US Army Corps of Engineers
Walla Walla District

SPORT FISHERY USE AND VALUE ON LOWER SNAKE RIVER RESERVOIRS

SUMMARY OF PHASE II STUDIES

Unimpounded Snake River Sport Fishery During 1997-1998

A creel survey of the sport fishery in the 48 km (30 mile) unimpounded reach of the Snake River immediately upstream of Asotin, Washington was initiated in September 1997 and continued through March 1998 as part of the Lower Snake River Feasibility Study. The survey was designed to provide data that could be used to estimate potential angling use of the 220 km (137 mile) impounded section of the lower Snake River if restoration to natural river level was the selected alternative. Use of these data, along with data from a companion economic survey (Phase II Report, Part 2), also permitted estimation of the monetary worth of the sport fishery in the restored river section.

Survey methods were similar to those utilized in the reservoir sport fishing analysis (Phase I study). A combination of aerial flights and in-person ground interviews at several access points along the river was used to estimate angler effort, catch and harvest, catch and harvest rates, and various angler attributes. Aerial and ground survey methods worked well, and the results were improved by follow-up phone calls to many anglers interviewed while fishing to obtain a larger sample of completed trips. Interviewed anglers were also asked to participate in a follow-up economic survey to estimate the monetary worth of the sport fishery in that reach.

Angler distribution was fairly uniform along the study reach in September and March, but was more clustered relative to the locations preferred by shore and boat anglers during the peak months of use. Boat anglers were aggregated near the town of Asotin and, especially from the vicinity of Heller Bar upstream to the Oregon border. Shore anglers predominated along the 10 km section of river downstream of Heller Bar. The spatial distribution of anglers along the study reach reflected the species pursued, the mode of fishing, access, preferred type of water for a particular fishing method, and upstream progress of the steelhead run. During September, when

many anglers sought resident species, angling pressure was diffuse throughout the reach, and many access points were used. During the peak steelhead angling months of October and November, anglers were distributed where there was good access for larger boats (near Asotin or Heller Bar), or where steelhead tended to aggregate (vicinity of Heller Bar). Despite known steelhead aggregations, some anglers (*e.g.*, fly fishers) elected to seek more isolated locations to fish.

A total of 16,120 angler trips produced an estimated 88,940 hours of fishing effort on the river upstream of Asotin. Monthly effort during the period peaked during November (39,909 hours) and declined substantially after December to the least effort in March (620 hours). Boat angler use formed 83.5% (74,281 hours) of total effort. Boat angler use peaked in November, whereas shore angler use was highest in October.

Anglers caught an estimated 20,592 fish and kept 12,026 (58.4%) of those caught. The highest catch occurred in November, and the lowest was in March. October (4,372 fish) and November (4,322 fish) represented the peak harvest months. Boat anglers caught and harvested about nine times more fish than shore anglers. Steelhead comprised 68.5% of the total catch and 74.3% of the harvest, and were the predominant sport fish taken from October through February. Boat anglers accounted for about 90% of the catch and harvest.

The principal resident sport fishes sought in this reach were smallmouth bass, northern pikeminnow, and white sturgeon. Most anglers pursued these species in September or March, reflecting the fact that these species are more typically sought during the spring and summer months. Much of the angling for northern pikeminnow was likely in response to bounties paid for harvested, large pikeminnow as part of the "Sport Reward Program" funded by Bonneville Power Administration. The principal resident species caught were northern pikeminnow and smallmouth bass. Anglers caught an estimated 3,320 northern pikeminnow and kept 2,527, mostly in September and October. Anglers caught 1,537 smallmouth bass and harvested 477. Most of the catch and harvest occurred in September, largely the result of boat angling. Other species occasionally caught included suckers, channel catfish, peamouth, chiselmouth, white sturgeon, mountain whitefish, and bull trout.

The catch and harvest rates for the overall sport fishery during September through March averaged 0.225 and 0.126 fish/hour, respectively. Boat anglers were twice as successful as shore anglers. Monthly catch and harvest rates were highest in September and lowest during the winter.

Angling for steelhead was the preference expressed by 93% of the anglers interviewed. The remaining anglers targeted mostly smallmouth bass, northern pikeminnow, or white sturgeon. Boat anglers sought mostly resident fish species in September, and steelhead thereafter.

The overall directed catch and harvest rates for those anglers specifically seeking steelhead were 0.153 and 0.093 fish/hour. Directed catch rates were highest in October (0.170 fish/hour) and November (0.173 fish/hour). While catch rates for boat anglers were also highest in these months (0.199 and 0.196 fish/hour, respectively), the catch rate for shore-based steelhead anglers was highest in September (0.188 fish/hour). Steelhead catch and harvest rates for guided boat anglers were up to three times higher than for unguided boats throughout the peak months of the season. The directed catch and harvest rates for smallmouth bass (1.047 and 0.321 fish/hour) and northern pikeminnow (1.861 and 1.763 fish/hour) exceeded those for any other resident species. The highest directed catch and harvest rates for smallmouth bass occurred in September, while those for northern pikeminnow were highest in October.

Anglers from 18 states and Canada fished the Snake River during the 1997-98 steelhead season. Most of the out-of-region anglers were from Montana or California. However, the 48 km reach of the Snake River above Asotin was visited primarily by local anglers (Lewiston, Clarkston, Asotin) and anglers from the population centers north of the area such as Spokane, Coeur d'Alene, and Moscow-Pullman. About 8% of those interviewed resided in Washington metropolitan areas west of the Cascades. Anglers from the northern population centers and cities west of the Cascades outnumbered local anglers in the peak angling months of October and November.

More than 50% of overall angler use resulted from day trips. However, during October, one of the peak months, 71% of the anglers stayed in facilities (paid or otherwise) or camped along or near the Snake River. Camping use was highest in September and October during the best weather. Use of motels was highest in October and November when the fishing success was also the highest.

Most steelhead angling was by boat anglers who fished from private craft, but more than 26% of all boat anglers used guide services. About equal use of bait, lures, or a combination of both was reported by steelhead anglers, but lure use was more prevalent early in the fishing season, whereas bait use predominated in later months. Fly rod anglers were most common in October. Most steelhead anglers fished with either a Washington license (49.6%), or also possessed an Idaho fishing license (21.6%).

The fall-winter sport fishery of the 48 km reach of Snake River upstream of Asotin was clearly dominated by anglers pursuing steelhead. During October through February virtually all anglers sought steelhead, although some monthly variability in the distribution of effort was found between shore and boat anglers and among species sought. Growth of the steelhead fishery in the mid-Snake River has continued since initial effort estimates were made by Washington Department of Fish and Wildlife in 1984-85 to 1986-87, despite variable, often lower, hatchery output and adult returns in recent years. The estimates of use suggest growth in angler effort may have leveled off and could represent saturation of this stream reach in terms of the ability to support more steelhead angling.

The highest catch rates for this fishery occurred in October and November, coincident with the beginning of sustained, reduced flow volumes released from Hells Canyon Dam. Consistent flows enabled anglers, especially those in guided boats, to more efficiently locate concentrations of steelhead. Steelhead catch rates during the peak months of October and November in the free flowing section (0.172 fish/hour) were about four times those observed in each of the lower Snake River reservoirs (range 0.030 in Little Goose Reservoir to 0.048 fish/hour in Lower Monumental Reservoir).

The survey results are considered precise with narrow confidence intervals, and conservative because of the count adjustments required for data expansion. Although the survey accurately portrays the scope and characteristics of the steelhead fishery in this reach, sport fishing for resident species remains largely unassessed during those spring and summer months when resident species are mostly pursued.

The steelhead sport fisheries were compared between the reservoirs and the free flowing reach. Angler use estimates for September through November 1997 for the reservoir system, which largely reflected effort targeting steelhead, were compared to effort in the 48 km reach upstream of Asotin. Although usage was comparable when standardized by reach length (reservoirs average 1,578 hours/km versus 1,473 hours/km in the unimpounded reach), use per hectare was about 2.8 times higher in the unimpounded reach (68.4 versus 24.7 hours/ha). Steelhead catch and harvest rates were three to four times higher in the unimpounded reach. Greater steelhead density and use of guides may explain the higher success rates upstream of Asotin.

More anglers from a wider geographic area utilized the unimpounded reach. During the peak use period, more than 70% of anglers were non-local. Other differences included greater use of "traditional" techniques or methods such as fly rods, and a lack of night fishing in the flowing water reach.

To make predictions of angling use in a restored Snake River, two assumptions were made. The initial assumption was that run sizes would remain similar, although the proportion of wild fish may change. Secondly, it was assumed that access to the restored river would eventually be available in a pattern similar to current availability. Trends in steelhead angling growth on the unimpounded Snake River were then examined, and predictions of future use on the restored river were made based on the assumption that current use in the flowing water section has reached saturation.

Usage for September through November on a restored lower Snake River will eventually approach 324,060 hours, and may attain 407,600 hours over a full steelhead angling season of September to March. Based on the average hours fished per year per angler (96.24), and $442 average annual expenditures per angler, the estimated monetary worth of steelhead angling on a restored lower Snake River is $1.87 million dollars (407,600/96.24=4,235 unique anglers x $442=$1.87 million). Initially, several factors will depress angling use in the normative river.

Reduced access, unstable banks, and turbid flows will likely persist for several years and deter angler use. Once these conditions abate and anglers become familiar with fishing conditions in the restored river channel, steelhead angling may increase to the intensity now experienced in the reach upstream of Asotin.

A greater diversity of anglers and angling opportunities will develop in a restored lower Snake River. Fly fishermen and guide services will take advantage of the riverine fishing conditions. Such opportunities will be attractive to anglers three to four hours away in urban areas such as Portland and Seattle-Tacoma. Anglers on a restored river should also experience higher catch and harvest rates than at present on the reservoirs. However, the ease of access that characterizes current reservoir steelhead angling will be lost.

Willingness-to-Pay

Two surveys were conducted on sport fishers on the Snake River above Lewiston, Idaho for the purposes of: (1) measuring willingness-to-pay for fishing trips and, (2) measuring expenditures by sport fishers. Steelhead was the primary species caught with 91.5 percent of anglers including steelhead in their catch. The surveys were conducted by a single mailing using a list of names and addresses collected from sport fishers along the unimpounded Snake River during September 1997 through March 1998. The sport fishing demand survey resulted in 247 usable responses. The response rate for the complex travel cost questionnaire was about 72 percent. The high response rate is thought to be a result of the excellent impression made by the initial on-site contacts by University of Idaho students, the return address for the questionnaire to the University of Idaho, and a two dollar bill included as incentive.[1] Expenditure survey data are reported elsewhere.

The sport fishing demand analysis used a model that assumed anglers did not (or could not) give up earnings in exchange for more free time for sport fishing. This model requires extensive data on angler time and money constraints, time and money spent traveling to the river fishing sites, and time and money spent during the sport fishing trip for a variety of possible activities. The travel cost demand model related sport fishing trips (from home to site) per year by groups of sport fishers (average about 12.38 trips per year) to the dollar costs of the trip, to the time costs of the trip, to the prices on substitute or complementary trip activities, and other independent variables. An individual angler's cost of a trip was based on the cost observed in the lower Snake River reservoirs study of 7.6 cents per mile times the round trip distance.[2]

The primary objective of the demand analysis was to estimate willingness-to-pay per trip for fishing on the unimpounded Snake River. Consumer surplus (the amount by which total consumer willingness-to-pay exceeds the costs of production) was estimated at $35.71 per person per travel cost trip. The average number of sport fishing trips per year from home to the unimpounded Snake River was 12.38 resulting in an average annual willingness-to-pay of $442 per year per angler. The total annual willingness-to-pay for all anglers is estimated at $368,628 to $408,408 (the value adjusted for nonresponse).

[1]The two-dollar incentive was terminated in late March on instructions from the Corps of Engineers.
[2]The demand model was estimated using truncated negative binomial regression, which is appropriate for a dependent variable that is always positive integers (the number of sport fishing travel cost trips from home to site and back per year). The truncated Poisson regression technique was discarded because its assumption that the mean and variance of the dependent variable are equal was found to be incorrect for this data set.