question, addressed in the regional economic impacts section of the socioeconomic analysis, relates to the contribution to local employment and income resulting from the expenditures on recreation services.

Economic Valuation Methods

There are various methodologies for estimating the economic value (i.e., social benefits) of recreation. Each of the methodologies is designed to measure the theoretically correct economic value. However, the selection of the valuation methodology is dependent on the nature and availability of data as well as the time and monetary resources of the study effort (EPA, 2000). The three primary recreation value estimation methods are recreation demand models, direct questioning methods, and benefits transfer methods. Each of these methods is described briefly in turn.

Recreation Demand Models

Recreation demand models, including travel cost demand models and Random Utility Models (RUM), can be used to estimate the recreation benefits in the Project area and downstream. In such models, the observed recreation patterns of users is related to the cost of travel, including travel time, and the quality characteristics of the recreation sites (e.g., challenge rating of the windsurfing, aesthetics, location and quantity of camping opportunities) available to the relevant population of users. These models essentially estimate demand curves for recreation, where the cost of travel is assumed to correspond to price of admission to the site.

The economic value generated by maintaining access to a site for certain on-site recreation activities is typically estimated using the travel cost demand method, which is based on observed data related to the quantity of site visits and the cost of travel to the site (EPA, 2000; Braden and Kolstad, 1991; NOAA, 1996; and, USDOI, 1996). The recreation benefits that would be provided to the public by opening a new site with unique characteristics are often estimated using this method.

The economic value measure for access to the new site can be visualized by the illustration in Figure 1. The shaded area, W_0, below the trip demand curve and above the price or cost of a trip, represents the individual's net willingness to pay for recreation trips. This measure of economic value is called "consumer surplus."

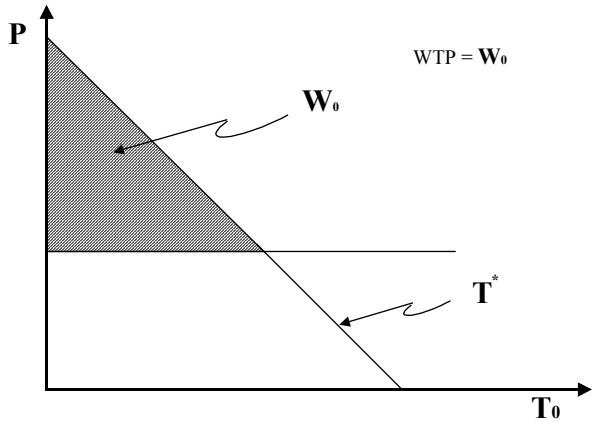

Figure 1. Baseline demand for trips, T, in year **t = 0**.

The trip demand curve would increase as would the consumer surplus represented by the area, W_0, as the perceived quality of the recreation visitor experience increases (e.g., opening of new or previously closed areas, increased safety, improved facilities, improved crowd control, decreased congestion). The values of such quality differences are often measured using random utility models, which measure peoples' strength of preferences for given attributes of a recreation site.

Direct Questioning Methods

Direct questioning methods are designed to elicit respondent's consumer surplus (e.g., willingness to pay user fees) for specified recreation opportunities, facilities, and management regimes, all using surveys. The self reports of willingness to pay are called

"contingent values," as they are contingent upon the establishment of the management alternative presented to the survey respondents. Because these methods rely on verbal reports of behavioral intentions rather than observed behavior, some have questioned their reliability and validity (Hausman, 1993). Nonetheless, direct questioning methods have been shown to lead to comparable values as the travel cost recreation demand models (Carson et al.,1996).

Benefits Transfer Method

Benefits transfer is the practice of adjusting the results from one or more existing studies for a specific type of recreation activity or experience and using them to value changes in a similar recreation activity. This process usually involves two steps: (1) adjusting or transferring an estimated model (or a set of per unit benefit estimates) from the situation where it was developed to the new application; and (2) developing an estimate of the relevant number of recreation visitor units (e.g., household trips, user days) for aggregating the per unit estimates.

The benefits transfer method is a practical alternative to valuation methods involving the collection of original data on preferences. This valuation method relies on approaches toward "transferring" existing studies, value estimates, and willingness to pay functions to new policy contexts, sites, and affected populations. The reliability and validity of such transferred values depend on the quality of the original studies as well as the degree of similarity between the original context in which the values were estimated and the new policy context.

Summary

Both the recreation demand model estimation method and the direct questioning method rely on a costly and time consuming survey design, survey administration, and data analysis process to estimate consumer surplus. In situations where time or monetary resources necessary for conducting such an original study are not available, a third method, benefits transfer analysis, is a practical valuation alternative. The application of this methodology relies on results from existing studies to estimate the economic value of similar recreation activities and sites. A benefits transfer analysis of recreation in the study area is described in the next section. Guidance on the application of these various valuation methodologies can be found in "Regulatory Impact Analysis Guidelines" (EPA, 2000) as well as in NOAA (1996) and USDOI (1996).

Methods

Define Geographic Scope

The geographic scope of the study area is consistent with the study area established for the socioeconomic study. This study area was divided into two sections, the Upper Klamath River area and the Lower Klamath River area. The Upper Klamath River portion of the study area includes the same developed recreation facilities and undeveloped dispersed sites within or adjacent to the Project boundary that are covered in the recreation survey study (3.2) as well as the river reaches and bypasses included in the recreation flow analysis study (3.1). These developed and undeveloped recreation sites and river reaches are:

- Link River Trail
- Veterans Park (Boat Launch)
- Miller Island Boat Launch
- Keno Reservoir Recreation Area
- Pioneer Park
- Sportsman's Park
- Topsy Recreation Site
- Boyle Bluffs dispersed use area
- Upper Klamath River Boater's Access
- Klamath River Campground
- Dispersed shoreline sites in the W&SR reach (2) – river right
- Frain Ranch shoreline sites
- Stateline Takeout
- Six public fishing access points in the Hell's Corner Reach
- Mallard Cove Recreation Site
- Copco Cove
- Fall Creek Park
- Jenny Creek recreation site
- Wanaka Springs recreation site
- Camp Creek recreation site
- Juniper Point recreation site
- Mirror Cove recreation site
- Overlook Park
- Long Gulch Park
- Iron Gate Fish Hatchery
- Iron Gate Fishing Access (Boat Ramp)
- R Ranch resort
- Link River bypass reach
- Keno Reach
- J.C. Boyle bypass reach
- Hell's Corner Reach
- Copco No. 2 Reach

The Lower Klamath River portion of the study area pertains primarily to the stretch of river from Iron Gate dam to the town of Orleans, which is the most accessible and frequented stretch of the Lower River. The KMZ ports are also included for capturing marine salmon sport fishing activity levels.

Estimate Primary Purpose Visitor Days

Upper Klamath River Area—Existing Condition

The recreation opportunities and visitor counts are described separately in the main body of the Socioeconomic Resources Final Technical Report (FTR), Section 2.7.3.3 Specific Economic Development, for the Upper and Lower Klamath River areas, respectively. Furthermore, the recreation resource opportunities in the Upper Klamath River area, as well as substitute opportunities, are the subject of a separate study (see the Recreation Resources FTR). The recreation visitor survey conducted as part of the recreation study was designed to estimate

recreational use for the Project area (see the Recreation Resources FTR, Section 3.0, for more details). The data summarized by EDAW (2003) describe the estimated baseline for recreation activity in the Project area, organized by primary purpose trip.[1] According to the data, boat fishing, waterskiing, resting/relaxing, shoreline fishing, RV camping, and whitewater boating account for most visitor days. The recreation visitor day counts are reported in Table 1. Whitewater boating days were separately estimated by the Bureau of Land Management (BLM) and these results are also reported in Table 1. EDAW estimates that total annual recreation days in the Project area are in the neighborhood of 192,000. In the Socioeconomic Resources FTR, these recreation days are distributed by primary purpose, with 45,630 fishing days, 23,040 days of waterskiing, 11,520 RV camping days, and 5,090 whitewater boating days. Other primary purpose trips include tent camping, swimming, wildlife viewing, hunting, sightseeing, pleasure boating, and visiting with friends and family, among others. These other recreation activities account for more than 77,000 of the total. Finally, more than 7,000 recreation days were not assigned to any one primary purpose activity.

Upper Klamath River Area—Incremental Changes Due to the Proposed Project and PM&E Measures

Recreation trips to the area are expected to increase over time as a result of population growth and trends in recreation participation. In addition, the proposed Project and PM&E measures, especially as they relate to improving facilities, access, recreational fisheries, and recreation resource management, are expected to have a net positive affect on recreation (see Appendix 4A). Only the changes in recreation activity that can be attributed to the proposed Project and PM&E measures over and above what would occur absent these modifications to the existing license, are included in the incremental recreation value assessment. Anticipated increments in recreation activities resulting from the proposed Project and PM&E measures in the Project area were estimated by EDAW (2003b) and are reported in Table 1. Total visitation to the area is expected to increase by about 3,300 visitor days per year in 2009 and rise steadily to more than 19,000 new visitor days per year by 2036.

[1] The definition of a "recreation day" for the purpose of preparing the Recreation Resource Management Plan (RRMP), is slightly different than the definition of a "recreation visitor day" typical of benefit cost analyses, and may tend to overestimate the recreation visitor day counts. Nonetheless, the recreation day data collected by EDAW represent the best available estimates for recreation visitor days in the Upper Klamath River area.

Table 1. Current (2001-2002) annual recreation use and projected changes in the Upper Klamath River Area[1]

Activity	Primary Purpose Recreation User Days 2001-2002	Projected Change By 2009	Projected Change By 2016	Projected Change By 2026	Projected Change By 2036
Fishing	45,630	830	2,300	4,280	4,750
Waterskiing	23,040	350	980	1,830	2,030
Resting/Relaxing	21,120	620	1,740	3,230	3,590
RV Camping	11,520	250	700	1,300	1,440
Whitewater Boating	5,090	100	270	500	550
Other	77,470	1,150	3,220	5,990	6,660
No Primary	7,680				
Total	**192,000**	**3,300**	**9,210**	**1,7130**	**19,020**

[1] Upper Klamath River Area is the area from Link River dam to Iron Gate dam.

[2] Total expenditures include expenditures by all visitors, including those visitors who live in the Project area or nearby.

[3] Total expenditures include expenditures by all visitors that stay overnight in the Project area.

[4] Total expenditures include expenditures by all visitors that stay overnight outside the Project.

[5] The 50-mile buffer area is inclusive of the 5-mile buffer area.

Lower Klamath River Area—Existing Condition

Information on the recreation activities enjoyed in the Lower Klamath River area was obtained from the California Department of Fish and Game on Klamath River fishing, from the U.S. Forest Service on whitewater boating and camping recreation activities, and from the local mining associations on recreational mining in and along the Klamath River. In addition, the Pacific Fisheries Management Council provided the data on ocean recreational salmon fishing.

Lower Klamath River Area—Incremental Changes Resulting from the Proposed Project and PM&E Measures

The fish resources and water resources sections of Exhibit E and the FTRs describe the PM&E measures and their anticipated impacts. Continued operation of the Iron Gate fish hatchery is considered a fish resource PM&E under the terms of the proposed Project. To the extent that these operations contribute to anadromous fish populations and harvest allocations to the in-river and ocean sport fisheries, they are responsible for generating the recreational fishing effort and consumer surplus that is tied to the fish populations.

About 80 percent of total hatchery operation costs have historically been absorbed by PacifiCorp. The IGH contributes about half of the total hatchery fish in the system, with the remaining fish coming from the Trinity hatchery (Forrest Olson, Personal Communication, January 24, 2004). According to the Klamath River Technical Advisory Team report (KRTAT, 2003), hatchery fish accounted for about 38 percent of ocean abundance of fall

Chinook in 2003. Combining all of these factors and assuming a proportionate relationship between ocean abundance, harvest allocations, and recreational fishing effort, suggests that the Iron Gate fish hatchery operations PM&E contributes to about 15 percent (i.e., .8*.5*.38) of the in-river and ocean sport recreation user days.

This is not to say that increases in anadromous fish populations will necessarily lead to proportionate increases in fishing effort. Rather, if there are no fish, there would be no sportfishery. Thus, to obtain a ballpark estimate of the value of the hatchery, the assumption is made that the hatchery is necessary for ensuring a sufficient quantity of ocean adult fish to support an annual harvest. Given the wide variability in allowable harvest from year to year, the average annual effort from Table 2 that was based on the last quarter century of data was used as an estimate of future recreation days. Attributing about 15 percent of the 28,400 in-river sport fishing days and 93,200 ocean recreational salmon fishing days to the IGH gives 4,620 in-river days and 13,980 ocean days.

Table 2. Average Annual Primary Purpose Recreation User Days Along and On the Lower Klamath River[2]

Activity	Primary Purpose User Days
Whitewater Boating	13,673
Gold Mining	10,000
Camping[3]	10,526
River Sport fishing[4]	28,432
Ocean Sport fishing[5]	93,235
Total	**155,866**

Besides the IGH, other proposed PM&E measures could benefit the in-river fishery downstream of Iron Gate dam. For example, heating of steelhead incubation water would likely have a positive affect on survival. Benefits are difficult to quantify, but they further substantiate the ballpark estimate of recreation benefits resulting from the proposed Project and PM&E measures.

Summary

By capturing all of the major primary activities, the study provides a comprehensive but approximate view of the types and levels of recreation activities under the existing condition and the changes from that condition resulting from the proposed Project and PM&E measures. The next sections document the literature sources and derive estimates of

[2] This table reproduces the visitor day estimates from Table 2.7-59 in the text of the Socioeconomic Resources FTR.

[3] Based upon input received from the U.S. Forest Service, Klamath National Forest (Boland, 2003), average user days for camping are assumed to be about a quarter of the total for the all recreation activities with the exception of gold mining and ocean sportfishing ((0.25 * (145,340 – 103,235)) or 0.25 * 42,105 = 10,526).

[4] Average user days for river sportfishing are based on estimates shown in Socioeconomic Resources FTR Table 2.7-52, and are for the period 1978-2002.

[5] Average user days for ocean sportfishing are based on estimates given in Socioeconomic Resources FTR Table 2.7-53, and are for the period 1976-2001.

the per day values associated with the relevant primary recreation activities. Then the estimates of recreation visitor days are combined with estimates of visitor day values obtained from the empirical literature to calculate the baseline for the current value of Klamath River-based recreation and the incremental value from the proposed Project and PM&E measures.

Review Recreation Valuation Literature

The review of the recent recreation value literature relates to valuation methods as well as empirical studies. The literature review emphasized studies relating to the primary recreation activities in the Upper Klamath River area, the Lower Klamath River area, and recreational ocean fishing for salmon. The literature search for this analysis included the following online resources:

- www.evri.ec.gc.ca/evri
- www.nps.gov/parks.html
- www.idealibrary.com
- www.indecon.com/iec_web/menu/infoprod.asp
- www.epa.nsw.gov.au/envalue

The following databases were also searched:

- ECONOLIT (American Economic Association)
- Applied science & technology index
- General Science Abstracts
- Biological Abstracts

Finally, several informal bibliographies collected from individuals working in the field were consulted.

Assess and Adjust the Recreation Values from the Literature and Select the Best Range or Point Estimate

This section applies a benefits transfer analysis method to estimate the average value or range in values of a visitor day for each of the identified primary purpose activities. These activities are sportfishing, recreational ocean salmon fishing, whitewater boating, camping, recreational mining, waterskiing, and resting/relaxing. The resultant values or value ranges are then multiplied by the estimates for visitor days to obtain total values for each of the types of recreation activities.

Sportfishing Values

Rosenberger and Loomis (2001) conducted a comprehensive benefit transfer study of outdoor recreation visitor day values in the U.S. This is a particularly useful resource for the present assessment as it includes an annotated bibliography on recreation use value studies, thus consolidating much of the needed information for identifying the relevant literature. The Rosenberger and Loomis study (2001) included 39 fishing studies providing 122 estimates of the value of a day's fishing across all types of species and water resources and using a variety of estimation methods and assumptions. One of the studies (Bergstrom and Cordell, 1981) provides an average value for fishing based on multiple sites within this region, including National Parks, National Forests, National Rivers, and U.S. Army Corps of

Engineers reservoirs and numerous state recreational areas. A second source, McCollum et al. (1990), concentrated on fishery resources on National Forest Lands, with some of the estimates pertaining to the Pacific Northwest. A total of 57 of the estimates were from studies based in the Pacific Northwest or Intermountain region of the country and several studies related to unique or especially high-quality fisheries. Rounding to the nearest dollar, the estimates ranged from $2 to $247 and the average recreational fishing values for all sites included in the Rosenberger and Loomis review of $42.00 (2003 dollars) is reported in Table 3.

Table 3. Recreational Fishing Values ($2003)

Citation	Habitat/Location	Number of Studies	Number of Value Estimates	Average Value per Visitor Day and (Range) ($2003)[6]
Freshwater and Anadromous				
Rosenberger and Loomis (2001)	All water resources/all locations including WA & OR	39	122	$42.00 ($2 to $247)
Boyle et. al. (1998)	Freshwater/CO & MT	2	3	$79 ($43 to $97)
Boyle et. al. (1998) (Per Trip estimates converted to Per day)	Freshwater/all locations, but primarily AK, CA, MT and including WA and OR	11	231	$54[7] ($1 to $214)
Layman, Boyce, and Criddle, (1996)	Freshwater/Chinook salmon/AK	1	1	$58 ($38 to $79)
Freshwater Summary		53	357	$50
Marine/Anadromous				
Boyle et. al. (1998)	Marine/WA, CA	4	6	$121 ($22 to $264)
Boyle et. al. (1998) (Per Trip estimates converted to per day)	Marine/primarily salmon in AK, WA, OR and CA	4	24	$44[8] ($3 to $103)
Marine/Anadromous Summary		8	30	$60

A second review study was conducted by Boyle et al. (1998). The summary results are provided in Table 4. They developed a database consisting exclusively of sportfishing

[6] The unadjusted Consumer Price Index (CPI) for all urban consumers was used to convert the estimates to 2003 dollars, where the CPI value for 2003 (i.e., 183.9) was based upon eleven months of data.

[7] These studies reported consumer surplus on a per trip basis. They did not report the number of days per trip. We used an assumed 2 days per trip based upon best professional judgement.

[8] These studies reported consumer surplus on a per trip basis. They did not report the number of days per trip. We used an assumed 2 days per trip based upon best professional judgement.

values. Their database covers the period from 1975 to 1996 and was structured in a way that facilitates grouping the studies by freshwater and marine fishing for anadromous species. Excluding studies that were already represented in Rosenberger and Loomis (2001), the survey of freshwater fishing adds two studies providing three additional estimates of consumer surplus per day. The average fishing day value from these studies involving trout, other coldwater species, and warmwater species was $79. An additional 11 studies from this survey added 231 estimates of consumer surplus per trip that varied by type of species sought, habitat, location, and model specification. Using an average of 2 days per fishing trip, the per trip average of $108 across all 231 estimates was converted to $54 on a consumer surplus per day basis.

An additional study (Loomis, 1992) specifically relates to demands for steelhead fishing in 10 Oregon rivers. The values per fishing trip ranged from a low of $47 for the Coquille River to a high of $89 per trip for John Day River. The average across all 10 rivers was $66. It appears that the data may have been from a 1977 survey of Oregon anglers. However, the study did not report the year dollars for the welfare measures. Also, the study did not report the days per trip. Therefore, it is not possible to directly use the results for the present purpose, but the per trip values are in the range of the other studies reported in Boyle et al. (1998).

The more recent literature, which had not been included in either of the above surveys, is also in this range. For example a study of sport fishing for Chinook salmon in the Gulkana River in Alaska (Layman, Boyce, and Criddle, 1996) estimated a range between $38 and $79 or an average of $59 (2003 dollars) per day of fishing.

Studies conducted outside of the U.S. also provide perspective on the likely value of Klamath River fishing. For example, Shrestha, Seidl, and Moraes (2002) estimate that a day of recreational fishing in the Brazilian Pantanal, a globally unique ecological service area, is worth from $107 to $172 ($2003 dollars). A review of a ten international sites (Shrestha and Loomis, 2001) revealed a range in values from $58 to $117 (2003 U.S. dollars) per fishing day. A separate study involving water-based recreation in Ireland (Curtis, 2003) estimated the value of sea-angling to range from $15 to $26 (2003 U.S. dollars).

The Upper Klamath River area offer several types of high-quality fishing opportunities, including especially bass fishing and redband trout. The Lower Klamath River area offers Chinook salmon and steelhead trout, as does the recreational ocean sportfishery in the KMZ. The fisheries are considered high in quality relative to average fishing opportunities, however, they are less accessible and more distant from large population centers, relative to substitute fishing opportunities. For the present purpose, for an estimate of the value of a recreational fishing day in both the Upper Klamath River area and the Lower Klamath River area, the average value of $50 computed from the 357 estimates is used.

The Boyle et al. (1998) summary of marine fishing trips included four additional studies providing six separate estimates of consumer surplus per day. The studies covered Washington and California and at least one of the target species was salmon. The average of these estimates was $121 per day. An additional four studies contributed 24 estimates of consumer surplus per trip for primarily salmon fishing in Alaska, Washington, Oregon, and California. The average per trip value of $87 was again converted to $44 per day, assuming 2 days per trip. For ocean sportfishing for salmon, the average of 30 estimates ($60) is used.

Also of potential interest should information related to expected changes in fish population become available, is the value that anglers place on increases in catch rates that may result from increased stock sizes, for example. Boyle et al. include several studies that estimate the value of increases in catch or stock. These are summarized in the sportfish appendix. Additional studies completed subsequent to the Boyle et al. (1998) review, include Alexander (1995); Shaw and Ozog, 1999; and, Knowler et al. (2003).

Whitewater Boating Values

The Rosenberger and Loomis study (2001) included 13 whitewater boating studies providing 19 estimates of the value of a day's whitewater boating across a range of rivers, seasons, and class of rapids, using a variety of estimation methods and assumptions. Among the sites included were the Colorado River in the Grand Canyon, the Middle Fork of the Salmon River, Idaho, West Water Canyon, Utah, 11 Colorado rivers, the Chatanooga River, the St. Joe River, Idaho, and the Salt River, Arizona. Another of the studies (i.e., Bergstrom and Cordell, 1981) included in the Rosenberger and Loomis review provides an average value for whitewater boating based on multiple sites within this region, including National Parks, National Forests, and National Rivers. In addition, the Bergstrom et al. (1996) study added several values for whitewater boating corresponding to the Forest Service Regions.

The results of the Rosenberger and Loomis Review are summarized in Table 5. They found that the average consumer surplus per day of whitewater boating was $73 and the weighted range went from $18 to $309. A further search of the literature revealed a few additional studies. One study (Bowker, English, and Donovan, 1996) related to guided rafting on two southern rivers, the Chatooga ($151to $364 per trip) and the Nantahala ($113 to $243 per trip). However, the number of days per trip was not reported. Another study (Loomis and Gonzalez-Caban, 1997) estimated that rafters were willing to pay about $16 (2003 dollars) for a day of whitewater boating on the Rio Mameyse in Puerto Rico. However, it is not clear how to compare this opportunity to the Klamath and the other rivers in the review. Therefore, no additions were made to the Rosenberger and Loomis Review.

In comparing the body of empirical literature on the value per day of whitewater boating to opportunities on the Klamath River, there are several factors to consider. First, the Hell's Corner reach on the Upper Klamath offers a comparatively high quality experience, and it is a higher quality experience than the reaches below Iron Gate dam. Even below Iron Gate dam, there are likely to be gradations in quality. Second, multiple day rafting trips are generally valued higher than single day trips. Relative to the higher-quality rivers in the review, the Klamath River provides more of a day use experience than a multiple-day experience. Third, the Klamath River does not have what is considered to be an easy shuttle and it is not located relatively close to large population centers. This has a dampening affect on willingness to pay. For example, if the Hell's Corner reach were within an hour's drive of Portland and had a convenient shuttle, it would be ranked among the top day-use whitewater boating day trips in the nation (Doug Whitaker, Personal communication,

Table 4. Sportfishing Consumer Surplus Estimates

CS Units/Species	Study	Location	Habitat	#estimates	CS $	Year $ CS	2002 dollars	2003 dollars	#estimates X 2003 dollars	Estimate Selection
Sportfishing Consumer Surplus Estimates (Freshwater)										
Average marginal CS per fish caught per day										
Trout, Brown	Harpman, Sparling and Waddle (1993)	CO	River	11	$0.72	1989	1.026373729	1.048953951	11.53849347	One estimate of its kind in study
Sum of #estimates				11						
Sum of #estimates x 2003 dollars				11.538493					0	
Average cs for category				1.048954						
Average marginal CS per fish caught per trip										
Trout, Steelhead	Brown, G., Jr., and R. Mendelsohn (1984)	WA	River	2	$4.55	1982	8.43335041	8.618884119	17.23776824	One estimate of its kind in study
Sum of #estimates				2						
Sum of #estimates x 2003 dollars				17.23776824						
Average cs for category				8.618884119						
Average marginal CS per fish kept per season (or year)										
Trout	Choi, S., D. Schreiner, D. Leslie, and J. Harper (1993)	OK	River	8	$24.51	1991	32.15107234	32.85839593	262.8671674	Estimate preferred using standard protocol
Salmon, King	Carson, R., M. Hanemann, and D. Steinberg (1990)	AK	River	3	$18.35	1986	30.04631674	30.70733571	92.12200713	Estimate preferred using standard protocol
Sum of #estimates				11					0	
Sum of #estimates x 2003 dollars				354.9891745					0	
Average cs for category				32.27174314					0	
Average marginal CS per fish caught per season (or year)										
Salmon, Chinook	Berrens, R., O. Bergland, R.M. Adams (1993)	OR	River	1	$2.57	1988	3.85819917	3.943079552	3.943079552	Author preferred estimate
Trout, Steelhead	Johnson, N.S. and R.M. Adams (1989)	OR	River	1	$6.65	1986	10.88674208	11.12625041	11.12625041	One estimate of its kind in study
Salmon	Loomis, J.B. (1988)	OR	River	2	$12.67	1984	21.75782051	22.23649256	44.47298513	One estimate of its kind in study
Sum of #estimates				4					0	
Sum of #estimates x 2003 dollars				59.54231509					0	
Average cs for category				14.88557877					0	
Average total CS per day										
Trout, Brown	Harpman, Sparling and Waddle (1993)	CO	River	1	$29.05	1989	41.67442506	42.59126241	42.59126241	One estimate of its kind in study
Warmwater	Brooks, R. (1991)	MT	Lake, Pond, Reservoir, River	2	$66.40	1989	95.25582871	97.35145694	194.7029139	Estimate preferred using standard protocol
Sum of #estimates				3					0	
Sum of #estimates x 2003 dollars				237.2941763					0	

Table 4. Sportfishing Consumer Surplus Estimates

CS Units/Species	Study	Location	Habitat	#estimates	CS $	Year $ CS	2002 dollars	2003 dollars	#estimates X 2003 dollars	Estimate Selection
Average cs for category				79.09805876					0	
Average total CS per trip										
[Not Specified]	Cooper, J., and J. Loomis (1990)	CA	River	5	$23.16	1985	38.32829094	39.17151334	195.8575667	Estimate preferred using standard protocol
	Hausman, J., G. Leonard, D. McFadden (1995)	AK	Bay, Marine	1	$148.00	1989	212.3172086	216.9881872	216.9881872	Author preferred estimate
	Roach, B. (1996)	CA	River	1	$27.15	1994	32.80851703	33.53030441	33.53030441	Author preferred estimate
American Shad	Roach, B. (1996)	CA	River	1	$32.73	1994	39.55148297	40.42161559	40.42161559	Author preferred estimate
Bass, Black; Catfish	Roach, B. (1996)	CA	River	1	$21.32	1994	25.76344689	26.33024273	26.33024273	Author preferred estimate
Bass, Striped	Roach, B. (1996)	CA	River	1	$34.59	1994	41.79913828	42.71871932	42.71871932	Author preferred estimate
Freshwater	Whitehead, J. (1992)	NC	River	1	$14.00	1991	18.36548223	18.76952284	18.76952284	One estimate of its kind in study
Salmon, fly hatch; Trout, Brown; Trout, Rainbow	Duffield, J.W., C.J. Neher and T.C. Brown (1992)	MT	River	2	$279.00	1988	418.8473029	428.0619436	856.1238871	Estimate preferred using standard protocol
Salmon, King	Roach, B. (1996)	CA	River	1	$23.81	1994	28.77240481	29.40539772	29.40539772	Author preferred estimate
Salmon; Trout	Brooks, R. (1990)	MT	Lake, Pond, Reservoir	10	$208.09	1988	312.3940332	319.2667019	3192.667019	Author preferred estimate
Trout	Boyle, K., M. Welsh, R. Bishop, and R. Baumgartner (1988)	AZ	River	5	$92.40	1985	152.9291857	156.2936278	781.4681391	One estimate of its kind in study
	Duffield, J. and S. Allen (1988)	MT	River	51	$133.14	1986	217.9624312	222.7576047	11360.63784	Estimate preferred using standard protocol
Trout	Duffield, J., J. Loomis, and R. Brooks (1987)	MT	Lake, Pond, Reservoir	24	$43.08	1985	71.30488792	72.87359546	1748.966291	Estimate preferred using standard protocol
		MT	River	45	$53.08	1985	87.84968893	89.78238209	4040.207194	Estimate preferred using standard protocol
Trout, Rainbow	Roach, B. (1996)	CA	River	1	$47.94	1994	57.93150301	59.20599607	59.20599607	Author preferred estimate
Trout, Steelhead	Roach, B. (1996)	CA	River	1	$30.11	1994	36.38543086	37.18591034	37.18591034	Author preferred estimate
Warmwater	Brooks, R. (1991)	MT	River	2	$131.50	1989	188.646709	192.7969366	385.5938731	One estimate of its kind in study
		MT	Lake, Pond, Reservoir	3	$139.33	1989	199.8842189	204.2816717	612.8450151	One estimate of its kind in study
Bass, Sea; Burbot; Capelin; Finfish; Hooligan; Pike, Northern; Rockfish; Salmon, Chum; Salmon, King (incl. small); Salmon, Silver; Sheefish; Shellfish; Smelt; Trout, Brook; Trout, Cutthroat; Trout, Steelhead; Whitefish (freshwater); Whitefish (saltwater)	Jones and Stokes Associates, Inc. (1987)	AK	Lake, Pond, Reservoir, Bay, River	1	$104.37	1986	170.864552	174.6235722	174.6235722	One estimate of its kind in study
Bass, Sea; Burbot; Capelin; Finfish; Hooligan; Pike, Northern; Rockfish; Salmon, Chum; Salmon, King; Salmon, Silver; Sheefish; Shellfish; Smelt; Trout, Brook; Trout, Cutthroat; Trout, Steelhead; Whitefish (freshwater); Whitefish (saltwater)	Jones and Stokes Associates, Inc. (1987)	AK	Lake, Pond, Reservoir, River	1	$4.19	1986	6.859466063	7.010374317	7.010374317	One estimate of its kind in study
Halibut; Salmon, King; Salmon, Silver	Jones and Stokes Associates, Inc. (1987)	AK	Lake, Pond, Reservoir, Bay, River	1	$5.89	1986	9.642542986	9.854678932	9.854678932	One estimate of its kind in study
Salmon, King	Jones and Stokes Associates, Inc. (1987)	AK	River	9	$8.61	1986	14.09728507	14.40742534	129.6668281	One estimate of its kind in study

Table 4. Sportfishing Consumer Surplus Estimates

CS Units/Species	Study	Location	Habitat	#estimates	CS $	Year $ CS	2002 dollars	2003 dollars	#estimates X 2003 dollars	Estimate Selection
Salmon, King; Salmon, Pink; Salmon, Red; Salmon, Silver	Jones and Stokes Associates, Inc. (1987)	AK	River	2	$3.61	1986	5.909945701	6.039964507	12.07992901	One estimate of its kind in study
Salmon, King; Salmon, Pink; Salmon, Red; Salmon, Silver; Trout, Dolly Varden; Trout, Rainbow	Jones and Stokes Associates, Inc. (1987)	AK	River	1	$21.47	1986	35.14862443	35.92189417	35.92189417	One estimate of its kind in study
Salmon, King; Salmon, Pink; Salmon, Red; Salmon, Silver; Trout, Rainbow	Jones and Stokes Associates, Inc. (1987)	AK	River	1	$4.96	1986	8.120036199	8.298676995	8.298676995	One estimate of its kind in study
Salmon, King; Salmon, Silver; Trout, Rainbow	Jones and Stokes Associates, Inc. (1987)	AK	River	1	$1.20	1986	1.964524887	2.007744434	2.007744434	One estimate of its kind in study
Salmon, Landlocked; Trout, Dolly Varden; Trout, Lake; Trout, Rainbow	Jones and Stokes Associates, Inc. (1987)	AK	Lake, Pond, Reservoir	13	$3.75	1986	6.131584407	6.266479263	81.46423043	Estimate preferred using standard protocol
Salmon, Landlocked; Trout, Rainbow	Jones and Stokes Associates, Inc. (1987)	AK	Lake, Pond, Reservoir	26	$2.08	1986	3.405176471	3.480090353	90.48234918	Estimate preferred using standard protocol
		AK	Lake, Pond, Reservoir, River	1	$5.89	1986	9.642542986	9.854678932	9.854678932	One estimate of its kind in study
		AK	River	1	$3.00	1986	4.911312217	5.019361086	5.019361086	One estimate of its kind in study
Salmon, Red	Jones and Stokes Associates, Inc. (1987)	AK	River	4	$3.71	1986	6.065470588	6.198910941	24.79564376	One estimate of its kind in study
Salmon, Silver	Jones and Stokes Associates, Inc. (1987)	AK	River	5	$4.19	1986	6.852917647	7.003681835	35.01840918	One estimate of its kind in study
Trout, Rainbow	Jones and Stokes Associates, Inc. (1987)	AK	River	1	$0.97	1986	1.58799095	1.622926751	1.622926751	One estimate of its kind in study
		AK	Lake, Pond, Reservoir	1	$1.61	1986	2.635737557	2.693723783	2.693723783	One estimate of its kind in study
Trout, Steelhead	Olsen, D., J. Richards and R.D. Scott (1991)	ID, MT, OR, WA	Bay, Marine, River	2	$74.83	1991	98.16350254	100.3230996	200.6461992	Estimate preferred using standard protocol
Salmon	Olsen, D., J. Richards and R.D. Scott (1991)	ID, MT, OR, WA	Bay, Marine, River	4	$83.80	1991	109.9305294	112.349001	449.3960041	Estimate preferred using standard protocol
Sum of #estimates				231						
Sum of #estimates x 2003 dollars				24959.37994						
Average cs for category				108.0492638						
Assuming 2 days/trip	CS/day = (CS/trip)/2= $108/2 =	54								
Sportfishing Consumer Surplus Estimates (Ocean)										
Average marginal CS per fish caught per year										
Bass, Striped; Salmon	Thomson, C.J. and D.D. Huppert (1987)	CA	Bay, Marine	190	$37.59	1986	61.54287792	62.89682124	11950.39604	Estimate preferred using standard protocol
Salmon	Loomis, J.B. (1988)	OR	Marine	5	$35.96	1984	61.78430769	63.14356246	315.7178123	One estimate of its kind in study
		WA	Marine	3	$27.00	1984	46.37888889	47.39922444	142.1976733	One estimate of its kind in study
Sum of #estimates				198						
Sum of #estimates x 2003 dollars				12408.31152						

Table 4. Sportfishing Consumer Surplus Estimates

CS Units/Species	Study	Location	Habitat	#estimates	CS $	Year $ CS	2002 dollars	2003 dollars	#estimates X 2003 dollars	Estimate Selection
Average cs for category				62.66824						
Average total CS per day										
Bass, Kelp; Mackerel, Pacific; Rockfish; Saltwater	Wegge, T.C., W.M. Hanemann, I.E. Strand Jr. (1986)	CA	Marine	2	$35.44	1983	63.28821323	64.68055392	129.3611078	Estimate preferred using standard protocol
Chinook Salmon; Striped Bass	Huppert, D. (1989)	CA	Marine	2	$178.00	1989		264	528	
Croaker; Mackerel, Pacific; Saltwater; Surfperch	Wegge, T.C., W.M. Hanemann, I.E. Strand Jr. (1986)	CA	Marine	1	$11.92	1983	21.28655479	21.75485899	21.75485899	Estimate preferred using standard protocol
Salmon	Crutchfield, J.A. and K. Schelle (1978)	WA	Marine	1	$18.19	1978	48.60518464	49.6744987	49.6744987	Estimate preferred using standard protocol
Sum of #estimates				6						
Sum of #estimates x 2003 dollars				728.7904655						
Average cs for category				121.4650776						
Average total CS per trip										
not specified	Hausman, J., G. Leonard, D. McFadden (1995)	AK	Bay, Marine	1	$148.00	1989	212.3172086	216.9881872	216.9881872	Author preferred estimate
Flatfish; Perch; Rockfish; Salmon; Smelt	Rowe, Robert W. (1985)	OR	Marine	1	$53.00	1981	101.9968085	104.2407383	104.2407383	One estimate of its kind in study
		AK	Bay	1	$10.50	1986	17.18959276	17.5677638	17.5677638	One estimate of its kind in study
Pelagic; Perch; Rockfish; Salmon; Smelt	Rowe, Robert W. (1985)	CA	Marine	3	$57.57	1981	110.7852128	113.2224874	339.6674623	One estimate of its kind in study
Perch; Rockfish; Salmon	Rowe, Robert W. (1985)	WA	Marine	1	$45.90	1981	88.33308511	90.27641298	90.27641298	One estimate of its kind in study
Salmon, King	Jones and Stokes Associates, Inc. (1987)	AK	Bay	2	$2.91	1986	4.763972851	4.868780253	9.737560507	One estimate of its kind in study
Salmon, King; Salmon, Pink; Salmon, Red; Salmon, Silver; Trout, Rainbow	Jones and Stokes Associates, Inc. (1987)	AK	Bay	1	$4.07	1986	6.663013575	6.809599873	6.809599873	One estimate of its kind in study
Salmon, Silver	Jones and Stokes Associates, Inc. (1987)	AK	Bay	2	$2.90	1986	4.73941629	4.843683448	9.687366896	One estimate of its kind in study
Trout, Steelhead	Olsen, D., J. Richards and R.D. Scott (1991)	ID, MT, OR, WA	Bay, Marine, River	2	$74.83	1991	98.16350254	100.3230996	200.6461992	Estimate preferred using standard protocol
Salmon	Olsen, D., J. Richards and R.D. Scott (1991)	ID, MT, OR, WA	Bay, Marine, River	4	$83.80	1991	109.9305294	112.349001	449.3960041	Estimate preferred using standard protocol
		ID, MT, OR, WA	Bay, Marine, River	2	$74.83	1991	98.16350254	100.3230996	200.6461992	Estimate preferred using standard protocol
Salmon	Olsen, D., J. Richards and R.D. Scott (1991)	ID, MT, OR, WA	Bay, Marine, River	4	$83.80	1991	109.9305294	112.349001	449.3960041	Estimate preferred using standard protocol
Sum of #estimates				24						
Sum of #estimates x 2003 dollars				2095.0595						
Average cs for category				87.294146						

January 14, 2004). Fourth, it is difficult to judge how coupling of events such as the Shakespeare festival in nearby Ashland, and visiting other area natural attractions (e.g., Crater Lake) fit into the valuation equation. The multiple attractions likely bring more tourists to the area, thus increasing the number of whitewater-boating days, and likely have an upward influence on consumer surplus relative to day-use rivers with no such complementary attractions. Fifth, as the whitewater guides and outfitters have observed for this region of the country, the Hell's Corner reach of the Klamath River uniquely offers a Class IV experience in the summer, much to the comfort and enjoyment of the recreationists.

Table 5. Whitewater Boating Values (2003 dollars)

Citation	Habitat/Location	Number of Studies	Number of Value Estimates	Average Value per Visitor Day and (Range) ($2003)[9]
Rosenberger and Loomis (2001)	All water resources/all locations including WA & OR	13	19	$73 ($18 to $309)

In all, this suggests that the Hell's Corner reach ranks among the rivers at the top of the list. If one excludes the Middle Fork of the Salmon River, which was valued over twice as much as the second highest valued area, and takes the mean of the cluster of the remaining five highest valued rivers (i.e., which ranged from $112 to $135), one arrives at a per day value of $122 (2003 dollars) for the Upper Klamath River. The Lower Klamath River whitewater boating days are likely more comparable to the five rivers in the middle range (i.e., $42 to $60) of the surveyed rivers. The average of this middle range is used, which is $48 (2003 dollars).

Camping and Recreational Mining Values

Camping was another primary purpose recreation activity that was included in the Rosenberger and Loomis (2001) review. As with the other activities, their survey covered a wide range in camping opportunities across the country, including national forest lands, national parks, reservoirs, and state parks. Their review encompassed 22 studies and provided 40 estimates. The average value was $36 per day with a range from $2 to $219. (See Table 6.) This average value per day of camping was very close to the review covering an earlier period of time (i.e., 1968 to 1988) by Walsh et al. (1992), which included 18 estimates and found an average of $33. A literature search led to two additional studies, both involving Alberta, Canada. The first study, by Boxall et al. (1996) involved 33 camping areas in the Rocky-Clearwater Forest. They estimated a camping value of $48 per trip in (2003 U.S. dollars). The per trip value could not be converted to a per day value because the number of days per trip was not provided. McFarlane and Boxall (1996) obtained a similar result for camping in the Foothills Model Forest in Alberta. Their estimate of willingness to pay for camping per trip was $51 (2003 U.S. dollars). The camping opportunities along the Klamath River, which includes BLM lands and U.S. Forest lands, is comparable to the range in sites included in the Rosenberger and Loomis and Walsh et al. (1992) reviews. For both the Upper Klamath River area and the Lower Klamath River area, the more recent Rosenberger

[9] The unadjusted Consumer Price Index (CPI) for all urban consumers was used to convert the estimates to 2003 dollars, where the CPI value for 2003 (i.e., 183.9) was based upon eleven months of data.

and Loomis review is relied upon, and $36 is used as an estimate of consumer surplus per day of camping.

Table 6. Camping Values (2003 dollars)

Citation	Habitat/Location	Number of Studies	Number of Value Estimates	Average Value per Visitor Day and (Range) ($2003)[10]
Rosenberger and Loomis (2001)	All water resources/all locations including WA & OR	22	40	$36 ($2 to $219)

There were no separate estimates relating to willingness to pay for recreational mining. However, camping is a significant component of most recreational mining trips, so for the present purpose, the average camping value of $36 is used as a proxy for consumer surplus per day of mining for recreation.

Waterskiing Values

Waterskiing values are not typically separated from motorized boating values in the empirical literature. The Rosenberger and Loomis (2001) survey included nine studies and 14 estimates of willingness to pay per day of motorized boating. The estimates ranged between $5 and $199 with an average value of $41 (see Table 7). The Walsh et al. (1992) review spanning the period 1968 to 1988 revealed five estimates with a similar average of $53, suggesting that the average is fairly stable over time. Again, relying more heavily upon the most recent review, the $41 estimate from the Loomis and Rosenberger (2001) survey was used as the value per day of waterskiing on the reservoirs in the Upper Klamath River area.

Table 7. Waterskiing/Motorized Boating Values (2003 dollars)

Citation	Habitat/Location	Number of Studies	Number of Value Estimates	Average Value per Visitor Day and (Range) ($2003)[11]
Rosenberger and Loomis (2001)	All water resources/ all locations including WA and OR	9	14	$41 ($5 to $199)

Resting/Relaxing

For some visitors, the main attraction of the site is a place to rest and relax and take in the experience of the setting. No single recreation activity stands out; rather, it is the composite that matters. Rosenberger and Loomis (2001) called this composite, "general" recreation. Their survey included 12 studies, which provided 31 estimates in all of the value of visiting a site for general rather than specific recreation. The estimates reported in Table 8 ranged in

[10] The unadjusted Consumer Price Index (CPI) for all urban consumers was used to convert the estimates to 2003 dollars, where the CPI value for 2003 (i.e., 183.9) was based upon eleven months of data.

[11] The unadjusted Consumer Price Index (CPI) for all urban consumers was used to convert the estimates to 2003 dollars, where the CPI value for 2003 (i.e., 183.9) was based upon eleven months of data.

value from $1 to $252 and the average value across all estimates was $28 (2003 dollars). A review of the more recent literature did not lead to finding additional relevant studies. Therefore, the average value of general recreation (i.e., $28) is used as the estimate for resting/relaxing in the Upper Klamath River area. This value is believed to be the best estimate for trips that were made to the area for "no primary" purpose.

Table 8. Resting/Relaxing Values (2003 dollars)

Citation	Habitat/Location	Number of Studies	Number of Value Estimates	Average Value per Visitor Day and (Range) ($2003)[12]
Rosenberger and Loomis (2001)	All water resources/ all locations including WA & OR	12	31	$28 ($1 to $252)

Other Recreation

Many other activities were identified as "primary" in the EDAW survey. The "other" recreation category includes swimming, sightseeing, wildlife viewing, hiking, target shooting, power boating, and other boating. Because the visitor days were grouped into one category, a weighted value of "other" recreation was calculated based on the studies from the Rosenberger and Loomis (2001) survey relating to each of the above categories included in their review. The separate values and the weighted average are reported in Table 9. The values range from a low of $25 for swimming to a high of $43 for hiking. The weighted average of $37 is most heavily influenced by the wildlife viewing average value of $36 owing to the comparatively large number of estimates for this activity. Thus, for the estimate of the value per day of "other" recreation in the Upper Klamath River area, $37 is used.

Table 9. Other Recreation Values (2003 dollars)

Citation Activity	Habitat/Location	Number of Studies	Number of Value Estimates	Average Value per Visitor Day and (Range) ($2003)[13]
Rosenberger and Loomis (2001) Swimming	All water resources/ all locations including WA and OR	9	12	$25 ($2 to $57)
Rosenberger and Loomis (2001) Sightseeing	All water resources/ all locations including WA & OR	9	20	$42 ($1 to $205)
Rosenberger and	All water resources/	9	14	$41

[12] The unadjusted Consumer Price Index (CPI) for all urban consumers was used to convert the estimates to 2003 dollars, where the CPI value for 2003 (i.e., 183.9) was based upon eleven months of data.

[13] The unadjusted Consumer Price Index (CPI) for all urban consumers was used to convert the estimates to 2003 dollars, where the CPI value for 2003 (i.e., 183.9) was based upon eleven months of data.

Table 9. Other Recreation Values (2003 dollars)

Citation Activity	Habitat/Location	Number of Studies	Number of Value Estimates	Average Value per Visitor Day and (Range) ($2003)[13]
Loomis (2001) Motorized boating	all locations including WA & OR			($5 to $199)
Rosenberger and Loomis (2001) Hiking	All water resources/ all locations including WA & OR	17	29	$43 ($2 to $256)
Rosenberger and Loomis (2001) Wildlife Viewing	All water resources/ all locations including WA & OR	16	157	$36 ($3 to $189)
Average		60	232	$37

Results

To estimate the current value of the recreation opportunities in the Upper Klamath River area and the Lower Klamath River area under the existing condition, the estimates of recreation user days for each type of primary purpose activity are multiplied by our preferred estimate of the $value assigned to that activity. These results are summarized in Table 10 for the Upper Klamath River area and Table 11 for the Lower Klamath River area. The current value of recreation in the Upper Klamath River area is approximately $7,900,000 per year and the corresponding value for the Lower Klamath River area is approximately $8,400,000 per year.

Table 10. Total annual value ($2003) of recreation in the Upper Klamath River area under the existing condition.

Activity	Primary Purpose Recreation User Days 2001-2002	Average Value per User Day	Total Value
Fishing	45,630	$50	$2,300,000
Waterskiing	23,040	$41	$900,000
Resting/Relaxing	21,120	$28	$600,000
RV Camping	11,520	$36	$400,000
Whitewater Boating	5,090	$122	$600,000
Other	77,470	$37	$2,900,000
No Primary	7,680	$28	$200,000
Total	**192,000**		**$7,900,000**

Table 11. Total Average Annual Value ($2003) of Recreation Along the Lower Klamath River Under the Existing Condition

Activity	Primary Purpose Recreation User Days	Average Value per User Day	Total Value
Whitewater Boating	13,673	$48	$700,000
Gold Mining	10,000	$36	$400,000
Camping[14]	10,526	$36	$400,000
River Sport fishing[15]	28,432	$50	$1,400,000
Ocean Sport fishing[16]	93,235	$60	$5,600,000
Total	**155,866**		**$8,400,000**[17]

The incremental recreation benefits in the Upper Klamath River area resulting from the proposed Project and PM&E measures are similarly estimated using the product of the projected increases in recreation activity days over time and the associated $ values per recreation user day. The projected increments are reported for select years by type of activity in Table 1. The complete benefit stream and the results of the net present value (NPV) calculation assuming a 2 percent rate of discount are reported in Table 12, and NPV assuming a 7 percent discount rate is reported in Table 13. The NPV of the incremental recreation stream is about $9.9 million at a 2 percent rate of discount and about $3.9 million using a 7 percent discount rate. A range is provided for the discount rate because the choice of discount rate depends on the alternative use of the funds to conduct the Project, as well as on policy decisions relating to the appropriate discount rate to use for enabling comparisons across Projects. The lower bound of the range corresponds to consumers' real rate of time preference (i.e., how much more they require in future goods and services to forego current consumption). The upper bound of this range relates to the average real rate of return on private risk-free investment and represents the opportunity cost of capital that could be invested elsewhere in the economy (EPA, 2000; Office of Management and Budget [OMB], 1992).

The incremental recreation benefits in the Lower Klamath River area are similarly estimated. Unlike the Upper Klamath River area, a growth in downriver fishing over time is not projected. Rather, a best estimate of future fishing days is based on the average effort from the past 25 years. For each year, over the term of the new license from 2006 to 2036, the in-river fishery would generate 28,400 angling days, of which about 4,620 days are attributed to the fish resources PM&E measures, for a total average value of $231,000. Similar calculations for the ocean salmon sport fishery gives an average annual value of $838,800. Summing across the two sport fisheries and taking the net present value from 2006 to 2036

[14] Based upon input received from the U.S.D.A Forest Service, Klamath National Forest (Boland, 2003), average user days for camping are assumed to be about a quarter of the total for the all recreation activities with the exception of gold mining and ocean sportfishing ((0.25 * (145,340 – 103,235)) or 0.25 * 42,105 = 10,526).

[15] Average user days for river sportfishing are based on estimates shown in Table 2.7-52, and are for the period 1978-2002.

[16] Average user days for ocean sportfishing are based on estimates given in Table 2.7-53, and are for the period 1976-2001.

[17] The estimate is slightly lower than the sum of the column due to rounding.

using a 2 percent discount rate, gives $23.6 million NPV and using a 7 percent discount rate gives $11.7 million.

Combining the estimates for Lower Klamath River area and Upper Klamath River area recreation benefits gives $34.5 million NPV at a 2 percent discount rate and $15.6 million NPV at a 7 percent discount rate (see Table 14). This estimate of recreation benefits does not include the benefits to the tribal commercial or subsistence fisheries or any passive use values associated with contributing toward a sustainable harvest of anadromous species. These and other benefits associated with the proposed Project and PM&E measures are discussed in the Socioeconomic Resources FTR and Section E9 of Exhibit E in the final license application.

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Table 12. Net Present Value (2003 $) Using a 2% Discount Rate

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	Sum NPV
Waterskiing	12,742	33,908	33,593	32,935	32,625	31,986	31,682	31,060	30,451	30,159	33,749	33,380	33,013	32,647	32,007	31,649	48,002	47,581	47,158	46,733	46,306	45,879	45,450	45,021	44,591	44,160	43,729	43,299	$1,045,495
RV camping	7,992	20,998	20,893	20,484	20,377	19,978	19,586	19,480	19,098	18,724	20,979	20,825	20,417	20,263	20,108	19,714	29,806	29,678	29,320	29,184	28,827	28,473	28,328	27,975	27,824	27,474	27,126	26,969	$650,904
Whitewater boating	10,833	27,614	27,073	26,542	26,021	25,511	25,973	25,464	24,964	24,475	27,550	27,010	26,480	25,961	26,273	25,758	38,668	38,684	37,925	37,925	37,181	37,167	36,438	36,411	36,370	35,657	35,605	34,907	$846,441
Fishing	36,851	97,067	95,591	94,135	92,699	91,686	90,282	88,899	87,156	85,818	96,519	95,341	94,171	93,355	91,861	90,719	137,130	135,709	134,603	133,487	132,364	130,940	129,809	128,671	127,528	125,840	124,699	123,554	$2,986,484
Resting/ relaxing	15,415	40,951	40,387	39,830	39,278	38,733	38,195	37,662	36,924	36,408	40,793	40,193	39,797	39,401	38,817	38,425	57,957	57,353	56,925	56,321	55,886	55,282	54,841	54,239	53,794	53,194	52,745	52,293	$1,262,038
Total Other	37,783	100,175	98,843	97,214	95,915	94,927	93,066	92,099	90,293	88,798	99,724	98,297	97,665	96,258	94,620	93,985	141,684	140,548	139,172	138,248	136,864	135,264	134,099	132,928	131,547	129,969	128,795	128,195	$3,086,977
Total All																													**$9,878,339**

Table 13. Net Present Value (2003 $) Using a 7% Discount Rate

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	Sum NPV
Waterskiing	9,562	24,256	22,908	21,409	20,217	18,894	17,840	16,673	15,582	14,712	15,694	14,797	13,950	13,151	12,290	11,585	16,750	15,827	14,954	14,126	13,343	12,602	11,901	11,238	10,611	10,017	9,456	8,925	$413,273
RV camping	5,997	15,021	14,248	13,315	12,627	11,801	11,029	10,457	9,773	9,134	9,756	9,231	8,627	8,163	7,722	7,216	10,401	9,872	9,297	8,822	8,307	7,821	7,418	6,983	6,621	6,232	5,866	5,559	$257,316
Whitewater boating	8,129	19,754	18,461	17,254	16,125	15,070	14,626	13,669	12,775	11,939	12,811	11,973	11,190	10,458	10,089	9,429	13,493	12,868	12,026	11,464	10,714	10,209	9,542	9,089	8,654	8,088	7,699	7,195	$334,791
Fishing	27,653	69,437	65,185	61,193	57,443	54,161	50,839	47,721	44,599	41,863	44,882	42,263	39,794	37,605	35,274	33,208	47,851	45,143	42,682	40,351	38,141	35,968	33,991	32,119	30,346	28,545	26,964	25,468	$1,180,688
Resting/ relaxing	11,568	29,294	27,541	25,891	24,340	22,880	21,508	20,217	18,894	17,760	18,969	17,817	16,817	15,872	14,906	14,066	20,224	19,078	18,051	17,025	16,104	15,185	14,360	13,539	12,800	12,066	11,405	10,779	$498,956
Total Other	28,353	71,660	67,402	63,194	59,436	56,075	52,407	49,439	46,205	43,316	46,373	43,573	41,270	38,775	36,334	34,404	49,440	46,752	44,131	41,790	39,438	37,156	35,114	33,181	31,302	29,481	27,850	26,425	$1,220,276
Total All																													**$3,905,299**
	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	1069800	
	949951.8	931325.3	913064	895160.8	877608.6	860400.6	843530	826990.2	810774.7	794877.2	779291.3	764011.1	749030.5	734343.6	719944.7	705828.2	691988.4	678420	665117.6	652076.1	639290.3	626755.2	614465.9	602417.5	590605.4	579024.9	567671.5	556540.7	**$20,620,506**
	712852.9	666217.7	622633.3	581900.3	543832.1	508254.3	475004	443929	414886.9	387744.8	362378.3	338671.3	316515.2	295808.6	276456.6	258370.7	241467.9	225671	210907.5	197109.8	184214.7	172163.3	160900.3	150374.1	140536.5	131342.6	122750.1	114719.7	**$9,257,613**

Table 14. Net Present Value of Project-Induced Lower Klamath River Area Sportfishing

Activity	Average Annual User Days	$ Per User Day (2003 dollars)	Average Annual Value (2003 dollars)	Net Present Value (2003 dollars)
In-River Sport Fishery	4,620	$50	$231,000	
Ocean Salmon Sport Fishery	13,980	$60	$838,800	
Total Annual			$1,119,800	
Total NPV 2 percent Discount Rate				$23.6 million
Total NPV 7 percent Discount Rate				$11.7 million

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