FISH PASSAGE CENTER

2501 SW First Avenue, Suite 230, Portland, OR 97201-4752
Phone: (503) 230-4099 Fax: (503) 230-7559
http://www.fpc.org
e-mail us at fpcstaff@fpc.org

MEMORANDUM

TO: ISRP

FROM: Michele DeHart

DATE: August 23, 2002

RE: **Response to the ISRP comments on the Smolt Monitoring By Federal and Non-Federal Agencies Contract #198712700.**

The following is our response to ISRP comments regarding project # 198712700, the Smolt Monitoring Program. Some of the responses to comments overlap or seem to be redundant with project # 35033the Fish Passage Center and project #199602000The Comparative Survival Study. Prior to 1994 the Fish Passage Center project and the Smolt Monitoring Project were together in one project. The subsequent splitting out of the single project into two separate projects is the source of apparent overlap. Also, the apparent overlap with the CSS project is in part a design for greatest efficiency and in part because one of the original program objectives of the SMP was to collect smolt to adult return data. That objective was not attainable prior to advancement of tagging technology. We have tried to reduce redundancy in the response to ISRP comments as much as possible.

Response to ISRP comments on the Smolt Monitoring Program

ISRP comments are restated in this document and are numbered and set in italics to provide ease of identifying them. Since our response is lengthy, we have referred both to attached documents and documents that are readily available on the FPC website, also BPA's and PSMFC's websites are cited in our response in an effort to cut down on the sheer volume of our response when documents are available on the web.

1. ***Methods must be attached to each task and provided in sufficient detail (or adequate summary and reference given to written protocols) to allow the review and ensure that they are documented for future use.***

Please find Attachment A, the document entitled **"Methods for Smolt Monitoring Tasks"** This document outlines site specific protocols for obtaining and handling, and sampling fish, as well

as providing references to more detailed procedures and guidelines that are followed at all sites. The document has several attachments to which it refers that are either included in this response or are readily available on the web.

Sampling protocols are determined by the conditions of the ESA Section 10 permit for the Smolt Monitoring Program.

2. Results and plans for monitoring and evaluation of this project must be given. It is not appropriate for one of the most quantitative projects to not have a quantitative monitoring and evaluation plan for itself.

The Fish Passage Center project #35033 carries out the monitoring and evaluation of the SMP project. Monitoring and evaluation of the SMP is carried out at several levels by the FPC staff. Monitoring and evaluation of the SMP involves SMP personnel from various agencies, regional data users, regional review and day-to-day monitoring by the FPC.

Outside independent Review
Quantitative monitoring and evaluation of the Fish Passage Center role in data management of the FPC, and the accuracy of Smolt Monitoring Program data has been evaluated by independent auditors. An independent outside auditor, *Symonds, Evans, & Larson, P.C. Certified Public Accountants*, audited the FPC SMP database in 1997 to determine its accuracy. FPC's SMP database is the only database in the region to have undergone an outside audit for accuracy. Recommendations were made by this auditor and incorporated into the methods, procedures and protocols used to collect, validate, and distribute SMP data. The results of this outside audit are attached to this document as Attachment F.

Fish Passage Advisory Committee Review
The SMP sampling design is reviewed annually by the state, federal and tribal fishery managers through the Fish Passage Advisory Committee, who evaluate the application of SMP data to daily, weekly, monthly and annual management decision application. The monitoring needs of the agencies relative to Biological Opinion measures are assessed in this review. The SMP is also coordinated with research projects through this process.

ESA Section 10 permit application and reporting
Quantitative monitoring and evaluation of FPC and SMP takes place through the ongoing quantitative monitoring and evaluation required for ESA section 10 permit compliance. Quantitative monitoring and evaluation of ESA listed species, that are "taken" and handled by remote SMP and GBT staff, is a requirement of the FPC section 10 ESA permit, and these data are reported to NMFS during and after each migration season. Any unusual mortality or unusual condition in the observed fish is evaluated and properly acted upon. An example of such a memo is attached to this document as Attachment G. The FPC monitors and reports on the web site, daily sample and facility mortalities. Sample rates are also reported daily.

Quality Assurance/ Quality Control SMP sample data
The FPC has established and implemented a Quality Assurance/Quality Control (QA/QC) procedure for all SMP data collected and distributed by FPC described in the *FPC32 Smolt*

Monitoring Program Remote Data Entry Program manual (Attachment C) which can also be found on-line at ftp://ftp.fpc.org/fpc32/2002SmoltMonitoring3.3a.doc. More SMP QA/QC procedures are to be found in *Fish Passage Center Procedures for Data Retreival and Posting*, which is found on-line at *http://www.fpc.org/fpc_docs/procedure_manual/procedures2002.doc*. Generally, electronic SMP data is quantitatively validated against the written hand-logs of SMP data using the monitoring and evaluation procedures described in these two manuals. Every week, spreadsheets of all SMP data collected YTD are sent from FPC to each SMP site for validation by remote SMP staff. Twice a year, the error rate at each SMP site and for the overall SMP program are quantitatively measured and evaluated. An "Error-Rate Memo" is published and sent to all SMP remote staff describing the findings. If any corrective actions or recommendations are required, they are taken. An example of the "Error-Rate Memo" is attached to this document as Attachment H. Quantitative monitoring and evaluation of GBT data is described in a document named *2002 GBT Monitoring Protocol for Juvenile Salmonids*, found on-line at ftp://ftp.fpc.org/gbtprogram/GBTMonProto2002v2.doc.

User surveys
Quantitative monitoring and evaluation of SMP data, as displayed and maintained by the FPC, takes place bi-weekly, in a customer survey and analysis. All web traffic and all data requests of the FPC web site are compiled, summarized and analyzed. A quantitative analysis report is created, evaluated, and stored electronically and printed on paper every two weeks. An example of this report is attached here as Attachment I.

FPC Monitors key derived indices
The FPC monitors and evaluates key derived indices during the passage season to test validity of assumptions. Quantitative monitoring and evaluation of SMP takes place during the passage season by monitoring and evaluation of key derived quantities such as the Passage Index. An example of this level of quantitative monitoring and evaluation can be found on-line at the FPC web site at http://www.fpc.org/fpc_docs/LGRCH1_PassageIndex2002.pdf
And at http://www.fpc.org/fpc_docs/LGRST_PassageIndex2002.pdf. In this process, the FPC evaluates the expansion of samples and catch data to passage indices utilizing PIT tag recaptures at the monitoring sites and at down stream sites, to evaluate assumptions such as collection efficiency and spill passage efficiency.

Monitoring and evaluation of the SMP takes place in assessment of output and outcome.
Each activity in the SMP accomplishes daily tasks, which are outputs of the SMP. Those outputs daily data are collected and displayed by the FPC. Weekly reports are in part outputs of the SMP generated by the FPC. The annual outputs are the annual reports and compliance with contract conditions. The outcomes of the SMP/FPC efforts are the application of monitoring data to daily weekly and annual passage management decisions by the fishery managers and action agencies.

3. ***The response should clarify the tasks and budget for smolt monitoring that is contracted out to the states and tribes. To be consistent with ISRP's statements on implementation of a systemwide M&E…the proportion of the budget passed through for participation of other agencies and tribes that could be potentially reallocated under the overall CBFWA proposal #35033 should be identified.***

The entire SMP budget is contracted out to agencies, tribes and private entities involved in the monitoring effort. All of the SMP budget is contracted out to individual entities, which are conducting the work and reporting the data. The following is the 2002 budget breakdown by site and entity, which was included in the project proposal.

CY 2002 *FEDERAL* & *NON-FEDERAL* SMOLT MONITORING PROGRAM (SMP)
BUDGET SUMMARY BY AGENCY (PSMFC Administered)

	Monitoring	PIT Tags	Total
Pacific States Marine Fisheries Commission			
JOHN DAY & BONNEVILLE DAMS	$639,425	N/A	$639,425
Chelan County Public Utility District			
ROCK ISLAND DAM	$173,870*		
16,200 PIT tags at a cost of $2.25 per tag:		$36,450	$210,320
Washington Department of Fish & Wildlife			
LOWER GRANITE DAM	$255,104	N/A	$255,104
WDFW Portion - $53,741*			
PSMFC Portion - $201,363			
Washington Department of Fish & Wildlife and			
Pacific States Marine Fisheries Commission			
MCNARY DAM, LOWER MONUMENTAL DAM			
(Appendix D):	$411,377	N/A	$411,377
WDFW Portion - $179,118*			
PSMFC Portion - $232,259			
Oregon Department of Fish & Wildlife			
LITTLE GOOSE DAM :			
ODFW Portion - $109,586*	$117,720	N/A	$117,720
PSMFC Portion - $8,134			
LOWER GRANDE RONDE RIVER TRAP*)*	$228,379*		
7,600 PIT tags at a cost of $2.25 per tag		$17,100	$245,479
Idaho Department of Fish & Game			
HEAD OF LOWER GRANITE RESERVOIR &			
LOWER GRANITE DAM	$327,100*		
23,500 PIT tags at a cost of $2.25 per tag		$52,875	$379,975
U.S. Fish and Wildlife Service**			
FISH MARKING SUPPORT	$42,175		
25,500 PIT tags at a cost of $2.25 per tag		$57,375	$99,550
**contracted separately by BPA			
TOTALS	$2,195,150	$163,800	$2,358,950
PSMFC Administration fee pass-thru funds (2% of 1,071,794*):			21,436
TOTAL 2002 SMP PROGRAM COST (without tags)			$2,216,586
TOTAL 2002 SMP PROGRAM COST (with tags) ($2,216,586 + $163,800)			$2,380,386

4. ***The response should include a careful self-review evaluating the advantages and disadvantages of combining this with the CBFWA proposal #35033.***

Because project #35033 and the SMP project are both CBFWA sponsored and jointly developed proposals in terms of joint sponsorship by the state, federal and tribal fishery managers, the functional melding of #35033 if it is funded and the SMP is assured. Project #35033 will not immediately replace other M&E components. It is intended to build upon existing M&E projects such as the SMP. As M&E protocols are developed, they will be phased into projects, such as the SMP, which directly implement M&E activities. Because both the SMP and #35033 are projects developed and proposed jointly by CBFWA members, any recommendations from the project will become management criteria used to evaluate projects in the future and will be a basis for CBFWA funding recommendations to the NWPPC. Using project #35033 recommendations as criteria for future funding recommendations provides a very high probability that project recommendations will be implemented. As proposed, project #35033 is intended to be overarching only in terms of providing a framework for organizing system-wide monitoring and evaluation information and recommending future M&E activities to inform decisions under the Fish and Wildlife Program and Biological Opinions. CBFWA as the project sponsors do not propose to formally bring other existing M&E projects under this project in the foreseeable future, but rather to coordinate activities with these other projects, and collaboratively improve the system-wide information to aid decision-making. This proposal for a collaborative, system-wide M&E program would provide a framework within which the above listed programs (CWT; StreamNet; Smolt Monitoring; FPC; CSS), or portions of these programs, could operate to monitor and evaluate the life cycle survival of listed and unlisted Columbia basin salmon, steelhead and other regionally important species.

As proposed by CBFWA, project #35033 does not propose to incorporate administration and implementation of these projects, or to dictate individual project M&E actions and protocols for existing M&E projects. (StreamNet, Smolt Monitoring, PTAGIS, FPC, CSS). However, project #35033 does propose to integrate relevant Tier 1, 2 and 3 data from these component programs into a systemwide M&E program, and make recommendations for filling critical information gaps related to key management questions facing the region. The component projects will need to mesh functionally for a successful system-wide M&E program, which we propose, would be best accomplished by close coordination of data collection and analytical activities, recommendations from the system-wide M&E Oversight Committee, and Core Group in a collaborative process. ISRP peer review of major work products from the system-wide M&E project would also be beneficial as guidance to M&E activities of the component projects.

Response to Action Agency/NMFS RME Group Comments on the Smolt Monitoring Program Proposal

1. ***The proposal identifies three BO research actions (1240,1241,1242) that can benefit from information obtained under this program. These research actions are linked to RME RPA 199 in the FCRPS BO. We further note that some of the estimates generated in the SMP may also have utility in the context of juvenile performance standards (Hydro) specified in the BO.***

We do agree that the present monitoring program does provide a source of fish for RA's 1240 and 1241 as the RME group correctly stated. We address the appropriateness of SMP addressing RA 1242 in the response to comment 2 (see below). Also, our proposal specifically addresses RA 1193. RA 1193 describes the need for in season monitoring for the benefit of management of the hydrosystem "The smolt monitoring program provides information on the migrational characteristics of the various salmon and steelhead stocks in the Columbia and Snake River basins and provides management information for implementing flow and spill measures…" The RA then lists the sites at which SMP is presently carried out. And further states that "Monitoring…(as presently carried out)…yields information on migration timing to FCRPS dams, travel time and relative survival data from release to Lower Granite Dam, the first dam encountered by out-migrating Snake River Fish.

2. ***The objective of RA 1242, the RME group stated was to "evaluate inriver migration survival and transportation survival from LGR to BON Dam. Fish PIT tagged under the SMP have the potential to contribute to this. However, it is not clear if sample sizes described in the proposal will generate survival estimates with suitable precision. It would be instructive to detail these points in a revised version of the proposal, so the utility of the proposed survival estimates can be evaluated a priori.***

Of the various types of monitoring that NMFS BiOp requires to evaluate, including the recovery of endangered species, two "performance standards" could be accomplished at the SMP traps given their present location and operations. Population abundance and hydrosystem survival both could estimated at SMP traps in the Snake River Basin. With regards to SMP trap operations, this would require changing operations so that estimates of trap efficiency could be developed. Trap efficiencies have been estimated through the SMP in past years and the SMP could be revised to develop trap efficiencies . In addition, PIT tagging release numbers could be increased in order to provide adequate sample sizes for making precise survival estimates over longer reaches.

Below, we describe methods by which abundance estimates for juvenile migrants and survival estimates through the hydrosystem can be accomplished by relatively small changes to the SMP proposal.

Abundance Estimates

Historically, SMP estimated trap efficiencies at the Snake and Salmon River Traps. The Nez Perce tribe as part of their SMP monitoring at the Imnaha trap have also estimated trap efficiency at the Imnaha Trap. At the Snake River trap, efficiency estimates have ranged around 1.39% for yearling chinook and 0.68% for steelhead (with 95% CI's of 0.43% and 0.97%). Table 1 summarizes the historic efficiency estimates calculated for the traps. In recent years the SMP traps, with the exception of the Imnaha River trap, did not have trap efficiency estimated because abundance estimates were not included as an objective of the SMP. Plus earlier trap efficiencies had shown that trap efficiencies were quite variable, but consistently low, at these sites ranging under 5%. Given that the NMFS RME group has identified abundance as a critical component of their performance measures in the BiOp, the SMP program could add those objectives and

modify trap operations to begin to estimate trap efficiencies and population abundance passing the trap. The SMP proposal for 2003 can be modified to include these tasks if the region desires. The two sections included below provide more details on modifying the SMP proposal to meet RM&E needs.

NMFS has identified four ESU's of endangered salmon in the Snake River Basin; Snake River Spring-Summer Chinook, Snake River Fall Chinook, Snake River Sockeye and Snake River Steelhead. Those populations sampled by the traps are provided in Table 2.

Trap Efficiency

Trap efficiency is the proportion of the population of fish migrating past a trap that are captured in the trap. Since trap efficiency may change as river discharge changes, efficiency will be estimated several times through the range of discharge at which the trap will be operated. A linear regression equation can then be generated, describing the relation of trap efficiency and discharge.

The ratio of recaptures to marks released is the estimate of trap efficiency (TE = recaptures/marks released). Historically trap efficiency tests conducted on the Snake River traps yielded recapture rates less than 5%. Data on proportions form a binomial distribution rather than normal distribution. To normalize the trap efficiency data, the arcsin square root of p transporformation was used to normalize the trap efficiency data (Snedecor and Cochran, 1989, Statistical Methods (8thEdition), Iowa State Univ Press, Ames, pp 289-290). All analyses will be conducted with the transformed data.

Trap efficiency tests can utilize two different release procedures. The first procedure utilizes marked fish released directly from a hatchery or part of a hatchery-transported release group, when that hatchery or release group is less than 80 km upriver from the trapping facility. The second procedure for estimating trap efficiency utilizes trap-caught fish that are marked, transported back upstream the same day, and released to pass the trap a second time.

Based on historic trap efficiencies at the Snake River trap which averaged between 0.5% and 2.5%, we estimate that future predictions of daily population numbers N_i passing the trap on day i may be possible to a precision of +/- 20% of N_i (Table 3). By releasing all collected fish on given days up to a maximum of 2,500 fish, it appears that trap efficiency estimates with approximately a 10% coefficient of variation may be obtained.

The accuracy of these estimates will be compared to historic estimates, as well as other sources of data that may provide an indication of trap efficiency, such passage and recapture of hatchery released PIT tagged fish. By using capture-recapture methods, we may be able to corroborate the accuracy of trap efficiency estimates. Although low sample size of recaptures (resulting in wider error widths of estimates derived in this manner) may make this method less effective, it may provide a range of values within which the primary estimate should fall.

Table 3. Precision of estimates of smolts passing a trap based on historic trap efficiencies between 0.5% and 2.5% with transformed arcsin vp having average of 0.11192 and standard error of 0.00533.

Actual Population Size	Expected Catch	Expected Population Size N			Coeff. of Var.
		Expected	Lower Limit	Upper Limit	
25,000	312	25,020	20,662	30,962	0.121
50,000	623	50,096	41,905	60,779	0.109
100,000	1247	100,241	84,402	120,484	0.103
200,000	2493	200,185	169,444	240,488	0.103

Hydrosystem Survival Estimates

PIT-tag operations are a primary function of the SMP traps. Under SMP protocol trap personnel tag 600 fish per week of each target species and rearing type. Estimates using these sample sizes result in precise and reliable estimates from the traps to Lower Monumental Dam (see Tables 4a and 4b for examples of estimates from previous years tagging). However, in order to estimate survival through the hydrosystem it would be necessary to increase tagging efforts so that adequate numbers of fish could be tagged to provide survival estimates with good precision.

Based on our experience in estimating hydrosystem survival, the estuary trawl does not provide a high enough collection efficiency to provide reliable estimates to Bonneville Dam without extraordinarily large numbers of tagged fish. We therefore considered survival estimates from tag location (above Lower Granite Dam) to John Day Dam for the 'hydrosystem survival' estimates.

We developed estimates of the number of fish necessary to tag for hydrosystem survival estimation by utilizing existing tag data. Our estimates were developed for the Salmon River Trap using PIT-tagged fish marked at Rapid River Hatchery, which is located above the trap on the Rapid River tributary. We chose the Salmon River Trap because it furthest from Lower Granite Dam and would require the highest sample sizes to achieve survival estimates with acceptable precision.

We determined sample sizes by randomly sub-sampling tags from the original tagging groups from the migration year (MY) 1999 and 2002. Using fish from CSS studies MY 1999 and 2002 (tagging coordinator id lrb, jlc) of which approximately 20% were removed for transportation, and 2002 NMFS tagging (tagging coordinator id lgg), of which fish were diverted back to river at transportation sites, we then estimated survivals for samples of between 600 and 10,000 tags.

We set as our criteria for precision a coefficient of variation (CV) of 10%. Initially, using the CSS tags from MY 1999, we selected groups of 600, 1000, 2000, 5000 and 10000 fish (Table 5). We then ran 4 additional replicates of sample size n = 5000 and 5 replicates of n = 7500 (tables 6 and 7). We repeated the n = 7500 replicates using CSS marks from MY 2002 (Table 8). Finally, we ran 5 replicates of n = 5000 using NMFS mark groups from MY 2002 (Table 9).

We determined that 5,000 to 7,500 tagged fish could yield an estimate with less than 10% CV depending on whether a portion of the tag group were either transported or all remained in river (see tables 4 to 8 below). Using a random sub-sample from the 126,000 yearling chinook tagged by NMFS at Rapid River Hatchery in 2002, we found that groups of 5,000 tagged fish, on average, yields a survival estimate with 10% CV. In these groups no fish were diverted for transportation studies (such as CSS). Using CSS tagged fish, from which a portion of the migrants are to be diverted to transportation, we determined that 7,500 tags would be necessary to provide an estimate with 10% coefficient of variation.

Our goal would be to mark blocks of fish on a weekly basis according to the sample sizes outlined above. We estimate the sites can tag between 1,000 and 2,000 fish per day during normal operations and assuming there are adequate numbers of fish in the river to capture. We could potentially tag 14,000 fish at each trap each week. Since peak outmigration of wild yearling chinook and wild steelhead occur at different times, with steelhead generally passing 2 to 3 weeks later than chinook, we could concentrate tagging on wild chinook early season, and switch emphasis to wild steelhead a few weeks later as their abundance increases. This would provide the best opportunity for providing multiple weekly blocks each season for estimating hydrosystem survival.

3. ***Performance Standards. The survival estimates derived from the PIT tagged SMP fish can potentially have application in the evaluation of BO performance standards. However, concerns regarding the suitability of precision need to be addressed before this could be determined.***

We agree, the current SMP has not been designed to meet BO performance standards. However, with some relatively small changes to the operations of the traps, we believe both abundance estimates and hydrosystem survival estimates could be reliably calculated using SMP trap generated data. See the response above (# 2) for our detailed explanation of how we could modify the proposal to accomplish these additional tasks. Initial discussions with agencies conducting the trap sampling and marking indicate that number of fish marked at the traps could be increased to generate survival estimates over the longer river reach. Again the SMP proposal objectives can be modified for 2003 to accomplish this task.

4. ***Also, as we noted for the NMFS survival proposal, the reliance on hatchery stocks may restrict the utility of these fish , since ESA focuses on wild stock performance. If this proposal remains linked to ESA needs, then it should offer evidence or rationale to support the use of hatchery fish as surrogates for wild populations.***

SMP marks both hatchery and wild fish. The SMP hatchery marking and migration data can be useful with other data such as that generated by the CSS study, in determining the utility of hatchery fish data as surrogates for wild fish data.. However, wild fish marking at traps in the Snake River would be of some of critical value to evaluating those wild stocks of Snake River Spring Chinook and Snake River Steelhead that are currently listed as endangered. At the present time the SMP and CSS projects overlap a great deal and are designed together so that mark groups have more than one application. The CSS study is also designed to contribute to

long term monitoring. As part of the coordination of the two projects, SMP sites mark wild Chinook and Wild steelhead for the CSS study. These marks are utilized in Smolt monitoring and also utilized in the CSS study design of smolt to adult return rate relative to passage history.

It may be possible to mark wild yearling chinook and wild steelhead at the SMP traps for the purposes of estimating hydrosystem survival. The key is the number of wild fish available and the allowance for handling and marking through section 10 permitting. And abundance estimates may also be estimable for the listed stocks that migrate past the traps. See the response to comment # 2 above for more details regarding this.

Table 1. Historic efficiency estimates for the SMP traps.

Year	Trap	Species	Efficiency Estimate (%)
1994	Imnaha River	Hatchery Yearling Chinook	13.8
1996	Imnaha River	Hatchery Yearling Chinook	11.6
1997	Imnaha River	Hatchery Yearling Chinook	45.9
1966 – 1968	Salmon Trap at White Bird Location	Hatchery Yearling Chinook and Hatchery Steelhead	Ranged from 0.2 to 3.6 avg > 1.5
1983	Salmon Trap at White Bird Location	Hatchery Yearling Chinook and Hatchery Steelhead	Ranged from 0.5 to 2.0
1984	Snake Trap	Yearling Chinook	Avg 1.7
1985	Snake Trap	Yearling Chinook	Avg 1.3
1986	Snake Trap	Yearling Chinook	Avg 1.2
1989	Snake Trap	Yearling Chinook	Avg 1.1
1985	Snake Trap	Steelhead	1.0
1986	Snake Trap	Steelhead	1.4
1988	Snake Trap	Steelhead	Avg 0.7
1989	Snake Trap	Steelhead	Avg 0.6
1990	Snake Trap	Steelhead	Avg 0.5

Table 2. NMFS ESU's Potentially Sampled at SMP traps in the Snake River Basin

Trap	Snake River ESU's sampled
Imnaha	Yearling Spring-Summer Chinook, Steelhead
Grande Ronde	Yearling Spring-Summer Chinook, Steelhead, Fall Chinook
Salmon River Trap	Yearling Spring-Summer Chinook, Steelhead, Sockeye
Snake River Trap	Yearling Spring-Summer Chinook, Steelhead, Sockeye, Fall Chinook

Table 3. Precision of estimates of smolts passing a trap based on historic trap efficiencies between 0.5% and 2.5% with transformed arcsin vp having average of 0.11192 and standard error of 0.00533.

Actual Population Size	Expected Catch	Expected Population Size N			Coeff. of Var.
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Table 4a. Annual average reach survival estimates of Snake River basin PIT tagged yearling chinook from trap release sites to Lower Monumental Dam tailrace in 2001 compared to 1998 – 2000.

Tag Site	Species	Rearing Type	Year	Date Range	No. of Blocks	Avg PIT Per Blk	Average Survival	Lower Limit	Upper Limit
Salmon River trap									
	Chinook	Wild	1998	3/23-5/1	3	402	0.777	0.697	0.857
		Wild	1999	3/18-4/30	5	614	0.809	0.775	0.844
		Wild	2000	3/27-4/21	4	378	0.763	0.690	0.835
		Wild	2001	3/19-5/4	4	399	0.583	0.547	0.619
		Hatchery	1998	4/6-5/1	3	600	0.679	0.618	0.740
		Hatchery	1999	3/18-5/21	8	706	0.694	0.660	0.729
		Hatchery	2000	3/13-5/5	8	555	0.690	0.602	0.777
		Hatchery	2001	3/19-5/17	8	533	0.629	0.605	0.653
Snake River trap									
	Chinook	Wild	1998	3/25-5/8	2	379	0.767	0.669	0.865
		Wild	1999	3/22-5/25	5	654	0.861	0.832	0.891
		Wild	2000	4/10-4/28	3	406	0.916	0.779	1.052
		Hatchery	1998	4/13-5/8	4	476	0.797	0.729	0.865
		Hatchery	1999	4/5-5/25	5	838	0.884	0.842	0.926
		Hatchery	2000	4/10-5/5	4	576	0.770	0.672	0.868
		Hatchery	2001	4/27-5/4	1	372	0.745	0.666	0.825
Imnaha River trap									
	Chinook	Wild	1998	3/16-4/23	6	626	0.751	0.707	0.795
		Wild	1999	3/28-5/14	5	808	0.806	0.775	0.837
		Wild	2000	3/13-4/23	4	721	0.757	0.699	0.815
		Wild	2001*	3/14-4/27	14	641	0.683	0.669	0.697
		Wild	2001*	4/29-5/12	1	567	0.529	0.475	0.583
		Hatchery	1998*	4/8-4/9	1	1007	0.583	0.512	0.655
		Hatchery	1998*	4/13-4/14	1	987	0.738	0.624	0.853
		Hatchery	1999	4/4-4/16	2	687	0.610	0.554	0.665
		Hatchery	2000	3/20-4/16	4	528	0.535	0.445	0.626
		Hatchery	2001*	3/23-3/28	1	638	0.611	0.556	0.665
		Hatchery	2001*	3/29-4/27	5	474	0.712	0.684	0.740
Grande Ronde River trap									
	Chinook	Wild	1998	3/24-5/8	2	310	0.699	0.600	0.798
		Wild	1999	4/12-4/30	1	607	0.825	0.756	0.894
		Wild	2000	4/3-5/5	5	200	0.775	0.650	0.900
		Wild	2001	3/28-5/3	2	294	0.764	0.694	0.835
		Hatchery	1998	4/8-4/9	1	644	0.776	0.619	0.934
		Hatchery	1999*	3/17-3/26	1	771	0.580	0.523	0.637
		Hatchery	1999*	3/29-4/9	1	995	0.706	0.634	0.779
		Hatchery	2001	4/2-4/26	3	462	0.624	0.578	0.670

*Identifies a year with a significant "between blocks (temporal releases)" variance component. For those years, survival estimates are presented separately for each set of blocks that differ significantly. No survival estimates are available for wild chinook from the Snake River trap in 2001 and hatchery chinook from the Grande Ronde River trap in 2000 due to not enough PIT tagged fish being released.

Table 4b. Annual average reach survival estimates of Snake River basin PIT tagged steelhead from trap release sites to Lower Monumental Dam tailrace in 2001 compared to 1998 – 2000.

Tag Site	Species	Rearing Type	Year	Date Range	No. of Blocks	Avg PIT Per Blk	Average Survival	Lower Limit	Upper Limit
Salmon River trap									
	Steelhead	Wild	2001	4/23-5/4	1	307	0.476	0.367	0.585
		Hatchery	1998	4/20-5/1	2	483	0.814	0.723	0.905
		Hatchery	1999	4/14-5/21	4	567	0.692	0.651	0.733
		Hatchery	2000	4/17-5/19	4	N/A	0.514	0.398	0.629
		Hatchery	2001	4/9-5/18	3	935	0.413	0.329	0.496
Snake River trap									
	Steelhead	Wild	1999	4/19-5/25	2	366	0.816	0.739	0.893
		Wild	2000	4/17-5/5	3	276	0.743	0.622	0.865
		Wild	2001	4/27-5/21	2	410	0.452	0.392	0.513
		Hatchery	1998	4/6-5/23	7	585	0.728	0.683	0.773
		Hatchery	1999*	4/19-4/30	2	604	0.874	0.817	0.930
		Hatchery	1999*	5/3-5/25	2	1249	0.717	0.676	0.758
		Hatchery	2000	4/17-5/26	4	852	0.692	0.580	0.803
		Hatchery	2001	4/27-5/21	3	760	0.465	0.365	0.565
Imnaha River trap									
	Steelhead	Wild	1999	5/10-5/20	2	817	0.784	0.733	0.835
		Wild	2000	4/17-5/21	5	732	0.611	0.508	0.714
		Wild	2001*	3/20-4/1 & 5/1-5/15	5	498	0.445	0.405	0.484
		Wild	2001*	4/15-4/30	2	461	0.637	0.555	0.719
		Hatchery	1998	4/27-5/22	4	629	0.635	0.589	0.681
		Hatchery	1999	4/11-6/24	5	1158	0.711	0.680	0.742
		Hatchery	2000	4/17-5/21	5	968	0.551	0.463	0.639
		Hatchery	2001	4/15-5/15	6	531	0.450	0.376	0.525
Grande Ronde River trap									
	Steelhead	Wild	1999	4/19-5/25	2	595	0.806	0.747	0.866
		Wild	2000	4/5-4/28	4	200	0.729	0.614	0.843
		Wild	2001*	4/23-5/1	1	307	0.547	0.401	0.692
		Wild	2001*	5/7-5/21	1	292	0.298	0.199	0.397
		Hatchery	1998	4/24-5/15	4	628	0.632	0.586	0.678
		Hatchery	1999	4/19-5/25	3	820	0.720	0.678	0.761
		Hatchery	2000	4/10-5/12	4	606	0.561	0.489	0.633
		Hatchery	2001	4/23-5/17	3	704	0.511	0.408	0.614

*Identifies a year with a significant "between blocks (temporal releases)" variance component. For those years, survival estimates are presented separately for each set of blocks that differ significantly. No survival estimates are available for wild chinook from the Snake River trap in 2001 and hatchery chinook from the Grande Ronde River trap in 2000 due to not enough PIT tagged fish being released.

Table 5. Survival estimates and variance estimates from five replicates of random sub-sampling groups of 600, 1000, 1,500, 2000, 5000 and 10000 tags from all CSS MY 1999 marks at Rapid River Hatchery

Survival and st.error	Sample Size					
	600	1000	1500	2000	5000	10000
Lgr	0.78667	0.78742	0.77601	0.77498	0.74774	0.74815
se_lgr	0.05682	0.04886	0.03830	0.03681	0.02105	0.01417
Lgs	0.93286	0.86338	0.92277	0.87261	0.92697	0.92723
se_lgs	0.09183	0.07107	0.06175	0.05453	0.03553	0.02350
Lmn	1.14259	1.02714	0.92633	0.94503	0.93292	0.98118
se_lmn	0.13631	0.07173	0.06206	0.04669	0.03211	0.02469
Mcn	0.87331	0.73800	0.81865	0.92839	0.85295	0.82581
se_mcn	0.18781	0.07680	0.08890	0.08273	0.04728	0.03477
Jda	1.35156	1.59101	1.13061	1.00301	0.93604	0.99659
se_jda	0.74775	0.46778	0.27193	0.18243	0.10554	0.08852
corr_lgrlgs	-0.83230	0.89258	0.84943	-0.90218	-0.87283	-0.85973
corr_lgslmn	-0.22127	0.16273	0.24435	-0.16400	-0.20711	-0.20768
corr_lmnmcn	-0.46278	0.53580	0.43475	-0.40682	-0.43889	-0.45094
corr_mcnjda	-0.28210	0.19164	0.31030	-0.36777	-0.33866	-0.32813
Reach	0.989689	0.819910	0.613957	0.595099	0.516271	0.560173
If parameters assumed independent						
var_reach	0.373650	0.075814	0.030548	0.017574	0.005126	0.003545
ul_reach	2.187777	1.359584	0.956527	0.854930	0.656605	0.676871
Ll_reach	0.208398	0.280235	0.271387	0.335268	0.375938	0.443474
If parameters assumed correlated						
cov_lgrlgs	0.004343	0.003100	0.002009	0.001811	0.000653	-0.000286
cov_lgslmn	0.002770	0.000830	0.000936	0.000418	0.000236	-0.000120
cov_lmnmnc	0.011848	0.002952	0.002399	0.001571	0.000666	-0.000387
cov_mcnjda	0.039617	0.006885	0.007501	0.005551	0.001690	-0.001010
surv_reach	0.98969	0.81991	0.61396	0.59510	0.51627	0.56017
se_reach	0.51764	0.23518	0.13825	0.09914	0.05389	0.04618
ul_reach	2.00427	1.28085	0.88493	0.78940	0.62189	0.65069
Ll_reach	-0.02489	0.35896	0.34299	0.40079	0.41065	0.46965

Table 6. Survival estimates and variance estimates from five replicates of random sub-sampling 5000 tags from all CSS MY 1999 marks at Rapid River Hatchery

Survival and st.error	rep 1 5000	rep 2 5000	rep 3 5000	rep 4 5000	rep 5 5000
Lgr	0.74774	0.71651	0.71382	0.75087	0.71809
se_lgr	0.02105	0.01680	0.01706	0.01807	0.01565
Lgs	0.92697	0.97722	0.95763	0.96220	1.01110
se_lgs	0.03553	0.03068	0.03088	0.03108	0.02992
Lmn	0.93292	0.91114	0.91426	0.92798	0.90937
se_lmn	0.03211	0.03080	0.02936	0.03042	0.02990
Mcn	0.85295	0.94460	0.90338	1.03948	0.91874
se_mcn	0.04728	0.05671	0.04965	0.06709	0.05140
Jda	0.93604	1.09999	1.01656	0.80155	1.01608
se_jda	0.10554	0.16314	0.12155	0.10106	0.13112
corr_lgrlgs	-0.87283	-0.81388	-0.82649	-0.83098	-0.79375
corr_lgslmn	-0.20711	-0.25388	-0.24023	-0.25345	-0.28246
corr_lmnmcn	-0.43889	-0.38829	-0.39755	-0.34770	-0.39104
corr_mcnjda	-0.33866	-0.30963	-0.33944	-0.42025	-0.32361
Reach	0.516271	0.662889	0.573928	0.558619	0.616365
If parameters assumed independent					
var_reach	0.005126	0.012426	0.006574	0.007102	0.008439
ul_reach	0.656605	0.881374	0.732849	0.723790	0.796419
Ll_reach	0.375938	0.444405	0.415006	0.393447	0.436311
If parameters assumed correlated					
cov_lgrlgs	-0.000653	-0.000419	-0.000435	-0.000467	-0.000372
cov_lgslmn	-0.000236	-0.000240	-0.000218	-0.000240	-0.000253
cov_lmnmnc	-0.000666	-0.000678	-0.000579	-0.000709	-0.000601
cov_mcnjda	-0.001690	-0.002865	-0.002048	-0.002849	-0.002181
surv_reach	0.51627	0.66289	0.57393	0.55862	0.61637
se_reach	0.05389	0.09245	0.06371	0.06275	0.07429
ul_reach	0.62189	0.84409	0.69880	0.68161	0.76198
Ll_reach	0.41065	0.48169	0.44905	0.43562	0.47075

Table 7. Survival estimates and variance estimates from five replicates of random sub-sampling 7500 tags from all CSS MY 1999 marks at Rapid River Hatchery

Survival and st.error	rep 1 7500	rep 2 7500	rep 3 7500	rep 4 7500	rep 5 7500
Lgr	0.73824	0.73805	0.74522	0.74160	0.74180
se_lgr	0.01569	0.01612	0.01589	0.01586	0.01606
Lgs	0.92851	0.94873	0.94441	0.95988	0.93841
se_lgs	0.02625	0.02790	0.02744	0.02728	0.02731
Lmn	0.94340	0.92473	0.93740	0.91672	0.96805
se_lmn	0.02513	0.02610	0.02590	0.02471	0.02807
Mcn	0.88860	0.93749	0.89588	0.92690	0.90128
se_mcn	0.04102	0.04667	0.04293	0.04416	0.04581
Jda	0.92870	0.92565	1.05114	0.92858	0.88968
se_jda	0.09402	0.09868	0.11795	0.09118	0.09224
corr_lgrlgs	-0.85266	-0.85112	-0.85807	-0.85326	-0.85216
corr_lgslmn	-0.21911	-0.23430	-0.21674	-0.23329	-0.22016
corr_lmnmcn	-0.40889	-0.39321	-0.41229	-0.38702	-0.42138
corr_mcnjda	-0.33565	-0.35449	-0.31442	-0.36903	-0.36148
Reach	0.533656	0.561900	0.621269	0.561663	0.540349
If parameters assumed independent					
var_reach	0.004084	0.005046	0.006542	0.004386	0.004522
ul_reach	0.658909	0.701126	0.779802	0.691469	0.672155
Ll_reach	0.408403	0.422674	0.462736	0.431858	0.408544
If parameters assumed correlated					
cov_lgrlgs	-0.000351	-0.000383	-0.000374	-0.000369	-0.000374
cov_lgslmn	-0.000145	-0.000171	-0.000154	-0.000157	-0.000169
cov_lmnmnc	-0.000421	-0.000479	-0.000458	-0.000422	-0.000542
cov_mcnjda	-0.001294	-0.001633	-0.001592	-0.001486	-0.001527
surv_reach	0.53366	0.56190	0.62127	0.56166	0.54035
se_reach	0.05018	0.05514	0.06535	0.05043	0.05124
ul_reach	0.63201	0.66998	0.74936	0.66051	0.64077
Ll_reach	0.43530	0.45382	0.49318	0.46282	0.43993

Table 8. Survival estimates and variance estimates from five replicates of random sub-sampling 7500 tags from all CSS MY 2002 marks at Rapid River Hatchery

Survival and st.error	rep 1 7500	rep 2 7500	rep 3 7500	rep 4 7500	rep 5 7500
Lgr	0.75087	0.79050	0.75408	0.74940	0.76363
se_lgr	0.01857	0.02177	0.01960	0.01830	0.01910
lgs	0.99692	0.90279	0.93839	0.95916	0.95325
se_lgs	0.03554	0.03389	0.03449	0.03333	0.03438
lmn	0.96623	1.00699	1.02647	1.00072	0.98618
se_lmn	0.03170	0.03246	0.03446	0.03253	0.03377
mcn	0.85802	0.83673	0.82014	0.85258	0.81193
se_mcn	0.03350	0.03345	0.03265	0.03284	0.03198
jda	0.96085	0.99009	1.14197	0.84809	0.91616
se_jda	0.09397	0.10022	0.12297	0.07384	0.08244
corr_lgrlgs	-0.75073	-0.79799	-0.77018	-0.74861	-0.74616
corr_lgslmn	-0.50351	-0.43839	-0.46417	-0.49305	-0.49856
corr_lmnmcn	-0.29824	-0.32899	-0.34607	-0.32054	-0.32985
corr_mcnjda	-0.28959	-0.27755	-0.24890	-0.31080	-0.29608
reach	0.596286	0.595356	0.680289	0.520113	0.533996
if parameters assumed independent					
var_reach	0.004995	0.005335	0.007559	0.003226	0.003635
ul_reach	0.734807	0.738517	0.850699	0.631431	0.652163
ll_reach	0.457766	0.452196	0.509880	0.408795	0.415828
if parameters assumed correlated					
cov_lgrlgs	-0.000495	-0.000589	-0.000521	-0.000456	-0.000490
cov_lgslmn	-0.000567	-0.000482	-0.000552	-0.000535	-0.000579
cov_lmnmnc	-0.000317	-0.000357	-0.000389	-0.000342	-0.000356
cov_mcnjda	-0.000912	-0.000930	-0.000999	-0.000754	-0.000781
surv_reach	0.59629	0.59536	0.68029	0.52011	0.53400
se_reach	0.05520	0.05725	0.07023	0.04242	0.04525
ul_reach	0.70449	0.70756	0.81794	0.60326	0.62269
ll_reach	0.48809	0.48315	0.54264	0.43696	0.44530

Table 9. Survival estimates and variance estimates from five replicates of random sub-sampling 5000 tags from all NMFS MY 2002 marks at Rapid River Hatchery

Survival and	rep 1	rep 2	rep 3	rep 4	rep 5
st.error	5000	5000	5000	5000	5000
Lgr	0.85539	0.86567	0.88891	0.86786	0.91334
se_lgr	0.02176	0.02265	0.02373	0.02189	0.02667
lgs	0.83216	0.77764	0.76858	0.81085	0.73602
se_lgs	0.02602	0.02488	0.02506	0.02507	0.02544
lmn	0.95466	0.95585	0.96530	0.99273	1.00156
se_lmn	0.02572	0.02513	0.02513	0.02576	0.02621
mcn	0.84904	0.87333	0.86253	0.83117	0.89620
se_mcn	0.03304	0.03455	0.03369	0.03171	0.03741
jda	1.09035	0.94457	0.90247	0.91767	0.78763
se_jda	0.11423	0.09603	0.08288	0.08906	0.06994
corr_lgrlgs	-0.77526	-0.78387	-0.79288	-0.78083	-0.83011
corr_lgslmn	-0.36927	-0.35650	-0.35793	-0.36243	-0.30429
Corr_lmnmcn	-0.38897	-0.36802	-0.36342	-0.38846	-0.38296
corr_mcnjda	-0.26075	-0.28567	-0.31114	-0.27659	-0.34854
reach	0.629096	0.530806	0.513351	0.532840	0.475254
if parameters assumed independent					
var_reach	0.005873	0.004029	0.003271	0.003731	0.002792
ul_reach	0.779302	0.655219	0.625456	0.652558	0.578818
ll_reach	0.478889	0.406393	0.401246	0.413122	0.371691
if parameters assumed correlated					
cov_lgrlgs	-0.000439	-0.000442	-0.000472	-0.000429	-0.000563
cov_lgslmn	-0.000247	-0.000223	-0.000225	-0.000234	-0.000203
cov_lmnmnc	-0.000331	-0.000320	-0.000308	-0.000317	-0.000376
cov_mcnjda	-0.000984	-0.000948	-0.000869	-0.000781	-0.000912
surv_reach	0.62910	0.53081	0.51335	0.53284	0.47525
se_reach	0.06305	0.05126	0.04432	0.04919	0.03894
ul_reach	0.75267	0.63127	0.60022	0.62926	0.55158
ll_reach	0.50553	0.43034	0.42648	0.43642	0.39893

Attachment A
to
Smolt Monitoring Proposal #198712700
Response to ISRP Comments

August 14, 2002

Methods for Smolt Monitoring Tasks

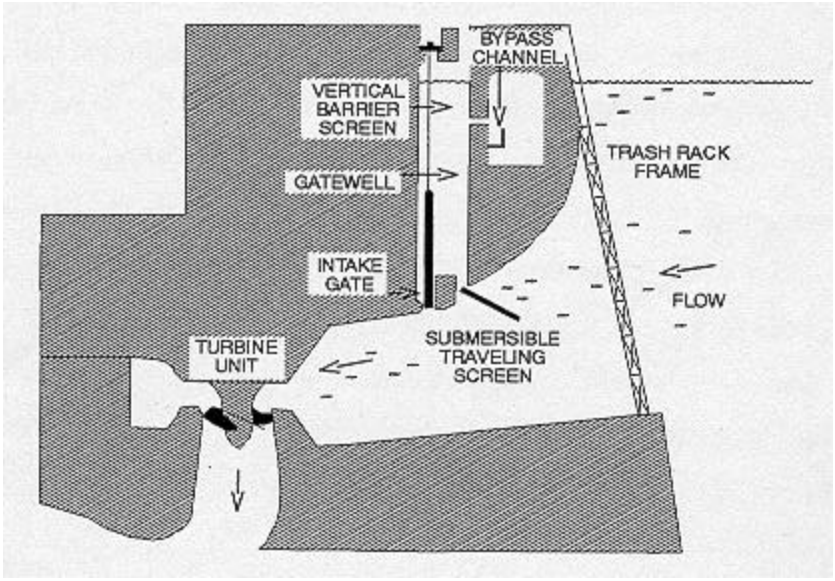
TASK 1. SMOLT MONITORING AT LOWER GRANITE DAM

Methods and Procedures for task 1a. Sample migrants daily in the sample system at Lower Granite Dam

Overview

Lower Granite Dam is located at river kilometer 172 of the Snake River at Lat. 46.66 N, Lon. 117.43 W. Like other Corps projects with mechanical bypass systems, fish are guided from turbine intakes into gatewells via Submersible Travelling Screens and Vertical Barrier Screens. Fish are collected from the top portion of water passing into the turbine intakes from the forebay. Extended Submersible Barrier Screens and subsequently Vertical Barrier Screens guide the migrating smolts, as the water moves vertically up the gatewell slot. Fish exit the gatewell slot near the top, through 12-inch orifice openings that pass the fish and water into the collection channel. The collection channel is a concrete tunnel that runs the length of the powerhouse and exits into the primary dewaterer.

When the fish reach the juvenile fish facility, they exit the flume onto a two-stage wet separator. The separator allows adult fallbacks, debris and larger nonsalmonids to be diverted back to the river, and is designed to separate the larger juvenile fish (generally steelhead) from the smaller juvenile fish (generally chinook, sockeye and coho). Evenly spaced parallel pipes divide the top few inches of water in the separator from the submerged exits. To exit the separator, fish must dive through the bars. The bars are more closely spaced on the upstream end (A-side), allowing only smaller fish to pass and more widely spaced at the downstream end (B-side), which allows larger smolts to pass but keeps out adults and larger debris. Debris and adult fish collect at the downstream end and are manually removed to a bypass flume which exits back to the river.



Longitudinal Section of a Kaplan Turbine Unit showing location of screens, gatewells, and the bypass channels.

Fish Sampling Procedures

NOTE: An explanation of the derivation of sample rates and target number of fish in the collection at Smolt Monitoring sites is available in Attachment D, the document entitled "Minimum sample rates for Smolt Monitoring Program at dams".

The sample system at Lower Granite consists of the following parts: two slide gates located in the bottom of the flumes a few feet downstream of the separator; a large slide gate which redirects PIT-tagged fish away from the sample fish; a sample tank with four 4-inch counter tunnel exits; an enclosed pipe that carries fish from the sample tank to the holding tank and a holding tank divided into two equal halves, each with two pre-anesthetizing chambers. The two primary slide gates, which are controlled by a timer calibrated in tenths of a minute, also act as PIT-tag diversion gates. The system has the capability to send PIT-tagged fish that exit the separator during a sample either to the sample or to the river. Most of the time, the system is set so the sample overrides the PIT-tag diversion system, sending PIT-tagged fish to the sample instead of being diverted back to the river. During 2000, this occurred from March 25 through July 28. From July 28 until October 31, the system was set to divert PIT-tagged fish back to the river during the sample.

Samples are taken six times per hour during the course of the season, through October 1. From approximately the first of October through the end of the season, 100% of the collection is sampled. Daily sampling generally begins at Lower Granite the last week of March and continues daily through the first week of October, at which time every other day sampling starts. If increased collection numbers occur in October then every day sampling resumes and continues until the numbers decline or the end of the sampling season. Sample rates are adjusted throughout the season to achieve daily

sample sizes of between 500 and 1,000 smolts whenever practical. Sample rate adjustments are based on guidelines provided by FPC and daily trends in total collection estimates. The sample rate is also adjusted when the National Marine Fisheries Service or other researchers need additional fish from the sample.

Fish diverted to the sample tank are held for up to 24 hours prior to examination. The 24-hour sample period starts at 0700. At the end of each 24-hour sampling period, the entire sample is processed. Small groups of fish are separated into batches as follows: screens in the sample holding tank are moved forward to crowd fish to the front of the tank. Once there, small groups of fish are drawn/guided into the pre-anesthetic chambers by opening and closing the knife gates. Batch sizes typically range between 30 and 60 fish per chamber and the number of fish is adjusted based on the amount of time the gate is opened and the position of the crowder screen. The fish anesthetic, ethyl m-aminobenzoate methansulfonate (MS-222®), is added to the chamber to obtain a concentration of about 62 mg/l. At this concentration, about 95 percent of the fish are adequately sedated within three minutes. Once anesthetized, these fish are flushed through the exit valve to the sorting trough.

The sorting trough is part of a re-circulating anesthetic system with water temperature control and aeration. The anesthetic levels in the system are set to keep fish sedated and easy to handle during the sample. Typically the MS-222 levels average between 55-60 mg/L. Sample fish remain in the sorting tank for as little as five seconds and up to five minutes. We strive to process fish within three minutes of entering the tank to minimize the effects of sedation and handling. Between the pre-anesthetic chambers and the sorting tank, sample fish are sedated an average of five minutes.

All fish handled in the sorting trough are enumerated by species and examined for unique marks and descaling. Additionally, a detailed sub-sample of up to 100 fish of each species is conducted during each daily sample. The detailed sub-sample records species, length, weight, unique marks, descaling, injuries and external symptoms of disease. In this process, fish are individually weighed and measured in a water-filled tray on an electronic balance. This detailed sub-sample provides the Corps with fish per pound and species composition data essential for calculations of raceway, barge and truck loading densities needed to stay within the maximum loading densities (0.5 pounds of fish per gallon of water). Immediately after handling, fish are routed in fresh water to the recovery tank on non-transport days or routed directly onto a waiting truck or barge on transport days. The maximum time that any fish are held at the fish facility is 48 hours.

The use of MS-222® to safely sedate juvenile salmonids is an important component of the smolt monitoring programs. Reviews of methods employed at different sites by FPC, USGS-BRD and SMP program staff in 1992 provided specific guidelines for standard stock solutions, minimal induction times and total exposure times for SMP sampling programs. Concentrations of approximately 60 mg/L of MS-222® from stock solutions of 100 g/L enable us to follow the general guidelines and handle the juvenile salmonids safely and efficiently. Over the course of each season we make some adjustments to account for changes in water temperature and the number of fish in the sample. Induction and recovery times for a given concentration tend to decrease as water temperatures increase.

Anesthetic solutions are used in the pre-anesthetic chambers and the re-circulating sample system. The pre-anesthetic chambers are drained to about 95 liters before we add

between 70 and 90 ml of MS-222® to achieve an initial concentration of about 63 mg/L. This typically sedates nearly all the fish within three minutes. However the pre-anesthetic chambers are not watertight. Fresh water seepage reduces the effective concentration. Depending upon the amount of fresh water seepage, fish response, water temperature, the size and number of smolts in the chamber, we may add more MS-222®. Once sedated, these fish are flushed down to the sorting trough.

The re-circulation system holds 670 liters of water and includes the sorting trough, sump, chilling reservoir, a rotary chiller, a filter and two pumps. We add anesthetic to the sump and chilling reservoir to achieve an initial concentration of about 50 mg/L. This level maintains sedation in most fish and allows some fish to gradually recover. The effective concentration of anesthetic in this system diminishes over time as more fish are sampled and absorb the anesthetic. Some leakage and infusion of fresh water also occurs throughout the sample. The longer we use the re-circulation system the more likely we are to add additional MS-222® in 50 to 100 ml increments to maintain effective concentrations. As a result, careful monitoring of fish response is a constant component of our sample procedures. To monitor anesthetic effectiveness and ensure the safety of the fish in the sample, we continuously watch and observe fish behavior and gilling rates.

Safe and effective induction times should be greater than one minute but not longer than three minutes. For each batch of fish sedated in the pre-anesthetic chambers, we recorded induction times as well as the estimated number and relative size of smolts, water temperature and concentration of MS-222®. The induction time was that point when approximately 95% of the fish were belly-up or on their side and gilling evenly.

Counts of fish examined during daily samples will be recorded on tally devices located near the sorting tank. The sample lab is equipped with a panel of LED displays labeled for the different fish species and rearing types. These displays are incremented by buttons mounted on the sorting tank framework. Handheld mechanical tally counters are also available to record some hatchery marks and descaling by species. Freeze brand data is recorded on forms printed on water resistant paper. Detailed subsample data - including lengths, weights, hatchery marks, descaling and assorted injury types and disease symptoms - are recorded on a digitizer station similar to a PIT-tagging station.

Hatchery marks and tags from smolts sampled in the Smolt Monitoring Program (SMP) and Gas Bubble Trauma sampling program (GBT) will be recorded. These marks include freeze brands, fin clips, elastomer tags (VIE) and coded-wire tags (CWT). Information recorded for each mark type will include: type of mark, location, orientation, colors, clip codes, lengths on branded fish and tally totals. This information will be reported daily to the Fish Passage Center throughout the season. Other information recorded, will be passive integrated transponder (PIT) tag codes from tagged fish collected in GBT samples and PIT-tagged fish mortalities from the raceways and the sample.

Methods and Procedures for task 1.b. Monitor Gas Bubble Symptoms at Lower Granite Dam according to FPC protocols

Overview

Fish are examined externally for signs of gas bubble trauma (GBT). The unpaired fins, and eyes are examined for the presence of bubbles and the area covered with bubbles is quantified. Monitoring of migrating juvenile salmonids is conducted at Lower Granite, Little Goose, Lower Monumental, Rock Island, McNary, and Bonneville dams. The goal of the juvenile salmonid examinations is to determine the relative extent to which the migrating juvenile salmonids passing the dam or sampling location have been exposed to harmful levels of total dissolved gas based upon the prevalence and severity of GBT induced bubbles on the fish. The data is reported to the fisheries management entities, the water quality agencies of Washington and Oregon, and is made available to other interested parties through Fish Passage Center weekly reports and daily postings to the FPC web site during the season.

A detailed description of sample size determination is available in Attachment E, the document entitled "Sample Size Determination for GBT Monitoring at SMP Locations".

Detailed procedures which are applicable to all sampling sites in the SMP are described in Attachment B the document "GBT Monitoring Protocol for the Smolt Monitoring Program" or by visiting our website following the link here.

Methods and Procedures for task 1.c. Transmit Data according to FPC protocol from Lower Granite Dam

Overview

All sample data recorded during the daily sample will be transcribed to a daily sample summary form. Additionally, other pertinent daily data from the fish facility and powerhouse will be recorded on the daily sample form, including: powerhouse flow and spill daily averages, research mortality and bypass numbers, facility mortality and bypass numbers, water temperature, sample rates and miscellaneous information. These data will be checked for accuracy by comparison with displays of the various tally devices and facility and researcher handlog forms.

Verified data from the daily sample summary forms will be transcribed into a computer file using Fish Passage Center software (FPC16.exe). When all pertinent data is loaded into the software program, summary printouts are printed and compared with the daily sample summary form handlog. After verification that the printouts and the handlogs match, the computer file will be transmitted to FPC. Files will be sent to FPC on the day of the sample by noon.

In the interest of reducing the total size of this document, a detailed description of data entry procedures can be found in attachment C (it applies to all sites creating data for transmittal to FPC) in document entitled "Smolt Monitoring Protocol Data Entry Manual" or visit our web site and view the link: ftp://ftp.fpc.org/fpc32/2002SmoltMonitoring3.3a.doc .

Methods and Procedures for task 1.d. Conduct data verification procedure for Lower Granite Dam according to FPC protocols

The QA/QC protocol requires that a portion of the daily batches submitted to the SMP database be cross-checked with the daily data sheets at the sites. There are a total of four traps that will be operating 5 days per week over a 12-week period for the SMP (3/8-5/29 for the traps on the Salmon and Snake rivers, and 3/15-6/5 for the traps on the Imnaha and Grande Ronde rivers). There are seven dams at which monitoring will take place for the SMP. This monitoring will occur 7 days per week over periods varying from 21 weeks (Rock Island Dam) to 30 weeks (Lower Granite, Little Goose, Lower Monumental, John Day, and Bonneville dams) to 36 weeks (McNary Dam). The goal of the QA/QC protocol is to cross-check enough batches to assure that the potential discrepancy rate across the total batches for a given site is acceptably low.

The QA/AC protocol will be to cross-check two daily batches out of every week at each of the monitoring sites. The Fish Passage Center (FPC) will randomly pick the two batches to be examined each week. FPC personnel will be responsible for conducting the cross-check and reporting back to the respective site on the results. The cross-check of a daily batch will consist of verifying the data entries in the data base with the data on the site's data sheets for that batch. The data entries are found in several tables of the data base, including the (1) catch summary table which includes the sample-related parameters and flow/spill entries, (2) the catch detail table which includes the fish counts per species, descaling numbers, mortalities, and sample rates, (3) the incidental catch detail which includes the number of fish from the incidental list, the (4) the mark detail table which includes counts of fish with elastomer tags, photonic tags, spaghetti tags, and freeze brands, and (5) the transportation detail table which includes the number of fish transported and bypassed at the collector dams.

If no discrepancies are reported on the two batches examined for a given site, then the QA/QC procedure for that site is finished for that week, and the process will begin again the following week. Under the condition that no discrepant batches are found in the batch examined over the full season, we will be 95% confident that the discrepancy rate across all batches for the season will not exceed approximately 5% for the monitoring at the dams and 10% for the monitoring at the traps (higher at the traps only because of fewer batches for the season). This estimation utilizes methods given in the Sampling Techniques book by Cochran (1977)[1] on pages 55-60. If for each site we let

[1] Cochran, William G., 1977. Sampling Techniques (third edition). John Wiley & Sons, New York. 428 pp.

N= total number of batches, **X**= number of batches with discrepancies, **n**= number of batches checked, and **x**= number of checked batches with discrepancies, then we may use the hypergeometric distribution to determine the probability of finding **x** discrepant batches in the **n** batches examined when **X** discrepant batches actually exist in the total **N** batches. The number **X** that satisfies the probability statement Pr(**x**=0|**X,N,n**)=0.05 is the upper 95% confidence limit for the number of discrepant batches in the total **N** batches when no discrepant batches (**x**=0) are found in the **n** sampled batches. In this case, there is a high probability that the seasonal discrepancy rate is less than **X/N**.

If a discrepant batch is found at a site during a given week, then the FPC will randomly pick two additional batches from that week to be cross-checked by FPC personnel. If neither of these new batches show discrepancies between the entries in the SMP data base and the values on the site's data sheets, then the QA/QC procedure is finished for that week. But if additional discrepancies exist, then there will be continued selection of batches and cross-checks made until the site is back in compliance with what it shows in the SMP data base and what it shows on the site data sheets. It is unlikely that such an extended level of cross-checking would be necessary at a given site past the first week of the season.

1.e. Project management, planning, work statement/budget preparation

Washington Department of Fish and Wildlife personnel will be responsible for developing a budget for operations of the project based on the statement of work provided by Fish Passage Center. Project management, including planning all activities, hiring, personnel management and data gathering activities will be the responsibility of WDFW.

1.f. Conduct sampling for implementation of the Smolt Transportation Program

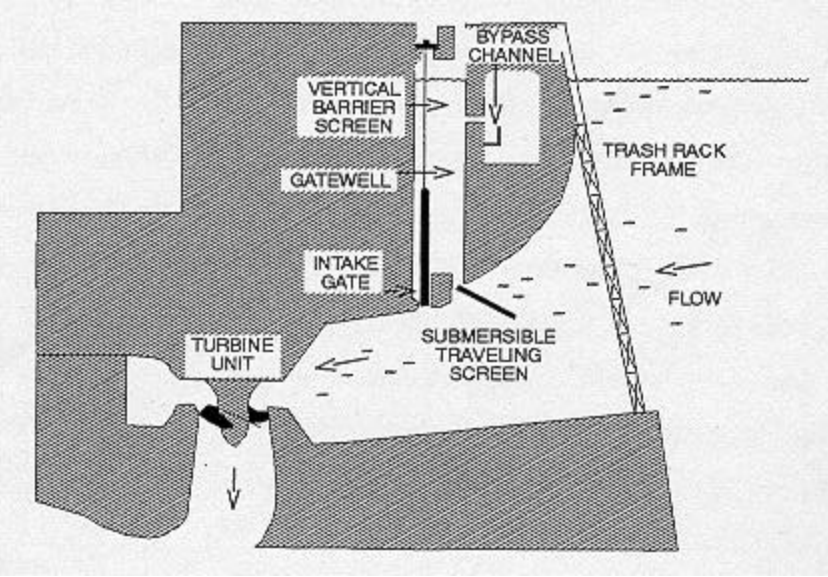
Methods used in sampling for transportation are the same described in the sections described above under task a. All fish number estimates, raceway, truck and barge loadings will be based on a sample of fish collected. Species composition and length samples will be taken to determine loading densities for raceways, barges and trucks. Project personnel will keep a running estimate of fish numbers, raceway totals, and direct loading totals for barges based on these estimates. Daily samples for descaling will contain a minimum of 100 fish for the dominant groups for which information is recorded. Data is made available to the ACOE by arrangement with SMP personnel on site.

TASK 2.1 AND 2.2 SMOLT MONITORING AT LOWER MONUMENTAL DAM AND MCNARY DAM

Methods and Procedures for task 2.1.a. Sample migrants daily in the sample system at Lower Monumental Dam

Overview

Lower Monumental Dam is located at river kilometer 67 on the Snake River at Lat 46.56 N Lon 118.54 W. As juvenile salmonids approach the forebay and turbine intakes at Lower Monumental Dam some are guided into the gatewell slots by submerged screens (STS's) set across the mouth of the turbine intakes. Once in the slots the fish can only leave by either sounding down and around the end of the STS or going through a 12-inch pipe (orifice) into a collection channel that runs the length of the powerhouse of the dam. Fish and water are carried in the channel down to the Primary Dewatering Unit that removes all but a small portion of the water. From here, water and the fish travel down a flume to the separator, which is located just above the JFF. As the fish reach the separator they are guided, depending upon their size, to one of two smaller flumes. Adult and larger non-target species are removed from the separator at this time by COE technicians. A timer located in the JFF operates the sample gates located in the small flumes. These gates direct fish either to the sample counting tank or to a transportation holding raceway. The timer can be set to open for 0 to 90 seconds and intervals ranging from 2 to 12. The number of intervals (samples) the gates open per hour and the duration of the time they are open determines how many fish are sampled and the sample rate. Sampled fish are routed by a flume into the sample counting tank and then into a sample holding tank. As they leave the counting tank, detectors located above the pipes send electrical impulses to counters and an estimate of fish in the holding tanks is established. Once in the holding tanks the fish are anesthetized in small batches and sent to a wet lab located inside the JFF.



Longitudinal Section of a Kaplan Turbine Unit showing location of screens, gatewells, and the bypass channels.

Fish Sampling

NOTE: An explanation of the derivation of sample rates and target number of fish in the collection at Smolt Monitoring sites is available in Attachment D, the document entitled "Minimum sample rates for Smolt Monitoring Program at dams".

Smolts, are initially introduced to anesthetic at the Lower Monumental Dam JJF in 1 of 4 pre-anesthetic chambers. These chambers are part of the sample holding tanks and have approximately 55gals (208liters) of river water in them when the anesthetic is added. We use tricaine methanesulfonate (MS-222) as an anesthetic at the JJF. After estimating how many fish are in the chamber, 60 ml to160 ml of a stock solution is mixed with river water and added to the chamber. Fish are held in the chamber for anywhere from 2 minutes to 3 minutes 30 seconds before being released into the wet lab. The overall concentration average in 2000 was 88.2 mg/l, while in 1999 it was 81.7 mg/l. Concentrations in the pre-anesthetic chambers were changed during the season for the following reasons: fish response to the tricaine, the numbers and species of fish in the sample, and to accommodate NMFS research. No other research fish were taken from the daily sample. All fish for GBT samples were collected off the separator and handled and anesthetized following GBT protocols.

Anesthetic is added to the re-circulation tank/system to keep fish sedated for examinations during sampling. The amount of anesthetic in the system and the volume of water in the tank determine the concentration in the system. Average concentration for 2000 was 39.0 mg/l with a high of 40.5 and a low of 28.9, average for 1999 was 34.9 mg/l.

Tricaine was added to the re-circulating system each day sample processing was conducted. The amount of anesthetic used this season in this system was either 28 grams or 33 grams. The number of fish to be sampled that day determined both the amount of tricaine and the water volume in the re-circulating tank. During non-research periods,

28g of tricaine a volume of 692.7 liters (21in of water depth in the tank) produced a beginning concentration of 40.4 mg/l. When we provided fish for NMFS to PIT tag project, 33g of tricaine and a volume of (28in water depth) produced a starting concentration of 34.2 mg/l.

The water volume in the re-circulating tank for a non-research sample starts 692.7 liters and was increased for the NMFS research project 966 liters. More water is required in the recirculation system to supply water to tagging stations. After sampling starts additional water comes into the re-circulation system when water from the pre-anesthetic chamber overflows across the dewatering screen in the wet lab sample trough. This overflow of fresh water gradually dilutes the anesthetic concentration. Therefore to offset the continuous dilution of the re-circulation system, we increased the concentrations of tricaine (144.0 mg/l vs. 74.1 mg/l in non-sample mode) in the pre-anesthetic chambers.

All fish handled in the sorting trough are enumerated by species and examined for unique marks and descaling. Additionally, a detailed sub-sample of up to 100 fish of each species is conducted during each daily sample. The detailed sub-sample records species, length, weight, unique marks, descaling, injuries and external symptoms of disease. In this process, fish are individually weighed and measured in a water-filled tray on an electronic balance. This detailed sub-sample provides the Corps with fish per pound and species composition data essential for calculations of raceway, barge and truck loading densities needed to stay within the maximum loading densities (0.5 pounds of fish per gallon of water). Immediately after handling, fish are routed in fresh water to the recovery tank on non-transport days or routed directly onto a waiting truck or barge on transport days. The maximum time that any fish are held at the fish facility is 48 hours.

We identify presumed columnaris (*Flavobacterium columnaris*) infection by identification of gross pathology known to be characteristic of columnaris symptoms. These symptoms included eroded fins, hemorrhaged vents and yellowish lesions about the mouth, snout, head, and at various locations on the body particularly on the ventral side.

The use of MS-222® to safely sedate juvenile salmonids is an important component of the smolt monitoring programs. Reviews of methods employed at different sites by FPC, USGS-BRD and SMP program staff in 1992 provided specific guidelines for standard stock solutions, minimal induction times and total exposure times for SMP sampling programs. Concentrations of approximately 60 mg/L of MS-222® from stock solutions of 100 g/L enable us to follow the general guidelines and handle the juvenile salmonids safely and efficiently. Over the course of each season we make some adjustments to account for changes in water temperature and the number of fish in the sample. Induction and recovery times for a given concentration tend to decrease as water temperatures increase.

Methods and Procedures for task 2.1.b. Monitor Gas Bubble Symptoms at Lower Monumental Dam according to FPC protocols

Overview

Fish are examined externally for signs of gas bubble trauma (GBT). The unpaired fins, and eyes are examined for the presence of bubbles and the area covered with bubbles is quantified. Monitoring of migrating juvenile salmonids is conducted at Lower Granite, Little Goose, Lower Monumental, Rock Island, McNary, and Bonneville dams. The goal of the juvenile salmonid examinations is to determine the relative extent to which the migrating juvenile salmonids passing the dam or sampling location have been exposed to harmful levels of total dissolved gas based upon the prevalence and severity of GBT induced bubbles on the fish. The data is reported to the fisheries management entities, the water quality agencies of Washington and Oregon, and is made available to other interested parties through Fish Passage Center weekly reports and daily postings to the FPC web site during the season.

A detailed description of sample size determination is available in Attachment E, the document entitled "Sample Size Determination for GBT Monitoring at SMP Locations".

Detailed procedures which are applicable to all sampling sites in the SMP are described in Attachment B, the document "GBT Monitoring Protocol for the Smolt Monitoring Program" or by visiting our website following the link here.

Methods and Procedures for task 2.1.c. Transmit Data according to FPC protocol from Lower Monumental Dam

Overview

All sample data recorded during the daily sample will be transcribed to a daily sample summary form. Additionally, other pertinent daily data from the fish facility and powerhouse will be recorded on the daily sample form, including: powerhouse flow and spill daily averages, research mortality and bypass numbers, facility mortality and bypass numbers, water temperature, sample rates and miscellaneous information. These data will be checked for accuracy by comparison with displays of the various tally devices and facility and researcher handlog forms.

Verified data from the daily sample summary forms will be transcribed into a computer file using Fish Passage Center software (FPC16.exe). When all pertinent data is loaded into the software program, summary printouts are printed and compared with the daily sample summary form handlog. After verification that the printouts and the handlogs match, the computer file will be transmitted to FPC. Files will be sent to FPC on the day of the sample by noon.

In the interest of reducing the total size of this document, a detailed description of data entry procedures can be found in attachment C (it applies to all sites creating data for transmittal to FPC) in document entitled "Smolt Monitoring Protocol Data Entry Manual" or visit our web site and view the link: ftp://ftp.fpc.org/fpc32/2002SmoltMonitoring3.3a.doc .

Methods and Procedures for task 2.1.d. Conduct data verification procedure for Lower Monumental Dam according to FPC protocols

The QA/QC protocol requires that a portion of the daily batches submitted to the SMP database be cross-checked with the daily data sheets at the sites. There are a total of four traps that will be operating 5 days per week over a 12-week period for the SMP (3/8-5/29 for the traps on the Salmon and Snake rivers, and 3/15-6/5 for the traps on the Imnaha and Grande Ronde rivers). There are seven dams at which monitoring will take place for the SMP. This monitoring will occur 7 days per week over periods varying from 21 weeks (Rock Island Dam) to 30 weeks (Lower Granite, Little Goose, Lower Monumental, John Day, and Bonneville dams) to 36 weeks (McNary Dam). The goal of the QA/QC protocol is to cross-check enough batches to assure that the potential discrepancy rate across the total batches for a given site is acceptably low.

The QA/AC protocol will be to cross-check two daily batches out of every week at each of the monitoring sites. The Fish Passage Center (FPC) will randomly pick the two batches to be examined each week. FPC personnel will be responsible for conducting the cross-check and reporting back to the respective site on the results. The cross-check of a daily batch will consist of verifying the data entries in the data base with the data on the site's data sheets for that batch. The data entries are found in several tables of the data base, including the (1) catch summary table which includes the sample-related parameters and flow/spill entries, (2) the catch detail table which includes the fish counts per species, descaling numbers, mortalities, and sample rates, (3) the incidental catch detail which includes the number of fish from the incidental list, the (4) the mark detail table which includes counts of fish with elastomer tags, photonic tags, spaghetti tags, and freeze brands, and (5) the transportation detail table which includes the number of fish transported and bypassed at the collector dams.

If no discrepancies are reported on the two batches examined for a given site, then the QA/QC procedure for that site is finished for that week, and the process will begin again the following week. Under the condition that no discrepant batches are found in the batch examined over the full season, we will be 95% confident that the discrepancy rate across all batches for the season will not exceed approximately 5% for the monitoring at the dams and 10% for the monitoring at the traps (higher at the traps only because of fewer batches for the season). This estimation utilizes methods given in the Sampling Techniques book by Cochran (1977)[2] on pages 55-60. If for each site we let **N**= total number of batches, **X**= number of batches with discrepancies, **n**= number of batches checked, and **x**= number of checked batches with discrepancies, then we may use

[2] Cochran, William G., 1977. Sampling Techniques (third edition). John Wiley & Sons, New York. 428 pp.

the hypergeometric distribution to determine the probability of finding **x** discrepant batches in the **n** batches examined when **X** discrepant batches actually exist in the total **N** batches. The number **X** that satisfies the probability statement Pr(**x**=0|**X,N,n**)=0.05 is the upper 95% confidence limit for the number of discrepant batches in the total **N** batches when no discrepant batches (**x**=0) are found in the **n** sampled batches. In this case, there is a high probability that the seasonal discrepancy rate is less than **X/N**.

If a discrepant batch is found at a site during a given week, then the FPC will randomly pick two additional batches from that week to be cross-checked by FPC personnel. If neither of these new batches show discrepancies between the entries in the SMP data base and the values on the site's data sheets, then the QA/QC procedure is finished for that week. But if additional discrepancies exist, then there will be continued selection of batches and cross-checks made until the site is back in compliance with what it shows in the SMP data base and what it shows on the site data sheets. It is unlikely that such an extended level of cross-checking would be necessary at a given site past the first week of the season.

2.1.e. Project management, planning, work statement/budget preparation

Washington Department of Fish and Wildlife personnel will be responsible for developing a budget for operations of the project based on the statement of work provided by Fish Passage Center. Project management, including planning all activities, hiring, personnel management and data gathering activities will be the responsibility of WDFW.

2.1.f. Conduct sampling for implementation of the Smolt Transportation Program

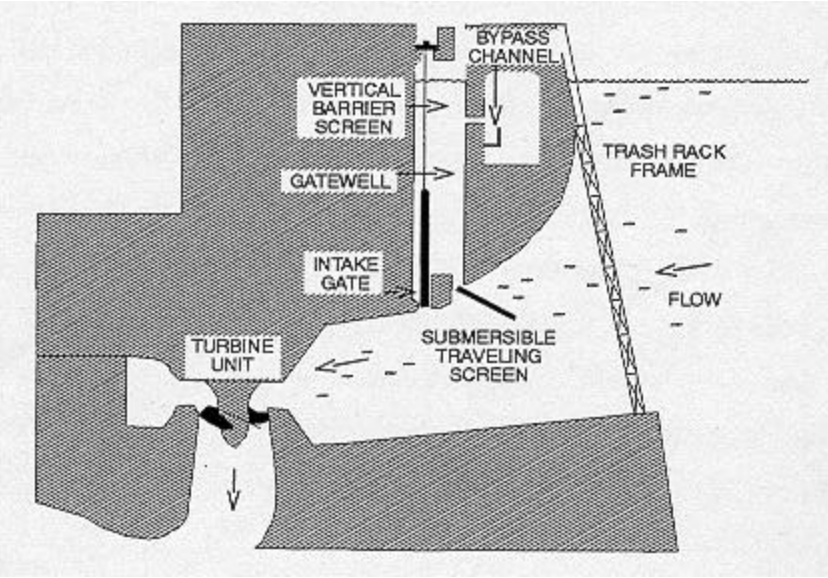
All fish number estimates, raceway, truck and barge loadings will be based on a sample of fish collected. Species composition and length samples will be taken to determine loading densities for raceways, barges and trucks. Project personnel will keep a running estimate of fish numbers, raceway totals, and direct loading totals for barges based on these estimates. Daily samples for descaling will contain a minimum of 100 fish for the dominant groups for which information is recorded.

Methods and Procedures for task 2.2.a. Sample migrants daily in the sample system at McNary Dam

Overview

McNary Dam is located on the Columbia River, approximately 470 kilometers from the mouth at Lat 45.94N Lon 119.29 W. McNary is the first of four dams below the confluence with the Snake River that migratory juvenile salmonids encounter on their way to the ocean. It is also the last of four juvenile fish bypass and transportation facilities operated by the Corps of Engineers on the Snake and Columbia Rivers. In the spring, fish entering the juvenile bypass system are returned to the river below the dam.

From summer through the end of the migration season, the Juvenile Fish Facility (JFF) is operated in collection mode, and fish are transported in barges and trucks to the release locations below Bonneville Dam on the Columbia River. From there, they complete the remaining 140-mile journey to the ocean on their own.



Longitudinal Section of a Kaplan Turbine Unit showing location of screens, gatewells, and the bypass channels.

Fish Sampling

NOTE: An explanation of the derivation of sample rates and target number of fish in the collection at Smolt Monitoring sites is available in Attachment D, the document entitled "Minimum sample rates for Smolt Monitoring Program at dams".

At McNary Dam, SMP staff collect and record data by inspecting a sample of each day's total smolt passage or collection. Staff technicians and biologists identify and record the following information for each fish sampled: species, marks (freeze brands, fin clips, and elastomer tags), descaling, evidence of lamprey predation, and signs of disease and stress. Lengths, weights, and detailed information on injury, disease, and signs of stress are taken on a sub-sample of up to one hundred fish of each species, every day. The staff also collects daily river flow and river temperature data, monitors and assists on-site research activities, maintains accurate records of sample and collection data, transmits daily reports to the FPC and prepares an annual report. The SMP has been active at McNary since 1979 and has been operated by the Washington State Department of Fish and Wildlife (WDFW) since 1988.

Since 1981, the U.S. Army Corps of Engineers has operated juvenile fish collection and sampling facilities at McNary Dam. All 14 turbine intakes are equipped with extended-length submersible bar screens (ESBS). The screens are installed in late March. The juvenile bypass system begins operation shortly after the screens are installed. The

facility can operate in primary bypass which routes fish directly back to the river below the project, or the facility may operate in secondary bypass which routes the fish through the Juvenile Fish Facility, allowing sampling of fish for the SMP and interrogation for Passive Integrated Transponder (PIT) tag information while maintaining in-river migration. The McNary JFF generally operates in secondary bypass through the spring migration period. The facility remains in secondary bypass until collection for transportation begins. Transportation generally continues through the end of November.

Anesthetics

We use a stock solution of tricaine methanesulfonate (MS-222) of 100 g/l throughout the season. It is often necessary to vary the anesthetic concentrations to achieve the required results. As water temperatures increase, the sensitivity of the fish to anesthetic increases. From mid-June 16 through early October, when water temperatures are 60 °F or higher, we use a reduced average concentration of 85.3 mg/l. At McNary Dam, the tricaine concentration in the re-circulating anesthetic system is recorded daily.

Fish Condition

All live smolts sampled were examined for descaling. While both the left and right sides of the fish are observed, only the side with the worst descaling is rated. If 20 percent or more of one side of the fish is missing scales, the fish is recorded as descaled. A subsample of up to 100 of each species group from the daily sample was examined for injury and disease. The head injury category included head and nose cuts and abrasions, eye injuries and operculum folds and tears. Other injuries included abrasions and cuts on the body and blood in the eyes or fins. Diseases, and symptoms of disease, such as bacterial kidney disease, columnaris, fungus, exopthalmia (protruding eyes), scoliosis of the spine, gas bubble trauma, black spot disease, and fin rot were observed. SMP staff used a classification system similar to last year, substituting clipped for hatchery and uclipped for wild. Steelhead and sockeye were identified as clipped or uclipped, while chinook were deemed yearling or subyearling, and all coho, clipped or not, were combined.

The use of MS-222® to safely sedate juvenile salmonids is an important component of the smolt monitoring programs. Reviews of methods employed at different sites by FPC, USGS-BRD and SMP program staff in 1992 provided specific guidelines for standard stock solutions, minimal induction times and total exposure times for SMP sampling programs. Concentrations of approximately 60 mg/L of MS-222® from stock solutions of 100 g/L enable us to follow the general guidelines and handle the juvenile salmonids safely and efficiently. Over the course of each season we make some adjustments to account for changes in water temperature and the number of fish in the sample. Induction and recovery times for a given concentration tend to decrease as water temperatures increase.

Methods and Procedures for task 2.2.b. Monitor Gas Bubble Symptoms at McNary Dam according to FPC protocols

Overview

Fish are examined externally for signs of gas bubble trauma (GBT). The unpaired fins, and eyes are examined for the presence of bubbles and the area covered with bubbles is quantified. Monitoring of migrating juvenile salmonids is conducted at Lower Granite, Little Goose, Lower Monumental, Rock Island, McNary, and Bonneville dams. The goal of the juvenile salmonid examinations is to determine the relative extent to which the migrating juvenile salmonids passing the dam or sampling location have been exposed to harmful levels of total dissolved gas based upon the prevalence and severity of GBT induced bubbles on the fish. The data is reported to the fisheries management entities, the water quality agencies of Washington and Oregon, and is made available to other interested parties through Fish Passage Center weekly reports and daily postings to the FPC web site during the season.

A detailed description of sample size determination is available in Attachment E, the document entitled "Sample Size Determination for GBT Monitoring at SMP Locations".

Detailed procedures which are applicable to all sampling sites in the SMP are described in Attachment B, the document "GBT Monitoring Protocol for the Smolt Monitoring Program" or by visiting our website following the link here.

Methods and Procedures for task 2.2.c. Transmit Data according to FPC protocol from McNary Dam

Overview

All sample data recorded during the daily sample will be transcribed to a daily sample summary form. Additionally, other pertinent daily data from the fish facility and powerhouse will be recorded on the daily sample form, including: powerhouse flow and spill daily averages, research mortality and bypass numbers, facility mortality and bypass numbers, water temperature, sample rates and miscellaneous information. These data will be checked for accuracy by comparison with displays of the various tally devices and facility and researcher handlog forms.

Verified data from the daily sample summary forms will be transcribed into a computer file using Fish Passage Center software (FPC16.exe). When all pertinent data is loaded into the software program, summary printouts are printed and compared with the daily sample summary form handlog. After verification that the printouts and the handlogs match, the computer file will be transmitted to FPC. Files will be sent to FPC on the day of the sample by noon.

In the interest of reducing the total size of this document, a detailed description of data entry procedures can be found in attachment C (it applies to all sites creating data for transmittal to FPC) in document entitled "Smolt Monitoring Protocol Data Entry Manual" or visit our web site and view the link: ftp://ftp.fpc.org/fpc32/2002SmoltMonitoring3.3a.doc.

Methods and Procedures for task 2.2.d. Conduct data verification procedure for Lower Monumental Dam according to FPC protocols

The QA/QC protocol requires that a portion of the daily batches submitted to the SMP database be cross-checked with the daily data sheets at the sites. There are a total of four traps that will be operating 5 days per week over a 12-week period for the SMP (3/8-5/29 for the traps on the Salmon and Snake rivers, and 3/15-6/5 for the traps on the Imnaha and Grande Ronde rivers). There are seven dams at which monitoring will take place for the SMP. This monitoring will occur 7 days per week over periods varying from 21 weeks (Rock Island Dam) to 30 weeks (Lower Granite, Little Goose, Lower Monumental, John Day, and Bonneville dams) to 36 weeks (McNary Dam). The goal of the QA/QC protocol is to cross-check enough batches to assure that the potential discrepancy rate across the total batches for a given site is acceptably low.

The QA/AC protocol will be to cross-check two daily batches out of every week at each of the monitoring sites. The Fish Passage Center (FPC) will randomly pick the two batches to be examined each week. FPC personnel will be responsible for conducting the cross-check and reporting back to the respective site on the results. The cross-check of a daily batch will consist of verifying the data entries in the data base with the data on the site's data sheets for that batch. The data entries are found in several tables of the data base, including the (1) catch summary table which includes the sample-related parameters and flow/spill entries, (2) the catch detail table which includes the fish counts per species, descaling numbers, mortalities, and sample rates, (3) the incidental catch detail which includes the number of fish from the incidental list, the (4) the mark detail table which includes counts of fish with elastomer tags, photonic tags, spaghetti tags, and freeze brands, and (5) the transportation detail table which includes the number of fish transported and bypassed at the collector dams.

If no discrepancies are reported on the two batches examined for a given site, then the QA/QC procedure for that site is finished for that week, and the process will begin again the following week. Under the condition that no discrepant batches are found in the batch examined over the full season, we will be 95% confident that the discrepancy rate across all batches for the season will not exceed approximately 5% for the monitoring at the dams and 10% for the monitoring at the traps (higher at the traps only because of fewer batches for the season). This estimation utilizes methods given in the Sampling Techniques book by Cochran (1977)[3] on pages 55-60. If for each site we let

[3] Cochran, William G., 1977. Sampling Techniques (third edition). John Wiley & Sons, New York. 428 pp.

N= total number of batches, **X**= number of batches with discrepancies, **n**= number of batches checked, and **x**= number of checked batches with discrepancies, then we may use the hypergeometric distribution to determine the probability of finding **x** discrepant batches in the **n** batches examined when **X** discrepant batches actually exist in the total **N** batches. The number **X** that satisfies the probability statement Pr(**x**=0|**X,N,n**)=0.05 is the upper 95% confidence limit for the number of discrepant batches in the total **N** batches when no discrepant batches (**x**=0) are found in the **n** sampled batches. In this case, there is a high probability that the seasonal discrepancy rate is less than **X/N**.

If a discrepant batch is found at a site during a given week, then the FPC will randomly pick two additional batches from that week to be cross-checked by FPC personnel. If neither of these new batches show discrepancies between the entries in the SMP data base and the values on the site's data sheets, then the QA/QC procedure is finished for that week. But if additional discrepancies exist, then there will be continued selection of batches and cross-checks made until the site is back in compliance with what it shows in the SMP data base and what it shows on the site data sheets. It is unlikely that such an extended level of cross-checking would be necessary at a given site past the first week of the season.

2.2.e. Project management, planning, work statement/budget preparation

Washington Department of Fish and Wildlife personnel will be responsible for developing a budget for operations of the project based on the statement of work provided by Fish Passage Center. Project management, including planning all activities, hiring, personnel management and data gathering activities will be the responsibility of WDFW.

2.2.f. Conduct sampling for implementation of the Smolt Transportation Program

All fish number estimates, raceway, truck and barge loadings will be based on a sample of fish collected. Species composition and length samples will be taken to determine loading densities for raceways, barges and trucks. Project personnel will keep a running estimate of fish numbers, raceway totals, and direct loading totals for barges based on these estimates. Daily samples for descaling will contain a minimum of 100 fish for the dominant groups for which information is recorded.

TASK 3 SMOLT MONITORING AT THE GRANDE RONDE TRAP

Methods and Procedures for Task 3.a. Sample migrants daily in the trap

Overview

A scoop trap is operated at river kilometer 2 on the Grande Ronde River at Lat 47.34N, Lon. 116.98 W just upstream of its confluence with the Snake River to capture juvenile fish, assess fish condition, and determine migration timing. Fish collection

begins in early March and continues five days per week through June 1st. Spring chinook salmon and summer steelhead are collected during their downstream migration.

The trapping site is characterized by an off center pool in the river channel toward the west tower. Upstream is a shallow, rocky area adjacent to a river bend where the river narrows before opening into a broader channel. Surface water characteristics such as velocity and laminar flow were primarily used to determine the optimum fishing location. The preferred location varies but is usually about 190 ft. across from the east tower. The depth is largely shallow elsewhere across the channel except for the pool section where we fish the trap.

We begin fishing approximately March 10th and end on June 1st. Our schedule is for five nights per week beginning each Sunday evening at 6:00 pm. All daily fish processing and data collection occurr on the trap (Setter and Carmichael, 1997, 1998, 1999); unlike the transport to shore procedure used during 1994-1996 (Zimmerman et al., 1995; Setter and Carmichael, 1996). A covered sampling area is located immediately behind the live box at the rear of the trap. This area consists of an aluminum countertop with two aerated sinks and two deep holding tanks for anesthetic recovery on either end.

Fish Sampling

Fish are netted from the live box and placed immediately into a sink for anesthetization. Water is exchanged periodically to maintain ambient river temperature and continually aerated using aquarium pumps. All fish are scanned for a pit tag prior to sampling or marking. Sample mortalities are recorded. Descaling criteria are also consistent with past years, with greater than or equal to 20% of a body side the minimum for classifying a fish as descaled. Fork lengths are recorded for the first 50 fish of a species each day. We record information on species, fork length, descaling, brands, and mortality. After fish are sampled they are placed in an aerated recovery tank and monitored for one hour prior to release. We record only total fork length for incidental fish species. Data were summarized daily and entered into FPC32 software for electronic transmittal to Fish Passage Center (FPC).

Methods and Procedures for Task 3.b. Apply PIT Tags

Preseason marking quotas are set at 1,400 wild chinook, 1,400 hatchery chinook, 1,200 wild steelhead and 3,600 hatchery steelhead but may vary from year to year depending on management or research needs. PIT tag marking generally begins the last week of March and is completed by the end May. The PIT tag station and related computer equipment is situated on the right side of the sample bench on the Trap.

The number of PIT-tags that are used annually at this site can be seen in the following table which lists the tag allocation and goals for tagging in 2002.

Year 2002 PIT tagging goals for the Grande Ronde River trap for SMP.

Grande Ronde River Trap			
Wild chinook	Hatchery chinook	Wild steelhead	Hatchery steelhead
1400	1400	1200	3600

PIT-tagging is carried out according to standard procedures available at the PTAGIS web site PIT Tag Procedures v2.0 1999. PIT-tag data will be sent to PTAGIS weekly according to standard protocols available at PTAGISSoftware_and_Documentation PITTAG2.

Methods and Procedures for Task 3.c. Transmit Data according to FPC protocol

Overview

All sample data recorded during the daily sample will be transcribed to a daily sample summary form. Additionally, other pertinent daily data from the fish facility and powerhouse will be recorded on the daily sample form, including: powerhouse flow and spill daily averages, research mortality and bypass numbers, facility mortality and bypass numbers, water temperature, sample rates and miscellaneous information. These data will be checked for accuracy by comparison with displays of the various tally devices and facility and researcher handlog forms.

Verified data from the daily sample summary forms will be transcribed into a computer file using Fish Passage Center software (FPC16.exe). When all pertinent data is loaded into the software program, summary printouts are printed and compared with the daily sample summary form handlog. After verification that the printouts and the handlogs match, the computer file will be transmitted to FPC. Files will be sent to FPC on the day of the sample by noon.

In the interest of reducing the total size of this document, a detailed description of data entry procedures can be found in attachment C (it applies to all sites creating data for transmittal to FPC) in document entitled "Smolt Monitoring Protocol Data Entry Manual" or visit our web site and view the link: ftp://ftp.fpc.org/fpc32/2002SmoltMonitoring3.3a.doc.

Methods and Procedures for Task 3.d. Conduct data verification procedure according to FPC protocol

The QA/QC protocol requires that a portion of the daily batches submitted to the SMP database be cross-checked with the daily data sheets at the sites. There are a total of four traps that will be operating 5 days per week over a 12-week period for the SMP (3/8-5/29 for the traps on the Salmon and Snake rivers, and 3/15-6/5 for the traps on the Imnaha and Grande Ronde rivers). There are seven dams at which monitoring will take place for the SMP. This monitoring will occur 7 days per week over periods varying from 21 weeks (Rock Island Dam) to 30 weeks (Lower Granite, Little Goose, Lower Monumental, John Day, and Bonneville dams) to 36 weeks (McNary Dam). The goal of the QA/QC protocol is to cross-check enough batches to assure that the potential discrepancy rate across the total batches for a given site is acceptably low.

The QA/AC protocol will be to cross-check two daily batches out of every week at each of the monitoring sites. The Fish Passage Center (FPC) will randomly pick the two batches to be examined each week. FPC personnel will be responsible for conducting the cross-check and reporting back to the respective site on the results. The

cross-check of a daily batch will consist of verifying the data entries in the data base with the data on the site's data sheets for that batch. The data entries are found in several tables of the data base, including the (1) catch summary table which includes the sample-related parameters and flow/spill entries, (2) the catch detail table which includes the fish counts per species, descaling numbers, mortalities, and sample rates, (3) the incidental catch detail which includes the number of fish from the incidental list, the (4) the mark detail table which includes counts of fish with elastomer tags, photonic tags, spaghetti tags, and freeze brands, and (5) the transportation detail table which includes the number of fish transported and bypassed at the collector dams.

If no discrepancies are reported on the two batches examined for a given site, then the QA/QC procedure for that site is finished for that week, and the process will begin again the following week. Under the condition that no discrepant batches are found in the batch examined over the full season, we will be 95% confident that the discrepancy rate across all batches for the season will not exceed approximately 5% for the monitoring at the dams and 10% for the monitoring at the traps (higher at the traps only because of fewer batches for the season). This estimation utilizes methods given in the Sampling Techniques book by Cochran (1977)[4] on pages 55-60. If for each site we let **N**= total number of batches, **X**= number of batches with discrepancies, **n**= number of batches checked, and **x**= number of checked batches with discrepancies, then we may use the hypergeometric distribution to determine the probability of finding **x** discrepant batches in the **n** batches examined when **X** discrepant batches actually exist in the total **N** batches. The number **X** that satisfies the probability statement $Pr(\mathbf{x}=0|\mathbf{X},\mathbf{N},\mathbf{n})=0.05$ is the upper 95% confidence limit for the number of discrepant batches in the total **N** batches when no discrepant batches (**x**=0) are found in the **n** sampled batches. In this case, there is a high probability that the seasonal discrepancy rate is less than **X/N**.

If a discrepant batch is found at a site during a given week, then the FPC will randomly pick two additional batches from that week to be cross-checked by FPC personnel. If neither of these new batches show discrepancies between the entries in the SMP data base and the values on the site's data sheets, then the QA/QC procedure is finished for that week. But if additional discrepancies exist, then there will be continued selection of batches and cross-checks made until the site is back in compliance with what it shows in the SMP data base and what it shows on the site data sheets. It is unlikely that such an extended level of cross-checking would be necessary at a given site past the first week of the season.

TASK 4. SMOLT MONITORING AT LITTLE GOOSE DAM

Methods and Procedures for task 4a. Sample migrants daily in the sample system at Little Goose Dam

Overview

[4] Cochran, William G., 1977. Sampling Techniques (third edition). John Wiley & Sons, New York. 428 pp.

Little Goose Dam is located at river kilometer 113 of the Snake River at Lat 46.54 N, Lon 118.03 W. Like other Corps projects with mechanical bypass systems, fish are guided from turbine intakes into gatewells via Submersible Travelling Screens and Vertical Barrier Screens. Fish are collected from the top portion of water passing into the turbine intakes from the forebay. Extended Submersible Barrier Screens and subsequently Vertical Barrier Screens guide the migrating smolts, as the water moves vertically up the gatewell slot. Fish exit the gatewell slot near the top, through 12-inch orifice openings that pass the fish and water into the collection channel, except for orifice opening 1A1 which has a 14-inch opening. The collection channel is a concrete tunnel that runs the length of the powerhouse and exits into the primary dewaterer. This dewatering structure removes excess water before the fish pass into a smaller metal flume, which carries them to the juvenile fish facility. A secondary dewaterer is located downstream of the primary dewaterer to allow fine adjustments to water height and flow. The primary dewaterer adequately regulates water flow so the secondary dewaterer has never been used.

When the fish reach the juvenile fish facility, they exit the flume onto a two-stage wet separator. The separator allows adult fallbacks, debris and larger nonsalmonids to be diverted back to the river, and is designed to separate the larger juvenile fish (generally steelhead) from the smaller juvenile fish (generally chinook, sockeye and coho). Evenly spaced parallel pipes divide the top few inches of water in the separator from the submerged exits. To exit the separator, fish must dive through the bars. The bars are more closely spaced on the upstream end (A-side), allowing only smaller fish to pass and more widely spaced at the downstream end (B-side), which allows larger smolts to pass but keeps out adults and larger debris. Debris and adult fish collect at the downstream end and are manually removed to a bypass flume which exits back to the river.

After exiting the separator from either the “A” or “B” side, fish pass through a PIT tag interrogation unit. A slide gate immediately downstream is triggered if a PIT tag is detected. This diverts the fish back to the river to continue the migration and survival studies conducted by PSMFC, or if the PIT tagged fish were being selected for other research purposes they could be diverted to a separate holding tank. Fish that are not diverted either enter the sample, or are loaded into raceways for holding until they are transported. At intervals determined by project staff, a sample gate opens and fish pass into the sample head tank. Automatic timers regulate the proportion of time sample gates remain open, enabling total collection numbers to be estimated from sample numbers by simple expansion. The duration of time the gate stays open is closely correlated with the target number of fish to be collected and the number of fish passing through the system. At one-hour intervals, the sample head tanks are drained and fish exit through a counting tunnel, into the sample holding tanks.
PIT tag override was initiated on July 10, which kept PIT tagged fish from becoming part of the daily sample even if passage occurred while the sample gate was open. This was implemented when fish collection numbers declined to minimize incidental bypass of large numbers of unmarked smolts.

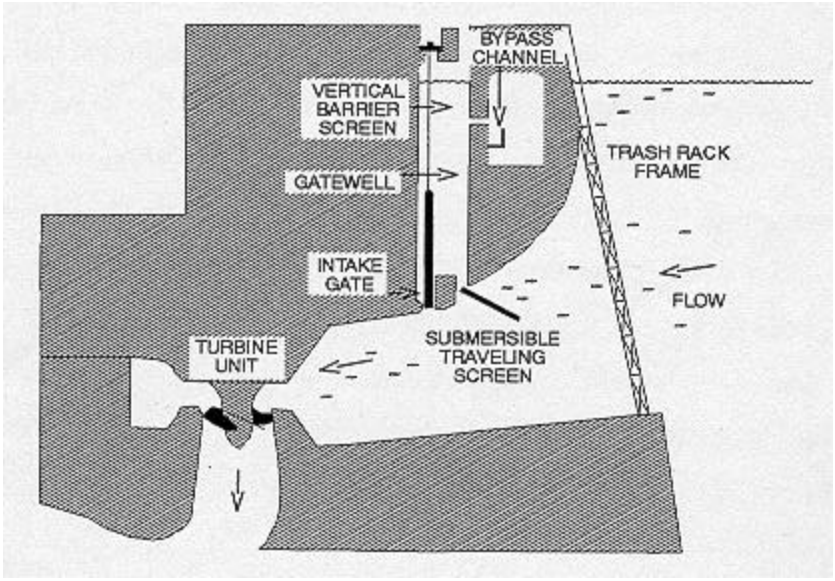


Figure 1. Longitudinal Section of a Kaplan Turbine Unit showing location of screens, gatewells, and the bypass channels.

Fish Sampling

NOTE: An explanation of the derivation of sample rates and target number of fish in the collection at Smolt Monitoring sites is available in Attachment D, the document entitled "Minimum sample rates for Smolt Monitoring Program at dams".

At 0700 each day, fish are crowded to one end of the sample tank. Beginning with tank "A", a subsample of 50-75 fish is moved into the pre-anesthetic chamber with a flat meshed paddle and dosed with Tricaine Methanosulfate (MS-222). A stock solution of 100g/l MS-222 is used to dose the water in the recirculation system, the sample trough and the pre-anesthetic chamber. Thirty to 40ml of stock solution is diluted with approximately 0.5 gallons of water, to anesthetize the fish in the pre-anesthetic chamber. Once exposed to anesthetic they are closely observed until they begin to "roll", generally about four minutes. At this time, a pneumatically controlled knife valve at the bottom of the pre-anesthetic chamber is opened allowing the water and anesthetized fish to flow into the sample trough inside the wet lab. A dewatering structure immediately upstream of the sample trough removes the pre-anesthetic solution. The sample trough water is supplied by a temperature controlled water recirculation system, which is dosed with 250-300ml of the MS-222 stock solution.

The fish anesthetic, ethyl m-aminobenzoate methansulfonate (MS-222®), is added to the chamber to obtain a concentration of about 62 mg/l. At this concentration, about 95 percent of the fish are adequately sedated within three minutes. Once anesthetized, these fish are flushed through the exit valve to the sorting trough.

The sorting trough is part of a re-circulating anesthetic system with water temperature control and aeration. The anesthetic levels in the system are set to keep fish sedated and easy to handle during the sample. Typically the MS-222 levels average between 55-60 mg/L. Sample fish remain in the sorting tank for as little as five seconds and up to five minutes. We strive to process fish within three minutes of entering the tank to minimize the effects of sedation and handling. Between the pre-anesthetic chambers and the sorting tank, sample fish are sedated an average of five minutes.

All fish handled in the sorting trough are enumerated by species and examined for unique marks and descaling. Additionally, a detailed sub-sample of up to 100 fish of each species is conducted during each daily sample. The detailed sub-sample records species, length, weight, unique marks, descaling, injuries and external symptoms of disease. In this process, fish are individually weighed and measured in a water-filled tray on an electronic balance. This detailed sub-sample provides the Corps with fish per pound and species composition data essential for calculations of raceway, barge and truck loading densities needed to stay within the maximum loading densities (0.5 pounds of fish per gallon of water). Immediately after handling, fish are routed in fresh water to the recovery tank on non-transport days or routed directly onto a waiting truck or barge on transport days. The maximum time that any fish are held at the fish facility is 48 hours.

We identify presumed columnaris (*Flavobacterium columnaris*) infection by identification of gross pathology known to be characteristic of columnaris symptoms. These symptoms included eroded fins, hemorrhaged vents and yellowish lesions about the mouth, snout, head, and at various locations on the body particularly on the ventral side.

The use of MS-222® to safely sedate juvenile salmonids is an important component of the smolt monitoring programs. Reviews of methods employed at different sites by FPC, USGS-BRD and SMP program staff in 1992 provided specific guidelines for standard stock solutions, minimal induction times and total exposure times for SMP sampling programs. Concentrations of approximately 60 mg/L of MS-222® from stock solutions of 100 g/L enable us to follow the general guidelines and handle the juvenile salmonids safely and efficiently. Over the course of each season we make some adjustments to account for changes in water temperature and the number of fish in the sample. Induction and recovery times for a given concentration tend to decrease as water temperatures increase.

Methods and Procedures for task 4.b. Monitor Gas Bubble Symptoms at Little Goose Dam according to FPC protocols

Overview

Fish are examined externally for signs of gas bubble trauma (GBT). The unpaired fins, and eyes are examined for the presence of bubbles and the area covered with bubbles is quantified. Monitoring of migrating juvenile salmonids is conducted at Lower Granite, Little Goose, Lower Monumental, Rock Island, McNary, and Bonneville dams. The goal of the juvenile salmonid examinations is to determine the relative extent to which the migrating juvenile salmonids passing the dam or sampling location have been

exposed to harmful levels of total dissolved gas based upon the prevalence and severity of GBT induced bubbles on the fish. The data is reported to the fisheries management entities, the water quality agencies of Washington and Oregon, and is made available to other interested parties through Fish Passage Center weekly reports and daily postings to the FPC web site during the season.

A detailed description of sample size determination is available in Attachment E, the document entitled "Sample Size Determination for GBT Monitoring at SMP Locations".

Detailed procedures which are applicable to all sampling sites in the SMP are described in Attachment B, the document "GBT Monitoring Protocol for the Smolt Monitoring Program" or by visiting our website following the link here.

Methods and Procedures for task 4.c. Transmit Data according to FPC protocol from Little Goose Dam

Overview

All sample data recorded during the daily sample will be transcribed to a daily sample summary form. Additionally, other pertinent daily data from the fish facility and powerhouse will be recorded on the daily sample form, including: powerhouse flow and spill daily averages, research mortality and bypass numbers, facility mortality and bypass numbers, water temperature, sample rates and miscellaneous information. These data will be checked for accuracy by comparison with displays of the various tally devices and facility and researcher handlog forms.

Verified data from the daily sample summary forms will be transcribed into a computer file using Fish Passage Center software (FPC16.exe). When all pertinent data is loaded into the software program, summary printouts are printed and compared with the daily sample summary form handlog. After verification that the printouts and the handlogs match, the computer file will be transmitted to FPC. Files will be sent to FPC on the day of the sample by noon.

In the interest of reducing the total size of this document, a detailed description of data entry procedures can be found in attachment C (it applies to all sites creating data for transmittal to FPC) in document entitled "Smolt Monitoring Protocol Data Entry Manual" or visit our web site and view the link: ftp://ftp.fpc.org/fpc32/2002SmoltMonitoring3.3a.doc.

Methods and Procedures for task 4.d. Conduct data verification procedure for Little Goose Dam according to FPC protocols

The QA/QC protocol requires that a portion of the daily batches submitted to the SMP database be cross-checked with the daily data sheets at the sites. There are a total of four traps that will be operating 5 days per week over a 12-week period for the SMP (3/8-5/29 for the traps on the Salmon and Snake rivers, and 3/15-6/5 for the traps on the

Imnaha and Grande Ronde rivers). There are seven dams at which monitoring will take place for the SMP. This monitoring will occur 7 days per week over periods varying from 21 weeks (Rock Island Dam) to 30 weeks (Lower Granite, Little Goose, Lower Monumental, John Day, and Bonneville dams) to 36 weeks (McNary Dam). The goal of the QA/QC protocol is to cross-check enough batches to assure that the potential discrepancy rate across the total batches for a given site is acceptably low.

The QA/AC protocol will be to cross-check two daily batches out of every week at each of the monitoring sites. The Fish Passage Center (FPC) will randomly pick the two batches to be examined each week. FPC personnel will be responsible for conducting the cross-check and reporting back to the respective site on the results. The cross-check of a daily batch will consist of verifying the data entries in the data base with the data on the site's data sheets for that batch. The data entries are found in several tables of the data base, including the (1) catch summary table which includes the sample-related parameters and flow/spill entries, (2) the catch detail table which includes the fish counts per species, descaling numbers, mortalities, and sample rates, (3) the incidental catch detail which includes the number of fish from the incidental list, the (4) the mark detail table which includes counts of fish with elastomer tags, photonic tags, spaghetti tags, and freeze brands, and (5) the transportation detail table which includes the number of fish transported and bypassed at the collector dams.

If no discrepancies are reported on the two batches examined for a given site, then the QA/QC procedure for that site is finished for that week, and the process will begin again the following week. Under the condition that no discrepant batches are found in the batch examined over the full season, we will be 95% confident that the discrepancy rate across all batches for the season will not exceed approximately 5% for the monitoring at the dams and 10% for the monitoring at the traps (higher at the traps only because of fewer batches for the season). This estimation utilizes methods given in the Sampling Techniques book by Cochran (1977)[5] on pages 55-60. If for each site we let **N**= total number of batches, **X**= number of batches with discrepancies, **n**= number of batches checked, and **x**= number of checked batches with discrepancies, then we may use the hypergeometric distribution to determine the probability of finding **x** discrepant batches in the **n** batches examined when **X** discrepant batches actually exist in the total **N** batches. The number **X** that satisfies the probability statement $Pr(\mathbf{x}=0|\mathbf{X,N,n})=0.05$ is the upper 95% confidence limit for the number of discrepant batches in the total **N** batches when no discrepant batches (**x**=0) are found in the **n** sampled batches. In this case, there is a high probability that the seasonal discrepancy rate is less than **X/N**.

If a discrepant batch is found at a site during a given week, then the FPC will randomly pick two additional batches from that week to be cross-checked by FPC personnel. If neither of these new batches show discrepancies between the entries in the SMP data base and the values on the site's data sheets, then the QA/QC procedure is finished for that week. But if additional discrepancies exist, then there will be continued selection of batches and cross-checks made until the site is back in compliance with what it shows in the SMP data base and what it shows on the site data sheets. It is unlikely that

[5] Cochran, William G., 1977. Sampling Techniques (third edition). John Wiley & Sons, New York. 428 pp.

such an extended level of cross-checking would be necessary at a given site past the first week of the season.

4.e. Project management, planning, work statement/budget preparation

Washington Department of Fish and Wildlife personnel will be responsible for developing a budget for operations of the project based on the statement of work provided by Fish Passage Center. Project management, including planning all activities, hiring, personnel management and data gathering activities will be the responsibility of WDFW.

4.f. Conduct sampling for implementation of the Smolt Transportation Program

All fish number estimates, raceway, truck and barge loadings will be based on a sample of fish collected. Species composition and length samples will be taken to determine loading densities for raceways, barges and trucks. Project personnel will keep a running estimate of fish numbers, raceway totals, and direct loading totals for barges based on these estimates. Daily samples for descaling will contain a minimum of 100 fish for the dominant groups for which information is recorded.

TASK 5. SMOLT MONITORING AT ROCK ISLAND DAM

Methods and Procedures for task 5a. Sample migrants daily in the sample system at Rock Island Dam

Overview

Rock Island Dam is located in the Columbia River at river kilometer 730 at Lat. 47.34 N, Lon. 120.09 W. Fish are collected from the second powerhouse turbine intake gatewells and fishway attraction water intake. Fish entering the gatewells and attraction water intake pass into a bypass channel through a series of submerged orifices. An inclined screen trap separates the fish from the 100 cfs bypass flow and confines them to a holding flume where they are retained for up to 24 hours prior to sampling.

Fish Sampling

All fish collected in the bypass flume are sampled. Fish collected in the bypass flume over a 24 hour sampling period, are crowded into an elevator hopper, raised to the upper deck of the dam, and released into an aluminum holding tank which measured 12' x 4' x 3.5'. The holding tank is supplied with a continuous supply of river water by a 5 hp. submersible pump which was installed in the right bank fish ladder. Before fish are dipped from the holding tank for sampling they are preanesthetized in an isolation chamber with a solution of Tricane Methane
Sulfonate (MS. 222). Groups of 30 - 50 fish are then dip netted into a small flume that passes fish into the sampling trailer. Fish are then further anesthetiied using a stronger

MS 222 solution. An ionic salt solution, ProPoly Aqua is added to all fish handling tanks within the sampling trailer to reduce stress during handling and to enhance wo und healing after the PIT tagging process. Timing of the preanesthetization, identification, examination and recovery process is conducted to insure fish are not overexposed to anesthetic. All fish are identified to species and race and scanned for PIT tags, clipped fins, and descaling.

After the examined fish had fully recovered from anesthesic in a recovery tank, they are released through a 4" aluminum pipe (elevation 620' m.s.1.) to the tailrace (elevation 574' m.s.1.). The release area of the tailrace is protected from gull (Larus spp.) predation with parallel lengths of stainless steel wire at above the pipe outlet and across the tailrace. In addition, employees from the U.S. Department of Agriculture'\s Animal Damage Control Division suppressed gull predation in the tailrace during the middle 80% of the spring outmigration by various behavior modifying techniques. Fork length measurements and scale samples are taken three times per week from subsamples of sockeye. Steelhead are categorized as naturally or ,hatchery produced according to clipped adipose fin, or if an adipose fin was present, a worn appearance of the dorsal and ventral fins (Peven and Hays, 1989). Hatchery produced steelhead released into Washington State waters since 1985 have been adipose clipped.

Methods and Procedures for task 6.b. Monitor Gas Bubble Symptoms at Rock Island Dam according to FPC protocols

Overview

Fish are examined externally for signs of gas bubble trauma (GBT). The unpaired fins, and eyes are examined for the presence of bubbles and the area covered with bubbles is quantified. Monitoring of migrating juvenile salmonids is conducted at Lower Granite, Little Goose, Lower Monumental, Rock Island, McNary, and Bonneville dams. The goal of the juvenile salmonid examinations is to determine the relative extent to which the migrating juvenile salmonids passing the dam or sampling location have been exposed to harmful levels of total dissolved gas based upon the prevalence and severity of GBT induced bubbles on the fish. The data is reported to the fisheries management entities, the water quality agencies of Washington and Oregon, and is made available to other interested parties through Fish Passage Center weekly reports and daily postings to the FPC web site during the season.

A detailed description of sample size determination is available in Attachment E, the document entitled "Sample Size Determination for GBT Monitoring at SMP Locations".

Detailed procedures which are applicable to all sampling sites in the SMP are described in Attachment B, the document "GBT Monitoring Protocol for the Smolt Monitoring Program" or by visiting our website following the link here.

Methods and Procedures for task 6.c. Apply PIT-tags at Rock Island Dam

In addition to the smolt monitoring program, subsamples of chinook yearlings, wild and hatchery steelhead; and sockeye are injected with PIT-tags each day between beginning April and continuing to the end of May. Beginning in late June, sub-yearling summer and fall chinook are injected with PIT tags on daily basis until the end of July. PIT tags are injected by hand using a medical syringe/pushrod mechanism with a 12 gauge veterinary needle attached. Syringes and needles are sterilized a minimum of 15 minutes in a bath of 95% ethanol prior to re-use. A random subsample of yearling chinook, subyearling chinook, steelhead and sockeye are PIT tagged daily. Weekly blocks of 600 fish per species and rearing type are to be tagged at the project (when fish are available).

The table below shows the number of tags that are annually allocated and the goals for tagging at Rock Island Dam.

Year 2002 PIT tagging goals at Rock Island Dam for SMP.

Rock Island Dam				
Subyearling chinook	Yearling chinook	Hatchery steelhead	Wild steelhead	Total sockeye
4800	4000	2800	1200	3400

Begin PIT tagging subyearling chinook after mid-June.

All PIT-tagging operations will be conducted according to procedures and guidelines provided by PTAGIS and available at the psmfc.org website or by clicking here PIT Tag Procedures v2.0 1999. PIT-tag data will be sent to PTAGIS weekly according to standard protocols available at PTAGISSoftware_and_Documentation PITTAG2.

Methods and Procedures for task 6.d. Transmit Data according to FPC protocol from Rock Island Dam

Overview

All sample data recorded during the daily sample will be transcribed to a daily sample summary form. Additionally, other pertinent daily data from the fish facility and powerhouse will be recorded on the daily sample form, including: powerhouse flow and spill daily averages, research mortality and bypass numbers, facility mortality and bypass numbers, water temperature, sample rates and miscellaneous information. These data will be checked for accuracy by comparison with displays of the various tally devices and facility and researcher handlog forms.

Verified data from the daily sample summary forms will be transcribed into a computer file using Fish Passage Center software (FPC16.exe). When all pertinent data is loaded into the software program, summary printouts are printed and compared with the daily sample summary form handlog. After verification that the printouts and the handlogs match, the computer file will be transmitted to FPC. Files will be sent to FPC on the day of the sample by noon.

In the interest of reducing the total size of this document, a detailed description of data entry procedures can be found in attachment C (it applies to all sites creating data for transmittal to FPC) in document entitled "Smolt Monitoring Protocol Data Entry Manual" or visit our web site and view the link: ftp://ftp.fpc.org/fpc32/2002SmoltMonitoring3.3a.doc.

Methods and Procedures for task 6.e. Conduct data verification procedure for Rock Island Dam according to FPC protocols

The QA/QC protocol requires that a portion of the daily batches submitted to the SMP database be cross-checked with the daily data sheets at the sites. There are a total of four traps that will be operating 5 days per week over a 12-week period for the SMP (3/8-5/29 for the traps on the Salmon and Snake rivers, and 3/15-6/5 for the traps on the Imnaha and Grande Ronde rivers). There are seven dams at which monitoring will take place for the SMP. This monitoring will occur 7 days per week over periods varying from 21 weeks (Rock Island Dam) to 30 weeks (Lower Granite, Little Goose, Lower Monumental, John Day, and Bonneville dams) to 36 weeks (McNary Dam). The goal of the QA/QC protocol is to cross-check enough batches to assure that the potential discrepancy rate across the total batches for a given site is acceptably low.

The QA/AC protocol will be to cross-check two daily batches out of every week at each of the monitoring sites. The Fish Passage Center (FPC) will randomly pick the two batches to be examined each week. FPC personnel will be responsible for conducting the cross-check and reporting back to the respective site on the results. The cross-check of a daily batch will consist of verifying the data entries in the data base with the data on the site's data sheets for that batch. The data entries are found in several tables of the data base, including the (1) catch summary table which includes the sample-related parameters and flow/spill entries, (2) the catch detail table which includes the fish counts per species, descaling numbers, mortalities, and sample rates, (3) the incidental catch detail which includes the number of fish from the incidental list, the (4) the mark detail table which includes counts of fish with elastomer tags, photonic tags, spaghetti tags, and freeze brands, and (5) the transportation detail table which includes the number of fish transported and bypassed at the collector dams.

If no discrepancies are reported on the two batches examined for a given site, then the QA/QC procedure for that site is finished for that week, and the process will begin again the following week. Under the condition that no discrepant batches are found in the batch examined over the full season, we will be 95% confident that the discrepancy rate across all batches for the season will not exceed approximately 5% for the monitoring at the dams and 10% for the monitoring at the traps (higher at the traps only because of fewer batches for the season). This estimation utilizes methods given in the Sampling Techniques book by Cochran (1977)[6] on pages 55-60. If for each site we let **N**= total number of batches, **X**= number of batches with discrepancies, **n**= number of batches checked, and **x**= number of checked batches with discrepancies, then we may use

[6] Cochran, William G., 1977. Sampling Techniques (third edition). John Wiley & Sons, New York. 428 pp.

the hypergeometric distribution to determine the probability of finding **x** discrepant batches in the **n** batches examined when **X** discrepant batches actually exist in the total **N** batches. The number **X** that satisfies the probability statement Pr(**x**=0|**X,N,n**)=0.05 is the upper 95% confidence limit for the number of discrepant batches in the total **N** batches when no discrepant batches (**x**=0) are found in the **n** sampled batches. In this case, there is a high probability that the seasonal discrepancy rate is less than **X/N**.

If a discrepant batch is found at a site during a given week, then the FPC will randomly pick two additional batches from that week to be cross-checked by FPC personnel. If neither of these new batches show discrepancies between the entries in the SMP data base and the values on the site's data sheets, then the QA/QC procedure is finished for that week. But if additional discrepancies exist, then there will be continued selection of batches and cross-checks made until the site is back in compliance with what it shows in the SMP data base and what it shows on the site data sheets. It is unlikely that such an extended level of cross-checking would be necessary at a given site past the first week of the season.

Methods and Procedures for task 6.e. Project management, planning, work statement/budget preparation

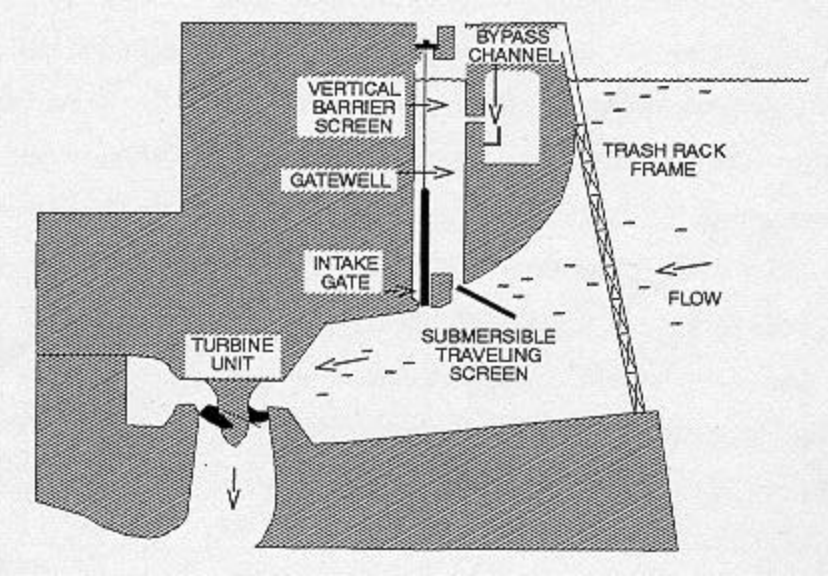
Chelan County PUD personnel will be responsible for developing a budget for operations of the project based on the statement of work provided by Fish Passage Center. Project management, including planning all activities, hiring, personnel management and data gathering activities will be the responsibility of WDFW.

TASK 6. SMOLT MONITORING AT JOHN DAY DAM

Methods and Procedures for task 6a. Sample migrants daily in the sample system at John Dam

Overview

John Day Dam is located at river kilometer 347 of the Columbia River at Lat 45.73 N, Lon. 120.66 W. Like other Corps projects with mechanical bypass systems, fish are guided from turbine intakes into gatewells via Submersible Travelling Screens and Vertical Barrier Screens. Fish are collected from the top portion of water passing into the turbine intakes from the forebay. Extended Submersible Barrier Screens and subsequently Vertical Barrier Screens guide the migrating smolts, as the water moves vertically up the gatewell slot. Fish exit the gatewell slot near the top, through 12-inch orifice openings that pass the fish and water into the collection channel, except for orifice opening 1A1 which has a 14-inch opening. The collection channel is a concrete tunnel that runs the length of the powerhouse and exits into the primary dewaterer.



Longitudinal Section of a Kaplan Turbine Unit showing location of screens, gatewells, and the bypass channels.

Fish Sampling

NOTE: An explanation of the derivation of sample rates and target number of fish in the collection at Smolt Monitoring sites is available in Attachment D, the document entitled "Minimum sample rates for Smolt Monitoring Program at dams".

Sampling commences the first week of April and ends in mid-September. The sample day extends from 0700 to 0700. Samples are collected daily and each sample day is divided into several sample periods. Fish are collected and sampled from 0700 to 1400, and from 1400 to 2000. Fish that are sampled during 2000-0300 are processed hourly during research collection periods. This is done to reduce delay of actively migrating smolts during peak passage hours and to accommodate the research fish collection needs. Fish collected after 0300 are sampled in the morning at 0700, which complets the daily sample. The combination of all of the sample periods comprises the daily count.

During the spring, with more species present, the target sample size range is 500 - 750 fish per day. During the summer/fall migration, with mainly just subyearling chinook present, the target sample range is 200 - 300 fish per day. Sample rates are adjusted as needed to achieve these target sample sizes or to collect more fish for research. Timed subsamples are collected using a 3-way rotational gate. When the gate rotates left (west), all fish are diverted into the sample holding tank. The center flume is the bypass-to-river flume and is the default. The 3-way gate can be programmed to collect specific PIT tagged fish detected in the coils just upstream, and divert them into the PIT tag flume with a rotation to the right (east). This feature is referred to as Separation by Code (S by C). This system is capable of further separation of the fish in the PIT tag flume using a 2-way rotational gate to divert fish into one of two holding tanks.

Fish are collected in a 6,796 liter (1,795 gal) holding tank located inside of the sampling lab. At the end of a sample period, a crowder is moved forward and the next sample is collected behind it. Approximately 50 - 75 smolt are then crowded into a 20 by 24-inch pre-anesthetic (PA) chamber using a panel net. The water level in the PA chamber is lowered to about 8 inches (48 liters) and fish are anesthetized with MS-222 at a concentration of about 51 mg/L. Once anesthetized, fish are gravity fed via a 6 inch PVC pipe onto a final dewatering screen and into the examination trough that contains about 36 mg/L of MS-222 to minimize stress during examination. A re-circulating system is used to minimize MS-222 usage and a chiller maintains examination trough water temperature consistent with river water temperature. An in-line water filtration system minimizes the possibility of inadvertently culturing and spreading pathogens (viruses, bacteria, and fungus) in the re-circulating examination water. Three Rainbow Plastics UV Sterilizer filters (40 watt), a Venturi Protein skimmer, and two sets of particulate bag filters (100 and 20 micron) are installed in-line with the existing re-circulation system. The bag filters are installed in parallel so that one set can be cleaned without shutting the system off. These are switched and cleaned daily or as needed. Following examination, all sampled fish are gravity fed via a 4 inch PVC pipe to a 2,726 liter (720 gal) recovery tank and held for a minimum of twenty minutes before being returned to the bypass system. This process is repeated until the entire sample has been examined. All holding and recovery tanks have a constant exchange of river water.

Subsampled Fish Condition

Detailed fish condition monitoring is performed on a target sample size of 100 individuals per species, three days per week. Steelhead and sockeye are examined Tuesday, Thursday, and Saturday, whereas chinook and coho are examined Monday, Wednesday, and Friday. The sample crews attempt to choose fish at random and to select fish throughout the sample day. In addition to fin clips and marks (brands or tags), smolts are examined for descaling, injuries to the head and body, parasites, disease, and signs of predation. Fork lengths are also recorded so that length averages can be calculated for all subsampled fish. At John Day, condition data is collected on yearling chinook, steelhead, coho, and sockeye from start of season to mid-June and subyearling chinook are examined for the remainder of the season. Bonneville condition data is collected on yearling chinook, steelhead, coho, and sockeye from start of season to the last week of June and subyearling chinook are examined from mid-June June to the end of season.

Performance Monitoring

Tests to evaluate species identification, brand recognition, descaling assessment, and data recording accuracy of SMP personnel were conducted during the migration season. A subsample of ten fish were randomly selected, anesthetized, and placed into a compartmentalized divider located in the sorting trough. Fish were processed independently and specific details were recorded for each fish including: 1) species, 2) fin clip, 3) level of descaling, and 4) presence of external marks or tags. Coworkers then compared and discussed results. This approach has several advantages over previously

used methods, including: 1) increased frequency of tests, 2) up to three people are able to test concurrently, 3) promotes teamwork and builds consistency between coworkers, and most importantly, 4) the ability to discuss discrepancies with fish in hand.

Data Collected

Items 1-5 of the following list were reported to the Fish Passage Center daily; item 6, the PIT tag data, was automatically uploaded to the PTAGIS data center four times per day.

1) Species specific daily sample totals
2) Brands and fin clips
3) Descaling and mortality
4) Species specific length and condition data (subsampling only)
5) River, powerhouse, turbine, and spill flow data
6) PIT tag detection

Methods and Procedures for task 6.b. Transmit Data according to FPC protocol from John Day Dam

Overview

All sample data recorded during the daily sample will be transcribed to a daily sample summary form. Additionally, other pertinent daily data from the fish facility and powerhouse will be recorded on the daily sample form, including: powerhouse flow and spill daily averages, research mortality and bypass numbers, facility mortality and bypass numbers, water temperature, sample rates and miscellaneous information. These data will be checked for accuracy by comparison with displays of the various tally devices and facility and researcher handlog forms.

Verified data from the daily sample summary forms will be transcribed into a computer file using Fish Passage Center software (FPC16.exe). When all pertinent data is loaded into the software program, summary printouts are printed and compared with the daily sample summary form handlog. After verification that the printouts and the handlogs match, the computer file will be transmitted to FPC. Files will be sent to FPC on the day of the sample by noon.

In the interest of reducing the total size of this document, a detailed description of data entry procedures can be found in attachment C (it applies to all sites creating data for transmittal to FPC) in document entitled “Smolt Monitoring Protocol Data Entry Manual” or visit our web site and view the link: ftp://ftp.fpc.org/fpc32/2002SmoltMonitoring3.3a.doc.

Methods and Procedures for task 6.c. Conduct data verification procedure for John Day Dam according to FPC protocols

The QA/QC protocol requires that a portion of the daily batches submitted to the SMP database be cross-checked with the daily data sheets at the sites. There are a total of four traps that will be operating 5 days per week over a 12-week period for the SMP (3/8-5/29 for the traps on the Salmon and Snake rivers, and 3/15-6/5 for the traps on the Imnaha and Grande Ronde rivers). There are seven dams at which monitoring will take place for the SMP. This monitoring will occur 7 days per week over periods varying from 21 weeks (Rock Island Dam) to 30 weeks (Lower Granite, Little Goose, Lower Monumental, John Day, and Bonneville dams) to 36 weeks (McNary Dam). The goal of the QA/QC protocol is to cross-check enough batches to assure that the potential discrepancy rate across the total batches for a given site is acceptably low.

The QA/AC protocol will be to cross-check two daily batches out of every week at each of the monitoring sites. The Fish Passage Center (FPC) will randomly pick the two batches to be examined each week. FPC personnel will be responsible for conducting the cross-check and reporting back to the respective site on the results. The cross-check of a daily batch will consist of verifying the data entries in the data base with the data on the site's data sheets for that batch. The data entries are found in several tables of the data base, including the (1) catch summary table which includes the sample-related parameters and flow/spill entries, (2) the catch detail table which includes the fish counts per species, descaling numbers, mortalities, and sample rates, (3) the incidental catch detail which includes the number of fish from the incidental list, the (4) the mark detail table which includes counts of fish with elastomer tags, photonic tags, spaghetti tags, and freeze brands, and (5) the transportation detail table which includes the number of fish transported and bypassed at the collector dams.

If no discrepancies are reported on the two batches examined for a given site, then the QA/QC procedure for that site is finished for that week, and the process will begin again the following week. Under the condition that no discrepant batches are found in the batch examined over the full season, we will be 95% confident that the discrepancy rate across all batches for the season will not exceed approximately 5% for the monitoring at the dams and 10% for the monitoring at the traps (higher at the traps only because of fewer batches for the season). This estimation utilizes methods given in the Sampling Techniques book by Cochran (1977)[7] on pages 55-60. If for each site we let **N**= total number of batches, **X**= number of batches with discrepancies, **n**= number of batches checked, and **x**= number of checked batches with discrepancies, then we may use the hypergeometric distribution to determine the probability of finding **x** discrepant batches in the **n** batches examined when **X** discrepant batches actually exist in the total **N** batches. The number **X** that satisfies the probability statement $Pr(\mathbf{x}=0|\mathbf{X},\mathbf{N},\mathbf{n})=0.05$ is the upper 95% confidence limit for the number of discrepant batches in the total **N** batches when no discrepant batches (**x**=0) are found in the **n** sampled batches. In this case, there is a high probability that the seasonal discrepancy rate is less than **X/N**.

[7] Cochran, William G., 1977. Sampling Techniques (third edition). John Wiley & Sons, New York. 428 pp.

If a discrepant batch is found at a site during a given week, then the FPC will randomly pick two additional batches from that week to be cross-checked by FPC personnel. If neither of these new batches show discrepancies between the entries in the SMP data base and the values on the site's data sheets, then the QA/QC procedure is finished for that week. But if additional discrepancies exist, then there will be continued selection of batches and cross-checks made until the site is back in compliance with what it shows in the SMP data base and what it shows on the site data sheets. It is unlikely that such an extended level of cross-checking would be necessary at a given site past the first week of the season.

6.d. Project management, planning, work statement/budget preparation

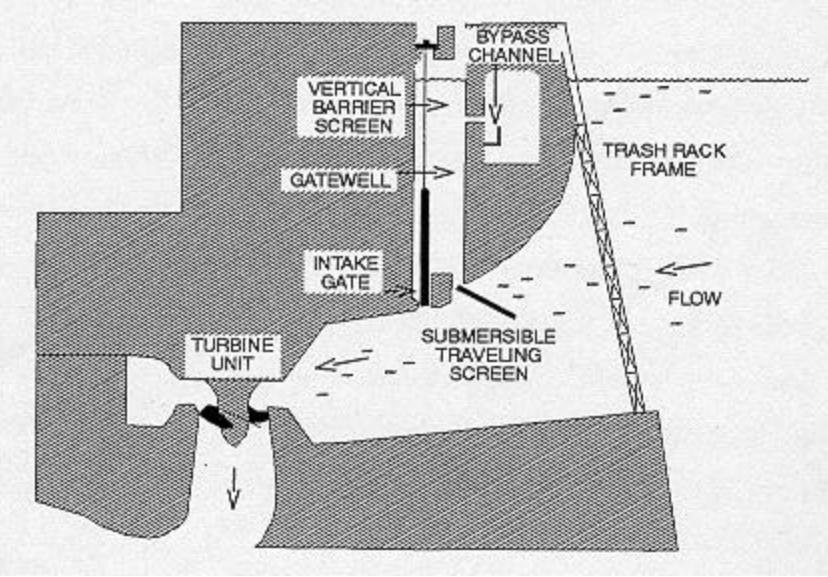
Washington Department of Fish and Wildlife personnel will be responsible for developing a budget for operations of the project based on the statement of work provided by Fish Passage Center. Project management, including planning all activities, hiring, personnel management and data gathering activities will be the responsibility of WDFW.

TASK 7. SMOLT MONITORING AT BONNEVILLE DAM

Methods and Procedures for task 7a. Sample migrants daily in the sample system at Bonneville Dam

Overview

Bonnevillle Dam is located at river kilometer 234 of the Columbia River at Lat 45.38 N, Lon. 121.56 W. Like other Corps projects with mechanical bypass systems, fish are guided from turbine intakes into gatewells via Submersible Travelling Screens and Vertical Barrier Screens. Fish are collected from the top portion of water passing into the turbine intakes from the forebay. Extended Submersible Barrier Screens and subsequently Vertical Barrier Screens guide the migrating smolts, as the water moves vertically up the gatewell slot.



Longitudinal Section of a Kaplan Turbine Unit showing location of screens, gatewells, and the bypass channels.

Fish Sampling - Second Powerhouse

NOTE: An explanation of the derivation of sample rates and target number of fish in the collection at Smolt Monitoring sites is available in Attachment D, the document entitled "Minimum sample rates for Smolt Monitoring Program at dams".

Sampling begins at 0700 hours the first week of March and concludes at 0700 on 31 October. The sample rate is programmed to divert samples on an hourly basis with sample time split into 2, 4, or 6 subsamples of equal duration per hour depending on passage numbers and run timing. Fish collected at different sample rates are processed separately. During the spring migration, when species diversity is greatest, the target sample size is 500 – 750 fish per day. During the summer/fall migration, with mainly subyearling chinook present, the target sample is 200 - 300 fish per day.

Fish that are guided by the PH2 bypass system travel the 1.7-mile conveyance pipe to get to the new Juvenile Monitoring Facility (JMF). A switchgate at the exit of the pipe directs fish to either the sampling facility or directly back to the river. In the sample position, the 30 cfs in the flume flows into the Primary Dewatering Structure (PDS) where it is reduced to about .5 – 1 cfs that then empties onto a set of parallel bars called the "large fish and debris separator bars". The purpose of these bars is to separate the juveniles, which slide through the bars, from the large fish and debris, which slide across the bars and are routed back to the river. As fish exit the "hopper" area under the separator bars, they travel down a flume toward the first set of PIT tag coils. These coils can be used to activate the 3-way rotational gate to divert fish with specific PIT tag codes into one of two holding tanks in the basement of the facility. This is the Separation by Code (SbyC) system. Just downstream of the 3-way rotational gate on the default or center flume is the 2-way rotational gate. The 2-way gate is used exclusively to collect timed subsamples for smolt monitoring. Collected fish are routed to an 18,930-liter

(5,000 gallon) holding tank in the basement. This system differs from John Day where the 3-way gate is used for initial S by C and SMP sample collection, the 2-way gate, which is on the S by C flume, is used for subdivision of S by C fish.

All of the holding tanks are equipped with crowders used to separate fish collected on one sample day from the next, or fish collected at different sample rates. The crowders are also used to crowd fish to the "fish lift" end of the holding tanks. Because the JMF is so far from the powerhouse, head loss made it necessary to put the holding area in the basement of the JMF. Since the processing area is on the main floor, it is necessary to use fish lifts to get fish upstairs. In the bottom of the fish lifts are 24 by 27-inch pre-anesthetic (PA) chambers. Approximately 50 - 75 smolt are crowded into the PA chamber, water is lowered to about 10 inches (104 liters), and fish are anesthetized with MS-222 at a concentration of about 51 mg/L. Once raised, fish are released from the PA compartment into a 20' piece of 6" PVC pipe which leads to the sorting trough. Fish pass through a final dewatering device before arriving in the examination trough. The exam trough contains about 42 mg/L of MS-222 to keep fish anesthetized during examination.

Following examination, fish are gravity fed via a 4 inch PVC pipe to a recovery tank and held for a minimum of thirty minutes before being released. Fish pass through one more set of PIT tag coils before returning to the bypass flume. Downstream of where they enter the bypass flume is another switch gate, which directs the flow to either the high water or low water outfall. The system switches from one outfall to the other when the river elevation at the outfall is around 17 feet.

Fish Sampling - First Powerhouse

With the indexing emphasis placed on PH2, sampling in PH1 has been reduced to two days per week for condition monitoring and gas bubble trauma exams. Fish samples are collected from the bypass channel of the first powerhouse using the downstream migrant trap. Gessel (1986) described the trap operation. Sampling occurs between 1600 and 2400 hours on Monday and Thursday for condition monitoring and Gas Bubble Trauma (GBT) exams. On Saturdays, only condition monitoring is conducted. Research fish collection occurrs on various days. The sample effort is adjusted from 30 seconds to 15 minutes per set, depending upon passage numbers and run timing. Typically, 15 to 25 fish per set are optimal for condition and GBT monitoring, while 50 to 100 fish per set are targeted for research fish collection. Samples are collected by lowering a wedge wire screen into the bypass channel at the end of the inclined screen, diverting fish into a 2,415-liter (638 gal) tank suspended in the downwell. Collected fish are drained from the tank to a stainless steel holding tank via a rectangular chute. From there, about 15 to 50 fish at a time are crowded into a PA chamber and anesthetized with MS-222 at a concentration of about 51 mg/l. Once anesthetized, fish are net transferred from the holding tank to the sorting trough. The sorting trough contains about 42 mg/l of MS-222 to minimize stress during handling. After processing, sampled fish are scanned for PIT tags before going to a recovery tank. Fish are allowed to recover for at least 30 minutes before releasing them into the downwell via a 6-inch PVC pipe.

Flat Plate Operation

The flat plate was operated 24 hours per day from 3 April through 8 September and was reconfigured this season to detect ISO PIT-tags. The primary differences between the ISO system and the previous system are: 1) 134.2 kHz frequency replacing the 400kHz frequency, 2) One antenna to transmit and receive versus separate transmitter and receiver antennas and, 3) Four detection coils instead of two. Conversion to the ISO system provides improved read rates and ranges. Also this year, a second pneumatic cylinder used to raise and lower the flat plate was added. This was done to eliminate wobbling which was stressing the structural frame of the system. Between samples, the flat plate was lowered onto the tank and the tank was lowered to sampling position. When the screen was lowered, fish passing over the flat plate were scanned for PIT tags. For sample collection, the flat plate was raised and fish were diverted into the collection tank.

Subsampled Fish Condition

Detailed fish condition monitoring is performed on a target sample size of 100 individuals per species, three days per week. Steelhead and sockeye are examined Tuesday, Thursday, and Saturday, whereas chinook and coho are examined Monday, Wednesday, and Friday. The sample crews attempt to choose fish at random and to select fish throughout the sample day. In addition to fin clips and marks (brands or tags), smolts are examined for descaling, injuries to the head and body, parasites, disease, and signs of predation. Fork lengths are also recorded so that length averages can be calculated for all subsampled fish. At John Day, condition data is collected on yearling chinook, steelhead, coho, and sockeye from start of season to mid-June and subyearling chinook are examined for the remainder of the season. Bonneville condition data is collected on yearling chinook, steelhead, coho, and sockeye from start of season to the last week of June and subyearling chinook are examined from mid-June June to the end of season.

Performance Monitoring

Tests to evaluate species identification, brand recognition, descaling assessment, and data recording accuracy of SMP personnel were conducted during the migration season. A subsample of ten fish were randomly selected, anesthetized, and placed into a compartmentalized divider located in the sorting trough. Fish were processed independently and specific details were recorded for each fish including: 1) species, 2) fin clip, 3) level of descaling, and 4) presence of external marks or tags. Coworkers then compared and discussed results. This approach has several advantages over previously used methods, including: 1) increased frequency of tests, 2) up to three people are able to test concurrently, 3) promotes teamwork and builds consistency between coworkers, and most importantly, 4) the ability to discuss discrepancies with fish in hand.

Data Collected

Items 1-5 of the following list were reported to the Fish Passage Center daily; item 6, the PIT tag data, was automatically uploaded to the PTAGIS data center four times per day.

1) Species specific daily sample totals
2) Brands and fin clips
3) Descaling and mortality
4) Species specific length and condition data (subsampling only)
5) River, powerhouse, turbine, and spill flow data
6) PIT tag detection

Methods and Procedures for task 7.b. Monitor Gas Bubble Symptoms at Bonneville Dam according to FPC protocols

Overview

Fish are examined externally for signs of gas bubble trauma (GBT). The unpaired fins, and eyes are examined for the presence of bubbles and the area covered with bubbles is quantified. Monitoring of migrating juvenile salmonids is conducted at Lower Granite, Little Goose, Lower Monumental, Rock Island, McNary, and Bonneville dams. The goal of the juvenile salmonid examinations is to determine the relative extent to which the migrating juvenile salmonids passing the dam or sampling location have been exposed to harmful levels of total dissolved gas based upon the prevalence and severity of GBT induced bubbles on the fish. The data is reported to the fisheries management entities, the water quality agencies of Washington and Oregon, and is made available to other interested parties through Fish Passage Center weekly reports and daily postings to the FPC web site during the season.

A detailed description of sample size determination is available in Attachment E, the document entitled “Sample Size Determination for GBT Monitoring at SMP Locations”.

Detailed procedures which are applicable to all sampling sites in the SMP are described in Attachment B, the document “GBT Monitoring Protocol for the Smolt Monitoring Program” or by visiting our website following the link here.

Methods and Procedures for task 7.c. Transmit Data according to FPC protocol from Bonneville Dam

Overview

All sample data recorded during the daily sample will be transcribed to a daily sample summary form. Additionally, other pertinent daily data from the fish facility and powerhouse will be recorded on the daily sample form, including: powerhouse flow and spill daily averages, research mortality and bypass numbers, facility mortality and bypass numbers, water temperature, sample rates and miscellaneous information. These data will be checked for accuracy by comparison with displays of the various tally devices and facility and researcher handlog forms.

Verified data from the daily sample summary forms will be transcribed into a computer file using Fish Passage Center software (FPC16.exe). When all pertinent data is loaded into the software program, summary printouts are printed and compared with the daily sample summary form handlog. After verification that the printouts and the handlogs match, the computer file will be transmitted to FPC. Files will be sent to FPC on the day of the sample by noon.

In the interest of reducing the total size of this document, a detailed description of data entry procedures can be found in attachment C (it applies to all sites creating data for transmittal to FPC) in document entitled "Smolt Monitoring Protocol Data Entry Manual" or visit our web site and view the link: ftp://ftp.fpc.org/fpc32/2002SmoltMonitoring3.3a.doc.

Methods and Procedures for task 7.d. Conduct data verification procedure for Bonneville Dam according to FPC protocols

The QA/QC protocol requires that a portion of the daily batches submitted to the SMP database be cross-checked with the daily data sheets at the sites. There are a total of four traps that will be operating 5 days per week over a 12-week period for the SMP (3/8-5/29 for the traps on the Salmon and Snake rivers, and 3/15-6/5 for the traps on the Imnaha and Grande Ronde rivers). There are seven dams at which monitoring will take place for the SMP. This monitoring will occur 7 days per week over periods varying from 21 weeks (Rock Island Dam) to 30 weeks (Lower Granite, Little Goose, Lower Monumental, John Day, and Bonneville dams) to 36 weeks (McNary Dam). The goal of the QA/QC protocol is to cross-check enough batches to assure that the potential discrepancy rate across the total batches for a given site is acceptably low.

The QA/AC protocol will be to cross-check two daily batches out of every week at each of the monitoring sites. The Fish Passage Center (FPC) will randomly pick the two batches to be examined each week. FPC personnel will be responsible for conducting the cross-check and reporting back to the respective site on the results. The cross-check of a daily batch will consist of verifying the data entries in the data base with the data on the site's data sheets for that batch. The data entries are found in several tables of the data base, including the (1) catch summary table which includes the sample-

related parameters and flow/spill entries, (2) the catch detail table which includes the fish counts per species, descaling numbers, mortalities, and sample rates, (3) the incidental catch detail which includes the number of fish from the incidental list, the (4) the mark detail table which includes counts of fish with elastomer tags, photonic tags, spaghetti tags, and freeze brands, and (5) the transportation detail table which includes the number of fish transported and bypassed at the collector dams.

If no discrepancies are reported on the two batches examined for a given site, then the QA/QC procedure for that site is finished for that week, and the process will begin again the following week. Under the condition that no discrepant batches are found in the batch examined over the full season, we will be 95% confident that the discrepancy rate across all batches for the season will not exceed approximately 5% for the monitoring at the dams and 10% for the monitoring at the traps (higher at the traps only because of fewer batches for the season). This estimation utilizes methods given in the Sampling Techniques book by Cochran (1977)[8] on pages 55-60. If for each site we let **N**= total number of batches, **X**= number of batches with discrepancies, **n**= number of batches checked, and **x**= number of checked batches with discrepancies, then we may use the hypergeometric distribution to determine the probability of finding **x** discrepant batches in the **n** batches examined when **X** discrepant batches actually exist in the total **N** batches. The number **X** that satisfies the probability statement Pr(**x**=0|**X,N,n**)=0.05 is the upper 95% confidence limit for the number of discrepant batches in the total **N** batches when no discrepant batches (**x**=0) are found in the **n** sampled batches. In this case, there is a high probability that the seasonal discrepancy rate is less than **X/N**.

If a discrepant batch is found at a site during a given week, then the FPC will randomly pick two additional batches from that week to be cross-checked by FPC personnel. If neither of these new batches show discrepancies between the entries in the SMP data base and the values on the site's data sheets, then the QA/QC procedure is finished for that week. But if additional discrepancies exist, then there will be continued selection of batches and cross-checks made until the site is back in compliance with what it shows in the SMP data base and what it shows on the site data sheets. It is unlikely that such an extended level of cross-checking would be necessary at a given site past the first week of the season.

7.e. Project management, planning, work statement/budget preparation

Washington Department of Fish and Wildlife personnel will be responsible for developing a budget for operations of the project based on the statement of work provided by Fish Passage Center. Project management, including planning all activities, hiring, personnel management and data gathering activities will be the responsibility of WDFW.

[8] Cochran, William G., 1977. Sampling Techniques (third edition). John Wiley & Sons, New York. 428 pp.

TASK 8. SMOLT MONITORING-HEAD OF LOWER GRANITE RESERVOIR & ON THE SALMON RIVER(IDAHO)

Methods and Procedures for Task 8.a. Sampling migrants daily in the traps

Overview

Two smolt-monitoring traps are operated to monitor the passage of juvenile chinook salmon and steelhead trout. A scoop trap (Raymond and Collins 1974) is operated on the Salmon River, near Slate Creek, Idaho. A dipper trap (Mason 1966) is operated on the Snake River near Lewiston, Idaho. Prior to the 1996 out-migration season, the FPC requested that all smolt-monitoring projects reduce handling of fish listed under the ESA. To comply with this request, sampling regimes and PlT-tag quotas were adjusted at this project's collection sites. Both traps are operated from mid-March to the end of May.

The Snake River trap is positioned approximately 40 m downstream from the Interstate Bridge, between Lewiston, Idaho and Clarkston, Washington at Lat. 46.06 N, Lon. 117.03 W. The trap is attached to bridge piers just east of the drawbridge span by steel cables. This location is at the head of Lower Granite Reservoir,0.5 km upstream from the convergence of the Snake and Clearwater arms. River width and depth at this location are approximately 260 m and 12 m, respectively.

The Salmon River trap site is located at rkm 103, approximately 17 km upstream from the previous trapping location and 1.6 km downstream from Slate Creek at Lat. 45.66 N, Lon. 116.29 W. The scoop trap is operated immediately downstream of the upper US Highway 95 bridge at Twin Bridges. This location was chosen to allow the trap to be operated through a wider range of discharge. River width at this location is approximately 90 m and varies with discharge.

Fish Sampling

The traps are sampled twice daily. A sample day is the evening sample of one day combined with the morning sample of the following day. The collection date recorded on the data forms is the date of the morning sample. All fish captured at the Snake and Salmon River traps will be interrogated for PIT (Passive Integrated Transponder) tags. In addition, up to 2000 fish of each species will be examined for freeze brands and elastomer tags, daily, at the Snake River trap and only for elastomers at the Salmon River trap. These data are recorded on the "Smolt Trap Data" form (STD).

All fish other than those marked or PIT tagged will be enumerated by species and recorded in the appropriate section of the STD form. Every fish we capture will be recorded on the STD FORm in only 1 location so that the sum of the STD sub-sections will equal the total trap catch for the day. All non-anadromous fish collected will be recorded in the remarks section of form STD. Fork lengths will be taken on all sockeye/kokanee and recorded on the length-frequency form. Young-of-the-year chinook (YOYCH/W) will be classified as any chinook under 80mm in length. Steelhead less than 140mm in fork length will be classified as rainbow trout (RBT). Record observations in

the remarks section of form STD. Pacific lamprey will be recorded in the remarks section of form STD. The ammocoetes (LA) life stage (pale brown in color, oral hood instead of sucker disc, and undeveloped eyes) or the transformed (LT) life stage (blue black to dark brown, lighter below, no pattern with sucker disc and eyes). Recaptures, mortalities, and brands are recorded by species in the appropriate section of form STD.

Anesthetizing process.

A stock solution of MS-222 (50g/l) is used. The stock solution is measured into the fish-working trough using a repipet junior. Approximately 3-5 ml of stock solution is used per 10 liters of water to make the anesthetic concentration in the fish trough 15-25 ppm. Variations in anesthetic concentrations are required due to changes in water conductivity, temperature, and species of fish, which are being anesthetized. Fish, which have been put in the work trough containing MS-222, should lose equilibrium within 1-3 minutes. Limit the number of fish in the work trough so they spend no more than five minutes in the work trough. Fish will be placed in a recovery tank for 15-30 minutes to recover from the anesthetic before being placed in the net pen in the river (Snake River trap). The fish will leave the net pen volitionally. After 15-30 minutes in a recovery tank fish will be released directly to the river at the Salmon River trap.

Daily summary sheet (form DSS)

1. Total Catch
    a. Hatchery chinook = sum of chinook age 1+ from all sections of form STD including number examined, number counted but not examined, mortalities, brands or elastomers, recaptures, and numbers of chinook PIT tagged.
    b. Wild/Natural chinook - same as hatchery chinook.
    c. Hatchery steelhead - same as hatchery chinook.
    d. Wild Steelhead - same as hatchery chinook.
    e. YOY Chinook - same as hatchery chinook.
2. Numbers examined for brands or elastomers: up to 2000 fish daily and any mortalities that have brands.
3. Number counted: fish in excess of the 2000 examined. These fish are enumerated but not examined for brands of elastomers.
4. Number PIT-Tagged: Number of fish tagged and recorded in the PIT tag file.
5. Sockeye/Kokanee: sum of sockeye/kokanee from form STD.
6. Brands: unique brands observed in the daily catch and the number of each.
7. Elastomers: unique elastormers observer in the daily catch and the number of each.
8. Fork lengths will be taken for chinook, steelhead, and sockeye - to the nearest millimeter.

Abbreviations used in forms: Abrreviations ;CW- Wild chinook, CH- Hatchery chinook, YOYCW- Young of the year wild chinook, YOYCH - Young of the year hatchery

chinook, SH - Hatchery steelhead,SW - Wild steelhead, RBT - Rainbow trout,SOC - Sockeye, KOK – Kokanee, LA - Lamprey/ammocoete, LT - Lamprey/transformed

Methods and Procedures for Task 8.b. Applying PIT-tags at the traps

When available, 600 fish of each species and rearing type will be PIT tagged weekly. YOYCH/W under 60mm will not be PIT tagged. Wild/Natural is defined to be fish that lack a fin clip or freeze brand. In addition, the Snake River trap catch may be supplemented by purse seine collections to supply fish needed for PIT tagging purposes. The number of fish tagged is recorded on the form STD. An example of the number of PIT-taggs that are used annually can be seen in the table below.

Year 2002 PIT tagging goals for the Salmon and Snake River traps for SMP.

Salmon River Trap				Snake River Trap			
Wild chinook	Hatchery chinook	Wild steelhead	Hatchery steelhead	Wild chinook	Hatchery chinook	Wild steelhead	Hatchery steelhead
3200	4000	1400	3400	2800	3600	1400	3700

All PIT-tagging operations will be conducted according to procedures and guidelines provided by PTAGIS and available at the psmfc.org website or by clicking here PIT_Tag_Procedures_v2.0_1999. PIT-tag data will be sent to PTAGIS weekly according to standard protocols available at PTAGISSoftware_and_Documentation PITTAG2.

Methods and Procedures for Task 8.c. Transmit data according to FPC protocol

Overview

All sample data recorded during the daily sample will be transcribed to a daily sample summary form. Additionally, other pertinent daily data from the fish facility and powerhouse will be recorded on the daily sample form, including: powerhouse flow and spill daily averages, research mortality and bypass numbers, facility mortality and bypass numbers, water temperature, sample rates and miscellaneous information. These data will be checked for accuracy by comparison with displays of the various tally devices and facility and researcher handlog forms.

Verified data from the daily sample summary forms will be transcribed into a computer file using Fish Passage Center software (FPC16.exe). When all pertinent data is loaded into the software program, summary printouts are printed and compared with the daily sample summary form handlog. After verification that the printouts and the handlogs match, the computer file will be transmitted to FPC. Files will be sent to FPC on the day of the sample by noon.

In the interest of reducing the total size of this document, a detailed description of data entry procedures can be found in attachment C (it applies to all sites creating data for transmittal to FPC) in document entitled “Smolt Monitoring Protocol Data Entry

Manual" or visit our web site and view the link:
ftp://ftp.fpc.org/fpc32/2002SmoltMonitoring3.3a.doc.

Methods and Procedures for task 8.d. Conduct data verification procedure for Snake and Salmon Traps according to FPC protocols

The QA/QC protocol requires that a portion of the daily batches submitted to the SMP database be cross-checked with the daily data sheets at the sites. There are a total of four traps that will be operating 5 days per week over a 12-week period for the SMP (3/8-5/29 for the traps on the Salmon and Snake rivers, and 3/15-6/5 for the traps on the Imnaha and Grande Ronde rivers). There are seven dams at which monitoring will take place for the SMP. This monitoring will occur 7 days per week over periods varying from 21 weeks (Rock Island Dam) to 30 weeks (Lower Granite, Little Goose, Lower Monumental, John Day, and Bonneville dams) to 36 weeks (McNary Dam). The goal of the QA/QC protocol is to cross-check enough batches to assure that the potential discrepancy rate across the total batches for a given site is acceptably low.

The QA/AC protocol will be to cross-check two daily batches out of every week at each of the monitoring sites. The Fish Passage Center (FPC) will randomly pick the two batches to be examined each week. FPC personnel will be responsible for conducting the cross-check and reporting back to the respective site on the results. The cross-check of a daily batch will consist of verifying the data entries in the data base with the data on the site's data sheets for that batch. The data entries are found in several tables of the data base, including the (1) catch summary table which includes the sample-related parameters and flow/spill entries, (2) the catch detail table which includes the fish counts per species, descaling numbers, mortalities, and sample rates, (3) the incidental catch detail which includes the number of fish from the incidental list, the (4) the mark detail table which includes counts of fish with elastomer tags, photonic tags, spaghetti tags, and freeze brands, and (5) the transportation detail table which includes the number of fish transported and bypassed at the collector dams.

If no discrepancies are reported on the two batches examined for a given site, then the QA/QC procedure for that site is finished for that week, and the process will begin again the following week. Under the condition that no discrepant batches are found in the batch examined over the full season, we will be 95% confident that the discrepancy rate across all batches for the season will not exceed approximately 5% for the monitoring at the dams and 10% for the monitoring at the traps (higher at the traps only because of fewer batches for the season). This estimation utilizes methods given in the Sampling Techniques book by Cochran (1977)[9] on pages 55-60. If for each site we let **N**= total number of batches, **X**= number of batches with discrepancies, **n**= number of batches checked, and **x**= number of checked batches with discrepancies, then we may use the hypergeometric distribution to determine the probability of finding **x** discrepant batches in the **n** batches examined when **X** discrepant batches actually exist in the total **N**

[9] Cochran, William G., 1977. Sampling Techniques (third edition). John Wiley & Sons, New York. 428 pp.

batches. The number **X** that satisfies the probability statement Pr(**x**=0|**X,N,n**)=0.05 is the upper 95% confidence limit for the number of discrepant batches in the total **N** batches when no discrepant batches (**x**=0) are found in the **n** sampled batches. In this case, there is a high probability that the seasonal discrepancy rate is less than **X/N**.

If a discrepant batch is found at a site during a given week, then the FPC will randomly pick two additional batches from that week to be cross-checked by FPC personnel. If neither of these new batches show discrepancies between the entries in the SMP data base and the values on the site's data sheets, then the QA/QC procedure is finished for that week. But if additional discrepancies exist, then there will be continued selection of batches and cross-checks made until the site is back in compliance with what it shows in the SMP data base and what it shows on the site data sheets. It is unlikely that such an extended level of cross-checking would be necessary at a given site past the first week of the season.

8.e. Project management, planning, work statement/budget preparation

Idaho Department of Fish and Game personnel will be responsible for developing a budget for operations of the project based on the statement of work provided by Fish Passage Center. Project management, including planning all activities, hiring, personnel management and data gathering activities will be the responsibility of IDFG.

Methods and Procedures for Task 8.f. Provide an interrogation site for PIT-tagged smolts, marked on other projects, at the end of their migration in a riverine environment and the beginning of migration in a reservoir environment & at an intermediate site on the Salmon River

The PIT-tag interrogation system on the Snake River trap consists of an 8-inch PVC pipe with two interrogation coils (D-4 and D-6). Each coil is connected to an exciter card and a PIT-tag reader. The system does not have the capability to provide exact time of capture. Since it is checked once daily, the interrogation time is set to 00:00 h. Coil efficiency tests were conducted on the dipper trap interrogation system. Seven hundred forty-two test tags were sent through the system. The reading efficiency was calculated to be 95.2% for both coils combined.

The PIT-tag interrogation system on the Salmon River trap consists of a 4-inch PVC pipe with two interrogation coils. Each coil is connected to an exciter card (D-8) that is in turn, attached to a single PIT-tag reader. Coil efficiency tests were conducted on the Salmon River trap interrogation system in 1999. Five hundred test tags were sent through the system. Reading efficiency was calculated to be 100% for both coils combined.

PIT-tag interrogation data will be sent to PTAGIS weekly according to standard protocols available at PTAGIS Software_and_Documentation PITTAG2.

Methods and Procedures for Task 8.g. Analyze data and produce an annual report

See IDF&G SMP Annual Reports at BPA's web site by clicking IDFG SMP Annual Report BPA.

Methods and Procedures for Task 8.h. Provide fish collection at the trap as requested by other agencies

Methods for fish handling as those described above in fish sampling. All fish collected for other agencies should be covered under that agencies ESA handling permit unless special arrangements have been made in advance to cover those handled fish under the SMP permit.

Methods and Procedures for Task 8.i. Provide a source of fish, in excess of SMP needs, for other research projects in the basin

Methods for fish handling as those described above in fish sampling. All fish collected for researchers should be covered under that research projects' ESA handling permit unless special arrangements have been made in advance to cover those handled fish under the SMP permit.

Methods and Procedures for Task 8.j. Maintain traps, boats, & other equipment prior to the field season

N/A

Attachment H
to
Smolt Monitoring Proposal #198712700
Response to ISRP Comments

FISH PASSAGE CENTER

2501 SW First Avenue, Suite 230, Portland, OR 97201-4752
Phone: (503) 230-4099 Fax: (503) 230-7559
http://www.fpc.org/
e-mail us at fpcstaff@fpc.org

MEMORANDUM

TO: All SMP Site Leaders

FROM: Michele Dehart

DATE: February 1, 2002

RE: SMP Repost Rates for the 2001 season

As you know, the 1997 Fish Passage Center audit uncovered a vulnerable area in our data system validation. The audit clearly showed that the remote site personnel were best able to assure the accuracy of the data entered and were best able to validate the data. As a result of the audit, we implemented several new procedures to assure that the data was checked for errors and validated at the sites. The remote site sampling personnel and project leaders maintain primary responsibility for the accuracy of the data.

However, the repost rate cannot be used alone to measure SMP remote site performance. Some reposts occur for reasons beyond the control of SMP personnel, these have been subtracted from the totals below. Meticulous attention to detail by SMP and FPC personnel is the reason most reposts occur. The high repost rate at Little Goose Dam for this period is due to a new crew asking questions and striving to be accurate. Problems encountered in the 2001 season included communication with the Corps., the continued use of non-standard external markings, duplicate external marks from different hatchery releases, and large marking programs at some SMP sites.

The following is a summary of the repost rates for the 2001 season. The repost rate is the number of SMP batches reposted minus the number of batches reposted due to circumstances beyond SMP control, divided by the total number of SMP batches submitted. The 2001 system-wide SMP repost rate is 9.79%, which is down from 10.73% reported for the first half of the 2001 season. In 2000, it was 17%, in 1999 it was 22%, and in 1998 it was 30.9%. Each year, there is measurable improvement in the repost rate due to the efforts of the remote site personnel. Our objective is to keep repost rates below 5%

2001 SMOLT MONITORING SEASON REPOST REPORT
FOR PERIOD ENDING 7/1/01--BATCH # 01182

Site	# of Batches Posted	# of batches Reposted	Repost Rate
BO1	33	2	6.06%
BO2	111	7	6.31%
JDA	94	8	8.51%
MCN	91	5	5.49%
LMN	91	16	17.58%
LGR	98	10	10.20%
LGS	91	28	30.77%
RIS	92	8	8.70%
GRN	60	5	8.33%
IMN	91	15	16.48%
LEW	80	3	3.75%
WTB	65	0	0.00%
			Average Error Rate
Totals	997	107	10.73%

2001 SMOLT MONITORING SEASON REPOST REPORT
FOR PERIOD 7/1/01--End of Season

Site	# of Batches Posted	# of batches Reposted	Repost Rate
BO1	11	2	18.18%
BO2	122	2	1.64%
JDA	78	8	10.26%
MCN	163	11	6.75%
LMN	122	10	8.20%
LGR	122	1	0.82%
LGS	122	29	23.77%
RIS	61	6	9.84%
			Average Error Rate
Totals	801	69	8.61%

2001 SMOLT MONITORING SEASON REPOST REPORT
SEASON TOTALS

Site	# of Batches Posted	# of batches Reposted	Repost Rate
BO1	44	4	9.09%
BO2	233	9	3.86%
JDA	172	16	9.30%
MCN	254	16	6.30%
LMN	213	26	12.21%
LGR	220	11	5.00%
LGS	213	57	26.76%
RIS	153	14	9.15%
GRN	60	5	8.33%
IMN	91	15	16.48%
LEW	80	3	3.75%
WTB	65	0	0.00%
			Average Error Rate
Totals	1798	176	9.79%

Attachment G
to
Smolt Monitoring Proposal #198712700
Response to ISRP Comments

FISH PASSAGE CENTER

2501 SW First Avenue, Suite 230, Portland, OR 97201-4752
Phone: (503) 230-4099 Fax: (503) 230-7559
http://www.fpc.org
e-mail us at fpcstaff@fpc.org

January 15, 2002

Mr. Robert Koch
Ms. Leslie Schaeffer
Permit Specialist
National Marine Fisheries Service
Protected Resources Division
525 NE Oregon St., Room 500
Portland, OR 97232-2737

Dear Mr. Koch and Ms. Schaeffer,

This information is being submitted in order to fulfill the 2001 reporting requirements for Section 10 Permit No.1193, as issued to the Fish Passage Center (FPC) for scientific research/monitoring purposes, under the authority of the Endangered Species Act (ESA) of 1973. The permit authorizes the take of listed Snake River spring/summer and fall chinook (*Oncorhynchus tshawytscha*), Snake River steelhead (*O. mykiss*), sockeye (*O. nerka*), Upper Columbia River spring chinook (*O. tshawytscha*), Upper Columbia River steelhead (*O. mykiss*), Mid Columbia River steelhead (*O. mykiss*), Lower Columbia River chinook (*O. tshawytscha*) and Lower Columbia River steelhead (*O. mykiss*) salmon smolts in sampling and tagging activities conducted as part of the regional Smolt Monitoring Program (SMP). These activities were performed in the states of Idaho, Washington, and Oregon in accordance with the 2001 Smolt Monitoring Program (SMP). Listed species take is authorized at Bonneville (BON), John Day (JDA), McNary (MCN), Lower Monumental (LMN), Little Goose (LGS), and Lower Granite (LGR) dams; and at the Snake River (LEW), Salmon River (WTB), and Grande Ronde River (GRN) traps. In addition, Permit No. 1193 specifies the requirement to report the incidental take of ESA listed adults at SMP projects that "fall back" through the juvenile bypass system into the SMP sample tank. This material is sent to you in order to satisfy the requirement stated in section C.1 of the permit, which directs us to provide an annual report by January 15 each year.

The actual 2001 Smolt Monitoring Program dates of sampling at the remote sites are presented in Table 1. The total number of juvenile salmon handled at SMP sites in 2001

is contained in Table 2a. The Smolt Monitoring Program is coordinated with various research projects, with the objective of reducing overall fish handling through the system. Some research projects authorized under separate permits were provided with fish from the SMP sample. This take will be reported under these other permits. The total numbers of fish sampled for the SMP are adjusted to reflect the take associated with these other projects and the actual numbers of fish handled specifically for the SMP are reported in Table 2b.

The estimated listed take of juvenile salmon and the associated incidental listed mortalities for 2001 are summarized in Tables 3 a, b and c. These numbers are to be compared to the estimated permit take proportions contained in Appendix H.2 of the 2000 FCRPS Biological Opinion (December 21, 2000).

We have maintained our goal of minimizing the effects of sampling activities on the listed species. The SMP crews adhered to their sampling protocols, which were established and documented in detail in our permit application. The objective to maintain uniformity and integrity of the procedures and the resulting data sets was accomplished. Fish were anesthetized using quality control procedures to avoid stress in live animals, as outlined in our permit application. Fish condition was recorded at all sites on a routine basis, and the traps were maintained frequently to minimize adverse impacts on sample fish.

> The 2001 smolt-monitoring season was a success, with few minor circumstances that affected the monitoring of the outmigration. The year was characterized as having the second lowest runoff volume in the 60-year water record. Flow and spill volumes in the Snake and Columbia River were significantly less than in recent past years.

The NMFS, CZES, developed a May 2, 2001 memo to David Knowles, entitled "Estimation of Percentages of Listed Spring/Summer and Fall Chinook……", from Michael Schiewe. These percentages were used to estimate all listed take reported in the tables. The associated mortalities of juvenile salmon for the 2001 Smolt Monitoring Program were determined in the same fashion and are reported in Table 3.

Permit compliance was met for the 2001 total take of juvenile listed stocks under Permit No. 1193. No exceedences occurred for the SMP sampling. Incidental mortalities of all listed stocks were well below our 2001 permit allowance.

Gas bubble trauma biological monitoring was conducted as part of the Smolt Monitoring Program. The plan protocols and procedures were reviewed and approved by regional fishery management agencies and state water quality agencies. Stress to the animals was minimized at all sites during the GBT examinations by keeping the smolts submerged in water during the examinations. The GBT sampling program was reduced this year to reduce handling of fish, while maintaining the procurement of sufficient data for management application. Juvenile fish examined for symptoms were obtained from the regular SMP sample at Bonneville Dam in the lower Columbia River. Fish were

netted off the wet separator for biological exams at Lower Granite, Little Goose, Lower Monumental, and McNary dams. The 2001 estimated listed take for GBT monitoring at all sites is included in our total take estimates.

Permit No. 1193 authorizes an incidental take of ESA listed adult salmon that "fallback" through the bypass and collection system into the SMP sampling tank. They are incidentally captured while conducting the juvenile monitoring activities at the sites. The immediate release protocol of all adult and jacks that inadvertently enter the juvenile sample, as specified in Special Condition B.3, was enforced to assure permit compliance. Some, mostly immature, adult salmon were intercepted by the juvenile sampling program. We used the percentages developed by NMFS for determining the numbers of listed juvenile fish in a population for the specific outmigration year and site, and applied them to the adult numbers collected this year. Using this procedure we estimated that the Smolt Monitoring Program sites under Permit No. 1193 intercepted the numbers listed in Table 4. The number of adults intercepted this year was slightly higher than observed in past years. This increase reflects the overall increase in returning adult salmonids observed in the system this year. These fish were routed back to the river without further handling.

To provide you with summaries of our research, we will send you a *Draft 2001 Fish Passage Center Annual Report* in this spring, followed by a final report as soon as it is published.

Sincerely,

Michele DeHart
Fish Passage Center Manager

Table 1. 2001 Start and Stop Dates of Smolt Monitoring Program Remote Sites

REMOTE SITES	START DATE	STOP DATE
Salmon River Trap (WTB)	03/12	06/08
Grande Ronde River Trap (GRN)	03/12	06/01
Snake River Trap (LEW)	03/12	06/29
Lower Granite Dam	03/26	10/31
Little Goose Dam	04/01	10/31
L. Monumental Dam	04/01	10/31
McNary Dam	03/30	12/11
John Day Dam	04/04	09/17
Bonneville Dam	03/08	10/31

Table 2a. Total numbers of fish handled through the Smolt Monitoring Program in 2001.

REMOTE SITES	Chinook Age 1	Chinook Age 0	Sockeye/Kokanee	Steelhead
WTB	12,660	1	24	4,567
GRN	9,049	13	NA	4,357
LEW	527	31	0	5,399
LGR	24,055	14,401	115	51,888
LGS	17,218	3,420	207	16,434
LMN	49,609	743	42	27,096
MCN	34,457	83,113	2,898	14,940
JDA	41,201	12,408	2,902	10,897
BON I & II	22,232	23,930	986	5,628
Total	211,008	138,060	7,174	141,206

Table 2b. Total numbers of fish handled for the Smolt Monitoring Program. (Research Fish Removed)

REMOTE SITES	Chinook Age 1	Chinook Age 0	Sockeye/Kokanee	Steelhead
WTB	12,660	1	24	4,567
GRN	9,049	13	NA	4,357
LEW	522	31	0	5,399
LGR	22,675	14,401	115	51,895
LGS	16,011	3,420	207	16,447
LMN	15,733	708	31	10,702
MCN	33,638	29,078	2,676	14,831
JDA	25,295	4,557	2,063	7,775
BON I & II	22,157	23,930	986	5,628
Total	157,740	76,139	6,102	121,601

Table 3. 2001 Estimated Listed Take of Juvenile Salmon (*Oncorhynchus sp.*) for the Smolt Monitoring Program

		GRN	LGR	LGO	LMN	MCN
Sockeye				1		
Sp/Su Ch	Listed Hatchery					
	Listed Wild		1			
	Listed Hatchery Jack		4	1	6	2
	Listed Wild Jack		11	3	7	1
Steelhead	Listed Wild	1	2			
	Kelts	1				

Table 4a/b. Estimated numbers of listed adult salmonids intercepted by the Smolt Monitoring program in 2001.

Type of Take	**2001 Annual Proportion Take by Species/Age of ESA-Listed Snake River Salmon (4a)**						
		Sockeye/Juv		Fall/ Juv		SS/ Juv Hatchery	SS/ Juv Wild
Collect for Transport							
Observe/Harass							
Capture/Handle/Release		0.14 Salmon R NA Grande Ronde 0.00 Snake R 0.68 Lwr Granite 1.22 Little Goose 0.18 Lwr Monmtl 0.02 McNary 0.00 John Day 0.00 Bonneville		0.00 Salmon R 0.00 Grande Ronde 0.00 Snake R 0.95 Lwr Granite 0.22 Little Goose 0.02 Lwr Monmtl 0.01 McNary 0.00 John Day 0.00 Bonneville		0.44 Salmon R 0.31 Grande Ronde 0.02 Snake R 0.78 Lwr Granite 0.54 Little Goose 0.99 Lwr Monmtl 0.15 McNary 0.05 John Day 0.01 Bonneville	0.44 Salmon R 0.31 Grande Ronde 0.02 Snake R 0.82 Lwr Granite 0.66 Little Goose 0.82 Lwr Monmtl 0.15 McNary 0.05 John Day 0.01Bonneville
Capture/ Handle/Tag/Mark and Release						758 Salmon R 553 Grande Ronde **68 Snake R**	1844 Salmon R 720 Grande Ronde 35 Snake R
Lethal Take							
Spawning, Dead or Dying							
Other Take							
Indirect Mortality as a result of a direct take		10		22		99	82
Incidental Take							
Incidental Mortality as a result of incidental take							

2001 Annual ProportionTake by Species/Age of ESA Listed Steelhead (4b)					
Type of Take					
	Juvenile Wild Mid Columbia	Juvenile Wild Lower Columbia	Juvenile Wild Snake River	Juvenile Hatchery Upper Columbia	Juvenile Wild Upper Columbia
Collect for Transport					
Observe/Harass					
Capture/Handle/Release	1.19 McNary 1.24 John Day 0.42 Bonneville	0.72 Bonneville	0.06 Salmon R 0.06Grande Ronde 0.07 Snake R 0.67 Lwr Granite 0.21 Little Goose 0.17 Lwr Monmtl 0.03 McNary 0.00 John Day 0.00 Bonneville	0.97 McNary 0.12 John Day 0.04 Bonneville	0.87 McNary 0.11 John Day 0.04 Bonneville
Capture/ Handle/Tag/Mark and Release			478 Salmon R 602 Grande Ronde 876 Snake R		
Lethal Take					
Spawning, Dead or Dying					
Other Take					
Indirect Mortality as a result of a direct take	7	0	48	42	13
Incidental Take					
Incidental Mortality as a result of incidental take					

Attachment F
to
Smolt Monitoring Proposal #198712700
Response to ISRP Comments

SYMONDS, EVANS & LARSON, P.C.
CERTIFIED PUBLIC ACCOUNTANTS

REPORT OF INDEPENDENT ACCOUNTANTS ON APPLYING AGREED-UPON PROCEDURES

Pacific States Marine Fisheries Commission
45 S.E. 82nd Drive, Suite 100
Gladstone, Oregon 97027

We have performed the procedures enumerated below, which were agreed to by the Pacific States Marine Fisheries Commission (the Commission), solely to assist you in determining the accuracy of selected information related to the Smolt Monitoring Program (the SMP) that has been compiled by the Fish Passage Center (the FPC) during the period from January 1, 1996 through July 31, 1997. This engagement to apply agreed-upon procedures was performed in accordance with standards established by the American Institute of Certified Public Accountants. The sufficiency of the procedures is solely the responsibility of the Commission. Consequently, we make no representation regarding the sufficiency of the procedures described below either for the purpose for which this report has been requested or for any other purpose.

Our agreed-upon procedures were as follows:

1) Through inquiry of various personnel at the FPC and the Bonneville and McNary field collection sites, and observation of data at the FPC, we developed an understanding of the system, controls, procedures and flow of documents for the processing of the SMP information.

2) On a judgmental basis, we selected 15 transactions during the year ended December 31, 1996 and 10 transactions during the seven-month period ended July 31, 1997 to verify that errors in data that were detected by the FPC were appropriately corrected.

3) On a test basis, we verified the accuracy of judgmentally selected SMP information processed during the period from January 1, 1996 through July 31, 1997. For all field collection sites, we judgmentally selected the following five days from each of the following four judgmentally selected months in 1996 and the following two judgmentally selected months in the seven-month period ended July 31, 1997 (resulting in 30 days' activity being tested at each field collection site) and compared judgmentally selected information from the hand logs prepared by the field collection sites to the information as processed, summarized and posted by the FPC for distribution to third parties:

March 4, 13, 19, 26, 29, 1996	November 5, 6, 14, 15, 29, 1996
May 2, 8, 14, 23, 31, 1996	April 3, 8, 17, 25, 28, 1997
July 3, 8, 18, 24, 29, 1996	July 7, 16, 21, 25, 30, 1997

9600 S.W. Oak Street, Suite 380
Portland, Oregon 97223

Phone: (503) 244-7350
Fax: (503) 244-7331

The following procedures were performed on this data:

a) Agreed selected information recorded at the field collection sites according to the hand logs (and/or hand log summary pages) to the Daily Summary Report.

b) Agreed selected information from the Daily Summary Report to the Daily Sample Catch and Passage Index Report.

c) Agreed selected passage index information (or collection counts for trap sites) according to the Daily Sample Catch and Passage Index Report to the FPC Weekly Reports.

d) Verified the mathematical accuracy of the passage indices according to the FPC Weekly Reports.

e) Agreed selected information according to the Two-Week Transportation Summary to the Daily Summary Reports.

f) Verified the accuracy of the Cumulative Transportation Summary by accumulating the activity according to the Daily Summary Reports.

g) On a judgmental basis, agreed the sample items selected in 3a) through 3f) to the FPC's archived web page information.

As a result of performing the above agreed-upon procedures, we noted the following matters (see Exhibit 1 for specific findings by field collection site):

1) For the judgmentally selected transactions in agreed-upon procedure 2), we verified that all such errors in data that were detected by the FPC were appropriately corrected.

2) During 1997, several programming errors made by the FPC's independent computer consultants resulted in incorrect data on the Daily Summary Reports and the Daily Sample Catch and Passage Index Reports. We understand that these reports are not distributed to third-parties and are only utilized within the FPC. In instances where errors were detected on these internal reports, we verified that the correct information was properly reported in the electronic data and web page data which is available to third-parties.

3) Various data entry errors were made by personnel at the field collection sites. These errors predominantly occurred during 1997. It is important to note that 1997 was the first year of a new data entry system and, accordingly, we understand that management anticipated that such discrepancies and problems would occur. In addition, our agreed-upon procedures for 1997 took place prior to the completion of data verification by the field collection sites. The data verification process was delayed in 1997 due to the additional time involved with implementation of the new data entry system.

4) Subsequent changes made to hand logs by the field collection sites were not always reflected in the Daily Summary Reports. This matter appears to be a result of the FPC's policy for re-posting revised batches. Changes are not made by the FPC on their database until a revised hand log, a revised electronic batch, and a memorandum explaining the modification is received from the field collection site. As previously noted, due to the implementation of a new data entry system in 1997, this process was sometimes delayed.

5) Errors by the field collection sites were made in transferring data from the hand log detail to the hand log summary page. When these discrepancies were discovered, we verified that the correct information was properly reported in the electronic data and web page data which is available to third-parties. We understand that the hand log summary page is an internal report utilized only by the field collection sites and that data at the field collection sites is entered into the system from the hand log detail page. The FPC may receive a copy of the hand log summary page, however, we understand that they only rely on the hand log detail to verify data accuracy.

6) An error by a field collection site was made in calculating the correct descaled percentage.

7) Differences in average lengths were noted between the hand logs and the Daily Summary Reports. These differences occurred when field collection sites entered lengths in the electronic batches that they did not include in their own average length calculation according to the hand logs. The FPC's computer program averaged all lengths entered, while the field collection sites did not include lengths below a minimum size (non-migrating fry) in calculating their average according to the Daily Summary Reports. Accordingly, the information regarding average lengths in the electronic data and web page data which is available to third-parties, is properly reported.

8) Differences were noted between the sample rates used in certain hand logs and Daily Summary Reports. The hand logs used a daily sample rate, whereas the Daily Summary Report used an hourly sample rate. We verified that the correct information (the hourly sample rate) was properly reported in the electronic data and web page data which is available to third-parties.

In response to the above matters, we recommend the following:

1) Management should contact the FPC's third-party computer consultants to ensure that all programming errors are appropriately corrected. In addition, FPC staff should continue internal efforts to prevent and detect any future programming errors.

2) On a daily basis, the field collection sites should compare their electronically transmitted data to the hand logs and the Daily Summary Report. This procedure would:

   a) Assist in the detection of data entry errors.

   b) Assist in the detection of substantive errors in the hand logs.

   c) Emphasize the importance and responsibility of the field collection site's personnel regarding the recording and input of data.

   To encourage the field collection sites to perform this procedure on a consistent and accurate basis, it may be prudent to include such a procedure in each field collection site's annual contract.

3) The FPC should formally establish and document an ongoing program for verifying the accuracy of the recording and processing of the SMP information. In addition, due to internal time constraints, the FPC may want to consider utilizing an independent contractor to help perform these verification and testing procedures.

4) The FPC should consider developing a standardized form to be used by all of the field collection sites when recording the sampling data. The use of a standardized form would:

   a) Help ensure that all field collection sites are reporting and recording data in the same manner and are utilizing consistent methods and calculations.

   b) Streamline the FPC's ability to monitor, compare and verify data obtained from the field collection sites.

   Due to the number of field collection sites and the different policies and procedures in effect at each location, we recognize that devising a standardized form that will be suitable and acceptable for each site may be difficult. Accordingly, it may be appropriate to utilize an independent, neutral third-party to assist in developing and implementing the standardized form.

* * * * *

We were not engaged to, and did not, perform an audit, the objective of which would be the expression of an opinion on the specified elements, accounts or items. Accordingly, we do not express such an opinion. Had we performed additional procedures, other matters might have come to our attention that would have been reported to you.

SYMONDS, EVANS & LARSON, P.C.
CERTIFIED PUBLIC ACCOUNTANTS

This report is intended solely for the use of the Commission and should not be used by those who have not agreed to the procedures and taken responsibility for the sufficiency of the procedures for their purposes.

Symonds, Evans + Larson, P.C.

November 3, 1997

EXHIBIT I

As a result of applying the agreed-upon procedures as described in the accompanying report of independent accountants, we noted the following exceptions and corresponding causes:

Rock Island:

1. Batch 97008:

   Exception: Database and hand log show 1 mortality for Unknown Chinook-1. Daily Summary Report shows no mortalities for Unknown Chinook-1.

   Cause: Programming error on Daily Summary Report.

McNary:

1. Batch 97094:

   Exception: Database, hand log and Daily Summary Report show 122,700 Unknown Chinook-0. Daily Sample Catch and Passage Index Report shows 22,700 Unknown Chinook-0.

   Cause: Programming error resulted in shortened database field on Daily Sample Catch and Passage Index Report.

2. Batch 97117:

   Exception: Database, hand log and Daily Summary Report show 113,620 Unknown Chinook-0. Daily Sample Catch and Passage Index Report shows 13,620 Unknown Chinook-0.

   Cause: Programming error resulted in shortened database field on Daily Sample Catch and Passage Index Report.

Lower Monumental:

1. Batch 97002:

   Exception: Database and hand log show 1 mortality for Wild Chinook-1. Daily Summary Report shows no mortalities for Wild Chinook-1.

   Cause: Programming error on Daily Summary Report.

2. Batch 97111:

   Exceptions: Database shows 226 Hatchery Steelhead and 94 Wild Sockeye. Daily Summary Report shows 230 Hatchery Steelhead and 101 Wild Sockeye.

   Cause: Site biologists omitted fish below a certain minimum length from their calculation. The biologists consider these fish to be non-migratory.

3. Batch 97115:

Exceptions: Hand log shows 3 Squawfish, whereas the Incidental Catch Report shows 2 Squawfish. Hand log shows 3 Rainbow Trout, whereas the Incidental Catch Report shows no Rainbow Trout.

Cause: Data entry errors at the field collection site.

Exception: Database and Daily Summary Report show Wild Steelhead average length of 110. Hand log shows Wild Steelhead average length of 135.

Cause: Site biologists omitted fish below a certain minimum length from their calculation. The biologists consider these fish to be non-migratory.

4. Batch 97016:

Exception: Database and Daily Summary Report show 1 descaled Wild Sockeye. Hand log shows no descaled Wild Sockeye.

Cause: Data entry error at the field collection site.

5. Batches 97016, 97024 & 97027:

Exceptions: Daily Summary Report shows doubled mortalities for all species counted as compared to the hand logs and database. Discrepancies were as follows:

Batch	Species	Mortalities according to Daily Summary Report	Mortalities according to hand log and database
97016	Hatchery Chinook-1	2	1
97024	Hatchery Chinook-1	14	7
97024	Hatchery Steelhead	8	4
97024	Wild Chinook-1	6	3
97024	Wild Steelhead	2	1
97027	Hatchery Chinook-1	4	2
97027	Wild Chinook-1	2	1
97027	Wild Steelhead	2	1

Cause: Programming error on Daily Summary Report.

Little Goose:

1. Batches 97002, 97016, 97024, 97027 & 97097:

Exceptions: Hand log average lengths differed from database and Daily Summary Reports average lengths as follows:

Batch	Species	Average lengths according to Database and Daily Summary Report	Hand log
97002	Hatchery Steelhead	208	225.2
97002	Wild Steelhead	194	201.2
97016	Hatchery Chinook-1	128	125.4
97016	Wild Chinook -1	128	122.5
97016	Hatchery Steelhead	214	210.3
97016	Wild Steelhead	185	189.9
97024	Wild Steelhead	207	208.5
97024	Wild Steelhead	120	118.3
97024	Wild Steelhead	175	176.7
97027	Hatchery Chinook-1	162	163.2
97027	Hatchery Steelhead	200	200.9
97027	Wild Steelhead	184	174.9
97097	Hatchery Chinook-0	120	121.5
97097	Hatchery Steelhead	203	215.6

Cause: Site biologists omitted fish below a certain minimum length from their calculation. The biologists consider these fish to be non-migratory.

2. Batch 97016:

Exception: Hand log and database show no mortalities for Wild Chinook-1. Daily Summary Report shows 1 mortality for Wild Chinook-1.

Cause: Programming error on Daily Summary Report.

3. Batch 97024:

Exceptions: Daily Summary Report and database show 13,047 Wild Steelhead collected and 4,597 Wild Steelhead barged. Hand log shows 13,092 Wild Steelhead collected and 4,585 Wild Steelhead barged.

Cause: Subsequent changes were made to the hand logs by the field collection sites that were not reflected in the Daily Summary Report.

4. Batch 97027:

Exceptions: Hand log "bypassed" and "barged" numbers for Hatchery Chinook-1, Hatchery Steelhead and Wild Steelhead did not agree to corresponding numbers according to the Daily Summary Report. However, when combining bypassed and barged numbers, the hand logs and Daily Summary Reports agreed in total. Discrepancies were as follows:

Species	Bypassed		Barged	
	Hand log	Daily Summary Report	Hand log	Daily Summary Report
Hatchery Chinook -1	450	447	1,493	1,496
Hatchery Steelhead	48,000	47,680	20,980	21,300
Wild Steelhead	2,100	2,086	4,147	4,161

Cause: Subsequent changes were made to the hand logs by the field collection sites that were not reflected in the Daily Summary Report.

Lower Grand Ronde:

1. Batch 97013:

Exceptions: Hand log and database show 1 Wild Chinook-1 mortality, 2 Hatchery Steelhead mortalities and 1 Wild Sockeye mortality. Daily Summary Report shows no mortalities for these species.

Cause: Programming error on Daily Summary Report.

Exceptions: Hand log shows 1 Hatchery Chinook-0 and 1 Wild Chinook-0. Database and Daily Summary Report show no Hatchery Chinook-0 and 2 Wild Chinook-0.

Cause: Data entry errors at the field collection site.

2. Batch 97022:

Exception: Database and Daily Summary Report show 3 descaled Hatchery Steelhead. Hand log shows 8 descaled Hatchery Steelhead.

Cause: Data entry error at the field collection site.

3. Batches 97022 & 97030:

Exceptions: Cumulative passage numbers did not print on Daily Sample Catch and Passage Index Report.

Cause: Programming error on Daily Sample Catch and Passage Index Report.

4. Batch 97030:

Exceptions: Hand log and database show 122,400 Hatchery Steelhead and 14,200 Wild Steelhead collected. Daily Sample Catch and Passage Index Report shows 22,400 Hatchery Steelhead and 4,200 Wild Steelhead collected.

Cause: Programming error resulted in shortened database field on Daily Sample Catch and Passage Index Report.

5. Batch 97033:

Exception: Database and hand log show 1,900 Wild Chinook-1 collected. Daily Summary Report shows 208 Wild Chinook-1 collected.

Cause: Programming error on Daily Summary Report.

John Day:

1. Batches 97001 & 97010:

Exceptions: Average River Flow, Average Powerhouse 1 and Average Unit 3 amounts according to the hand log do not agree to database or Daily summary Report. Discrepancies were as follows:

Batch	Source	River Flow	Powerhouse 1	Unit 3
97001	Daily Summary Report and database	19.8	263.4	262.1
97001	Hand log	263.4	262.1	19.8
97010	Daily Summary Report and database	4.6	271.3	265.1
97010	Hand log	271.3	265.1	4.6

Cause: Data entry errors at the field collection site. Although these exceptions were noted by the FPC and the field collection site was notified, the errors were not corrected.

2. Batch 97021:

Exceptions: Hand log shows average lengths of Hatchery Steelhead, Wild Steelhead and Unknown Chinook-1 to be 208, 185 and 165, respectively. Database and Daily Summary Report do not show any average lengths for Hatchery Steelhead, Wild Steelhead and Unknown Chinook-1.

Cause: Data entry errors at the field collection site.

3. Batch 97091:

Exception: Daily Summary Report and hand log detail show 1 Wild Steelhead collected. Hand log summary page shows no Wild Sheelhead collected.

Cause: Error at the field collection site when transferring data to hand log summary page. (Note: Data on hand log detail and Daily Summary Report was correct.)

Exception: Hand log summary page was blank for average length of Unknown Chinook-0. Daily Summary Report shows average length of 102 for Unknown Chinook-0.

Cause: Field collection site did not transfer average length data from hand log detail to hand log summary page.

4. Batch 97105:

Exception: Hand log summary page was blank for average length of Unknown Chinook-0. Daily Summary Report shows average length of 99.

Cause: Field collection site did not transfer average length data from hand log detail to hand log summary page.

Bonneville 1:

1. Batch 97032:

Exception: Hand log shows 3 descaled Coho. Database and Daily Summary Report show 2 descaled Coho.

Cause: Data entry error at field collection site.

2. Batch 97040:

Exception: Daily Summary Report shows 2% descaled for Chinook-1. Hand log shows 18.2% descaled for Chinook-1. Based on observation and recalculation of hand log data, 2% is correct.

Cause: Error by field collection site in calculating descaled percentage.

Exception: Database and Daily Summary Report show Chinook-1 average length of 161. Hand log shows Chinook-1 average length of 141.

Cause: Site biologists omitted fish below a certain minimum length from their calculation. The biologists consider these fish to be non-migratory.

3. Batches 96065, 96074 & 97043:

Exceptions: Different sample rates were used between the hand log and the Daily Summary Report to estimate collected numbers. Sample rates used were as follows:

Batch	Daily Summary Report	Hand log
97043	.10905	.10000
96065	.06771	.08528
96074	.08565	.08888

Cause: Hand log used a daily sample rate, whereas Daily Summary Report used an hourly sample rate.

4. Batch 97113:

Exception: Hand log and database show 2 mortalities for Unknown Chinook-0. Daily Summary Report shows no mortalities for Unknown Chinook-0.

Cause: Programming error on Daily Summary Report.

Bonneville 2:

1. Batches 97022, 97024 & 97030:

Exceptions: As a result of performing our agreed-upon procedures, we noted various errors in these batches; however, such errors had already been detected by the field collection sites and were subsequently corrected.

Cause: Not applicable because errors were corrected.

Lewiston:

No exceptions noted.

Whitebird:

1. Batch 97033:

Exception: Although sampling was performed by the field collection site and was properly reported on the Daily Summary Report and hand log, the Daily Sample Catch and Passage Index Report reflected no sampling activity for the day.

Cause: Programming error on the Daily Sample Catch and Passage Index Report.

Grand Ronde:

1. Batch 97004:

   Exceptions: Hand log and database show 2 Wild Chinook-1 and 1 Hatchery Chinook-1 sampled. Daily Summary Report shows 0 Wild Chinook-1 and 3 Hatchery Chinook-1 sampled.

   Cause: Programming error on Daily Summary Report.

   Exception: Daily Summary Report shows Hatchery Chinook-1 average length of 107. Hand log shows Hatchery Chinook-1 average length of 105.

   Cause: Site biologists omitted fish below a certain minimum length from their calculation. The biologists consider these fish to be non-migratory.

Imnaha:

1. Batch 96055:

   Exception: Hand log shows 2 Hatchery Steelhead mortalities. Daily Summary Report shows 0 Hatchery Steelhead mortalities.

   Cause: Data entry error at field collection site.

Attachment E
to
Smolt Monitoring Proposal #198712700
Response to ISRP Comments

August 14, 2002

Sample Size Determination for GBT Monitoring at SMP Locations

Overview

The sample design and sample size requirement for GBT monitoring are based on expectation of a certain level occurrence of the signs being observed in the population related to total dissolved gas saturation (TDGS) levels. This expectation is based upon laboratory research and historical experience monitoring GBT at the sites traditionally used in the Columbia and Lower Snake rivers. The Incidence of GBT detected in the monitoring program is used as a "trigger" to reduce spill when an incidence of 15% is observed in the samples and this trigger is part of a legal requirement of the water quality standard waivers issued by the water quality agencies of Oregon, Washington and Idaho for spill mitigation.

GBT sampling occurs at Lower Granite, Little Goose and Lower Monumental dams 1 day per week, with a total of 100 fish being examined for GBT. At Rock Island, McNary and Bonneville dams, GBT sampling occurs 2 days per week, with 100 fish being examined. During the Spring migration, yearling chinook and steelhead are both examined in combination while in the summer subyearling chinook are examined for GBT.

Research conducted by the USGS BRD Cook, WA reports available at the BPA web site http://www.efw.bpa.gov/Environment/EW/EWP/DOCS/REPORTS/DOWNSTRM/D93279-1.pdf, showed that signs of GBT were progressive in the fins of fish at the TDGS levels allowed by the water quality agencies waivers, in the 115% to 120% saturation. Since the biological monitoring program is a requirement of the waiver, it is geared to detecting signs in fish exposed to TDGS in these ranges. The onset of mortality in the laboratory fish occurred when nearly 60% of fish in experimental groups showed signs of GBT in fins. However, the waiver limit set the maximum incidence of signs in juvenile salmonids at a conservative 15% incidence to be protective of fish in the riverine environment. Therefore, the monitoring program is designed to detect a 15% incidence in the population. Given that goal, the statistical basis for arriving at the sample size used for the monitoring program is described below.

Sample Size Determination

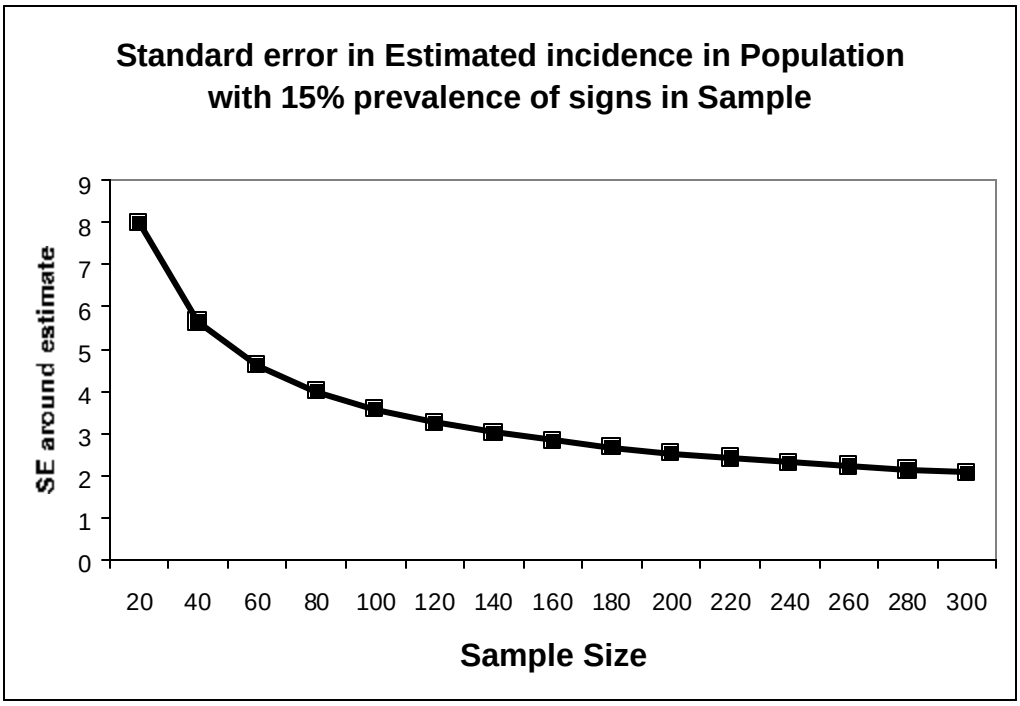
The sample size is 100 fish per sampling date. The original statistical determination of this sample size for GBT monitoring was done by John Beeman of USGS BRD, when USGS was involved in day-to-day monitoring at the dams. We paraphrase his analysis below.

The sample size required to detect differences in prevalence is determined using a binomial function.

$$L = 2\sqrt{\frac{pq}{n}}$$

Where L represents the error with 95% probability, and p and q are the true proportions of p = having signs of GBT and q = not having signs in the population (Snedcore and Cochran 1982). The sample size estimate is based on the proportion of affected (p) and non-affected (q) individuals in the population. As p and q approach 0.5 there is more variability in collections and a larger sample size is required. This exercise is based on a power analysis of chi-square tests. Assuming p = q = 0.5, to be conservative, and assume that the cost of Type I and Type II errors is equal, setting alpha and beta at 0.10. Based on his analysis he recommended that 40 fish be used to detect the incidence of signs. He based this upon the resulting 95% confidence interval that was $\pm$ 9.4% when p = 0.1 and q = 0.9 and $\pm$ 15.6% when p = q = 0.5.

The Fish Passage Cener was not comfortable with such a small sample size and large error associated with it. Also, FPC was planning to use a less time consuming examination method, (and therefore less stressful to the fish) than that being used by USGS in 1994. So to be more conservative we suggested 100 fish per target group. We used the Cochran method described above to determine the error around estimates of various sample sizes and summarized these data in the figure below.



Using a sample size of 100 fish, when observing a true population incidence of 15% yields a standard error of 3.57% (95% CI at alpha 0.05 $\pm$ 7.0). While it is possible to

further reduce the estimated error with higher sample sizes, the diminishing improvement in precision is offset by concern of increased handling. Based on the use of the 100 fish sample size, when the trigger value of 15% is reached, the true population on average will have a 15% incidence of GBT. This of course could vary between 8% and 22% incidence given the CI at 95% confidence. However, since we are not concerned about the incidence being lower than 15%, in other words the chance of 2.5% of time when we observe 15% incidence in the sample the true population incidence is less than 8%, we can use a two-tailed 90% CI and maintain a 95% confidence that the true population incidence is below the upper bound (i.e. exceeds the upper bound 5% of the time, and lower bound 5% of the time). Using this approach, when the incidence of 15% is observed in the population, the resulting confidence interval narrows to 15% $\pm$ 5.9. This level of error is acceptable given the nature of the "trigger" used for the monitoring program, both in terms of how it was derived and because it is believed to be very conservative relative to incidence of signs seen in laboratory fish held at TDGS levels applicable to the monitoring program.

Attachment D
to
Smolt Monitoring Proposal #198712700
Response to ISRP Comments

Minimum sample rates for Smolt Monitoring Program sites at dams

On October 7, 1992, NMFS provided the FPC with additional comments on the 1993 Smolt Monitoring Program. One comment pertained to determining minimum sample rates at collector dams. According to their letter, CZES in consultation with Dr. Lyle Calvin, arrived at the following recommended sampling criteria:

- 500 fish per day when daily estimated totals are < 50,000 fish, and
- 1% of the number collected at Lower Granite Dam when daily estimated totals are >50,000 fish.
- 1.67% of the number collected at Little Goose and McNary dams when daily estimated totals are >50,000 fish.

The rationale for these criteria is that sample sizes should be selected that keep the coefficient of variation (standard error / estimate) of the collection less than 5%. Within each hour the series of systematic sub-samples are taken at fixed intervals. Including "enough" sub-samples per hour to account for the non-uniform (*i.e.*, clumped or aggregated) emigration pattern of fish from the wet separator to the sample gate was an important consideration in establishing the hourly sampling protocol. In 1991, the FPC requested that the minimum duration of any sub-sample be no less than 12 seconds, and that a minimum of 5 sub-samples per hour (equivalent to a minimum hourly sample rate of 1.67%) be taken. The minimum sub-sample duration was set at 12 seconds. With the old mechanical sample timers, which could only be set to the nearest tenth of a minute, the lowest duration of 6 seconds would have increased the likelihood of biased (mostly undercounted) estimates of collection totals due to the sampling edge effect created by the time it takes to open and close the sampling gates.

In 1995, the FPC was asked to look at reducing the handling of large numbers of smolts during periods of peak passage. A new minimum allowable sample rate of 0.667% was established for use when collection numbers were rising above 100,000 at the dams. By 2001, all the old mechanical timers had been replaced at the COE dams with modern electronic timers, which are programmed to create sample rates changeable at increments of tenths of a percent. In 2002, a new set of sample rates was established to replace the old rates, *e.g.*, the 0.667% rate was replaced with a 0.7% rate. Also in 2002, the FPC was asked by the COE biologist at Little Goose Dam to allow for even lower sample rates during periods of excessively large numbers of fish being collected, as was occurring at that site. We added an emergency level of 0.5% for use during those periods, with the stipulation that the normal minimum rate remains at 0.7%. The optimal number of sub-samples per hour is still set at 6 until the sample rate drops below the level that allows for a minimum 12-second duration per sub-sample. When sample rates drop to 1.5%, 1.0% and 0.7%, the corresponding number of sub-samples drop to 4, 3, and 2 sub-samples per hour, respectively in order to sub-sample durations of at least 12 seconds.

At sample rates below 25%, the minimum number of fish in the sample will be approximately 500 fish, the goal in effect since 1992. At sample rates of 25% and higher, the number of fish actually sampled may drop below 500 as the collected population

decreases. The maximum rate at the lower Columbia River dams is 25%, whereas it goes to 100% at Snake River dams when the transportation in mini-tankers begins. The following table lists the current sample rates, number of sub-samples per hour, and range of daily number of fish desired for each sample rate.

Sample rate recommendations at John Day, Bonneville, McNary, Lower Monumental, Little Goose, and Lower Granite Dams

Recommended electronic timer-controlled sample gate settings.

Estimated Daily Collection	Sample Rate (%)	Equivalent Multiplier 1/sample rate	Sample Sec/ hour	Subsamples per hour	Subsample Duration in seconds	Estimated number of fish in Sample
Emergency	0.50%	200	18	2	9	
> 75,000	0.70%	143	25.2	2	12.6	> 525
50,000 - 75,000	1.00%	100	36	3	12	500 - 750
35,000 - 50,000	1.50%	66.6	54	4	13.5	525 - 750
25,000 - 35,000	2.00%	50	72	6	12	500 - 750
16,500 - 25,000	3.00%	33.3	108	6	18	495 - 750
12,500 - 16,500	4.00%	25	144	6	24	500 - 660
10,000 - 12,500	5.00%	20	180	6	30	500 -625
7,500 - 10,000	7.00%	14.3	252	6	42	525 - 700
5,000 - 7,500	10.00%	10	360	6	60	500 - 750
4,000 - 5,000	12.50%	8	450	6	75	500 - 625
3,000 - 4,000	15.00%	6.66	540	6	90	450 - 600
2,500 - 3,000	20.00%	5	720	6	120	500 - 600
1,500 - 2,500	25.00%	4	900	6	150	375 - 625
500 - 1,500	50.00%	2	1800	6	300	250 - 750
< 500	100.00%	1	3600	1	3600	< 500

For Lower Columbia River sites, the max sample rate is 25% except when a higher rate is needed for several hours to collect fish for tagging studies.

Carry multipliers to 3 digits total, then round(1/multiplier,3) will provide sample rate to nearest 10th place that is correct.

During periods of peak juvenile shad passage, lower sample rates than needed to meet salmonid sample goals may be used to reduce handling and mortalities on shad.

Figure 1 shows a plot of the coefficient of variation that results from the current sample rate criteria. It shows that the goal of having the collection's coefficient of variation be less than 5% is maintained when sample rates drop to 0.7% as long as collections exceed 75,000 fish. At this lowest normal sample rate, two sub-samples of 12.6 seconds duration are possible per hour. As collections decrease in numbers, the sample rates must increase to maintain a coefficient of variation less than 5%. When collections are 25,000 fish or less, then sample rate of 2% or higher are needed to maintain a coefficient of variation less than 5%. As sample rates increase from 2% to higher levels, six sub-samples of 12 seconds or greater duration are possible per hour.

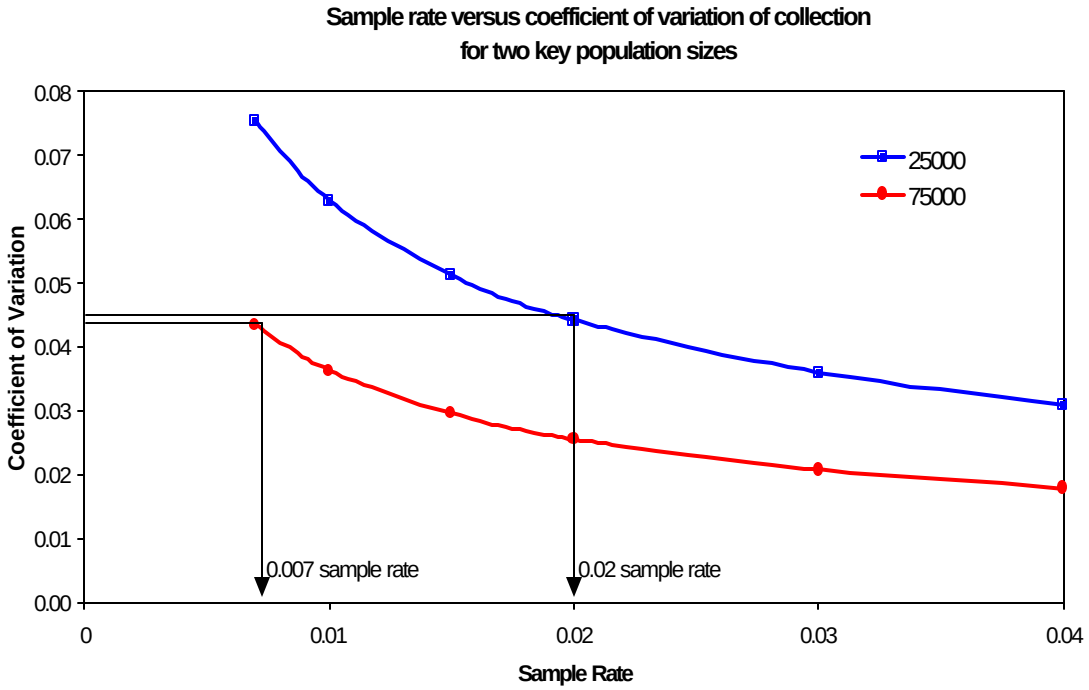


Figure 1. Plot showing minimum sample rates needed to maintain a coefficient of variation of less than 5% for two levels of estimated collected population at a dam facility.

Attachment C
To Smolt Monitoring Proposal # 198712700
Response to ISRP Comments

Table of Contents

I. *Introduction*

A. The Fish Passage Center (FPC).

The Fish Passage Center (FPC) provides current and historic data on salmon and steelhead passage in the main stem Snake and Columbia River Basins. Data from the **Smolt Monitoring Program (SMP)** are intended to provide the information basis for federal, state and tribal recommendations for fish passage in the Federal Columbia River Hydro-electric System. In addition to real-time access to SMP data, the FPC provides data about river conditions, hatchery releases, smolt migration and adult returns.

The FPC plans and implements the annual Smolt Monitoring Program (SMP) that provides daily information for in-season management decisions. The FPC also provides the agencies and tribes, and the FPC Board of Directors, with reservoir operation information and analysis, including current and historical data.

During the in-river migration season, FPC summarizes current conditions in a Weekly Report. FPC also provides web distribution of System Operation Requests (SORs) made by the Salmon Managers. SORs are requests to the U.S. Army Corps of Engineers to operate the federal hydro system to protect or enhance in-river fish passage and survival conditions.

If you would like more information or to view Weekly Reports and SORs please visit our web page www.fpc.org, or contact our office at (503) 230-4099.

B. Remote SMP Site Data Entry Program (FPC32).

The FPC32 data entry program was originally designed as an organized method of obtaining fish and water flow data from remote Smolt Monitoring Program sites. The software program has changed names slightly over the years, beginning with RSDEP (Remote Site Data Entry Program). Later it was ported to Windows and named FPC16. The current version is FPC32 version 3.2a, which has many improvements to reduce typographic and electronic errors (Section V.).

This manual has been provided for the biologist who input the data, as a reference to assist in the operation of the FPC32 program. Not only is this manual a reference but it is essential that all SMP personnel, who are responsible for entering fish data into the FPC32 program and corresponding with the FPC, **MUST** read this manual for a complete understanding of the procedures. The FPC 32 manual must be completely read and understood by remote SMP staff. If any questions arise, please call Henry Franzoni at the Fish Passage Center (503)230-4290 with questions. After the manual is

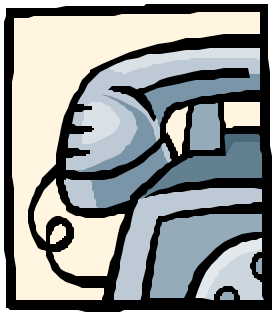
read by each individual SMP remote site staff member; please sign the form enclosed with the manual, which acknowledges that you have read the manual, and return the signed form to:

Fish Passage Center
Attn: Henry Franzoni
2501 SW 1st Ave. Suite 230
Portland OR 97201

This form can be found at the end of the manual.

II. *FPC Contacts & Correspondence*

A. Personnel.



- Henry Franzoni - Data System Mgr (503) 230-4290 hfranzoni@fpc.org.
- Deidre Wood - Data Analyst (503) 230-5362 dwood@fpc.org.
- Sergie Rasskazov - Senior Data Analyst (503) 230-4289 srasskazov@fpc.org.
- Christopher McCarty - Computer Assistant (503) 230-4582 cmccarty@fpc.org.
- Main Line / Voice (503) 230-4099 fpcstaff@fpc.org.

B. Correspondence.

- Modem – (503) 230-7560 or (503) 230-7561.
- Fax – (503) 230-7559.
- Main SMP E-mail – smp@fpc.org.
- Reposting E-mail – repost@fpc.org.
- FTP site – ftp.fpc.org.
- Web site – www.fpc.org.
- Address – 2501 SW 1st Ste 230 Portland, OR 97201.

C. SMP Remote Site Facilities.

- Bonneville Dam Powerhouse 1 (**BO1**) Pacific States Marine Fisheries Commission
- Bonneville Dam Powerhouse 2 (**BO2**) Pacific States Marine Fisheries Commission
- Grande Ronde River Trap (**GRN**) Oregon Dept of Fish and Wildlife
- Imnaha River Trap (**IMN**) Nez Perce Tribe
- John Day Dam (**JDA**)
- Lewiston (**LEW**) Snake River Fish Trap/Idaho Dept of Fish and Game
- Little Goose Dam (**LGS**) Oregon Dept of Fish and Wildlife
- Lower Granite Dam (**LGR**) Washington Dept. of Fish and Wildlife
- Lower Monumental Dam (**LMN**) Washington Dept of Fish and Wildlife
- McNary Dam (**MCN**) Washington Dept of Fish and Wildlife
- Rock Island Dam (**RIS**) Washington Dept of Fish and Wildlife
- Whitebird (**WTB**) Salmon River Trap /Idaho dept of Fish and Game.

Smolt Monitory Dates for 2002	
BON	March 11- October 31
GRN	March 12- June 2
IMN	March 10- June 2
JDA	March18- September 15
LEW	March 10- June 2
LGS	April 1- October 31
LGR	March 25- October 31
LMN	April 1 - October 31
MCN	March 15-December 15
RIS	April 1 - August 31
WTB	March 10- June 2

III. *Using the FPC32 Manual*

A. Notation.

1. **Buttons** - To click within the FPC32 program.
2. **[Keys]** - To press on keyboard.
3. **"Titles"** - And menu items e.g. "Start", "Run", "File".
4. **(Directories)** - **Sub**-directories, and file extensions.

B. Definitions.

Bypass Facilities – Smolt bypass facilities, smolt bypass/collection facilities. These terms refer collectively to the mainstream dam remote SMP sites of BO1, BO2, JDA, MCN, RIS, LMN, LGS and LGR.

Coded Wire Tag – A small piece of wire inserted into the surface of a fish's nose, which has been coded with information about the origin of the fish.

COE Daily Report – The US Army Corps of Engineers produces many hydrological reports containing measurements of various hydro system parameters.

Descaled – For SMP basin-wide purposes, when a fish is at more than 20% descaled on either side as determined by ocular measurement, the fish is considered descaled. Descaled fish tagged with PIT tags that are entered into PTAGIS are segmented into three descaling categories: at least 10% descaled, between 10-20% descaled, and greater than 20% descaled. This last PTAGIS descaling category is the same as the basin-wide SMP definition of a "descaled" fish.

Electronic Batch – The (.bch) file, which is sent from the remote SMP sites to FPC each sampling day of the fish migration season. This file is actually in (.dbf) format, using the Windows ANSI standard character set, with a different file extension.

External Mark – Fish tags or marks, which are readable through simple visual inspection. Floy Tags, Freeze Brands, Elastomer Tags, and Visual Implant tags are examples of External marks. PIT tags and Coded Wire Tags are not considered external marks, since they are not readable through simple visual inspection.

FPC32 – The current 32 bit Windows version of the Fish Passage Center's Remote Site Data Entry Program for the Smolt Monitoring Project (SMP). This program can run under these operating systems: Windows 95, 98, NT 4.0 and Windows 2000. Some older versions of the Remote Site Data Entry Program were referred to as RSDEP. The older Windows version, which ran under Windows 3.1, Windows for Workgroups 3.11, and Windows 95, was known as FPC16.

Freeze Brands – A form of external mark whereby a fish is branded with a mark using a super-cold branding iron.

Ftp client – A program installed on a computer that enables the user to download files from FTP sites on the Internet using File Transfer Protocol (FTP).

Gas Bubble Trauma Monitoring Program – Also referred to as GBT monitoring. This is a monitoring program, which examines fish after they pass through dams to monitor and measure biological effects from dissolved gas.

Incidental Catch – Fish that are caught in the sample tanks at Remote SMP sites that are not one of the four main anadromous fish species whose passage is monitored in the Smolt Monitoring Program. The four main anadromous species are Chinook Salmon, Sockeye Salmon, Coho Salmon, and Steelhead Trout.

Julian Date – In Basin biological terms, the number of the day of the year, from 1-365. In computer software terms, the number of days after Julius Caesar changed the Roman calendar from the old Roman lunar calendar to the new Julian Sun calendar in 44BC.

KCFS – Kilo cubic feet per second, a quantity measurement of liquid flow. A commonly used measurement scale at mainstem dams in the Columbia and Snake River basin.

Major Species – The four anadromous fish species that are monitored in the Columbia/Snake River basin, Chinook, Sockeye, Coho, and Steelhead.

Mark Recapture – When an externally marked fish is recaptured and observed at an SMP remote sample site, it is called a "mark recapture" or "mark recap". The marks that are considered "external" are elastomer tags; freeze brands, floy tags, and visual implants. PIT tags and coded wire tags and blank cheek tags are not considered external marks.

Multiplier – The mathematical inverse of the sample rate, I.E. one over the sample rate. (1/sr)

PC ANYwhere 32 – A Windows program which is used in the SMP to transfer electronic batches to FPC from sites where Internet e-mail is unavailable. Most SMP remote sites use PC ANYwhere 32 as a backup transfer method for when their Internet connection is down.

Pick List - Drop down menu, List Box, or any popup menu, which uses a scrolling highlighted bar to mark the desired choice.

PIT tag – Passive Integrated Transponder Tag. This is an internal mark, which is used in the SMP predominately to measure travel time down the hydro system. SMP PIT tag marking sites are generally Rock Island, White Bird, Lewiston, Imnaha, and Grand Ronde. The PIT tag is a small glass cylinder approximately 1mm in diameter x 10 mm in length, which contains a small coil and chip which transmit a tiny 134.7 kHz radio signal when excited by a 134.7 kHz radio frequency signal.

Raceway – Part of the juvenile bypass system at mainstem dams that are transportation sites (LMN, LGS, LGR, MCN). Raceways are large water troughs where the fish are stored awaiting transportation by truck or barge after they have passed through the bypass system and/or the sample tanks and recovery tanks.

Rearing disposition – A fish is reared in the wild, or it is reared in a hatchery, or where it was reared is unknown.

Remote site – The locations, (remote to FPC), where SMP sampling takes place. There are currently four remote sites that are fish traps in rivers, and seven remote sites at mainstem dams on the Snake and Columbia Rivers.

Repost – (revise and resend) – When an SMP batch of data is resent to FPC from a remote site for any reason, it is called a repost. Reasons for reposting a batch of data

can vary widely and include such things as intermittent Internet email failure and erroneous data entry that was not picked up by the error checking algorithms.

Separator – This is part of the juvenile bypass system at mainstem dams, which have a juvenile bypass system. The separator is designed to let small fish pass through, and keep mini-jacks, jacks, and adults out of the juvenile bypass system. The separator is also part of the dewatering system in the juvenile bypass systems that removes water and increases the statistical density of fish within a given volume of water passing through the system.

Smolt – An anadromous fish that is migrating down river, towards the ocean. In the SMP, the use of the term smolt almost always refers to the four monitored anadromous fish species. As a baby anadromous fish begin to move down river, morphological changes can occur to the baby fish. For example, some species will "silver up" or become more silver in color. As another example, Chinook will become more "football shaped" as they reach the time to migrate downstream.

SMP – Smolt Monitoring Program, the program to monitor and evaluate the four main anadromous fish species in the Columbia/Snake River basin.

Sub-batch – Each batch of electronic data sent from the remote sites to FPC can contain multiple sub-batches, but not all batches do. Some batches only use the default sub-batch number for the entire batch, which is "01". Usually, one creates a sub-batch for each change in the sample rate during a 24-hour sample. Up to 99 sub-batches can be made for each batch of submitted SMP data.

Transportation – At LGR, LGS, LMN, and MCN, sometimes referred to as the four collector sites, juvenile anadromous fish headed downstream are collected and transported via barge or truck to a place in the river downstream from Bonneville Dam, where they are unloaded back into the river. The transportation program was created to attempt to mitigate the negative health effects on anadromous fish of in-river passage through the hydro system.

Trap Facilities – This refers collectively to the remote site SMP river traps of LEW, WTB, IMN, GRN and CLW.

Validation process – In terms of the SMP, there are multiple levels of the "validation process". First of all, a statistical quality control process is applied to the submitted electronic batches and hand logs, and any discrepancies and possible errors are brought to the attention of the remote site that submitted the batch for possible correction by the remote site. Secondly, each week during fish migration season a spreadsheet containing all of the data submitted year to date from a remote site is sent to the remote site to ensure that what FPC has in its database matches what the remote site has in its database.

Wire Tag – A wire tag can be a coded wire tag (CWT) or a blank wire tag. For example, in the year 2000, some steelhead in the Mid-Columbia basin were marked with blank wire cheek tags, which were not coded wire tags.

IV. *Site by Site SMP Overview*

The smolt data for all four traps will be recorded on data sheets similar to 1999 with the major exception being that fish will be categorized as clipped or unclipped, they will not by categorized by rearing disposition. Recorded data sheets (hand logs) will be faxed to the FPC (Fax: 503-230-7559) ASAP, **No Later than 8:00am** the day following the sample (besides previously arranged exceptions). The data will then be summarized by day and entered into the Fish Passage Center Remote SMP Site Data Entry Program (FPC32). The three daily reports printed from the FPC32 program **Must Be Validated** (Section X) against the data recorded on the data sheets, before each batch of data is electronically transferred to the Fish Passage Center.

A. Bonneville Dam Powerhouse 1.

In the year 2002 migration season, data will be collected at BO1 to compare descaling rates, for fish condition, and for GBT monitoring. GBT Monitoring will begin on April 3, 2002 and end August 31st, 2002 taking place Mondays and Thursdays. The FPDS computes a passage index for the entire project using data collected at BO2. There are no expansions for the collection counts at BO1. Data will be generated daily at BO2, and two to three times per week at BO1. Beginning in 2002, **Enter flow data for each batch submitted by BO1 as well as by BO2.**

B. Bonneville Dam Powerhouse 2.

Smolt sampling at the Powerhouse 2 collection facility will begin March 11th, 2002 and end October 31st, 2002. Smolts will be examined for various factors including species, fin clips, and for smolt quality including descaling. Fish from the general population are obtained from a timed sub-sample of fish diverted from the bypass channel during a 24-hour interval between 7am and 7am daily. Examination of fish occurs at completion of each 24-hour interval. All sampled fish are run through PIT tag detectors.

C. Grande Ronde River trap.

Operates a scoop trap on the lower Grande Ronde River 5 km upstream of the mouth from March 11, 2002 to June 2, 2002 five days per week for a 12-week period. In 2002, PIT tag 200-600 chinook and steelhead for the purpose of providing travel time and survival indices from trap to downstream dams. The total trap allocation for the season is 7,600 tags.

D. Ice Harbor Dam.

GBT Monitoring will begin April 4, 2002, end on approximately June 20, 2000, and take place on Thursdays.

E. Imnaha River trap.

PIT tag a total of 45,000 spring chinook at Lookingglass Hatchery, and 20,000 summer chinook at Imnaha Hatchery for the 2002 comparative survival study. As in prior years funding of the trap operation was split between SMP and lower Snake River

Compensation Study (LSRCS) funds. Operation of the screw trap in the lower Imnaha River will occur between March 12, 2002 and June 2, 2002 five days per week, with operation outside this period covered by LSRCS. As in prior years the SMP will cover the PIT tagging of steelhead (1,400 unclipped, 3,200 clipped) at the trap. The total PIT tag allocation for the season is 4,600 tags.

F. John Day Dam.

Sample smolts from the bypass collection facility in 2002 from April 1 to Sept 15. Fish from the general population are obtained from a timed sub-sample of fish diverted from the bypass channel during a 24-hour interval between 7am and 7am daily. The PIT tag detection system will operate seven days per week, 24-hrs per day, from April 1 until the end of the season or until the number of PIT tag detections becomes negligible.

G. Lewiston.

Operate a dipper trap on the lower Snake River at Lewiston for a 12-week period from March 14 to June 4, five days per week. In 2002, PIT tag 200-600 chinook and steelhead weekly with the goal of providing travel time and survival indices from trap to downstream dams. The total PIT tag allocation for the season is 11,400 tags at the Snake River trap. Examine all unclipped yearling chinook for coded wire tags.

H. Little Goose Dam.

Sample smolts from the collection facility from April 1, 2002 to October 31, 2002 for counts by species and clipped/unclipped status, and for assessing smolt quality including descaling. Examine all unclipped yearling chinook for coded wire tags. Anticipate the need to post-season determine the number of PIT tagged smolts (by species and clipped/unclipped category), which were not originally counted in the summer collection due to the PIT tag override of sample protocol. Fish from the general population are obtained from a timed sub-sample of fish diverted from the bypass channel during a 24-hour interval between 7am and 7am daily. GBT monitoring will begin April 5, 2002 end approximately June 20, 2002 and take place on Wednesdays.

I. Lower Granite Dam.

Sample smolts from the collection facility from March 25, 2002 to October 31, 2002, for counts by species and clipped/unclipped status, and for assessing smolt quality including descaling. Fish from the general population are obtained from a timed sub-sample of fish diverted from the bypass channel during a 24-hour interval between 7am and 7am daily. Examine all unclipped yearling chinook for coded wire tags. Anticipate the need to post-season determine the number of PIT tagged smolts (by species and clipped/unclipped category) that were not originally counted in the summer collection due to the PIT tag override of sample protocol. GBT Monitoring will begin on April 5, 2002, end approximately June 20th, 2002 and take place on Mondays.

J. Lower Monumental Dam.

Sample smolts from the collection facility from April 1, 2002 to October 31, 2002 for counts by species and clipped/unclipped status, and for assessing smolt quality

including descaling. Fish from the general population are obtained from a timed sub-sample of fish diverted from the bypass channel during a 24-hour interval between 7am and 7am daily. Examine all unclipped yearling chinook for coded wire tags. Anticipate the need to post-season determine the number of PIT tagged smolts (by species and clipped/unclipped category) that were not originally counted in the summer collection due to the PIT tag override of sample protocol. GBT Monitoring will begin on April 3, 2002 and end approximately June 20th, 2002 and take place on Mondays.

K. McNary Dam.

Sample smolts from the collection facility from March 25, 2002 to the end of the transportation season, for counts by species and clipped/unclipped status, and information on smolt quality including descaling. Fish from the general population are obtained from a timed sub-sample of fish diverted from the bypass channel during a 24-hour interval between 7am and 7am daily. In recent years, this season has extended as late as mid-December when inclement weather has curtailed the trucking of smolts due to safety concerns. GBT Monitoring will begin on April 5, 2002 and end on August 31st, 2002 and take place on Mondays and Thursdays.

L. Rock Island Dam.

Sample smolts from the collection facility from April 1, 2002 to August 31, 2002 for counts by species and clipped/unclipped status, and for smolt quality including descaling. Examine unclipped steelhead for coded wire tags and blank wire cheek tags. Fish from the general population are obtained from a timed sub-sample of fish diverted from the bypass channel during a 24-hour interval between 7am and 7am daily. PIT tag yearling and subyearling chinook, hatchery and wild steelhead, and sockeye, with the goal of providing travel time and survival indices from trap to downstream dams. Do not PIT tag any fish whose rearing disposition cannot be determined with relative certainty. The total allocation of PIT tags for the season is 4000 yearling chinook, 3400 sockeye, 1200 wild steelhead, and 2800 hatchery steelhead during the spring migration period, and up to 4800 subyearling chinook during the summer migration period (16,200 tags total). GBT Monitoring will begin on April 5, and end on August 31st, and take place on Mondays and Thursdays.

M. Whitebird.

Operate a scoop trap on the lower Salmon River above Whitebird for a 12-week period from March 12, 2000 to June 2, 2000 five days per week. In 2000, PIT tag 200-600 chinook and steelhead weekly with the goal of providing travel time and survival indices from trap to downstream dams. The total trap allocation for the season is 12,000 tags at the Salmon River trap. Examine all unclipped yearling chinook for coded wire tags.

V. System Requirements

The FPC32 program was designed and tested on Windows 95, Windows 98, Windows NT 4.0, and Windows 2000. It has not been tested on Windows ME, but it should work fine. FPC32 does not run under Windows 3.x.

A. Hardware and Software.

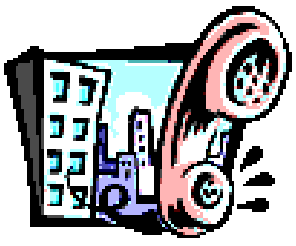
1. **PC Details:**
A 66Mhz 486dx or better PC, with at least 32MB's of RAM  to run the FPC32 program (64-128 MBs recommended) and 120MBs of free hard drive space for each season of data (more RAM and processor power than the minimum is strongly encouraged).

2. **Software**:

   a) **Windows** 95, Windows 98, Windows NT 4.0, Windows 2000, or Windows XP is required and FPC32 does not run under Windows 3.x.
   b) **PC Anywhere** 32, version 7.5 or above (preferably version 8.01 at this date). OR…
   c) An internet **e-mail** connection capable of sending files attached with base 64 encoding.
   d) A **spreadsheet** program such as MS Excel, Lotus, or Quattro Pro to read the (.csv) validation files. (Section X.D).

3. **Communication Devices**:

   a) A **printer** (preferably a laser printer that understands PCL 4 or above) to print the daily reports.
   b) Access to a **FAX** machine to fax the daily hand logs to FPC.
   c) An appropriate **modem** or other types of communication hardware for other types of internet connections such as a cable modem, DSL or ISDN.



VI. *Obtaining the FPC32 Program*

The FPC32 program, version 3.2a, which consists of one file named FPC3232a.exe is available on line and can be downloaded and obtained in two ways:

A. Option 1. FTP Connection.

An ftp client can be connected anonymously to the Fish Passage Center ftp site (ftp.fpc.org) and the files can be found in the (\fpc32\) subdirectory visible on the site. To connect to the ftp fpc site, configure your ftp client to connect to ftp.fpc.org and use 'anonymous' as a login name. If you use a web browser such as Netscape or Internet Explorer to access the ftp site, go to the URL ftp://ftp.fpc.org. Enter your email address as a password. Once you log in, you can transfer the files in the subdirectory for your site to your PC using whatever method your ftp client uses. If you have trouble, please call the FPC Data Center and we will help you

B. Option 2. PC Anywhere.

1. Log In:

You can also use PC Anywhere 32 to obtain the program files, by setting your PC Anywhere to have the correct user login name and password from this list:
Then call (503)230-7560 or (503)230-7561 to log in to the network.

Login Name	Password
BO1	INCONNU
BO2	INCONNU
GRN	VARDEN
IMN	SISCOWET
LEW	GILA
LGR	CHUM
LGS	WHITEFISH
LMN	CHINOOK
MCN	TROUT
RIS	BROOK
WTB	ALVROD

2. Download:

After you have logged in, use the file transfer function of PC Anywhere, by right clicking on the "PC Anywhere in session" icon that is displayed on the Remote Windows 95/NT Desktop Program Bar. When the popup menu displays, choose "PC Anywhere" then choose "File Transfer", and then choose "Controlled by Remote". (Do NOT choose "Controlled by Host"). Find the subdirectory named (G:\FPC32\) in the file list on the right side of the screen. Find or make a suitable subdirectory in the file list on the left side of the screen, which is the temporary subdirectory on your machine that you want to download the FPC32 program to. Highlight the files named (fpc3232a.exe) on the right side of the screen, and then click on [send], and on the next screen, click OK to send or download them to your computer. This is how the FPC32 program is downloaded to your machine. You can check the [hang up when transfer complete] option on the file transfer screen, or once your file download is complete, you can click on the [PC anywhere in session] icon displayed on the Remote Windows 95/NT Desktop Program Bar, choose "PC Anywhere" on the popup menu, then choose "End Session" to hang up.

C. Installation.

1. Run Setup.exe:

Copy the program to a temporary subdirectory, and run it using the “run” command of the Windows Start Menu. When it is finished executing and is fully decompressed, go to the “run” command on the Windows start menu and run the program named (setup.exe) found in the same temporary subdirectory. This version of the (setup.exe) program will install itself by default into a subdirectory named (c:\fpc32) and a program group of Fish Passage Center. You can install the program into any other program group or any other subdirectory or hard drive. If you run two copies of the program on one computer, for two sites, you should install the program into two different subdirectories.

2. Uninstall:

The program will have installed itself into the Windows menu system, and can be found under the program group "Fish Passage Center". The program also installs an uninstall method into the Windows control panel, so that it is listed under "Add/Remove Programs", and can be cleanly uninstalled, while preserving any data batches in the (c:\fcp32) subdirectory.

If you ever have any questions, problems, need help, or wish to discuss anything regarding the FPC/Remote SMP Site Data Entry Program, call Christopher McCarty (503) 230-4582, Henry Franzoni (503) 230-4290, Deidre Wood (503)230-5362 or Sergie Rasskazov (503)230-4289, and we will be glad to help you.

VII. *Operating the FPC32 Program*

A. Setup.

When you start the FPC remote SMP Site data entry program, it opens to a Windows style menu. The first time you are here, click on "Setup" and then click on "Set SMP Site Configuration" (Figure 2). You can enter your site here using the pick list menu. Enter the default sample rate for you site, a sample rate of greater than "1" and less than "0" will not be allowed. Enter a default gear code, a gear code of "MT" will not be allowed at the dams, and a gear code of "GC" will not be allowed at the traps. Enter the default start and stop hours, in military time, ranging from "0000 to 2400". If you are at a trap location, the trap location field appears in the site configuration screen, otherwise it does not. Click on Continue when you are done.

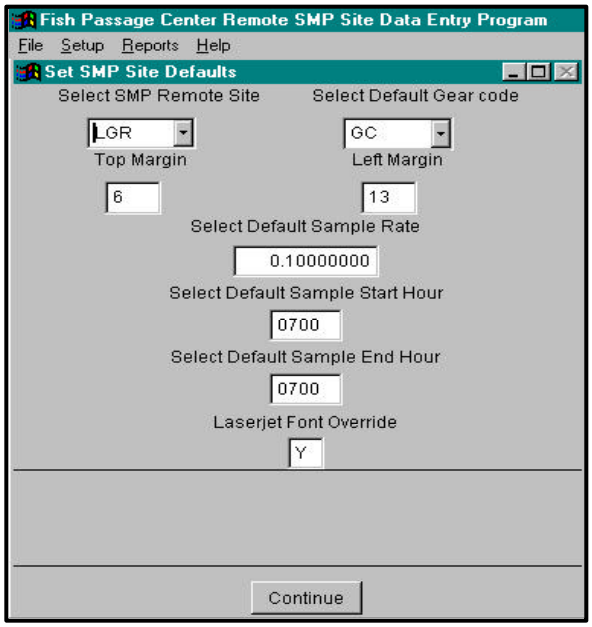


Figure 2. Set SMP Site Configuration.

B. Creating a New Batch for Data Entry.

1. **Batch Name:**

   The first batch of the season should be named "AAA00xxx", (where AAA represents the three letter site code (BO2, JDA, LGR, etc), 00 is the year code for the year 2000, and xxx represents the Julian Date (the number of the day of the year) from 001-366). When you click on "File" then "New SMP Batch", an editing window opens (Figure 3) viewing a (.bch) file named with the three-letter site abbreviation, and a new batch number. Each time you click on "New SMP Batch", the computer creates a batch numbered according to the day of the year.

Example - If on July 6th you select "New SMP Batch" it creates a batch named "BO200288" because July 6th is the 188th day of the year. Any other time on July 6th that you select "New SMP Batch", the program will still try to create a batch named BO200288 if the date is still July 6th. **The program will ask you if you really want to overwrite the batch named BO200288**. If you select "New SMP Batch" on July 7th, the program will create a batch named BO200289. In an ideal world, you should never have

to set the batch number, and each day when you create a batch, the batch will automatically be numbered with the number of the day of the year.

2. Adjusting Batch Numbers:

You must reset the Windows time and date of the computer you are using to the desired date, in order to enter a batch for a date other than the current date. After setting the Windows date to the desired date, create a new batch with the appropriate date, and then reset the Windows time and date to the current time and date.

3. Opening and Closing Batches:

You can open only one batch at a time. You can open an already existing SMP batch by clicking on "Open SMP Batch". Once you have the correct batch number for the database CURRENTLY IN USE you may begin data entry. Click on the X in the upper right hand corner of the editing screen to close the batch. Once that batch is closed, you can go to the "Reports" menu and print reports for the batches.

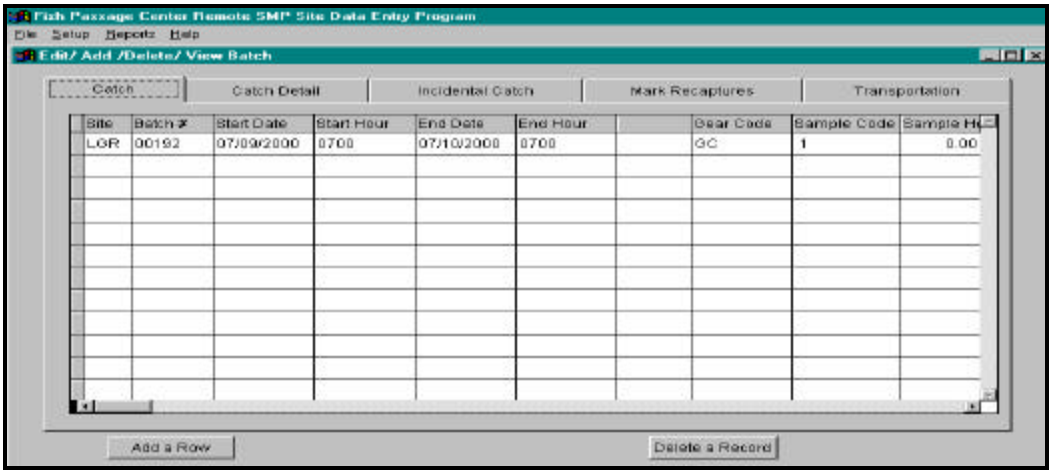


Figure 3. New SMP Batch/Catch Screen

C. Entering Daily Batch Data.

1. Begin Data Entry:

One begins data entry in the Catch screen (Figure 3), the first editing window visible when "New SMP Batch" is selected. To select any of the other screens, select the tab for that screen in the tab section of the editing window. For a detailed description of data entry fields on each screen in the editing window see (Section IX). In any of the data detail screens (Catch Detail, Incidental Catch, Mark Recaptures and Transportation) click on the Add a Row button to add a row to any of these detail data entry screens. Place the cursor in a particular row in a detail screen and click on the Delete a Record button to delete that record. You cannot add or delete a row from the Catch master screen (Figure 3), there is one and only one Catch master record for each batch.

2. **End and Send:**

a) End data entry each day by **printing** out all the reports in the FPC32 program and comparing them to your hand logs (Section X/XI). They are found under "Reports" in the main menu bar. Print the Daily Summary, Incidental Catch and Mark Recaptures reports.

b) **VALIDATE YOUR DATA DAILY BEFORE SENDING IT TO FPC!** Be as certain as possible that the data in the electronic batches matches the data you recorded on your hand logs. In particular, make sure that the sample start date and the sample end date are correct. Also make sure that the sample count, collection count, and mortality counts match your hand logs. (Section X.B).

c) **Send** your hand logs via FAX, to (503) 230-7559 along with forwarding your electronic batches via email or PC anywhere.

d) If you cannot send the batches in on time, be sure to call a member of the data center staff and let us know the reason and when you expect to get the batch in.

e) Send new batches only as an internet email attachment to smp@fpc.org OR

f) Send new batches only via PC Anywhere file transfer to the G: drive root directory found after logging in at (503)-230-7560 or (503)-230-7561. See Section VII, B for details on operating PC Anywhere. Note: If email attachments are being corrupted enroot to FPC from your site, compressing them with a file utility such as WinZip will usually prevent them from being corrupted. If you do compress the data files before sending them, please make sure to inform FPC Data Center Staff that you have done so.

D. Reposts.

If you need to revise and resend a batch, you can reopen a batch that was previously created by selecting "Open SMP Batch" from the menu bar. A dialogue box will open from which you can open your batch file. If you wish to resend a batch, **you must document why you are changing the batch and submit** this documentation along with the batch, preferably via FAX or email. **FPC WILL NOT UPDATE BATCHES UNLESS PROPER DOCUMENTATION IS RECEIVED.** You should also send a copy of this documentation to your project leader. If the batch is already on the (G:) drive, a new batch will not be allowed to overwrite the old batch, call Deidre Wood (503)230-5362, Henry Franzoni (503)230-4290, or Chris McCarty (503)230-4582 to discuss this. One of them may need to move the old data batch before you resend it. Batch changes are NOT cumulative: if you send in an updated batch, all previous batch information is erased, and the new batch overwrites the old batch information. Batches can be sent via email, or via PC Anywhere 32.

- **Via E-mail:** If you send a batch via email, attach it to an email sent to **repost@fpc.org**, along with an explanation memo of why this batch is being resubmitted. If you use Microsoft Exchange, configure your mail client to send a return receipt back to you, acknowledging that the mail arrived.

- **Via PC Anywhere:** If you send it via PC Anywhere 32, connect to the FPC data system by dialing (503)230-7560 or (503)230-7561, and upload it to the (G:\replace) drive using the file transfer portion of PC Anywhere 32. Be sure to also send an e-mail to **repost@fpc.org**, stating that you have uploaded a repost. (Section X.C). **Send new batches only to smp@fpc.org**

E. Special Situations.

1. **Daylight Savings Time Transitions:**
   a) In the **Spring**, the start and end times will be recorded normally, but on April 1st, the sampling hours will be 1 hour less and the flows averaged for 23 hours.
   b) In the **Fall**, the start and end times will be recorded normally, but on October 28th, the sampling hours will be 1 hour more and the flows averaged for 25 hours.

2. **Sampling End Date is the Same for Two Batches:**

Each batch must have a unique batch number and a unique date.

a) If sampling ends on the same day as the previous batch, the **batch number** must be that of the following day
b) Then put the **actual end date** and **end hour** in the Comments field.
c) Put the **actual sample hours** in the Sample Hours field.
d) Put the **adjusted sample end date** (the following day) in the End Date field.
e) Be sure that the **Sample Code** reflects this adjusted sample.

VIII. *Format of Data Entries*

A. Catch Screen.

When a new SMP batch is created, or an old SMP batch is opened, the program displays the master Catch screen (Figure 4). Only one row can be added to the Catch screen, for each batch has only one catch master record. To exit this screen and close the batch, click on the X in the upper right hand corner. To switch to one of the other data entry screens, click on the appropriate tab along the upper edge of the screen.

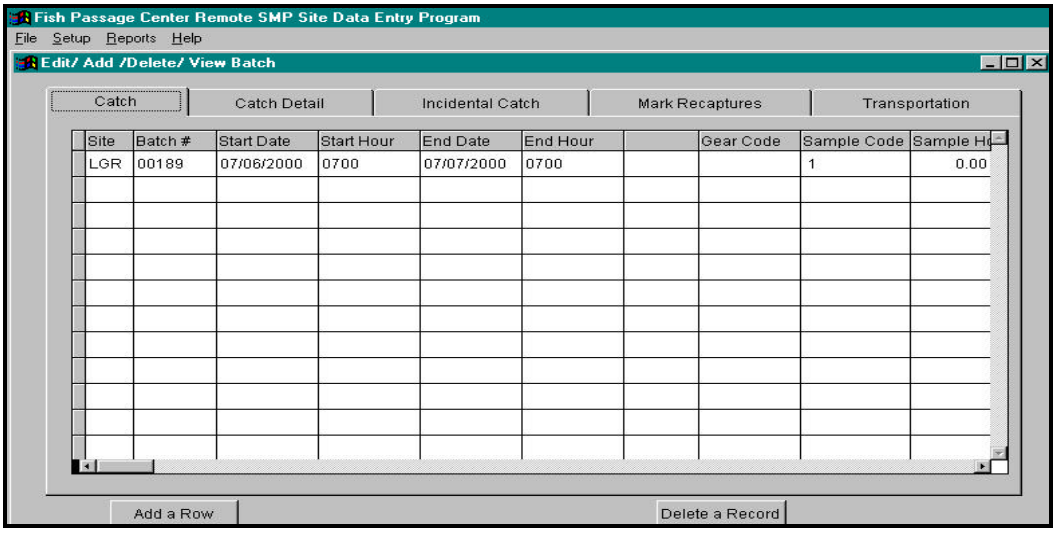


Figure 4. Catch Screen.

The data entries for each field follow:

1. Start Date:

Enter the date the sample began. The default is yesterday's date. Format = MM/DD/YYYY. Legal dates must be entered here, the date is validated to determine if it is a legal date.

2. Start Hour:

Enter the actual start hour, in 24hr military time. The default start hour is carried forward from the site setup screen (Section VIII.A, Figure 2). Numbers less than 0000 or greater than 2400 are restricted from entry here.

3. End Date:

Enter the date the sample ended (Format = MM/DD/YYYY). This defaults to today's date for all sites. The date is compared against the sample start date, and if the end date is less than the start date, an error message is displayed. If sampling end date is the same for two batches see Section VIII.E, 2.

4. End Hour:

Enter the actual end hour, (in military 24hr time). The default end hour is carried forward from the site setup screen. Numbers less than 0000 or greater than 2400 are restricted from entry here.

5. Trap Location:

At the **Imnaha** river trap, enter "1,2,3, or 4" for trap positions 1-4. At the **Snake** River Trap, enter "0" or "east" when the trap is in its normal position. At the **Salmon** River Trap, enter the number of meters the trap is from the northern cable tower, IE. "10M, 30M, 50M or 10,30,50". At the **Grande Ronde** River Trap, enter the number of feet from the east tower that the trap is located at, for example, "175".

6. Gear Code:

Click on the pick list in the cell and select a gear code (Figure 5). A default gear code selection appears on the site setup screen. This code will be carried forward into the catch detail screen, and most often, it will not need to be edited on the catch detail screen to change it for sub-batches. A Gear Code of "MT" is restricted from being entered at the **dams**, and gear codes other than "MT" or "00" are restricted from being entered at the **traps**.

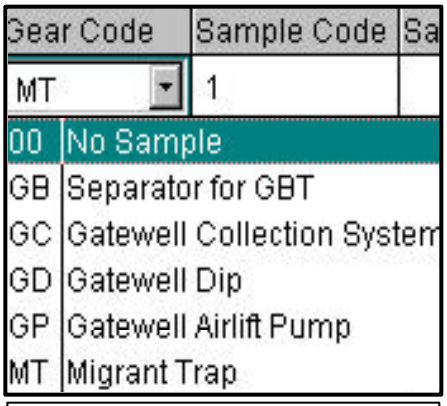


Figure 5. Gear Codes

7. Sample Code:

The sample code defaults to "1", which means "Normal Complete Sample". If you wish to change this, select from the pick list menu with the codes and their meanings. When there is no sample conducted in a collection period, enter a sample code of "3" and a gear code of "00", and enter flow information. If there is a sample conducted but no fish are collected, enter a gear code of "GC" along with the flow information. If sampling end date is the same for two batches see Section VIII.E, 2. The available codes for the sample code field are listed below:

- **1** = Normal Complete Sample.
- **2** = Two or more samples taken during a day with separator clean out.
- **3** = No sample /biased sample due to abnormal flows or in operation of sample unit.
- **4** = No sample / biased sample due to weather conditions.
- **5** = No sample / biased sample due to equipment failure / maintenance / repair.
- **7** = Incomplete sample, no code provided, cause explained in comments.
- **8** = No fish counts were entered for this sample period; fish accumulated and were sampled at a later date.
- **9** = Incomplete / biased sample, counts are modified to estimate a normal sample.

- **10** = Two or more samples taken during a day with multiple sample rates.
- ≥ **12** = Sample of fish accumulated 2 or more days. The sample code minus 10 is the number of days that fish accumulated before being sampled.

8. Sample Hours:

Enter the actual number of hours sampled to the nearest 0.5 hours. If sampling end date is the same for two batches see Section VIII.E, 2. Daylight savings time see Section VIII.E, 1.

9. River Flow:

(**Total Discharge**) Enter this value at the mainstem dams sites only, (**BO2, JDA**, **MCN, RIS, LMN, LGS**, and **LGR**) enter the daily average hourly total flow (in kcfs) corresponding with the collection period. [At the trap sites, (GRN, IMN, LEW, WTB), entering this value is optional and not required. If one enters this value at a trap site, it is allowable to enter it in either KCFS or CFS units.] On days when there is no sample performed, send in a batch with flow and spill information only, using a gear code of "00" and a sample code of "3" to denote a "flow/spill only" batch. Obtain this number from the COE's Crohms System daily report, or from online COE data reports such as report 96 (ftp://ftp.nwd-wc.usace.army.mil/pub/café/). Email/fax FPC a copy of this report along with your daily hand-logs. Daylight savings time, see Section VIII.E, 2.

10. PH 1 Flow/Turbine Discharge:

Enter this value at mainstem dam sites only (**BO2, JDA, MCN, RIS, LMN, LGS**, and **LGR)**. Enter the daily average hourly flow (in kcfs) for powerhouse 1 corresponding with the collection period as described for River Flow above. Obtain this daily number from the Army Corps. of Engineers at the project (for BO2, obtain this value by subtracting BON 2 AVG DISCH from AVG TURB DISCH found in row BON D on the COE daily report). At **BON** and **RIS**, this flow number plus the powerhouse 2 flow number plus the spill (PH1+PH2+Spill) cannot be greater than the total discharge. If the sum is greater than Total Discharge, an error message is displayed. At **JDA, MCN, LGS, LMN** and **LGR**, the powerhouse 1 number plus the spill (PH1+spill) is compared to the total discharge number, and this field is labeled Turbine Discharge. If the sum is greater than Total Discharge, an error message is displayed. This column is not displayed at **WTB, IMN, LEW,** and **GRN**. Daylight Savings time see Section VIII.E, 2.

11. PH 2 Flow:

This field only appears at **BO2** and **RIS** in the SMP Data Entry program. Enter the daily average hourly flow for powerhouse 2. This number is found on the COE daily report BON 2 AVG DISCH in the row labeled BON D. At **BON**, the sum of powerhouse 2 flow plus powerhouse 1 flow plus spill (PH2+PH1+spill) cannot exceed the total discharge or an error message is displayed. This column is not displayed at **WTB, GRN, LEW**, and **IMN**. Daylight savings time see Section VIII.E, 2.

12. Total Spill:

Enter this value at mainstem dam sites only **(BO2, JDA, MCN, RIS, LMN, LGS**, and **LGR).** Enter the AVG SPILL , found in row BON D on the COE daily report. This number is added to the flow from Powerhouse 1, (or Powerhouse 1 + 2 for **RIS** and **BO1**), and compared with the Total Discharge. If the Total Discharge is less than the sum, an error message is displayed. This column is not displayed at **LEW, WTB, GRN**, or **IMN**.

13. **Comments**:

(Comments 1 and 2) Comments are used primarily to explain problems in getting the daily sample as described in number 7 above. Observations of fish condition or abnormal size should be included in the comments. Extraordinary events impacting fish passage should be notated. The comments field should not be used to indicate data entry updates, such comments as: water temperature, turbidity, lamprey, kokanee, etc. should not be included. If sampling end date is the same for two batches see Section VIII.E, 2.

B. Catch Detail Screen.

Site, batch and gear code are carried over from the Catch screen. You must click Add a Row for these codes to appear and to begin data entry into the Catch Detail screen (Figure 6). The default sample rate and multiplier are carried over from the site setup screen. If you must edit the gear code for a sub-batch, you must override the default value, which will be the same as it appears on the catch record for each particular batch. Enter a separate detail record for each sample rate used during the day, for each species (the four main monitored salmonids), for each rearing disposition, and for chinook only, each age (1 or 0).

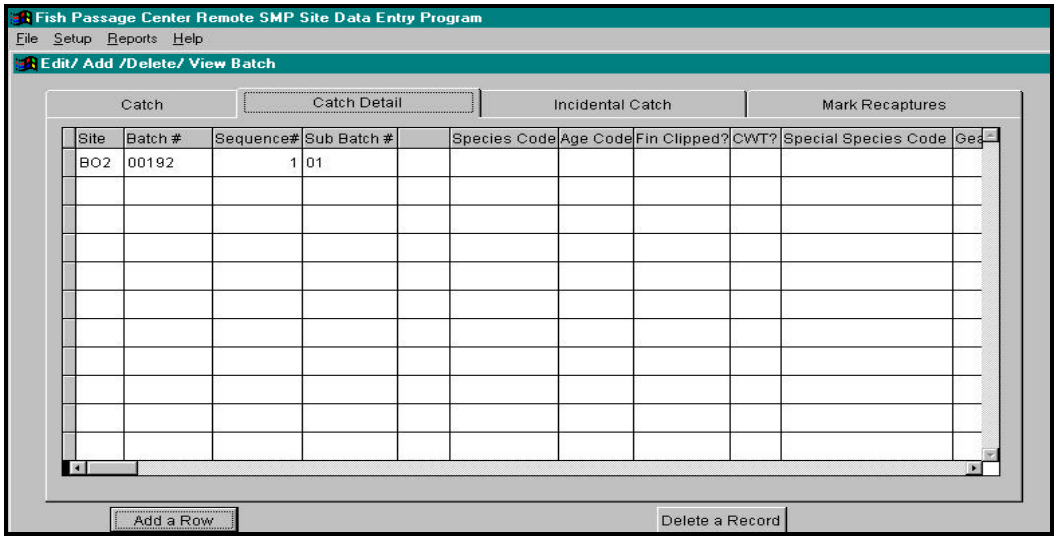


Figure 6. Catch Detail Screen.

1. **Sub Batch:**

Enter "01" for the first sample, which is the default. If the sample rate changes during sample day, create a new sub-batch for each period with a different sample rate. Enter "02" for second sub-batch, "03" for third, etc. Sub batch only changes with sample rate. Each sample rate gets a sub batch.

2. **Tank:**

This field only appears at **LGS, LMN** and **MCN**, use the pick list to enter "A", "B" or a blank. Use a blank to denote fish from the separator that are put into a raceway after examination, not into tank A or B. At **MCN** use a blank to denote raceway 10.

3. **Trap:**

This field only appears at **IMN.** Use the pick list to enter "A" or "B" to designate trap.

4. **Species Code:**

Click on the pick list in the cell and select the appropriate species code (Figure 7). These are the only species codes that are allowed to be entered here.

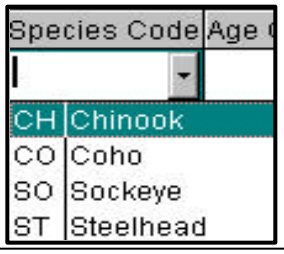


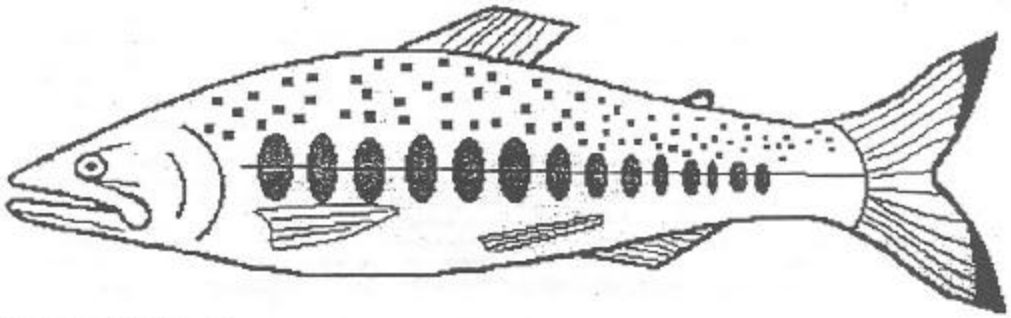
Figure 7. Species Codes

NOTE:

- Exclude chinook mini-jacks (150-300mm) that are obvious precocious males to the extent possible from the chinook smolt count. Enter them in Incidental Catch detail.
- Use a size threshold of 200mm to exclude large obvious kokanee from the sockeye smolt count and enter them instead in incidental catch detail. The sockeye smolt count will include all sockeye and kokanee 200mm or smaller.
- Use the less streamlined shape and the non-silvery color characteristics of rainbow trout to exclude them from the steelhead smolt count and enter them instead in the incidental catch detail.

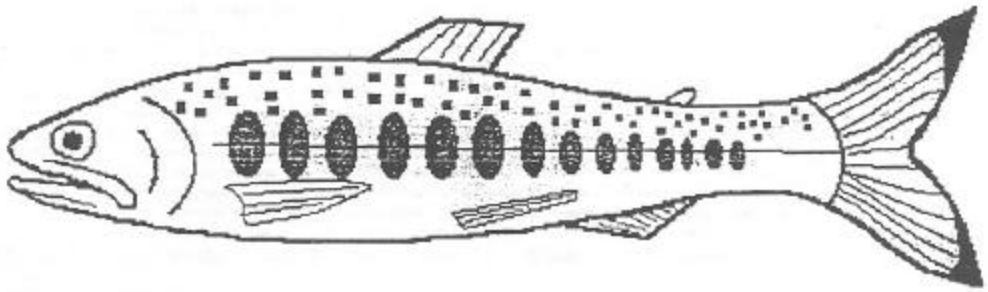
5. **Age Code:**

For **chinook** only click on the pick list in the cell and select "0" for "subyearling" or "1" for "yearling"; leave blank for all other species. To determine whether a chinook is a yearling or subyearling, see the morphologic diagram below. The Age Code field will not allow entry if the species code is other than chinook, and requires entry if the species code is chinook.



Sub-Yearling Chinook

1. Caudal fin forked, with outer margin usually black.
2. Parr marks large, vertical oblong shapes centered on lateral line and wider than interspaces.
3. Anal fin rays short, wedge shaped, usually not pigmented.
4. Large spots on back.
5. Body wider, eye smaller, nose more sharp than a yearling chinook (football shape).



Yearling Chinook

1. Caudal fin forked, usually edged in black.
2. Parr marks large, vertical oblong shapes centered on lateral line and wider than interspaces.
3. Anal fin rays short, wedge shaped, usually not pigmented.
4. Large spots on back.
5. Body narrower, eye larger, nose more rounded than sub-yearling chinook.

6. <u>Fin Clipped?:</u>

Enter "Y" for "Yes it has a Fin clip, an Adipose or Ventral fin clipped". Enter "N" for "No it doesn't have a fin clip".

7. CWT?:

Does it have a coded Wire Tag? Ignore this field at **BON, MCN** and **JDA,** leave it blank. This is to be used only at **LEW, WTB, IMN, GRN, LGR, LGS,** and **LMN** for unclipped chinook yearlings with coded wire tags. This is to be used at **RIS** for unclipped steelhead with blank cheek tags.

8. Special Species Code:

Click on the pick list in the cell and enter "FR" for "FRY" if fish is 60mm or less at all sites (Figure 8). "TU" for "TULE" will be entered by default for Chinook subyearlings sampled before June 1st at **BON** only. You can overwrite this default if required. Do not use the code "NS" (Natural Supplementation) at **BON** or **JDA**, this is for **Snake River** sites only. When you enter the Fry code, the species code is checked to make sure it is for Chinook or Coho, the only species that have fry, an error message is displayed otherwise. If Chinook is the species code, the age code is checked to make sure it is age 0, since only age "0" chinook can be fry. An error message is displayed otherwise.

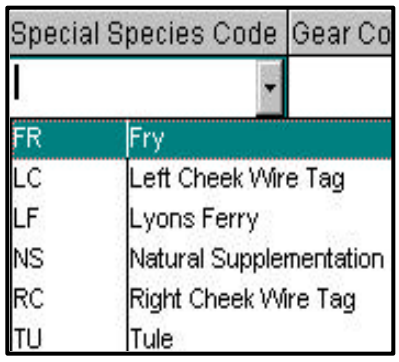


Figure 8. Special Species Codes

NOTE:

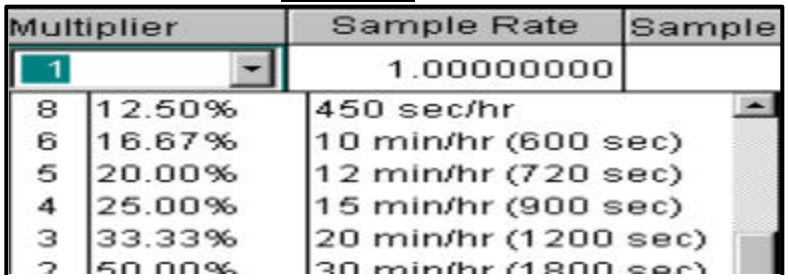
- If fish do not meet the above-mentioned criteria, contact FPC for instructions as to which code is appropriate.

9. Gear Code:

Click on the pick list in the cell and select a gear code, if different from the default. The gear code of "MT" is restricted from being entered at **BON** or **JDA**, an error message will display. You should not be entering this gear code on the Catch Detail screen if you are entering flow information only. The current codes for use at the **traps** are, "00" and "MT".

10. Multiplier and Sample Rate:

For each sub-batch, use the default multiplier or click on the pick list to pick another multiplier and its corresponding sample rate will automatically appear in the Sample Rate field. The pick list displays the multiplier, the sample rate percentage, and the number of minutes and seconds per hour for each sample rate (Figure 9). If you enter a sample rate directly, (which you can't do at **BON** or **JDA**, where the sample rate field is read only), use eight digits to the right of the decimal point (e.g. enter 0.00666667 for a .679 rate). **You must first click on the field and use [Delete] or [Backspace] in this field, to enter a sample rate manually.** The recommended multiplier/sample rates in the Multiplier pick list menu produce integer collection



counts and allow for easy checking of accuracy.

11. Sample Count:
Enter the number of fish sampled.

12. Collection Count:
Default is calculated by dividing Sample Rate into Sample Count. The calculated value cannot be over ridden at **JDA** or **BON** only. Using integer multipliers instead of sample rates will reduce any rounding errors that may appear in the calculated quantity.

13. Num Exam for Descal:
Enter the number of fish examined for descaling. The automatic field validation logic displays an error message if the Sample Count minus Sample Morts is less than the number examined for descaling.

14. Num Descaled:
Enter the number of fish descaled from the fish examined for descaling. A fish that has greater than 20% descaling on one side is considered descaled. The auto field validation logic checks to see if Number Descaled is greater than Num Exam for Descal, if so, an error message is displayed.

15. Sample Morts:
For each sub-batch, enter the number of SMP related sampling mortalities for each species/age/rearing disposition. Enter the sample tank/room mortalities and GBT mortalities that died after being removed from the separator. Separator mortalities get entered in a special way described below as Facility Morts. Do **NOT** enter a single mortality in more than one place. This quantity is subtracted from Sample Count, and the result is compared with the number examined for descaling. If the number examined for descaling is greater, an error message is displayed. **Mortalities are NOT examined for descaling**.

NOTE:
- If a mortality is externally marked (elastomer tagged or freeze branded) the following steps must be taken: Enter the mort as a regular mortality, enter a comment in the comment field (Section IX.A.13) describing the external mark of the mort, and also enter the marked mort as a marked live fish in the Mark Recapture Screen.

16. Facility Morts:
In a sub batch, enter the daily number of facility related mortalities (e.g. transportation raceways, separator morts.), for each species/age/rearing disposition. Enter separator morts here using the following protocol; enter a sample count of "0", a sample rate of "1", and enter the mortalities in the collection count field, and the facility mortality field. In this way, the separator morts will be considered facility

morts, and included in the collection count, but not in the sample count. This field does not appear at the **traps**.

NOTE:

- If a mortality is externally marked (elastomer tagged or freeze branded) the following steps must be taken: Enter the mort as a regular mortality, enter a comment in the comment field (Section IX.A.13) describing the external mark of the mort, and also enter the marked mort as a marked live fish in the Mark Recapture Screen.

17. Research Morts:

In a sub-batch, enter the daily number of fish taken out of the SMP sample and sacrificed by non-SMP researchers. (e.g. mortalities from NMFS PIT-tagging or other agency research) for each species/age/rearing disposition.

18. PIT Tag Morts:

Do not use this field at **BON**, **JDA, MCN, LMN, LGS, or LGR.** Use this field only at **RIS, WTB, LEW, IMN,** and **GRN** Enter the number of mortalities due to SMP PIT tagging operations.

C. Incidental Catch Screen.

The Incidental Catch screen is for recording daily totals for sample counts and mortalities of incidental species (species not recorded as part of the regular catch detail entry) (Figure 10). You must click Add a Row for default codes to appear and to begin data entry.

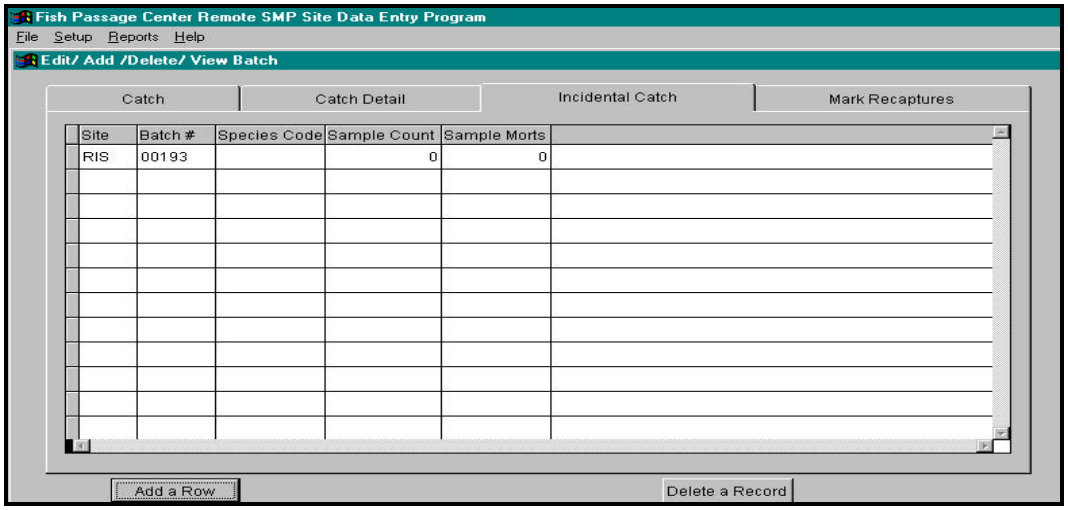


Figure 10. Incidental Catch Screen.

1. Species Code:

Click on the pick list within the cell and select the appropriate species code from the list box. The list is sorted alphabetic by major species. I.E. all the Trout species are grouped together, all the Lamprey, Dace, and Whitefish species are grouped together, and an English description is displayed next to the species code in the pick list. The Adult codes are at the end of the pick list, (due to the infrequency of their use) except

for Jacks and Mini Jacks, which are found in their standard place in the alphabetic list. The incidental species report also prints out in this same order, to facilitate validation. Incidental species codes are listed below and on the next page:

Fall back Salmonids

J0 = Minijack Chinook (6-12 inches)
J1 = Jack Chinook (12-22 inches)
J2 = Wild Minijack Chinook
J3 = Hatchery Minijack Chinook
J4 = Wild Jack Chinook
J5 = Hatchery Jack Chinook
A1 = Adult Chinook
A2 = Adult Coho
A3 = Adult Steelhead
A4 = Adult Sockeye
A5 = Adult Hatch Chinook
A6 = Adult Hatchery Coho
A7 = Adult Hatchery Steelhead
A8 = Adult Hatchery Sockeye
A9 = Adult Wild Chinook
AA = Adult Wild Coho
AB = Adult Wild Steelhead
AC = Adult Wild Sockeye
AD = Adult Kelts
AE = Adult Hatchery Kelts
AF = Adult Wild Kelts

More Incidental Codes

BS = Small-mouth bass
BL = Bluegill and Pumpkinseed
BH= Bullhead
CP = Carp
CC = Channel Cat
CM = Chiselmouth
CR = Crappie species
LD = Long Nose Dace
SD = Speckled Dace
KO = Kokanee
LA = Adult Lamprey
LJ = Juvenile Lamprey
LB = Juvenile Lamprey Brown
LS = Juvenile Lamprey Silver
PM = Peamouth
PE = Perch, Yellow
RS = Redside Shiner
SR = Sand Roller
SC = Sculpin species
SN = Sturgeon, Green
MA = Tadpole Madtom
AT = Adult Bull Trout
SJ = Juvenile Shad
SA = Adult Shad
SQ = Northern Pike Minnow
SK = Stickleback, 3 spine
SG = Sturgeon, White
SU = Sucker species
BU = Bridgelip Sucker
LU = Largescale Sucker
MU = Mountain Sucker
TT = Tench
BT = Brook Trout
NT = Brown Trout
LT = Bull Trout **(Adult or Juvenile)**
CT = Cutthroat Trout
RT = Rainbow Trout
WE = Walleye
MW = Mountain Whitefish
LW = Lake Whitefish
OT = Other species not listed
WA = Warmouth
BM = Largemouth bass
JT = Juvenile Bull Trout

2. Sample Count:

Enter the number of incidental fish of each particular incidental species found in the sample tank Species Code.

3. Sample Morts:

For **Lamprey** only, enter the number of incidental mortalities found in the sample.

D. Mark Recapture Screen.

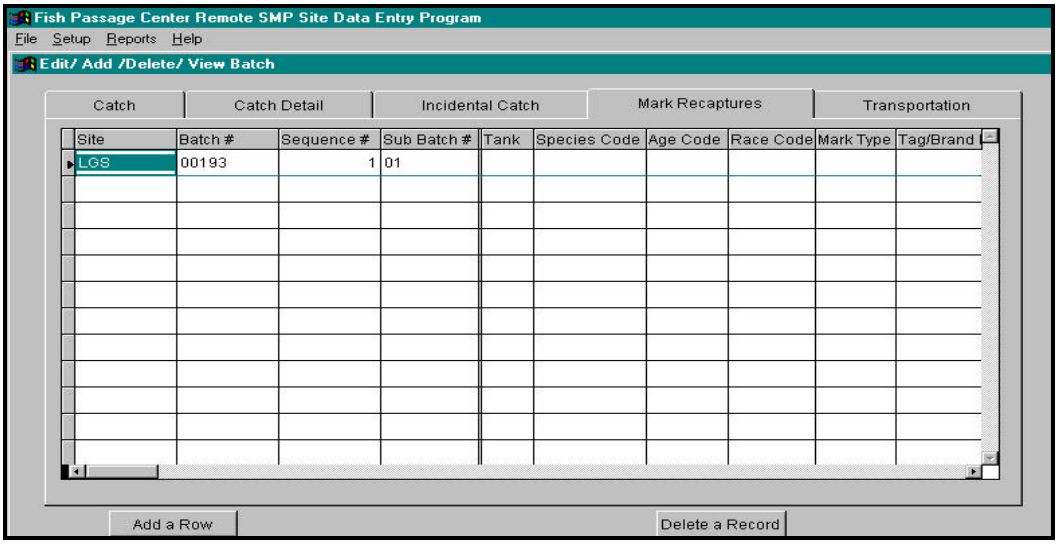


Figure 11. Mark Recapture Screen.

1. Sub Batch:

This field facilitates the reporting of marked fish in samples carried out using different sample rates and/or mechanisms, within one batch or sampling period. The default is "01". Sample rates should not change within a sub batch. If you change the sample rate, change to a new sub-batch number, there can only be one sample rate per sub batch. A sample rate for each sub batch is found on the Catch Detail screen. Make sure you are aware that the sample rate for the sub-batch in the Catch Detail screen relates to the marked fish in the sub batch you are entering here. The sub batch on the bottom most record in the list will be carried forward when you add a record here. If you change it, the changed sub batch will be carried forward when you add a record here.

2. Tank:

This field only appears at **LGR**, **LGS**, **LMN**, and **MCN**, enter "A" or "B" to designate tank.

3. Trap:

This field only appears at **IMN**, enter "A" or "B" to designate trap.

4. Species Code:

Click on the pick list in the cell and then select the appropriate species code from the list box (Figure 12).

Enter in "RT" for "Rainbow Trout" if you encounter **marked rainbow** trout only.

5. Age Code:

Figure 12. Species Codes

For **Chinook** only, click on the pick list in the cell and enter "0" for "Subyearling" or "1" for "Yearling". The validation logic allows age code entry for chinook, and no other species. See morphological diagram above to for method to distinguish between yearling and subyearling chinook.

6. Race Code:

Click on the pick list in the cell and then select the appropriate race code from the list box. Below are the race codes available by species. Leave blank for coho and sockeye. If a race code is entered for coho or sockeye, and error message is displayed. If a race code is omitted for rainbow trout, steelhead or chinook, and error message is displayed. If needed, refer to the current mark release hatchery information on the FPC web site at http://www.fpc.org/Hatchery/Hatchery.htm to determine what race the marked fish is.

Chinook	Steelhead	Rainbow Trout
SP = Spring	**SU** = Summer	**UN** = Unknown
SU = Summer	**WI** = Winter	
FA = Fall	**UN** = Unknown	
UN = Unknown		

7. Mark Type:

Click on the pick list and select the type of external mark observed on a fish or group of fish with identical mark types/attributes. Current valid mark types are listed (Figure 13).

Figure 13. Mark Types

NOTE:

- Coded Wire tags and PIT tags are internal marks that are not included in this entry screen. Recaptured PIT tagged fish are reported directly to PTAGIS.

8. Tag/Brand Location:

(Mark Location) Click on the pick list and select a location code for freeze brand and elastomer (Figure 14). The auto field validation logic checks to see what mark type was entered. An error message is displayed if the wrong location codes are used for the wrong mark type. An error message is also displayed if Mark Type is a "Floy" tag or a "Visual Implant" tag and data entry is attempted in this field.

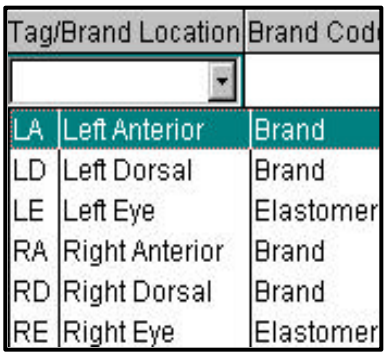


Figure 14. Tag/Brand Locations.

9. Brand Code:

This is for Freeze Brands only. Select the brand from the pull down list..

10. Brand Orientation:

This field is only used when Mark Type is "FB" (Freeze Brand). Click on the pick list in the cell to select an orientation. e.g. 12 o'clock = 1, 3 o'clock = 2, 6 o'clock = 3, 9 o'clock = 4. An error message is displayed if the mark type is anything other than "FB", and data entry is attempted here.

11. Tag Number:

For **Floy** and **Visual Implant Tags** only, it is discernible; enter tag number in this field. An error message is displayed if Mark Type is "FB" or "EL", and data entry is attempted here.

12. Tag Color:

For **Elastomer Tags** only, click on the pick list in the cell and select the appropriate color code, (RE = Red, GR = Green, OR = Orange, YE = Yellow, and BL = Blue). Leave blank for numbered VI tags. If a color code entry is attempted for any other mark type, an error message is displayed.

13. Clip Code:

Click in the pick list in the cell and record clipped fins, and clipped fin combinations on marked fish

Figure 15. Clip Codes.

14. Supplemental Code:
Leave blank.

15. Length:
Record for **freeze brand** fish only, use millimeters as the measurement unit.

16. Tally Total:
For each mark group enter total number sampled. If entering individual fish records (e.g. individual freeze brand fish) then enter "1".

E. Transportation Screen.

This screen appears at **transportation** sites only and you must click Add a Row to begin data entry (Figure 16). Transportation data is by species and broken down by the clipped or unclipped characteristic. Unclipped yearling chinook with coded wire tags are also tracked. The numbers for bypassed, trucked and barged are derived from the collection totals minus total facility mortalities for each species.

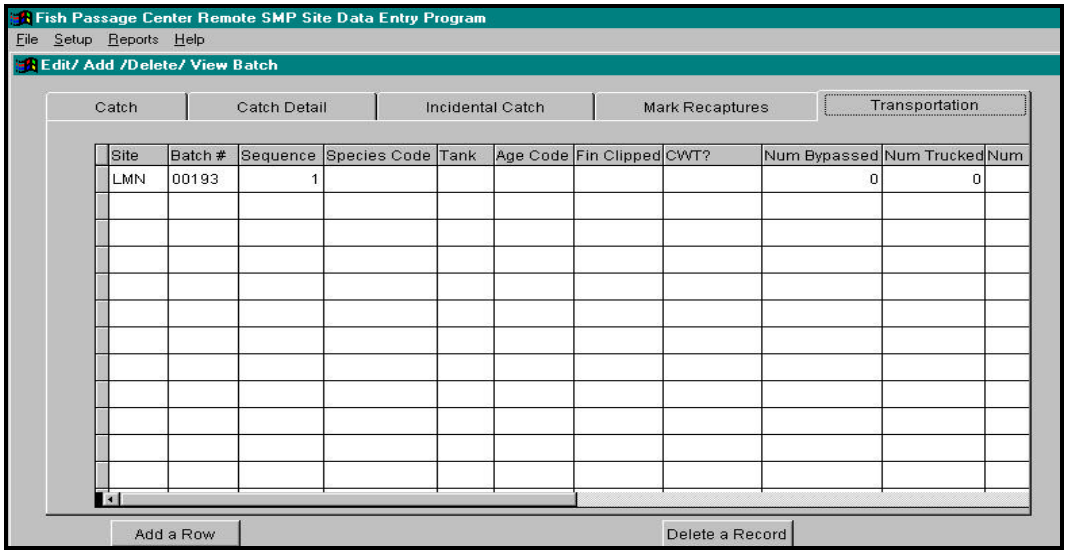


Figure 16. Transportation Screen.

1. **Tank:**

At **LGS, LMN**, and **MCN** enter "A" or "B" to designate the correct tank. Enter a blank to designate fish from the separator.

2. **Species Code:**

Click on the pick list and select the appropriate species code from the list box (Figure 17).

Figure 17. Species Codes

3. **Special Species Code:**

Click on the pick list in the cell and enter "FR" for "FRY" if fish is 60mm or less at all sites (Figure 8). Use the "NS" (Natural Supplementation) for the three **Snake River** sites only (LGR, LGS, LMN). When you enter the Fry code, the species code is checked to make sure it is for Chinook or Coho, the only species that have fry. An error message is displayed otherwise. If Chinook is the species code, the age code is checked to make sure it is age 0, since only age "0" chinook can be fry. An error message is displayed otherwise.

NOTE:

- If fish do not meet the above-mentioned criteria, contact FPC for instructions as to which code is appropriate.

4. **Age Code:**

For **chinook** only: enter "0" for "subyearling" and "1" for "Yearling", otherwise leave blank.

5. **Fin Clipped:**

Enter "Y" if the fish has an adipose or ventral fin clip. Enter "N" if there are no adipose or ventral fin clips.

6. **CWT?:**

Enter "Y" if there is a coded wire tag and you have been requested by FPC to check for a coded wire tag on that particular species. Enter "N" only if you have checked for a coded wire tag and there is there is not a tag. Otherwise leave blank.

7. **Num Bypassed:**

Enter the number of fish bypassed for each species/rearing disposition group.

8. **Num Trucked:**

Enter the number of fish trucked for each species/rearing disposition group.

9. **Num Barged:**

Enter the number of fish barged for each species/rearing disposition group.

IX. *Validation*

A. Automatic Data Validation.

There is an automatic data validation process that occurs for most fields when data is entered. For example, if the special species code for Fry is entered, the program checks to see if the general species code has been entered. If the general species code is for chinook, the age code is checked to make sure that it is an age code of zero, since only a chinook zero could be a Fry. The details of the various data checking algorithms are explained in the detailed instructions for entering data into each field of the FPC32 program. (Section IX).

B. SMP Site Validation.

After printing the three required reports it is important that you **Validate your data before sending anything to the Fish Passage Center**. Validate by comparing these printed reports to your hand logs, paying special attention to the sample counts, collection counts, flow/spill quantities and mortality counts, before each batch of data is electronically transferred to the Fish Passage Center.

C. FPC Weekly Validation.

1. The FPC validates two random batches from every week by comparing the hand logs with the electronic batches for any discrepancies.
2. For every batch with a discrepancy the FPC validates two additional batches for the same week.
3. The FPC then contacts the appropriate site via e-mail requesting that necessary corrections be made and batches resent. (Section VIII.D).
4. When resending hand logs or electronic batches you are required to include a description of what you are sending and why. **FPC WILL NOT UPDATE BATCHES UNLESS PROPER DOCUMENTATION IS RECEIVED.**

D. FPC Validation Spreadsheets.

Once a week the FPC will send all sites a set of validation spreadsheets generated form our SQL database. These spreadsheets should be checked against the data in your electronic batches. If discrepancies are found then follow normal reposting procedures. (Section VIII.D). The validation files have been improved for 2002, rows for days with no data are included, and batch numbers are included in each row to facilitate the use of pivot tables in spreadsheet programs to subtotal and grand total the counts by species rearing disposition, batch number, etc.

E. End of Year Validation.

When sampling for the year is complete each site must send an e-mail to the FPC, as notification that the sample season has ended and stating the final data batch number. If necessary this e-mail will also request a yearly validation spreadsheet including the data from the site for the entire year, which should match the sites own data records. After you have validated your end-of-year data against the FPC validation

spreadsheets and all corrections have been made, you must send us an e-mail stating that your data is finalized. Once a week the FPC will send all sites a set of validation spreadsheets generated form our SQL database. These spreadsheets should be checked against the data in your electronic batches. If discrepancies are found then follow normal reposting procedures.(Section VIII.D). **The validation files have been improved for 2002, rows for days with no data are included, and batch numbers are included in each row to facilitate the use of pivot tables in spreadsheet programs to subtotal and grand total the counts by species rearing disposition and batch number, to facilitate comparing hand logs and electronic batches to the validation data.**

F. Project by Project Details for SMP Reporting Requirements

1) For Bonneville Dam and John Day Dam: Tasks 1.01, 1.02, 1.03, 1.04, 1.05, 1.06, 1.10, 2.01, 2.02, 2.03, 2.04, 2.05, 2.06, 2.07, 2.08, 2.12, 3.01, 3.02, 3.03, 3.04, 3.05, 3.06, and 3.10 in Appendix B of the 2002 Smolt Monitoring Program Work Statements and Budgets, must be completed and reported to FPC ASAP, at the latest by 8:00am of the day following sampling. For tasks 1.11, 2.13, and 3.11 in Appendix B, a spreadsheet containing year to date data will be sent weekly to each site from FPC, and the data must be compared to remote site data and validated and any discrepancies reported to FPC within one week of receiving the weekly spreadsheet. At the end of the season, the whole year of data must be validated and any discrepancies reported to FPC by the remote site within two weeks of the last sampling date. After any end-of-the-year discrepancies are resolved, the remote site leader must send a memo to FPC declaring that the data is accurate and final for the year within one week of that resolution.

2) For Rock Island Dam, Appendix C of the 2002 Smolt Monitoring Program Work Statements and Budgets states that sampling will include the following:

   1) Sampling salmonid migrants captured in the collection facility from 1 April to 31 August 2002 for counts by species and adipose fin-clipped/unclipped status, for smolt condition and descaling daily.
   2) Totaling the number of tagged fish of each and all species caught daily
   3) Report counts and condition of all species to the FPC daily
   4) Insert PIT tags into between 200 and 600 chinook yearlings, adipose fin-clipped hatchery steelhead and sockeye, and 200 adipose fin-present steelhead weekly (Table 1).
   5) Insert PIT tags into as many sub-yearling chinook daily as necessary to reach 600 fish per week over an 8-week period between mid-June and mid-August (seasonal total of 4,800 fish).
   6) Transfer PIT tag data if generated to PSMFC PITAGIS system daily.
   7) Examine juvenile salmonid emigrants for symptoms of GBT twice weekly.
   8) Report GBT examination results to FPC when collected
   9) Report the average river flow, average flow through Powerhouse No. 1, average flow through Powerhouse No. 2, and average spill daily

   Tasks 1,2, 3, and 8 must be completed and reported to FPC ASAP, at the latest by 10:00am of the day following sampling. The PIT Tag tagging files generated by tasks 4,5 and 6 must be

submitted everyday to PTAGIS. If the tagging files require further editing, they must be edited and submitted to PTAGIS in their final form not later than one month after the initial tagging takes place.

A spreadsheet containing FPC year to date data will be sent weekly to Rock Island Dam from FPC, and the data must be compared to remote site data and validated and any discrepancies reported to FPC within one week of receiving the weekly spreadsheet. At the end of the season, the whole year of data must be validated and any discrepancies reported within two weeks of the last sampling date. After any end-of-the-year discrepancies are resolved, the remote site leader must send a memo to FPC declaring that the data is accurate and final for the year within one week of that resolution.

3) For Lower Granite Dam, Appendix D of the 2002 Smolt Monitoring Program Work Statements and Budgets specifies five tasks under objective 5:

Transmit data to FPC via the Remote Site Data Entry Program (FPC32).

Task 1. Transmit daily sample, catch, mark, and brand recovery data to FPC daily. Transmit GBT sample data daily. Data normally transmitted via electronic mail.
Task 2. Transmit daily USCOE project operation, flow data, fish transport numbers, facility mortalities, percent descaling, number and species of non-salmonids sampled, and as requested, average fork length data.
Task 3. Ensure prompt transfer of data. Notify FPC by phone whenever we cannot transmit data by 1400 on weekdays and/or critical weekends via RSDEP. Advise and discuss problems with FPC when they occur.
Task 4. Provide FPC with additional information/data as requested.

Each of these tasks must be completed ASAP, no later than 14:00 on weekdays and/or critical weekends. A spreadsheet containing year to date data will be sent weekly to Lower Granite from FPC, and the data must be compared to Lower Granite data and validated and any discrepancies reported to FPC within one week of receiving the weekly spreadsheet. At the end of the season, the whole year of data must be validated and any discrepancies reported to FPC within two weeks of the last sampling date. After any end-of-the-year discrepancies are resolved, the remote site leader must send a memo to FPC declaring that the data is accurate and final for the year within one week of that resolution.

4) For McNary Dam and Lower Monumental Dam, Appendix E of the 2002 Smolt Monitoring Program Work Statements and Budgets state the following:

Objective 1. Monitor juvenile salmonid passage at McNary Dam from March 25, 2002 through December 15, 2002 and at Lower Monumental Dam from April 1, 2002 through October 31, 2002.

Task 1.1. Monitor the smolt migration at McNary and Lower Monumental Dams.
Task 1.2. Sample and record external marks (freeze brands, elastomer, etc.) observed at McNary and Lower Monumental Dams.
Task 1.3. Provide FPC with daily sample data on smolt collection and passage at McNary and Lower Monumental Dams. Data shall include daily collection estimates, sample and mortality statistics by species and hatchery and wild status (clipped and unclipped).
Task 1.4. Provide FPC with daily mark recapture information, along with length and descaling data.

Task 1.5. Provide FPC with daily project operation, flow and spill data.

Task 4.3. Conduct GBT examination data entry and provide the FPC with GBT examination summaries in accordance with pre-established protocol.

Data from Tasks 1.1, 1.2, 1.3, 1.4, 1.5 and 4.3, must be completed and reported to FPC as soon as possible, at the latest by 8:00am of the day following sampling.

A spreadsheet containing year to date data will be sent weekly to McNary and Lower Monumental Dams from FPC, and the data must be compared to remote site data and validated and any discrepancies reported to FPC within one week of receiving the weekly spreadsheet.

Objective 5. Data analysis and reporting November 1, 2002 through February 28, 2002.

Task 5.1. Data analysis and verification of data entries.

At the end of the season, the whole year of data must be validated and any discrepancies reported within two weeks of the last sampling date. After any end-of-the-year discrepancies are resolved, the remote site leader must send a memo to FPC declaring that the data is accurate and final for the year within one week of that resolution.

5) For Little Goose Dam, Appendix F of the 2002 Smolt Monitoring Program Work Statements and Budgets states the following:

Objective 5. Transmit facility collection data to the FPC electronically on a daily basis.

Task 5.1. Transmit daily sample, catch, fork length, and mark and brand recovery data to the FPC daily.

Task 5.2. Transmit daily Corps project operations, flow data, fish transport numbers, facility mortalities, percent descaling and average fork length data daily or every other day during low collection periods from August to October.

Task 5.3. Ensure prompt transfer of data. Notify FPC by phone whenever we cannot transmit data by 1400 hours on weekdays and/or critical weekends via FPC32. Advise and discuss problems with FPC when they occur.

Task 5.4. Provide FPC/Corps with additional information/data as requested.

Task 5.5. Download records from PTAGIS daily information on fish bypassed with the pit tag override system directly to the river during summer months as requested and report it.

Data from Tasks 5.1, 5.2, 5.3, 5.4, and 5.5, must be completed and reported to FPC as soon as possible, at the latest by 8:00am of the day following sampling.

A spreadsheet containing year to date data will be sent weekly to Little Goose Dam from FPC, and this data must be compared to remote site data and validated and any discrepancies reported to FPC within one week of receiving the weekly spreadsheet.

At the end of the sampling season, the whole year of data must be validated and any discrepancies reported within two weeks of the last sampling date. After any end-of-the-year discrepancies are resolved, the remote site leader must send a memo to FPC declaring that the data is accurate and final for the year within one week of that resolution.

6) For the Grand Ronde Fish Trap, Appendix G of the 2002 Smolt Monitoring Program Work Statements and Budgets states the following:

Phase 3. Determine passage indices for chinook and steelhead collected at the Lower Grande Ronde River trap during March 11 - June 1.

Task 1. Operate trap 5 nights/week March 11 - June 1. This will mean lowering the trap to begin the sample period at 6:00 p.m. on Sunday and cessation on Friday morning at 9:00 a.m. Collect data on daily catch, hatchery and wild composition, descaling, recaptures of pit tagged parr, and average length by species. Collect length data on warm water incidental fish captures.

Task 2. Electronically transmit salmonid collection data to FPC daily in a standard format determined by FPC. This will be done from a site several miles upriver that has standard phone access.

Data from Tasks 1 and 2 must be completed and reported to FPC as soon as possible, at the latest by 10:00am of the day following sampling.

A spreadsheet containing year to date data will be sent weekly to the Grande Ronde Fish Trap from FPC, and this data must be compared to remote site data and validated and any discrepancies reported to FPC within one week of receiving the weekly spreadsheet.

At the end of the sampling season, the whole year of data must be validated and any discrepancies reported within two weeks of the last sampling date. After any end-of-the-year discrepancies are resolved, the remote site leader must send a memo to FPC declaring that the data is accurate and final for the year within one week of that resolution

7) For the Salmon and Snake River Fish Traps, Appendix H of the 2002 Smolt Monitoring Program Work Statements and Budgets states the following:

Objective 1: Provide daily trap catch data and a smolt passage index at the head of Lower Granite Reservoir and on the lower Salmon River as part of the Columbia River Basin Smolt Monitoring Program (SMP) and for fish transportation management purposes. March 12 – June 30, 2002.

Task 1: Install Snake and Salmon River traps and have operational by March 12.

Task 2: Collect trap catch, hatchery vs. wild breakdown, and PIT-tag interrogation data daily and send to appropriate agencies.

Task 3: Report trap information to FPC daily by 1400 hours, in a standard format as per their request.

A spreadsheet containing year to date data will be sent weekly to the Snake River and Whitebird fish traps from FPC, and this data must be compared to remote site data and validated and any discrepancies reported to FPC within one week of receiving the weekly spreadsheet.

At the end of the sampling season, the whole year of data must be validated and any discrepancies reported within two weeks of the last sampling date. After any end-of-the-year discrepancies are resolved, the remote site leader must send a memo to FPC declaring that the data is accurate and final for the year within one week of that resolution

8) The 2002 Smolt Monitoring Program Work Statements and Budgets document states that the Nez Perce tribe operate a fish trap on the lower Imnaha River for a 12-week period during the springtime migration for the SMP (operation of additional weeks and additional traps is covered under other tribal contracts). The trap is to be put in sampling mode by 6 p.m. Sunday nights and process collections at 9 a.m. Mondays through Fridays. Begin trap operations Sunday March 12 and end operations Friday June 2 for SMP purposes. Data is to be reported to FPC as soon as possible, no fewer than two times per week, no later than Tuesday and Friday at 8:00am.

A spreadsheet containing year to date data will be sent weekly to the Imnaha fish trap from FPC, and this data must be compared to remote site data and validated and any discrepancies reported to FPC within one week of receiving the weekly spreadsheet.

At the end of the sampling season, the whole year of data must be validated and any discrepancies reported within two weeks of the last sampling date. After any end-of-the-year discrepancies are resolved, the remote site leader must send a memo to FPC declaring that the data is accurate and final for the year within one week of that resolution

X. *Printing Daily Reports*

The three reports available for printing, Daily Summary, Mark Recapture and Incidental Catch, have been improved in FPC32 to aid accurate manual data validation. (Section X.B/C).

A. Set Font.

The three printed reports are set to print with "1" inch margins defaulting to a "10" point "MS Line Draw" non-proportionally spaced font for the most widespread printer compatibility possible, and the best looking vertical columns. If the "MS Line Draw" font is not installed in Windows or available on the printer, the closest font to this will be substituted. The user can choose "Set Printer Font" in the "Setup" and "Reports" menus to find the best font for their particular printer configuration (Figure 18). It is recommended that non-proportionally spaced printer fonts be used because all the columns of numbers will line up better.

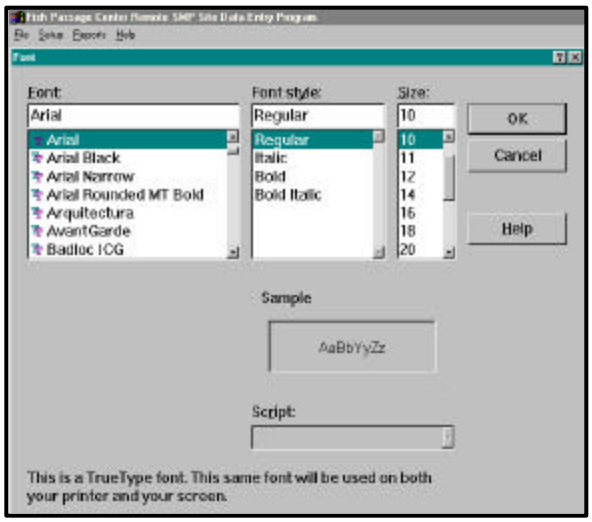


Figure 18. Set Printer Font.

B. Print.

1. Close Batch:

The user must close the batch he/she is working on before printing. The old program, FPC16, printed the reports when the batch was open. FPC32 prints the reports after the batch-editing window is closed. There are many reasons for this, mainly that printer malfunctions are often the cause program crashes. When a program crashes, the probability that data files will be damaged is high. Experience has taught the author that it is good user interface design policy to allow the users to edit the data and have all the data tables open, OR have users print reports, using a copy of the data.

2. Select Batch:

The reports are printed from the "Reports" menu in the main menu bar (Figure 19). In FPC32, when the user selects a report to print, a list of data batches, (.bch) files

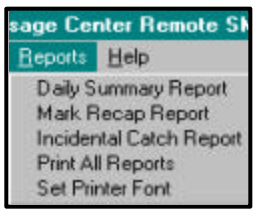


Figure 19. Reports

that already exist, will be presented to the user. Usually the last one in the list is the last batch created. When the user selects a batch to print a report from, a copy of the data in that batch is made and the report is printed from the copy. This ensures that data won't be accidentally lost due to a printer jam or printer failure.

C. Printed Reports.

1. Daily Summary:

The Daily Summary Report, (also called the "Cover Sheet"), now prints facility mortalities and sample mortalities, in addition to total mortalities. The Daily Summary Report has been revised to include all data about Fry. The left margin and the top margin of the Daily Summary sheet can now be configured in the Set SMP Site Configuration screen found under "Setup"(Section VIII.A, Figure 2). Research mortalities and pit tags will be included for 2002.

2. Mark Recapture:

The Mark Recapture Report now prints the color of the tag.

3. Incidental Catch:

The Incidental Catch Report is now sorted by the English description of the fish, and the Incidental Catch, "Species Code" pick list menu is sorted the same way. The Incidental Catch Report and pick list menu are sorted alphabetically by description, but the adult codes are placed at the end of the list, to better match the hand logs. The Incidental Catch Report now prints incidental catch mortalities.

XI. *What's New In FPC32*

The FPC32 data entry program has been improved to make it easier to enter more accurate data than the earlier versions of FPC32 and the older SMP data entry programs (FPC16 and RSDEP). The goal of FPC32's new design (3.2a) is to reduce data entry errors as the data is being entered at the remote sites. FPC32 is Y2K compliant, and is designed to run on Windows 95, Windows 98, Windows NT 4.0 and Windows 2000. It has not been tested under Windows ME but it should run fine on that platform. FPC32 does not run under Windows 3.x.

A. User Interface.

1. Windows:

The standard Windows user interface is applied to FPC32 as much as possible to ease learning and reduce errors. The user interface is designed to be mouse driven in order to avoid typographic errors by reducing keystrokes needed for entering data. The mouse and [Enter] key are the preferred navigational methods in the FPC32 user interface.

2. Spreadsheet Design:

The user interface is also designed to look like a spreadsheet, since the majority of remote SMP staff is experienced with and comfortable operating spreadsheet programs, and since the data entered into the FPC32 program is summarized on paper or in a spreadsheet. The user can rearrange the data entry columns to better match the hand logs used at each individual SMP site by clicking on the column and holding down the button while dragging the column to its new location. Every time the program data entry screen is closed, the column order is reset to the default column order. However, unlike a spreadsheet, data entered into FPC32 is restricted, validated, and checked against other entries before the user is allowed to enter the erroneous or logically inconsistent value into the field. Also unlike a spreadsheet, (or the previous program FPC16), the daily data transmitted to FPC is in a small, compact 20-75K file which is quickly sent thus reducing bandwidth use, internet on-line charges, and long distance phone charges.

B. Pick List Menus.

1. Description:

Many data entry fields now have pull down pick lists or menus listing the possible entry codes or values (Figure 1). The pull down pick lists have descriptive text associated with each value, so that there is very little need to refer to the user manual to find out what the different data entry codes mean. The user does not need paper

tables and codes next to the computer to explain what the data entry codes mean. Many of the fields restrict data entry only to those values found on the pick lists.

2. Activation:

To activate the pull down pick lists in the data entry cells, click inside the cell on the right side. Pressing the [alt] key and down arrow will activate most pick lists, but pointing and clicking with the mouse is the recommended method for accessing the pick lists. The left and right arrow keys are **NOT** the recommended navigational method here, since depending on what window is selected in the user interface, the left and right arrows will move through the frames or columns.

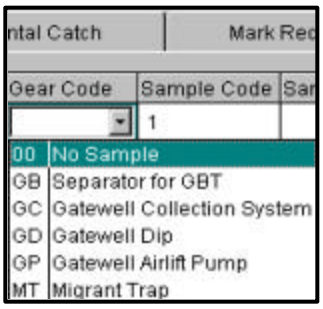


Figure 1. Pick List

C. Automatic Data Validation.

There is an automatic data validation process that occurs for most fields when data is entered. For example, if the special species code for Fry is entered, the program checks to see if the general species code has been entered. If the general species code is for chinook, the age code is checked to make sure that it is an age code of zero, since only a chinook zero could be a Fry. The details of the various data checking algorithms are explained later in this document in the detailed instructions for entering data into each field of the FPC32 program. (Section X.A).

D. Printed Reports.

The three reports available for printing, Daily Summary, Mark Recapture and Incidental Catch, have been improved to aid accurate manual data validation. The report menu is available only when the batch-editing window is closed. (Section XI).

1. Daily Summary Report (cover sheet):

Now prints facility mortalities and sample mortalities, not just total mortalities. The interactive mortalities page at the FPC web site (www.fpc.org) also displays the facility and sample mortalities. The Daily Summary Report has been revised to include all data about Fry. The left margin and the top margin of the Daily Summary Report can now be configured in the configuration screen. (Figure 2, Section VIII.A, Figure 2). Research mortalities and pit tags will be included in 2002.

2. Mark Recapture Report:

Now prints the color of the tag.

3. Incidental Catch Report:

Is sorted by the English description of the fish, as is the pick list menu for incidental catch species codes. The Incidental Catch Report and pick list menus are sorted alphabetically by description, but the adult codes are placed at the end of the list, to

better match the hand logs in use at certain lower river sites. The Incidental Catch Report now prints incidental catch mortalities.

E. Miscellaneous Updates.

1. Installation:

When you install the program, it creates a group in the Window menu system entitled "Fish Passage Center". To uninstall the program, in Windows go to "Setting", then to "Control Panel", and then choose "Add/Remove Programs". The Fish Passage Center program will be listed there. Follow the instructions for removing the entire program. A special safety feature is that after uninstalling FPC32 with this method all of the data files (.bch) files, and the three (.txt) report files remain untouched in the (c:\fpc32) subdirectory. (Section VII.C).

2. Setup Site:

FPC32 allows for more default codes than FPC16 to be brought forward from the Set SMP Site Defaults screen. A default gear code, sample rate, start and stop hour, and printer font can be set once and used the rest of the season. This also helps to minimize data entry errors. (Section VIII.A)

3. Batch Numbers:

The data batches are now numbered by Julian date (the number of the day of the year). This makes the batch numbers relate more exactly to the date the sample ended. When adding sub-batches, the next record you add will have the last sub-batch number. The sample start date defaults to yesterday for all sites. The sample end date defaults to today for all sites. (Section VIII.B).

4. Catch Detail Screen:

A clipped and unclipped field has been put back into the Catch Detail screen and the rearing disposition field removed. A coded wire tag field has also been added to the Catch Detail screen. (Section IX.B).

5. Flow and Spill:

The entries have been restricted to tenths of a KCFS. (Section IX.A, 9-12).

6. Columns:

a) The Trap Location column and the default trap location appear when the site is the Salmon River Trap (**WTB**), Snake River Trap (**LEW**), **IMN** River Trap, and **GRN** River Trap, otherwise the column is blank and not able to be entered.

b) The Tank column appears when the site is **LMN**, **LGS**, **MCN** or **LGR**; otherwise it too is blank and cannot be entered.

7. Codes:

Race Code is only used in the mark recapture data this year. Determine the race code from the hatchery release group that the Freeze Brand or Elastomer Tag originate in from the list of marks supplied by FPC. Elastomer Tags and Freeze Brands cannot be entered without a location code. This list of marks is also always available from the FPC web site (www.fpc.org) in the hatchery release section.

8. Multiplier:

The Multiplier field has a pick list menu to facilitate the entering of sample rates in the form of 1/sr., and to facilitate the validation of the collection count and passage index calculations. The pick list for the multiplier automatically fills in the Sample Rate when chosen. The pick list has the multiplier, the corresponding sample rate in percentages, and the corresponding minutes per hour for each multiplier and sample rate. (Section IX.B, 10).

9. Exit:

The internal method used to perform housekeeping chores and exit the program has been changed to improve cleanup. One closes the editing window by pressing the black X in the upper right hand corner of the edit window. One closes the program by going to the "File" menu, and choosing "Exit".

XII. *Acknowledgement Form*

I, the undersigned, acknowledge that I have read this manual.

Name: (Please Print) _____

Signature: _____ Date:_____

Please tear out and mail this completed form to:

Fish Passage Center
Attn: Henry Franzoni
2501 SW 1st Ave #230
Portland OR 97201

Attachment B
to
Smolt Monitoring Proposal #198712700
Response to ISRP Comments

Revised 02/25/02

GBT Monitoring Protocol for the Smolt Monitoring Program

Fish will be examined externally for signs of gas bubble trauma (GBT). The unpaired fins, and eyes will be examined for the presence of bubbles and the area covered with bubbles will be quantified. Monitoring of migrating juvenile salmonids will be conducted at Lower Granite, Little Goose, Lower Monumental, Rock Island, McNary, and Bonneville dams. The goal of the juvenile salmonid examinations is to determine the relative extent to which the migrating juvenile salmonids passing the dam or sampling location have been exposed to harmful levels of total dissolved gas based upon the prevalence and severity of GBT induced bubbles on the fish. The data will be reported to the fisheries management entities, the water quality agencies of Washington and Oregon, and will be made available to other interested parties through Fish Passage Center weekly reports and daily postings to the FPC web site during the season.

Method of fish examination for GBT

Fish will be examined using a variable magnification (6X to 40X) dissecting scope. Unpaired fins, and eyes will be examined for the presence of bubbles. Fish to be examined will be netted off the separator (or removed from bypass or other sampling apparatus at Rock Island and Bonneville dams) and anesthetized. A specially designed tray, that allows fish to be continually anesthetized during the GBT examination, will be used to hold the fish. Fins on the left side of the fish will be examined for signs of GBT and then both eyes will be examined for signs of GBT. The eye with the highest % of bubbles will be used for ranking, using the same ranking as for fins.

The fish exam will begin with the unpaired fins and then the eyes will be examined and data recorded based on the percent area of the fin or eye covered with bubbles. A minimum magnification for these examinations will be 10X. The area covered will be estimated using the examiners best judgement. A visual technique for estimating the area of the fin covered by bubbles is illustrated in Figure 1.

A rank will be assigned based upon the percent area of the fin or eye covered with bubbles. A rank 0 is assigned if no bubbles occur; rank 1 will be assigned if 1 to 5 percent of the fin or eye is covered with bubbles; rank 2 is assigned for 6 to 25 percent area covered; rank 3 for 26 to 50 percent area covered; and rank 4 for greater than 50 percent area covered. The rank reported for the eyes will be the highest rank for either eye. When the percent area covered is near the boundary for two ranks (e.g. at or near 25 percent) then the higher rank will be assigned. A summary of ranks is listed in Table 1 in the data entry section below.

Other information will be collected and recorded for each fish examined: species; time of examination; fork length (mm); origin (hatchery, wild, or unknown), and comments regarding tags and fish condition as deemed relevant by the examiner. A sample data sheet is attached.

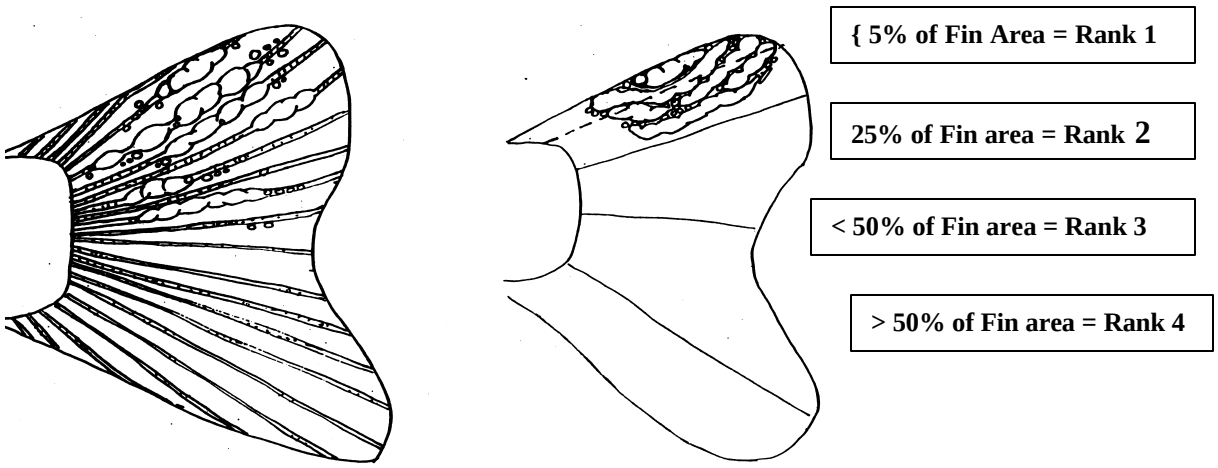


Figure 1. Conceptual drawing depicting the estimation of area of a fin occluded. The fin on the left is what might actually be viewed on a fish, and the fin on the right shows the fin are divided in areas approximating 25% of fin area and occlusion grouped to estimate actual percent area covered.

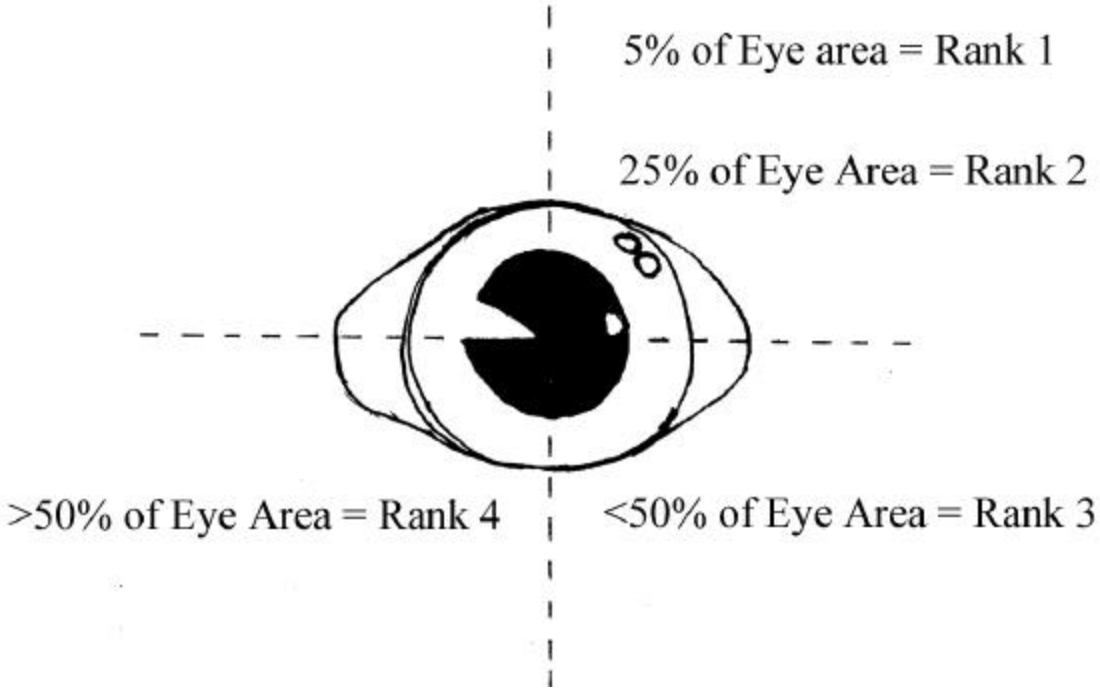


Figure 2. Conceptual drawing depicting the estimation of area of an eye occluded.

Sample Size

The number of juvenile salmonids to be examined at each site each day will be adequate to detect signs of GBT. The target sample of 100 juvenile chinook and/or steelhead is a daily miniumum and is based on the availability of fish at each monitoring site. This number is sufficient to detect signs of GBT that would indicate potential mortality in the population. Based on calculations developed by USGS - Biological Resources Division, a sample size of 100 fish should be able to detect within ±6% the incidence of fish in a population showing signs of GBT based on a population where 10% of the fish had signs. We consider this level of precision and subsequently the sample size, optimal for the monitoring program.

Method of Collection

Fish to be examined for GBT will be collected at the separator at transportation sites and by the standard collection methods at Rock Island and Bonneville dams. Fish will be netted one at a time and placed in a dark bucket (not white) filled with anesthetic water. At transportation sites, no more than 10 fish per examiner will be netted off the separator at a time, so that all fish can be examined within 15 minutes of netting. Fish netted off the separator will be placed in a bucket containing a solution of 30mg/l MS-222 and if necessary 30mg/l sodium bicarbonate buffer (see method of anesthetizing below).

Handling PIT-tagged fish at Transportation Sites

At Lower Granite, Little Goose, Lower Monumental, McNary and Bonneville dams, fish that are netted off the separator for GBT exams will be scanned for the presence of PIT-tags. As soon as the fish can be handled (after anesthetization) it will be scanned for a PIT-tag. If a tag is encountered, a tag file will be created for that date and the information sent to PTAGIS. The PIT-tagged fish will be placed in a recovery bucket and returned to the separator as soon as possible.

Method of Anesthetizing fish for GBT examination

Each site will have five 5-gal plastic buckets. Three buckets will be used for holding fish and two will be used for the gill irrigation system while fish are being held in the examination tray. Prior to examination fish will be held in 30mg/l MS-222 anesthetic solution (buffered if necessary depending upon the pH change in the water when anesthetic is added). Once all fish are anesthetized they will be moved to an 80mg/l solution of MS-222 just prior to examination to fully anesthetize them. During the examination a solution of 30mg/l MS-222 will be washed over the gills of the fish to keep fish under anesthetic for the entire examination. The fish will be held in an examination tray during the examination. The tray will be modified to hold a siphon tube that will carry anesthetic water over the animal's gills. The anesthetic water will drain out of the tray into another bucket via a drain tube. After the examination fish will be placed in a recovery bucket of fresh water containing an air stone. The recovery bucket will have a lid and the air stone will vigorously pump air into the bucket.

Handling of Fish After Examination at Transportation Sites

At transportation sites, after the fish have been examined for GBT, the fish will be placed in the location where other SMP fish are placed after examination: fish should be placed in a recovery tank or a holding tank. Ultimately these fish will be transported, as are fish that are examined by SMP for condition information. These GBT examined fish will be counted as fish sampled at 100% sample rate. Daily totals of the number sampled by species and origin will be reported to the FPC so that this information can be included in their daily sampling reports.

Data Recording and Data Entry Procedures

As each fish is examined, data will be recorded on a data sheet. The following information will be recorded as part of a record for each fish: the date of examinations; the time each examination, the site examinations were done, species, origin, fork length (mm), the rank of GBT in each unpaired fin, rank of GBT in the eyes, information on tags, and fish handled but not examined for GBT. See data sheet

Data will be entered to the GBT data entry program and sent to FPC via e-mail or other electronic transmission technique. The following section describes the format of data that will be entered to the spreadsheets. Data will be entered into a Data Entry Program provided by FPC to the sites. Data entry must strictly follow the guidelines below so that data can be transferred to the database properly

Definition and format of data entries:

Format codes: A = character strings; Iw = integers, where w=field width; Fw.d = Fixed, real numbers, where w=field width and d=# of decimal places.

1. **Site**: An acronym for the sample site name. Format = A3

Rock Island Dam = RIS	Lower Granite Dam = LGR	Little Goose Dam = LGS
McNary Dam = MCN	Lower Monumental = LMN	Ice Harbor = IHR

2. **Date:** Start date of GBT sampling entered as month-day-year (MM/DD/YY).

3. **Examiner**: Initials of person(s) doing actual fish exams for GBT. Format = A2

4. **Time**: Hour-minute (HHMM) military time, to the nearest minute for each fish examination. Format = Iw (XXXX), e.g. (5:15 for 5:15 am or 19:25 for 7:25 pm). Midnight is 2400 hours. One minute after midnight is 00:01 hours.

S. **Num**: Special field – Enter this number to coincide with "Num" field of the GBT data entry program GBTDEP. This can only be entered while entering data into the GBTDEP

5. **SP**: **(Species)**

CH = Chinook
ST = Steelhead

6. **Age:** For Chinook, 1 or 0, otherwise leave blank.

7. **Race:**

For Chinook, SP (spring) or FA (fall) for Elastomer tagged fish only.

8. **FL**: **(Fork Length)** Enter fork length to the nearest millimeter

9-12. **CA, AN, DO, EY: GBT Rank in Unpaired Fins and Eyes**

See section above for a description of how to do examination. Enter the number corresponding to the percent area of the fin or eye that is covered by bubbles. Rank is entered into the data sheet as 0,1,2,3, or 4.

Table 2. Rank scores assigned based on percent area of fins or eyes covered with bubbles.

Rank	Percent area covered With bubbles
0	0
1	1 to 5%
2	6 to 25%
3	26 to 50%
4	Greater than 50%

13. **Clip Code** To record clipped fins, and clipped fin combinations on marked fish.
NC = NO FIN CLIPS AD= Adipose RV= Right ventral only
AR= Adipose/Right ventral LV= Left ventral only AL= Adipose/Left ventral
NW = NO FIN CLIPS with Coded Wire Tag

14. **Mark Type:** Enter the type of external mark observed on a fish or group of fish with identical mark types/attributes. Current valid mark types are:

EL: Elastomer Tags
FB: freeze brands
FL: Floy tags
VI: Visual Implant tags

NOTE: Coded Wire tags and PIT tags are internal marks that are not included in this entry screen. Recaptured PIT tagged fish are reported directly to PTAGIS. They are counted as not examined and put back in the separator.

15. **Mark Location**: (i.e. Brand Location, Tag Location) Enter location code for freeze brands and elastomers

Brand Location
LA = Left anterior RA = Right anterior LD = Left Dorsal
RD = Right dorsal

Elastomer Location
LE= Left Eye RE= Right Eye

16. **Color Code:** For ELASTOMER TAGS , the appropriate color code should be entered, (RE=Red, GR=Green, and BL=Blue) (Leave blank for numbered VI tags). For **FREEZE BRANDS** enter the brand orientation here,
e.g. 12 o'clock = 1, 3 o'clock = 2, 6 o'clock = 3, 9 o'clock = 4.

17. **Exam Y/N?:** Enter N if fish was/were not examined for GBT. Leave blank if fish was examined

18. **Num Fish:** Leave blank if fish was examined for GBT. Enter number of fish if previous field = N.

Data Transfer Procedures

The data will be saved as FoxPro .dbf and .cdx files, and both files will be transferred to FPC via e-mail or other available electronic medium. Files will be named according to the site and the date on which the data was collected. For example if data were collected on April 10, at Bonneville dam, the data file would be named "BO1410.dbf" and "BO1410.cdx". The first three characters of the file name are the site designator, the next character is the month, and the next two characters are the day data was collected. File names must be 6 characters long.

Data Reporting Procedures

Once the faxed data is received at FPC it will be used to check the electronically transferred spreadsheet file. The final report will be generated based on the data management system that the FPC has developed.

Quality Assurance and Quality Control

In order to assure quality control/quality assurance several checks will be included as part of the monitoring program. At the first step in the process, fish examinations, there will be visits to the monitoring sites to assess the accuracy of the results of examinations and data recording. A supervisory fish biologist from Fish Passage Center or USGS - Biological Resources Division will visit the sites to perform QA/QC checks. The supervisor, who will also compare those examinations with the results from the on-site biotechnician's exams, will examine twenty fish. The results of these visits will be compiled in a report and be available for interested parties.

Attachment I
to
Smolt Monitoring Proposal #198712700
Response to ISRP Comments

Bi-Monthly FPC Report

Prepared By:
Deidre Wood
Fish Passage Center
On 8/29/02, 12:47:15

Table of Contents

General Statistics

The User Profile by Regions graph identifies the general location of the visitors to your Web site. The General Statistics table includes statistics on the total activity for this web site during the designated time frame.

General Statistics	
Date & Time This Report was Generated	Friday August 16, 2002 - 07:20:57
Timeframe	08/01/02 00:00:00 - 08/15/02 23:59:59
Number of Hits for Home Page	4,292
Number of Successful Hits for Entire Site	214,636
Number of Page Views (Impressions)	31,171
Number of User Sessions	15,420
User Sessions from United States	73.41%
International User Sessions	1.69%
User Sessions of Unknown Origin	24.89%
Average Number of Hits Per Day	14,309
Average Number of Page Views Per Day	2,078
Average Number of User Sessions Per Day	1,028
Average User Session Length	00:04:02
Number of Unique Users	7,082
Number of Users Who Visited Once	4,663
Number of Users Who Visited More Than Once	2,419

Most Requested Pages

This section identifies the most popular web site pages and how often they were accessed. The average time a user spends viewing a page is also indicated in the table.

Most Requested Pages					
	Pages	**Views**	**% of Total Views**	**User Sessions**	**Avg. Time Viewed**
1	ADULTS COUNT *http://www.fpc.org/CurrentDaily/7day-ytd_adults.htm*	8,260	26.49%	7,812	00:02:34
2	Fish Passage Center Homepage - Salmon and Steelhead data for the Columbia and Sn *http://www.fpc.org/*	4,292	13.76%	3,875	00:01:02
3	Fish Passage Center Adult Return Data *http://www.fpc.org/adult.html*	3,378	10.83%	3,172	00:00:24
4	FPC 2002 SORS *http://www.fpc.org/sors/2002-SOR/2002_sors.htm*	3,075	9.86%	110	00:00:10
5	*http://www.fpc.org/CurrentDaily/adltpass.txt*	1,266	4.06%	1,192	00:01:06
6	Fish Passage Center's Columbia and Snake River Adult Passage Graph for 2002, 200 *http://www.fpc.org/adultqueries/Adult_Graph.asp*	1,230	3.94%	551	00:01:02
7	Fish Passage Center's Columbia and Snake River Adult Passage Graph for 2002, 200 *http://www.fpc.org/adultqueries/Adult_Graph_Submit.asp*	671	2.15%	580	00:00:14
8	Weekly Reports *http://www.fpc.org/weekrprt/wr2002/2002wr.html*	408	1.3%	387	00:02:34
9	*http://www.fpc.org/CurrentDaily/flowspil.txt*	407	1.3%	379	00:01:19
10	2002 QA Data for COE TDGS Monitoring *http://www.fpc.org/tempgraphs/tempgraph.asp*	348	1.11%	253	00:01:35
11	2000 Real Time versus Historic Temperature Graphs *http://www.fpc.org/tempgraphs/tempsubmit.htm*	322	1.03%	305	00:00:17
12	River Data *http://www.fpc.org/rivrdata.html*	316	1.01%	306	00:00:35
13	*http://www.fpc.org/adultqueries/Adult_Table_2002.asp*	287	0.92%	141	00:00:55
14	Data Reporting Sites *http://www.fpc.org/fishway/map.html*	279	0.89%	261	00:00:30
15	Fish Passage Center's Columbia and Snake River Adult Passage Data *http://www.fpc.org/adultqueries/Adult_Table_Submit.asp*	278	0.89%	249	00:00:53
16	*http://www.fpc.org/robots.txt*	277	0.88%	259	00:00:55
17	Smolt Data *http://www.fpc.org/smpdata.html*	245	0.78%	223	00:00:27
18	*http://www.fpc.org/CurrentDaily/passindx.txt*	215	0.68%	176	00:02:22
19	What's New *http://www.fpc.org/whats_new.htm*	196	0.62%	180	00:01:11
20	Bull Trout *http://www.fpc.org/bulltrout/BullTrout.htm*	184	0.59%	164	00:01:55

Most Requested Pages					
	Pages	**Views**	**% of Total Views**	**User Sessions**	**Avg. Time Viewed**
21	*http://www.fpc.org/links.html*	181	0.58%	166	00:03:29
22	*http://www.fpc.org/adultqueries/Adult_Table.asp*	143	0.45%	60	00:01:03
23	Bonneville Dam *http://www.fpc.org/fishway/bon.html*	113	0.36%	109	00:00:50
24	*http://www.fpc.org/CurrentDaily/adultpassage.htm*	112	0.35%	102	00:02:02
25	Hatchery Release Information *http://www.fpc.org/Hatchery/Hatchery.htm*	111	0.35%	106	00:02:06
26	FPC SiteMap *http://www.fpc.org/sitemap.html*	100	0.32%	97	00:01:42
27	2001 Passage Index Graphs from Fish Passage Center *http://www.fpc.org/Passgraphs/passgraph.asp*	95	0.3%	43	00:01:49
28	Historic Adult Counts *http://www.fpc.org/adult_history/adultsites.html*	90	0.28%	83	00:00:20
29	Hatchery Query by Agency - Results *http://www.fpc.org/Hatchery/HatcheryAgency_Results.asp*	79	0.25%	15	00:00:37
30	*http://www.fpc.org/fpc_docs/2001JuvSalMigr_files/outline.htm*	77	0.24%	28	00:00:15
31	Bonneville Dam YTD Totals *http://www.fpc.org/adult_history/YTD-BON.htm*	76	0.24%	72	00:02:27
32	Ives Island *http://www.fpc.org/ives_island.htm*	74	0.23%	70	00:01:28
33	FPC Documents *http://www.fpc.org/fpc_docs.htm*	70	0.22%	64	00:02:29
34	The Dalles Dam *http://www.fpc.org/fishway/tda.html*	67	0.21%	66	00:01:07
35	Wells Dam *http://www.fpc.org/fishway/wel.html*	65	0.2%	61	00:00:36
36	Real Time Ives Island Water Elevations and Temperature Data *http://www.fpc.org/ivesisland.htm*	64	0.2%	53	00:02:27
37	Lower Granite Dam *http://www.fpc.org/fishway/lgr.html*	64	0.2%	61	00:00:34
38	Biography *http://www.fpc.org/Biography.html*	63	0.2%	60	00:01:58
39	*http://www.fpc.org/CurrentDaily/dgassum.txt*	59	0.18%	41	00:01:20
40	*http://www.fpc.org/adultqueries/Adult_Table_10yr.asp*	58	0.18%	35	00:01:21
	Sub Total For the Page Views Above	27,695	88.84%	N/A	N/A
	Total For the Log File	**31,171**	**100%**	**N/A**	**N/A**

Least Requested Pages

This section identifies the least popular pages on your Web site, and how often they were accessed.

Least Requested Pages				
	Pages	**Views**	**% of Total Views**	**User Sessions**
1	SYSTEM OPERATIONAL REQUEST:#98-2 *http://www.fpc.org/sors/1999-SOR/99-24.htm*	1	0%	1
2	SYSTEM OPERATIONAL REQUEST:#98-2 *http://www.fpc.org/sors/1999-SOR/92-99.html*	1	0%	1
3	*http://www.fpc.org/sors/1999-SOR/SOR_99-C2.html*	1	0%	1
4	SYSTEM OPERATIONAL REQUEST:#99-26 *http://www.fpc.org/sors/1999-SOR/99-26.htm*	1	0%	1
5	SYSTEM OPERATIONAL REQUEST:#99-25 *http://www.fpc.org/sors/1999-SOR/99-25.htm*	1	0%	1
6	SYSTEM OPERATIONAL REQUEST:#98-2 *http://www.fpc.org/sors/1999-SOR/147-99.html*	1	0%	1
7	SYSTEM OPERATIONAL REQUEST:#99-29 *http://www.fpc.org/sors/1999-SOR/99-29.htm*	1	0%	1
8	CRITFC SOR C-7 *http://www.fpc.org/sors/1999-SOR/Sor_99c7.htm*	1	0%	1
9	SYSTEM OPERATIONAL REQUEST:#99-21 *http://www.fpc.org/sors/1999-SOR/99-21.htm*	1	0%	1
10	SYSTEM OPERATIONAL REQUEST:#98-2 *http://www.fpc.org/sors/1999-SOR/99-28.htm*	1	0%	1

Top Entry Pages

This section identifies the first page viewed when a user visits this site. This is most likely your home page but, in some cases, it may also be specific URLs that users enter to access a particular page directly. The percentages refer to the total number of user sessions that started with a valid Document Type. If the session started on a document with a different type (such as a graphic or sound file), the file is not be counted as an Entry Page, and the session is not counted in the total.

Top Entry Pages			
	File	**% of Total**	**User Sessions**
1	ADULTS COUNT *http://www.fpc.org/CurrentDaily/7day-ytd_adults.htm*	41.64%	5,397
2	Fish Passage Center Homepage - Salmon and Steelhead data for the Columbia and Sn *http://www.fpc.org/*	27.76%	3,598
3	Fish Passage Center Adult Return Data *http://www.fpc.org/adult.html*	11.02%	1,428
4	*http://www.fpc.org/CurrentDaily/adltpass.txt*	2.8%	363
5	*http://www.fpc.org/robots.txt*	1.75%	227
6	*http://www.fpc.org/CurrentDaily/flowspil.txt*	0.82%	107
7	Fish Passage Center's Columbia and Snake River Adult Passage Graph for 2002, 200 *http://www.fpc.org/adultqueries/Adult_Graph_Submit.asp*	0.81%	105
8	Weekly Reports *http://www.fpc.org/weekrprt/wr2002/2002wr.html*	0.67%	87
9	River Data *http://www.fpc.org/rivrdata.html*	0.65%	85
10	Data Reporting Sites *http://www.fpc.org/fishway/map.html*	0.47%	62
11	2000 Real Time versus Historic Temperature Graphs *http://www.fpc.org/tempgraphs/tempsubmit.htm*	0.44%	58
12	*http://www.fpc.org/CurrentDaily/passindx.txt*	0.42%	55
13	What's New *http://www.fpc.org/whats_new.htm*	0.4%	52
14	Fish Passage Center's Columbia and Snake River Adult Passage Data *http://www.fpc.org/adultqueries/Adult_Table_Submit.asp*	0.36%	47
15	FPC 2002 SORS *http://www.fpc.org/sors/2002-SOR/2002_sors.htm*	0.35%	46
16	*http://www.fpc.org/links.html*	0.35%	46
17	Smolt Data *http://www.fpc.org/smpdata.html*	0.3%	40
18	Bull Trout *http://www.fpc.org/bulltrout/BullTrout.htm*	0.3%	39
19	FPC SiteMap *http://www.fpc.org/sitemap.html*	0.25%	33
20	Hatchery Release Information *http://www.fpc.org/Hatchery/Hatchery.htm*	0.24%	32
	Total For the Pages Above	**91.88%**	**11,907**

Top Entry Requests

This section identifies the first hit from a user visiting this site. This is most likely the home page but, in some cases, it may also be specific URLs that users enter to access a particular file directly. The percentages refer to the total number of user sessions.

Top Entry Requests			
	File	**% of Total**	**User Sessions**
1	Fish Passage Center Homepage - Salmon and Steelhead data for the Columbia and Sn *http://www.fpc.org/*	22.76%	3,510
2	ADULTS COUNT *http://www.fpc.org/CurrentDaily/7day-ytd_adults.htm*	19.96%	3,078
3	*http://www.fpc.org/CurrentDaily/table.css*	19.26%	2,971
4	Fish Passage Center Adult Return Data *http://www.fpc.org/adult.html*	7.58%	1,169
5	*http://www.fpc.org/_themes/fpc-dw/oceanwater2.jpg*	2.33%	360
6	*http://www.fpc.org/CurrentDaily/adltpass.txt*	1.95%	302
7	*http://www.fpc.org/robots.txt*	1.46%	226
8	*http://www.fpc.org/ICONS/CLEARDOT.GIF*	1.31%	203
9	*http://www.fpc.org/_derived/Index.htm_cmp_fpc-dw010_bnr.gif*	0.62%	97
10	Fish Passage Center's Columbia and Snake River Adult Passage Graph for 2002, 200 *http://www.fpc.org/adultqueries/Adult_Graph_Submit.asp*	0.59%	92
11	*http://www.fpc.org/_derived/whats_new.htm_cmp_fpc-dw010_vbtn.gif*	0.59%	91
12	*http://www.fpc.org/CurrentDaily/flowspil.txt*	0.55%	85
13	*http://www.fpc.org/_derived/SMPDATA.html_cmp_fpc-dw010_vbtn_a.gif*	0.46%	71
14	*http://www.fpc.org/_derived/adult.html_cmp_fpc-dw010_vbtn.gif*	0.43%	67
15	*http://www.fpc.org/_derived/whats_new.htm_cmp_fpc-dw010_vbtn_a.gif*	0.4%	62
16	*http://www.fpc.org/_derived/adult.html_cmp_fpc-dw010_vbtn_a.gif*	0.39%	61
17	*http://www.fpc.org/_derived/SMPDATA.html_cmp_fpc-dw010_vbtn.gif*	0.38%	59
18	*http://www.fpc.org/bulltrout/_derived/BullTrout.htm_cmp_fpc-dw010_vbtn.gif*	0.37%	58
19	*http://www.fpc.org/_derived/rivrdata.html_cmp_fpc-dw010_vbtn.gif*	0.36%	56
20	*http://www.fpc.org/sors/2002-SOR/_derived/2002_sors.htm_cmp_fpc-dw010_vbtn.gif*	0.35%	55
	Total For the Requests Above	**82.18%**	**12,673**

Top Exit Pages

This section identifies the pages users were on when they left the site. The percentages refer to the total number of user sessions that started with a valid Document Type. If the session started on a document with a different type (such as a graphic or sound file), the file is not counted as an Exit Page, and the session is not counted in the total.

Top Exit Pages			
	Pages	**% of Total**	**User Sessions**
1	ADULTS COUNT *http://www.fpc.org/CurrentDaily/7day-ytd_adults.htm*	52.9%	6,856
2	Fish Passage Center Homepage - Salmon and Steelhead data for the Columbia and Sn *http://www.fpc.org/*	14.13%	1,832
3	*http://www.fpc.org/CurrentDaily/adltpass.txt*	5.3%	687
4	Fish Passage Center's Columbia and Snake River Adult Passage Graph for 2002, 200 *http://www.fpc.org/adultqueries/Adult_Graph.asp*	3.11%	403
5	Fish Passage Center Adult Return Data *http://www.fpc.org/adult.html*	3.04%	394
6	*http://www.fpc.org/CurrentDaily/flowspil.txt*	1.89%	245
7	Weekly Reports *http://www.fpc.org/weekrprt/wr2002/2002wr.html*	1.47%	191
8	2002 QA Data for COE TDGS Monitoring *http://www.fpc.org/tempgraphs/tempgraph.asp*	1.26%	164
9	*http://www.fpc.org/robots.txt*	1.21%	157
10	*http://www.fpc.org/links.html*	0.86%	112
	Total For the Pages Above (only sessions starting on a valid document type are included)	**85.2%**	**11,041**

Single Access Pages

This section identifies the pages on the site that visitors access and exit without viewing any other page. The percentages refer to the total number of user sessions that started with a valid Document Type. If the session started on a document with a different type (such as a graphic or sound file), the file is not counted as a Single Access Page, and the session is not counted in the total

Single Access Pages			
	Pages	**% of Total**	**User Sessions**
1	ADULTS COUNT *http://www.fpc.org/CurrentDaily/7day-ytd_adults.htm*	59.82%	5,064
2	Fish Passage Center Homepage - Salmon and Steelhead data for the Columbia and Sn *http://www.fpc.org/*	19.83%	1,679
3	Fish Passage Center Adult Return Data *http://www.fpc.org/adult.html*	3.5%	297
4	*http://www.fpc.org/CurrentDaily/adltpass.txt*	3.39%	287
5	*http://www.fpc.org/robots.txt*	1.59%	135
6	*http://www.fpc.org/CurrentDaily/flowspil.txt*	0.93%	79
7	*http://www.fpc.org/CurrentDaily/passindx.txt*	0.49%	42
8	FPC 2002 SORS *http://www.fpc.org/sors/2002-SOR/2002_sors.htm*	0.48%	41
9	Weekly Reports *http://www.fpc.org/weekrprt/wr2002/2002wr.html*	0.47%	40
10	*http://www.fpc.org/links.html*	0.34%	29
11	2000 Real Time versus Historic Temperature Graphs *http://www.fpc.org/tempgraphs/tempsubmit.htm*	0.3%	26
12	Real Time Ives Island Water Elevations and Temperature Data *http://www.fpc.org/ivesisland.htm*	0.29%	25
13	Rocky Reach Dam *http://www.fpc.org/fishway/rrh.html*	0.27%	23
14	*http://www.fpc.org/CurrentDaily/7day-ytd_adults.txt*	0.25%	22
15	Data Reporting Sites *http://www.fpc.org/fishway/map.html*	0.23%	20
16	Smolt Data *http://www.fpc.org/smpdata.html*	0.23%	20
17	Bull Trout *http://www.fpc.org/bulltrout/BullTrout.htm*	0.22%	19
18	River Data *http://www.fpc.org/rivrdata.html*	0.22%	19
19	McNary Dam *http://www.fpc.org/fishway/mcn.html*	0.21%	18
20	What's New *http://www.fpc.org/whats_new.htm*	0.21%	18
	Total For the Pages Above	**93.36%**	**7,903**

Most Accessed Directories

This section analyzes accesses to the directories of the site. This information can be useful in determining the types of data most often requested.

Most Accessed Directories						
	Path to Directory	**Hits**	**% of Total Hits**	**Non Cached %**	**Non Cached K Xferred**	**User Sessions**
1	http://www.fpc.org/_derived	95,556	44.52 %	57.34%	150,314	5,133
2	http://www.fpc.org/CurrentDaily	18,064	8.41%	70.33%	762,178	9,777
3	http://www.fpc.org/_themes	13,858	6.45%	59.72%	8,900	4,708
4	http://www.fpc.org/sors	13,059	6.08%	55.74%	53,873	4,162
5	http://www.fpc.org/weekrprt	12,055	5.61%	65.9%	95,103	4,002
6	http://www.fpc.org/fishway	10,735	5%	62.93%	26,911	4,144
7	http://www.fpc.org/	10,162	4.73%	68.11%	187,398	6,086
8	http://www.fpc.org/Hatchery	9,726	4.53%	61.13%	92,848	3,938
9	http://www.fpc.org/bulltrout	8,590	4%	61.22%	38,711	3,243
10	http://www.fpc.org/ICONS	4,828	2.24%	59.85%	3,012	4,068
11	http://www.fpc.org/images	3,744	1.74%	60.49%	8,694	2,793
12	http://www.fpc.org/fpc_docs	3,545	1.65%	83.13%	193,300	486
13	http://www.fpc.org/graphics	2,747	1.27%	64.87%	13,683	2,471
14	http://www.fpc.org/adultqueries	2,673	1.24%	100%	31,344	783
15	http://www.fpc.org/DataReqs	1,869	0.87%	98.18%	154,577	894

Top Paths Through Site

This section identifies the paths people most often follow when visiting the site. The path begins at the starting page and shows the next six consecutive pages viewed.

Top Paths Through Site by Starting Page			
Starting Page	**Paths from Start**	**% of Total**	**User Sessions**
All Entry Pages	1.ADULTS COUNT http://www.fpc.org/CurrentDaily/7day-ytd_adults.htm	22.41%	2904
	1.Fish Passage Center Homepage - Salmon and Steelhead data for the Columbia and Sn http://www.fpc.org/	12.63%	1637
	1.Fish Passage Center Homepage - Salmon and Steelhead data for the Columbia and Sn http://www.fpc.org/ 2.Fish Passage Center Adult Return Data http://www.fpc.org/adult.html 3.ADULTS COUNT http://www.fpc.org/CurrentDaily/7day-ytd_adults.htm	4.86%	630
	1.Fish Passage Center Adult Return Data http://www.fpc.org/adult.html 2.ADULTS COUNT http://www.fpc.org/CurrentDaily/7day-ytd_adults.htm	3.38%	438
	1.Fish Passage Center Adult Return Data http://www.fpc.org/adult.html	2.12%	276
	1.http://www.fpc.org/CurrentDaily/adltpass.txt	2.02%	263
	1.Fish Passage Center Homepage - Salmon and Steelhead data for the Columbia and Sn http://www.fpc.org/ 2.Fish Passage Center Adult Return Data http://www.fpc.org/adult.html 3.http://www.fpc.org/CurrentDaily/adltpass.txt	1.11%	145
	1.http://www.fpc.org/robots.txt	1.03%	134
	1.Fish Passage Center Adult Return Data http://www.fpc.org/adult.html 2.http://www.fpc.org/CurrentDaily/adltpass.txt	0.84%	109
	1.Fish Passage Center Homepage - Salmon and Steelhead data for the Columbia and Sn http://www.fpc.org/ 2.Fish Passage Center Adult Return Data http://www.fpc.org/adult.html 3.ADULTS COUNT http://www.fpc.org/CurrentDaily/7day-ytd_adults.htm 4.Fish Passage Center's Columbia and Snake River Adult Passage Graph for 2002, 200 http://www.fpc.org/adultqueries/Adult_Graph_Submit.asp 5.Fish Passage Center's Columbia and Snake River Adult Passage Graph for 2002, 200 http://www.fpc.org/adultqueries/Adult_Graph.asp	0.73%	95

Most Downloaded Files

This section identifies the most popular file downloads for the site. If an error occurred during the transfer, that transfer is not counted.

Most Downloaded Files				
	File	**No. of Downloads**	**% of Total Downloads**	**Session Downloads**
1	*http://www.fpc.org/fpc_docs/Annual_FPC_Report/Final-FPC2001_Annual_Report.pdf*	932	23.7%	82
2	*http://www.fpc.org/fpc_docs/153-02.pdf*	498	12.66%	115
3	*http://www.fpc.org/weekrprt/wr2002/WR-02-22.pdf*	319	8.11%	111
4	*http://www.fpc.org/weekrprt/wr2002/WR-02-21.pdf*	282	7.17%	109
5	*http://www.fpc.org/fpc_docs/memos/157-02.pdf*	188	4.78%	45
6	*http://www.fpc.org/bulltrout/ChelanBullT_movement_firstdraft_3885_3.pdf*	112	2.84%	10
7	*http://www.fpc.org/fpc_docs/200-01.pdf*	94	2.39%	12
8	*http://www.fpc.org/bon_jda/ARPT01.pdf*	69	1.75%	6
9	*http://www.fpc.org/weekrprt/wr2002/WR-02-20.pdf*	61	1.55%	19
10	*http://www.fpc.org/fpc_docs/css/CSS_Report_FINAL.pdf*	60	1.52%	13
11	*http://www.fpc.org/fpc_docs/hatchery_releases/hatchery_releases2001.pdf*	50	1.27%	18
12	*http://www.fpc.org/fpc_docs/137-01.pdf*	45	1.14%	17
13	*http://www.fpc.org/fpc_docs/memos/153-02.pdf*	40	1.01%	12
14	*http://www.fpc.org/fpc_docs/127-01.pdf*	31	0.78%	18
15	*http://www.fpc.org/bon_jda/lifecycles.pdf*	29	0.73%	7
16	*http://www.fpc.org/fpc_docs/joint-technical/29-02.pdf*	25	0.63%	4
17	*http://www.fpc.org/fpc_docs/joint-technical/42-02.pdf*	23	0.58%	16
18	*http://www.fpc.org/fpc_docs/247-01.pdf*	22	0.55%	8
19	*http://www.fpc.org/fpc_docs/Fishway_Inspection/2001-09FishwayInspection.pdf*	22	0.55%	7
20	*http://www.fpc.org/fpc_docs/Fishway_Inspection/2002-06FishwayInspection.pdf*	20	0.5%	5
	Total For the Files Above	**2,922**	**74.31%**	**N/A**

Most Downloaded File Types

This section identifies the accessed file types and the total kilobytes downloaded for each file type. Cached requests and erred hits are excluded from the totals.

Most Downloaded File Types			
	File type	**Files**	**K Bytes Transferred**
1	gif	94,252	240,429
2	htm	14,775	856,588
3	jpg	6,183	179,869
4	html	4,088	100,638
5	pdf	3,894	368,038
6	asp	3,885	72,741
7	css	3,398	41,539
8	txt	2,009	13,492
9	xml	196	346
10	ico	173	93
11	emz	140	752
12	csv	98	2,833
13	tee	58	771
14	js	37	629
15	xls	29	32,186
16	doc	29	2,313
17	cab	25	8,565
18	jar	18	199
19	mso	13	514
20	png	12	77
	Total Files & K Bytes Transferred	**133,312**	**1,922,602**

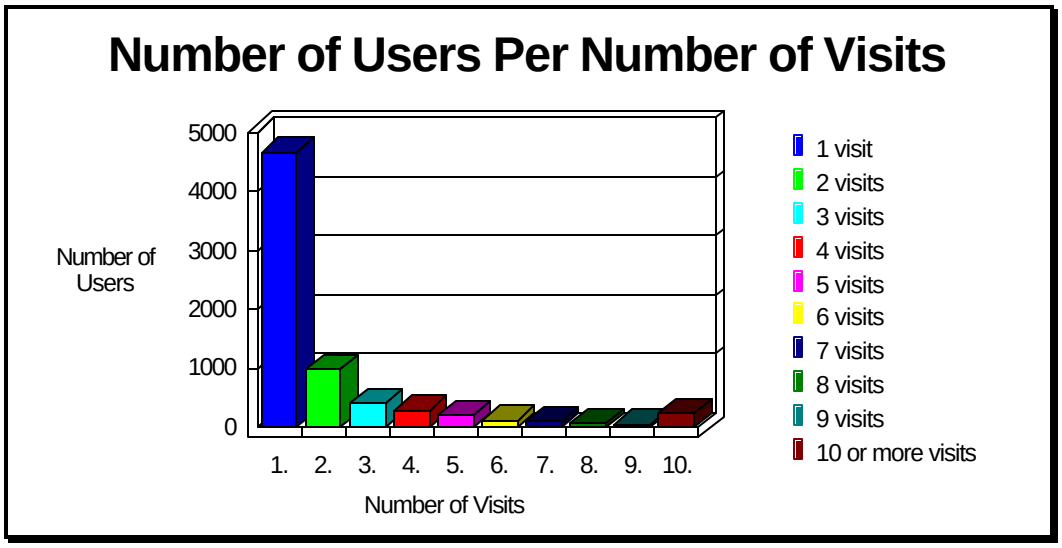
Dynamic Pages & Forms

This section identifies the most popular dynamic pages and forms executed by the server. WebTrends counts any line with a Post command or a Get command with a "?" as a dynamic page, and shows only successful hits.

Dynamic Pages & Forms				
	Dynamic Pages	**No. of Pages**	**% of Total**	**User Sessions**
1	*http://www.fpc.org/smolt/descalingquery/descaling_query.asp*	13	41.93%	2
2	*http://www.fpc.org/adultqueries/Adult_Table_2002.asp*	4	12.9%	3
3	*http://www.fpc.org/Hatchery/HatcheryRelDates_Results.asp*	2	6.45%	2
4	*http://www.fpc.org/smoltqueries/HistoricDailyGraph.asp*	2	6.45%	2
5	*http://www.fpc.org/adultqueries/Adult_Table.asp*	2	6.45%	2
6	*http://www.fpc.org/smoltqueries/newHistoricDailyData.asp*	2	6.45%	1
7	*http://www.fpc.org/ivesisland.asp*	2	6.45%	2
8	*http://www.fpc.org/Hatchery/HatcheryAgency_Results.asp*	1	3.22%	1
9	*http://www.fpc.org/Hatchery/HatcherybyHatchery_Results.asp*	1	3.22%	1
10	*http://www.fpc.org/smoltqueries/CurrentDailyData.asp*	1	3.22%	1

Number of Users Per Number of Visits

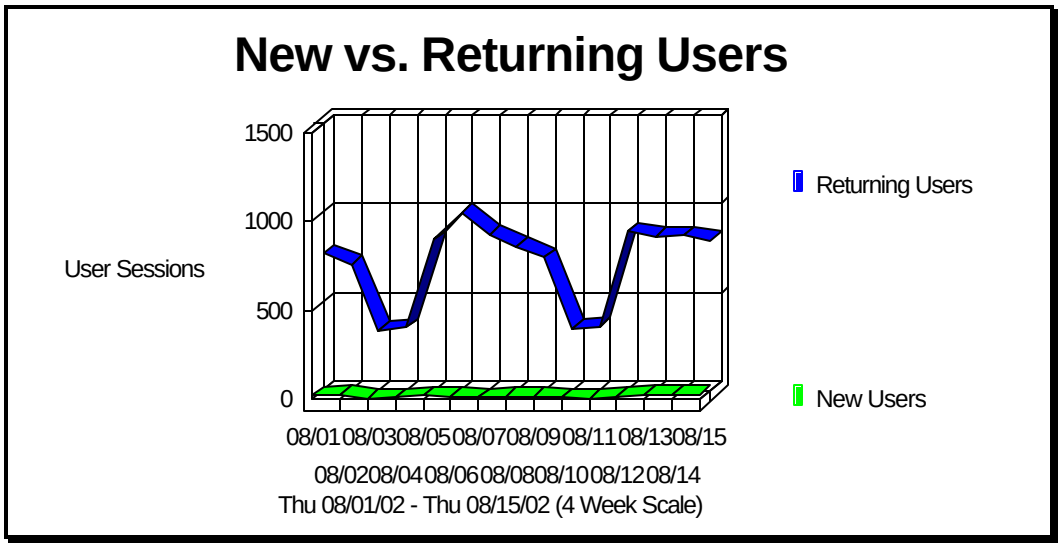
This section shows the distribution of users based on how many times each user visited your site.



Number of Users Per Number of Visits	
Number of Visits	**Number of Users**
1 visit	4663
2 visits	980
3 visits	413
4 visits	286
5 visits	200
6 visits	116
7 visits	90
8 visits	62
9 visits	49
10 or more visits	223

New vs. Returning Users

This section shows the number of new visitors to your site and the number of returning visitors to your site. Only visitors identified by cookies are counted. New visitors are those who didn't have a cookie on their 1st hit, but had one on later hits. Returning visitors are those who already had a cookie on their 1st hit (their previous visit happened before the start of this report period.)



New vs. Returning Users	
New or Returning User	**Number of User Sessions**
Returning Users	10,633
New Users	294

Top Users

This section identifies the IP address and/or domain name and their relative activity level on the site. If you do not use WebTrends cookies to track sessions on the site, WebTrends cannot differentiate between hits from different users of a same IP.

Top Users				
	User	**Hits**	**% of Total Hits**	**User Sessions**
1	63.224.35.180-1103042144.29478736	2,978	1.37%	4
2	204.245.210.210-3117222448.29496262	2,693	1.24%	33
3	12.229.3.136-2235152048.29478037	2,228	1.02%	40
4	204.245.210.206-2041343232.29503533	2,139	0.98%	28
5	209.19.139.2-856688064.29485591	1,992	0.91%	21
6	204.245.210.200-3583856336.29506759	1,837	0.84%	15
7	204.245.210.232-1850554096.29506699	1,126	0.51%	17
8	204.245.210.211-2967090528.29504157	976	0.45%	39
9	208.35.181.250-534938912.29485203	933	0.43%	23
10	12.224.182.86-1647937712.29500528	899	0.41%	21
11	63.194.167.81-3053887792.29485798	843	0.38%	21
12	12.225.146.4-3066136928.29487007	823	0.37%	17
13	63.15.127.211-829991856.29472889	807	0.37%	13
14	12.36.12.2-4125781312.29486428	800	0.36%	11
15	209.216.171.113-193548048.29505787	800	0.36%	14
16	161.55.198.23-3673136464.29280191	755	0.34%	11
17	66.12.19.190-2138459824.29408406	741	0.34%	17
18	206.81.101.104-979869376.29407644	705	0.32%	9
19	12.18.216.44-1523110496.29502049	698	0.32%	14
20	66.224.0.35-3390366992.29491223	673	0.31%	19
	Sub Total for Users Above	17,801	8.21%	241
	Total	**214,636**	**100%**	**15,420**

Most Active Organizations

This section identifies the companies or organizations that accessed the site the most often.

Most Active Organizations				
	Organizations	**Hits**	**% of Total Hits**	**User Sessions**
1	attbi.com	11,512	5.56%	810
2	uswest.net	8,492	4.1%	282
3	UUNET Technologies Inc. uu.net	7,711	3.72%	559
4	America Online aol.com	6,084	2.94%	1,520
5	KOKANEE	4,613	2.22%	72
6	CABZON	3,151	1.52%	119
7	ANCHOVY	3,132	1.51%	56
8	Gorge Networks Inc. gorge.net	3,053	1.47%	267
9	PAIUTE	2,678	1.29%	35
10	Charter Systems charter.com	2,457	1.18%	174
11	dsl-verizon.net	2,302	1.11%	152
12	pioneernet.net	2,275	1.09%	50
13	First Step fsr.net	2,238	1.08%	115
14	blm.gov	2,232	1.07%	62
15	boeing.com	2,210	1.06%	191
16	fs.fed.us	2,188	1.05%	54
17	Department Of Energy Richland hanford.gov	2,176	1.05%	65
18	HALFMOON	2,139	1.03%	33
19	Micron Electronics Inc. micronpc.com	2,033	0.98%	22
20	NorthWest Link nwlink.com	2,019	0.97%	157
21	army.mil	1,882	0.9%	74
22	United States Geological Survey usgs.gov	1,676	0.8%	74
23	bossig.com	1,591	0.76%	80
24	Level3.net	1,477	0.71%	170
25	Idaho National Engineering And Environmental Laboratory INEL.GOV	1,329	0.64%	30
26	Northwest Internet nwinternet.com	1,162	0.56%	78
27	nw-tel.com	1,102	0.53%	54
28	208.35.181.252	1,070	0.51%	26
29	Rocky Mountain Communications Inc rmci.net	1,033	0.49%	44
30	GTE Intelligent Network Services gte.net	1,012	0.48%	62
	Sub Total For Companies Above	88,029	42.54%	5,487
	Total For the Log File	**214,636**	**100%**	**15,420**

Organization Breakdown

This section provides a breakdown by types of organizations (.com, .net, .edu, .org, .mil, and .gov.) This information can only be displayed if reverse DNS lookups have been performed, and the percentages refer to the total of hits for which the organization type can be determined (some IPs cannot be resolved to a domain, and therefore an organization type cannot be determined).

Organization Breakdown				
	Organization Type	**Hits**	**% of Total Hits**	**User Sessions**
1	Company	65,733	45.8%	6,375
2	Network	56,065	39.06%	3,677
3	Government	11,813	8.23%	464
4	Education	3,833	2.67%	239
5	Organization	3,394	2.36%	242
6	Military	2,578	1.79%	121
7	Arpanet	100	0.06%	9
	Total for Known Organization Types	**143,516**	**100%**	**11,127**

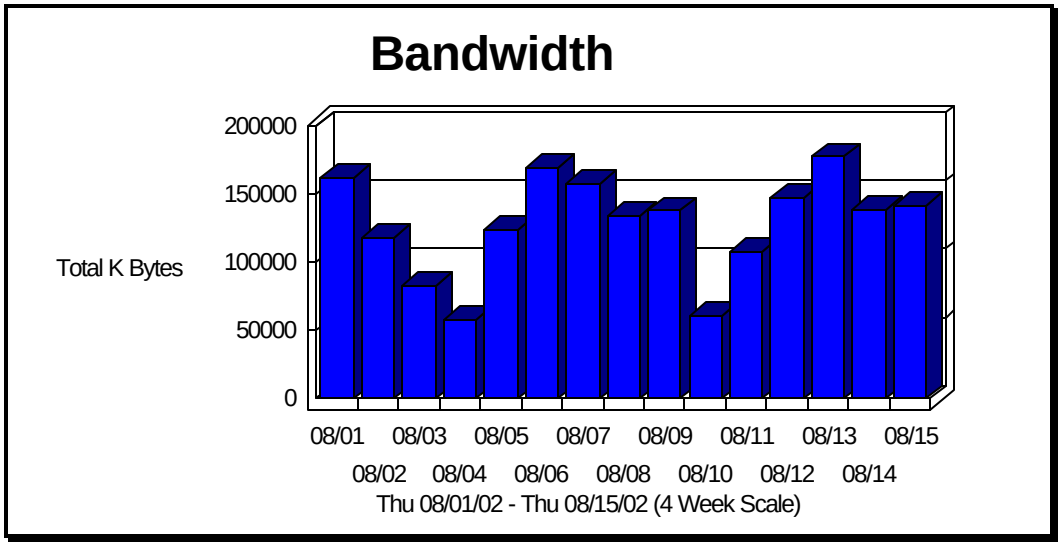
Summary of Activity for Report Period

This section outlines general server activity, comparing the level of activity on weekdays and weekends. The Average Number of Users and Hits on Weekdays are the averages for each individual week day. The Average Number of Users and Hits for Weekends groups Saturday and Sunday together. Values in the table do not include erred hits.

Summary of Activity for Report Period	
Average Number of ***Users*** per day on Weekdays	1,177
Average Number of ***Hits*** per day on Weekdays	17,022
Average Number of ***Users*** for the entire Weekend	1,232
Average Number of ***Hits*** for the entire Weekend	13,696
Most Active Day of the Week	Thu
Least Active Day of the Week	Sat
Most Active Day Ever	August 06, 2002
Number of Hits on Most Active Day	22,894
Least Active Day Ever	August 03, 2002
Number of Hits on Least Active Day	5,919
Most Active Hour of the Day	09:00-09:59
Least Active Hour of the Day	02:00-02:59

Summary of Activity by Time Increment

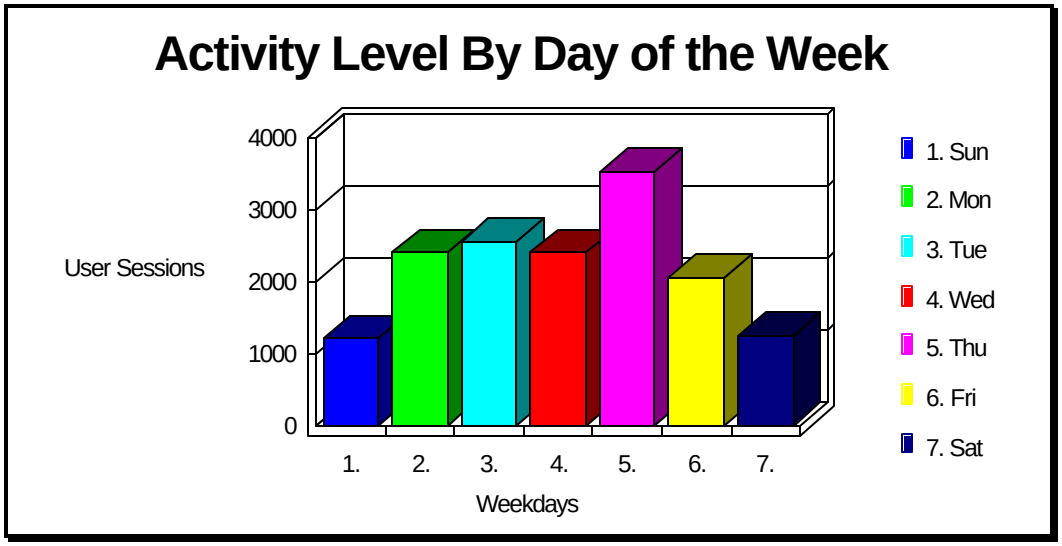
This section helps you understand the bandwidth requirements of the site by indicating the volume of activity in kilobytes transferred. The table provides various measures of activity by unit of time for the report period (the unit of time depends on the amount of time covered by the report, and will be the day in most cases).



Summary of Activity by Time Increment				
Time Interval	**Hits**	**Page Views**	**KBytes Transferred**	**User Sessions**
08/01	14,202	2,104	162,893 K	1,150
08/02	14,963	1,919	118,400 K	1,035
08/03	5,919	819	83,494 K	592
08/04	6,904	910	58,061 K	596
08/05	15,974	2,085	124,605 K	1,154
08/06	22,894	4,772	169,069 K	1,334
08/07	17,873	2,223	157,991 K	1,213
08/08	15,613	2,183	134,268 K	1,185
08/09	13,841	1,848	138,078 K	1,021
08/10	6,939	936	60,732 K	663
08/11	7,631	1,131	108,462 K	613
08/12	17,833	2,263	147,590 K	1,256
08/13	19,521	3,527	177,652 K	1,223
08/14	17,471	2,174	139,313 K	1,191
08/15	17,058	2,277	142,147 K	1,194
Total	**214,636**	**31,171**	**1,922,755 K**	**15,420**

Activity Level by Day of the Week

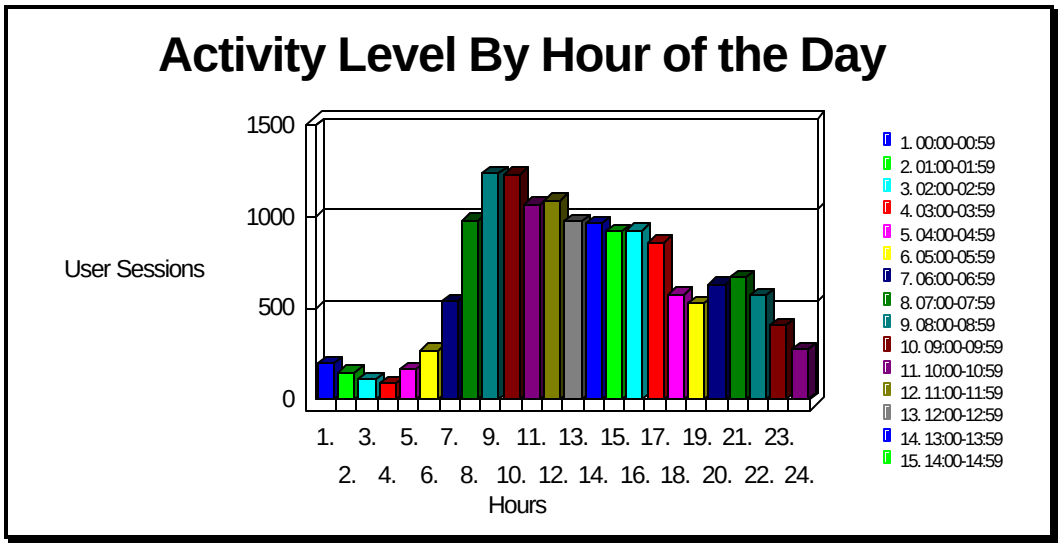
This section shows the activity for each day of the week for the report period (i.e. if there are two Mondays in the report period, the value presented is the sum of all hits for both Mondays.) Values in the table do not include erred hits.



Activity Level by Day of the Week				
	Day	**Hits**	**% of Total Hits**	**User Sessions**
1	Sun	14,535	6.77%	1,209
2	Mon	33,807	15.75%	2,410
3	Tue	42,415	19.76%	2,557
4	Wed	35,344	16.46%	2,404
5	Thu	46,873	21.83%	3,529
6	Fri	28,804	13.41%	2,056
7	Sat	12,858	5.99%	1,255
	Total Weekdays	187,243	87.23%	12,956
	Total Weekend	**27,393**	**12.76%**	**2,464**

Activity Level by Hour of the Day

This section shows the most and the least active hour of the day for the report period. The second table breaks down activity for the given report period to show the average activity for each individual hour of the day (if there are several days in the report period, the value presented is the sum of all hits during that period of time for all days). All times are referenced to the location of the system running the analysis.



Activity Level by Hours Details			
Hour	**# of Hits**	**% of Total Hits**	**# of User Sessions**
00:00-00:59	2,186	1.01%	200
01:00-01:59	1,302	0.6%	152
02:00-02:59	818	0.38%	113
03:00-03:59	881	0.41%	91
04:00-04:59	1,874	0.87%	167
05:00-05:59	2,681	1.24%	271
06:00-06:59	7,384	3.44%	539
07:00-07:59	14,436	6.72%	981
08:00-08:59	20,601	9.59%	1,236
09:00-09:59	20,713	9.65%	1,230
10:00-10:59	17,101	7.96%	1,065
11:00-11:59	15,193	7.07%	1,086
12:00-12:59	14,974	6.97%	976
13:00-13:59	15,238	7.09%	961
14:00-14:59	14,768	6.88%	920
15:00-15:59	13,644	6.35%	924
16:00-16:59	10,297	4.79%	862
17:00-17:59	7,336	3.41%	576
18:00-18:59	5,933	2.76%	526
19:00-19:59	7,393	3.44%	628
20:00-20:59	6,909	3.21%	668
21:00-21:59	5,968	2.78%	570
22:00-22:59	3,926	1.82%	404
23:00-23:59	3,080	1.43%	274
Total Users during Work Hours (8:00am-5:00pm)	142,529	66.4%	9,260

Activity Level by Hours Details			
Hour	**# of Hits**	**% of Total Hits**	**# of User Sessions**
Total Users during After Hours (5:01pm-7:59am)	**72,107**	**33.59%**	**6,160**

Technical Statistics and Analysis

This table shows the total number of hits for the site, how many were successful, how many failed, and calculates the percentage of hits that failed. It may help you in determining the reliability of the site.

Technical Statistics and Analysis	
Total Hits	216,810
Successful Hits	214,636
Failed Hits	2,174
Failed Hits as Percent	1%
Cached Hits	81,303
Cached Hits as Percent	37.49%

Dynamic Pages & Forms Errors

This section shows the number of successful form submissions compared to the number that failed. WebTrends considers anything with Post command as a dynamic page.

Dynamic Pages & Forms Errors		
Type	**Hits**	**% of Total**
Failed Forms Submitted	480	93.93%
Successful Forms Submitted	31	6.06%
Total	**511**	**100%**

Client Errors

This section identifies the error codes from the browsers accessing your server.

Client Errors		
Error	**Hits**	**% of Failed Hits**
404 Page or File Not Found	1,320	87.35%
405 Incomplete / Undefined	90	5.95%
406 Incomplete / Undefined	75	4.96%
403 Forbidden Access	17	1.12%
400 Bad Request	9	0.59%
Total	**1,511**	**100%**

Page Not Found (404) Errors

This section identifies pages that returned "Page Not Found" (404) errors on the server.

Page Not Found (404) Errors		
Target URL and Referrer	**Hits**	**% of 404 Hits**
/images/1.gif *http://www.fpc.org/JuvNSDaily2002Request.asp" target="_new">http://www.fpc.org/JuvNSDaily2002Request.asp*	156	11.81%
/winnt/system32/cmd.exe?/c+ *(no referrer)" target="_new">(no referrer)*	40	3.03%
/fpc_docs/2001JuvSalMigr_files/notes_flag.gif *http://www.fpc.org/fpc_docs/2001JuvSalMigr_files/outline.htm" target="_new">http://www.fpc.org/fpc_docs/2001JuvSalMigr_files/outline.htm*	38	2.87%
/default.ida?NNN%u9090%u6858%ucbd3%... *(no referrer)" target="_new">(no referrer)*	21	1.59%
/2000Daily/7_Day_Adults2000.htm *http://www.steelheader.net/home/default.shtml" target="_new">http://www.steelheader.net/home/default.shtml*	14	1.06%
/images/1.gif *http://www.fpc.org/JuvNS2002Request.asp" target="_new">http://www.fpc.org/JuvNS2002Request.asp*	12	0.9%
/2000Daily/7_Day_Adults2000.htm *(no referrer)" target="_new">(no referrer)*	11	0.83%
/DataReqs/adultgraph/205.139.121.937062.jpg *(no referrer)" target="_new">(no referrer)*	10	0.75%
/sor-list.htm *(no referrer)" target="_new">(no referrer)*	9	0.68%
/images/back_over.gif *http://www.fpc.org/DailyChartClient.htm" target="_new">http://www.fpc.org/DailyChartClient.htm*	9	0.68%
/class/tscrollBeanInfo.class *(no referrer)" target="_new">(no referrer)*	9	0.68%
/images/back_load.gif *http://www.fpc.org/DailyChartClient.htm" target="_new">http://www.fpc.org/DailyChartClient.htm*	9	0.68%
/images/back_click.gif *http://www.fpc.org/DailyChartClient.htm" target="_new">http://www.fpc.org/DailyChartClient.htm*	8	0.6%
/_vti_bin/owssvr.dll?UL=1&ACT=4&BUILD=2614&STRMVER=4&CAPREQ=0 *(no referrer)" target="_new">(no referrer)*	8	0.6%
/MSOffice/cltreq.asp?UL=1&ACT=4&BUILD=2614&STRMVER=4&CAPREQ=0 *(no referrer)" target="_new">(no referrer)*	8	0.6%
Total for Pages Above	**362**	**27.42%**

Server Errors

This section identifies by type the errors which occurred on the server.

Server Errors		
Error	**Hits**	**% of Total**
500 Internal Error	663	100%
Total	**663**	**100%**

Top Referring Sites

This section identifies the domain names or numeric IP addresses with links to the site. This information will only be displayed if your server is logging this information.

Top Referring Sites		
	Site	**User Sessions**
1	No Referrer	7,506
2	http://www.fpc.org/	5,001
3	http://www.ifish.net/	649
4	http://www.google.com/	302
5	[unknown+origin]	273
6	http://search.msn.com/	160
7	http://ifish.net/	129
8	http://www.flyfishingdeschutes.com/	119
9	http://www2.state.id.us/	111
10	http://google.yahoo.com/	108
11	http://search.yahoo.com/	80
12	http://www.wa.gov/	67
13	http://www.fpc.org	53
14	http://auto.search.msn.com/	51
15	bookmarks	39
16	http://www.idfishnhunt.com/	37
17	http://www.ifish.net	31
18	http://www.creeksideflyfishing.com/	29
19	http://aolsearch.aol.com/	24
20	http://www.cqs.washington.edu/	24
	Sub Total for the Referring Sites Above	14,793
	Total for the Log File	**15,420**

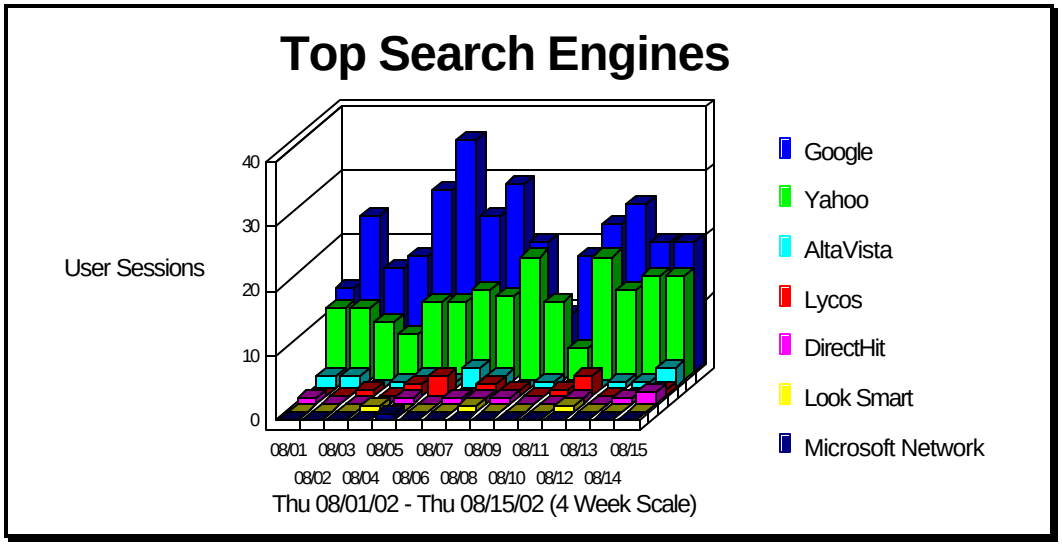
Top Referring URLs

This section provides the full URLs of the sites with links to the site. This information will only be displayed if your server is logging the referrer information.

Top Referring URLs		
	URL	**User Sessions**
1	No Referrer	7,506
2	http://www.fpc.org/CurrentDaily/7day-ytd_adults.htm	2,647
3	http://www.fpc.org/	1,532
4	http://www.ifish.net/	649
5	http://www.fpc.org/adult.html	412
6	[unknown+origin]	273
7	http://ifish.net/	129
8	http://www.flyfishingdeschutes.com/fish_count.htm	119
9	http://www2.state.id.us/fishgame/fish/programsinfo/anadcounts/counts.htm	111
10	http://www.wa.gov/wdfw/fishcorn.htm	67
11	http://www.fpc.org	53
12	http://www.fpc.org/Index.htm	52
13	bookmarks	39
14	http://www.ifish.net	31
15	http://www.fpc.org/SMPDATA.html	30
16	http://www.creeksideflyfishing.com/fishingreport.htm	29
17	http://auto.search.msn.com/results.asp?cfg=SMCINITIAL&RS=CHECKED&v=1&srch=	23
18	http://www.flyfishusa.com/about-our-waters/our-waters-home/our-waters.html	20
19	http://www.fishingmagician.com/links.html	20
20	http://www.fpc.org/tempgraphs/tempsubmit.htm	18
	Sub Total for the Referrers Above	13,760
	Total for the Log File	**15,420**

Top Search Engines

The graphic illustrates the new user sessions initiated by searches from each search engine. The first table identifies which search engines referred visitors to the site the most often. Note that each search may contain several keywords. The second table identifies the main keywords for each search engine.



Top Search Engines			
	Engines	**Searches**	**% of Total**
1	Google	409	60.68%
2	Yahoo	208	30.86%
3	AltaVista	23	3.41%
4	Lycos	17	2.52%
5	DirectHit	12	1.78%
6	Look Smart	4	0.59%
7	Microsoft Network	1	0.14%
	Total of Searches for the Engines Above	674	100%
	Total of Searches for the Log File	**674**	**100%**

Top Search Engines with Search Phrases Detail			
Engines	**Phrases**	**Phrases Found**	**% of Total**
Google	snake fish	26	3.85%
	fish passage center	25	3.7%
	bonneville dam fish count	8	1.18%
	rocky reach dam	7	1.03%
	columbia river fish counts	7	1.03%
	mcnary dam	6	0.89%
	wells dam	5	0.74%
	ice harbor dam	5	0.74%
	adult fish count on columbia	5	0.74%
	columbia river fish count	5	0.74%
Yahoo	snake fish	17	2.52%
	fish passage center	17	2.52%
	fish passage	12	1.78%
	the dalles dam	5	0.74%

Top Search Engines with Search Phrases Detail			
Engines	**Phrases**	**Phrases Found**	**% of Total**
	fish counts on bonneville dam	4	0.59%
	steelhead	4	0.59%
	rocky reach dam	4	0.59%
	mcnary dam	4	0.59%
	fish	4	0.59%
	wanapum dam	3	0.44%
AltaVista	http://www.fpc.org/fishway/jda.html	5	0.74%
	carbonate or passage or reg or bureaus or incas	1	0.14%
	columbia fish count	1	0.14%
	columbia river fish counts	1	0.14%
	april 1, 1984	1	0.14%
	elder or prolate or carnivorous or roam or fish	1	0.14%
	fish adult passage columbia	1	0.14%
	fish ladder	1	0.14%
	fish passage center	1	0.14%
	abominate or fish or tot or schooner or forewarns	1	0.14%
DirectHit	columbia river fish count	6	0.89%
	columbia river fish counts	1	0.14%
	columbia river steelhead	1	0.14%
	mcnary dam	1	0.14%
	rock island dam	1	0.14%
	wells dam	1	0.14%
	columbia river	1	0.14%
Lycos	army smp	4	0.59%
	map salmon migration	2	0.29%
	snake fish	2	0.29%
	fish passage center	1	0.14%
	fpc.org	1	0.14%
	columbia river dams	1	0.14%
	dam fish counts	1	0.14%
	fish identification	1	0.14%
	salmon	1	0.14%
	system operation and support	1	0.14%
Look Smart	fish passage center	1	0.14%
	rocky reach dam	1	0.14%
	usace fish counts	1	0.14%
	bonneville dam fish counts	1	0.14%
Microsoft Network	columbia river fish count	1	0.14%

Top Search Engines with Keywords Detail			
Engines	**Keywords**	**Keywords Found**	**% of Total**
Google	fish	175	25.96%
	dam	94	13.94%
	bonneville	46	6.82%
	columbia	45	6.67%

Top Search Engines with Keywords Detail			
Engines	**Keywords**	**Keywords Found**	**% of Total**
	count	43	6.37%
	river	41	6.08%
	passage	41	6.08%
	counts	33	4.89%
	snake	32	4.74%
	center	28	4.15%
Yahoo	fish	106	15.72%
	dam	48	7.12%
	passage	44	6.52%
	snake	27	4%
	river	24	3.56%
	center	23	3.41%
	columbia	17	2.52%
	counts	12	1.78%
	count	12	1.78%
	salmon	11	1.63%
AltaVista	fish	13	1.92%
	http://www.fpc.org/fishway/jda.html	5	0.74%
	passage	5	0.74%
	salmon	3	0.44%
	columbia	3	0.44%
	counts	2	0.29%
	1984	1	0.14%
	bigot	1	0.14%
	bleat	1	0.14%
	bureaus	1	0.14%
Lycos	fish	5	0.74%
	army	4	0.59%
	smp	4	0.59%
	salmon	3	0.44%
	migration	2	0.29%
	map	2	0.29%
	snake	2	0.29%
	identification	1	0.14%
	fpc.org	1	0.14%
	dam	1	0.14%
DirectHit	columbia	9	1.33%
	river	9	1.33%
	fish	7	1.03%
	count	6	0.89%
	dam	3	0.44%
	mcnary	1	0.14%
	counts	1	0.14%
	island	1	0.14%
	rock	1	0.14%
	steelhead	1	0.14%
Look Smart	fish	3	0.44%
	counts	2	0.29%

Top Search Engines with Keywords Detail			
Engines	**Keywords**	**Keywords Found**	**% of Total**
	dam	2	0.29%
	bonneville	1	0.14%
	passage	1	0.14%
	reach	1	0.14%
	rocky	1	0.14%
	usace	1	0.14%
	center	1	0.14%
Microsoft Network	count	1	0.14%
	fish	1	0.14%
	river	1	0.14%
	columbia	1	0.14%

Top Search Phrases

The first table identifies Phrases which led the most visitors to the site (regardless of the search engine). The second table identifies, for each phrase, which search engines led visitors to the site.

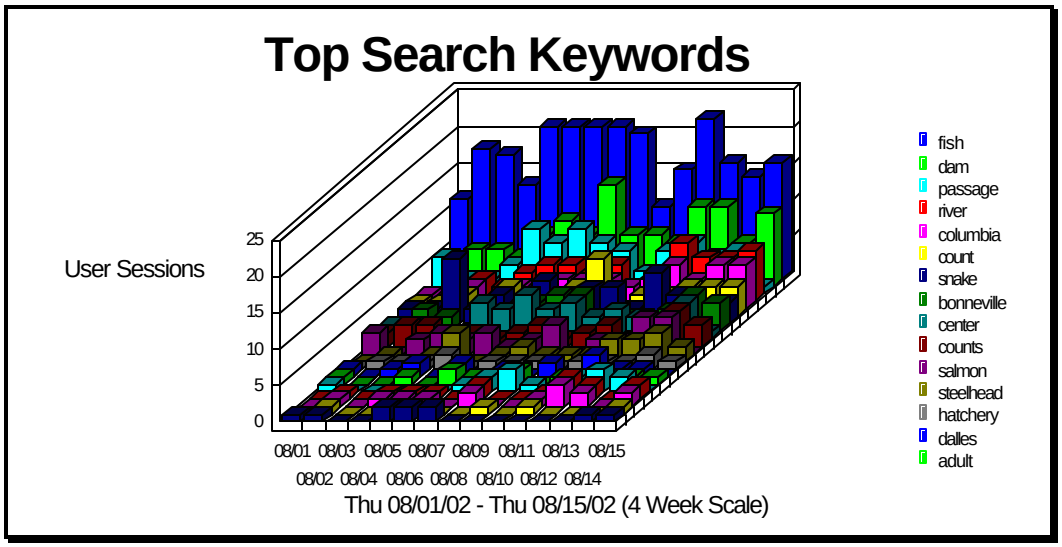
Top Search Phrases			
	Phrases	**Phrases found**	**% of Total**
1	fish passage center	45	6.67%
2	snake fish	45	6.67%
3	columbia river fish count	14	2.07%
4	fish passage	13	1.92%
5	rocky reach dam	12	1.78%
6	columbia river fish counts	11	1.63%
7	mcnary dam	11	1.63%
8	bonneville dam fish count	10	1.48%
9	the dalles dam	8	1.18%
10	ice harbor dam	8	1.18%
11	wells dam	7	1.03%
12	fish	7	1.03%
13	wanapum dam	6	0.89%
14	bonneville fish counts	6	0.89%
15	passage	6	0.89%
16	http://www.fpc.org/fishway/jda.html	5	0.74%
17	fish count bonneville dam	5	0.74%
18	adult fish count on columbia	5	0.74%
19	lower granite dam	4	0.59%
20	fish counts on bonneville dam	4	0.59%
	Total Found for the Phrases Above	232	34.42%
	Total of Phrases Found in the Log File	**674**	**100%**

Top Search Phrases with Engines Detail			
Phrases	**Engines**	**Searches**	**% of Total**
fish passage center	Google	25	3.7%
	Yahoo	17	2.52%
	Lycos	1	0.14%
	Look Smart	1	0.14%
	AltaVista	1	0.14%
snake fish	Google	26	3.85%
	Yahoo	17	2.52%
	Lycos	2	0.29%
columbia river fish count	DirectHit	6	0.89%
	Google	5	0.74%
	Yahoo	2	0.29%
	Microsoft Network	1	0.14%
fish passage	Yahoo	12	1.78%
	Google	1	0.14%
rocky reach dam	Google	7	1.03%
	Yahoo	4	0.59%
	Look Smart	1	0.14%
columbia river fish counts	Google	7	1.03%

Top Search Phrases with Engines Detail			
Phrases	**Engines**	**Searches**	**% of Total**
	Yahoo	2	0.29%
	DirectHit	1	0.14%
	AltaVista	1	0.14%
mcnary dam	Google	6	0.89%
	Yahoo	4	0.59%
	DirectHit	1	0.14%
bonneville dam fish count	Google	8	1.18%
	Yahoo	2	0.29%
the dalles dam	Yahoo	5	0.74%
	Google	3	0.44%
ice harbor dam	Google	5	0.74%
	Yahoo	3	0.44%
wells dam	Google	5	0.74%
	Yahoo	1	0.14%
	DirectHit	1	0.14%
fish	Yahoo	4	0.59%
	Google	3	0.44%
wanapum dam	Yahoo	3	0.44%
	Google	3	0.44%
bonneville fish counts	Google	5	0.74%
	Yahoo	1	0.14%
passage	Google	4	0.59%
	Yahoo	2	0.29%
http://www.fpc.org/fishway/jda.html	AltaVista	5	0.74%
fish count bonneville dam	Google	4	0.59%
	Yahoo	1	0.14%
adult fish count on columbia	Google	5	0.74%
lower granite dam	Google	4	0.59%
fish counts on bonneville dam	Yahoo	4	0.59%

Top Search Keywords

The first table identifies keywords which led the most visitors to the site (regardless of the search engine). The second table identifies, for each keyword, which search engines led visitors to the site.



Top Search Keywords			
	Keywords	**Keywords found**	**% of Total**
1	fish	310	15.67%
2	dam	148	7.48%
3	passage	92	4.65%
4	river	77	3.89%
5	columbia	76	3.84%
6	count	63	3.18%
7	snake	61	3.08%
8	bonneville	58	2.93%
9	center	54	2.73%
10	counts	51	2.57%
11	salmon	37	1.87%
12	steelhead	30	1.51%
13	hatchery	19	0.96%
14	dalles	18	0.91%
15	adult	18	0.91%
16	mcnary	15	0.75%
17	rocky	15	0.75%
18	reach	15	0.75%
19	on	15	0.75%
20	island	14	0.7%
	Total Found for the Keywords Above	1,186	59.95%
	Total of Keywords Found in the Log File	**1,978**	**100%**

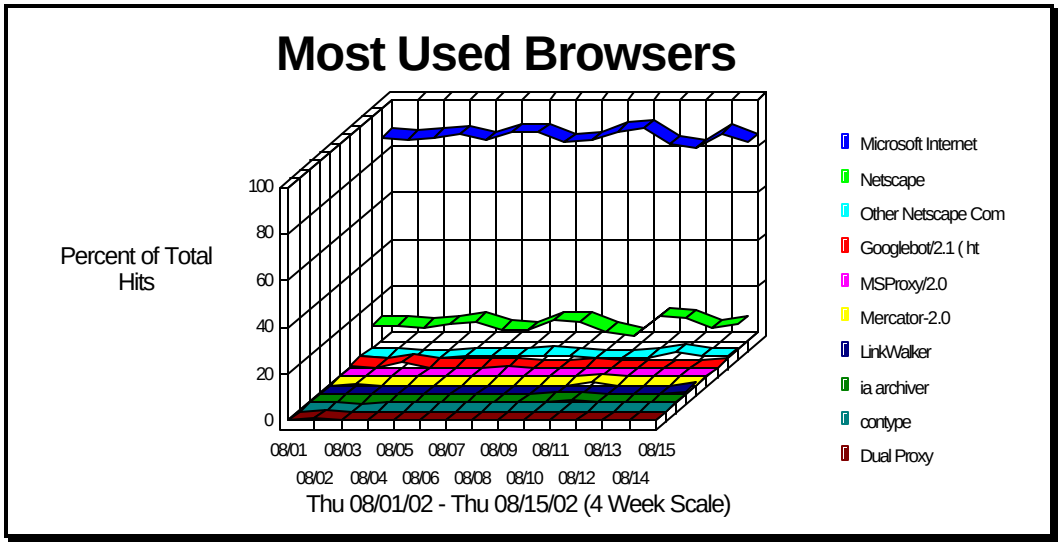
Top Search Keywords with Engines Detail			
Keywords	**Engines**	**Searches**	**% of Total**
fish	Google	175	8.84%
	Yahoo	106	5.35%

Top Search Keywords with Engines Detail			
Keywords	**Engines**	**Searches**	**% of Total**
	AltaVista	13	0.65%
	DirectHit	7	0.35%
	Lycos	5	0.25%
	Look Smart	3	0.15%
	Microsoft Network	1	0.05%
dam	Google	94	4.75%
	Yahoo	48	2.42%
	DirectHit	3	0.15%
	Look Smart	2	0.1%
	Lycos	1	0.05%
passage	Yahoo	44	2.22%
	Google	41	2.07%
	AltaVista	5	0.25%
	Lycos	1	0.05%
	Look Smart	1	0.05%
river	Google	41	2.07%
	Yahoo	24	1.21%
	DirectHit	9	0.45%
	Microsoft Network	1	0.05%
	Lycos	1	0.05%
	AltaVista	1	0.05%
columbia	Google	45	2.27%
	Yahoo	17	0.85%
	DirectHit	9	0.45%
	AltaVista	3	0.15%
	Microsoft Network	1	0.05%
	Lycos	1	0.05%
count	Google	43	2.17%
	Yahoo	12	0.6%
	DirectHit	6	0.3%
	Microsoft Network	1	0.05%
	AltaVista	1	0.05%
snake	Google	32	1.61%
	Yahoo	27	1.36%
	Lycos	2	0.1%
bonneville	Google	46	2.32%
	Yahoo	11	0.55%
	Look Smart	1	0.05%
center	Google	28	1.41%
	Yahoo	23	1.16%
	Lycos	1	0.05%
	Look Smart	1	0.05%
	AltaVista	1	0.05%
counts	Google	33	1.66%
	Yahoo	12	0.6%
	Look Smart	2	0.1%
	AltaVista	2	0.1%
	Lycos	1	0.05%
	DirectHit	1	0.05%
salmon	Google	20	1.01%

Top Search Keywords with Engines Detail			
Keywords	**Engines**	**Searches**	**% of Total**
	Yahoo	11	0.55%
	Lycos	3	0.15%
	AltaVista	3	0.15%
steelhead	Google	18	0.91%
	Yahoo	11	0.55%
	DirectHit	1	0.05%
hatchery	Google	15	0.75%
	Yahoo	4	0.2%
dalles	Google	12	0.6%
	Yahoo	6	0.3%
adult	Google	14	0.7%
	Yahoo	3	0.15%
	AltaVista	1	0.05%
mcnary	Google	8	0.4%
	Yahoo	6	0.3%
	DirectHit	1	0.05%
rocky	Google	9	0.45%
	Yahoo	5	0.25%
	Look Smart	1	0.05%
reach	Google	9	0.45%
	Yahoo	5	0.25%
	Look Smart	1	0.05%
on	Google	10	0.5%
	Yahoo	5	0.25%
island	Google	7	0.35%
	Yahoo	6	0.3%
	DirectHit	1	0.05%

Most Used Browsers

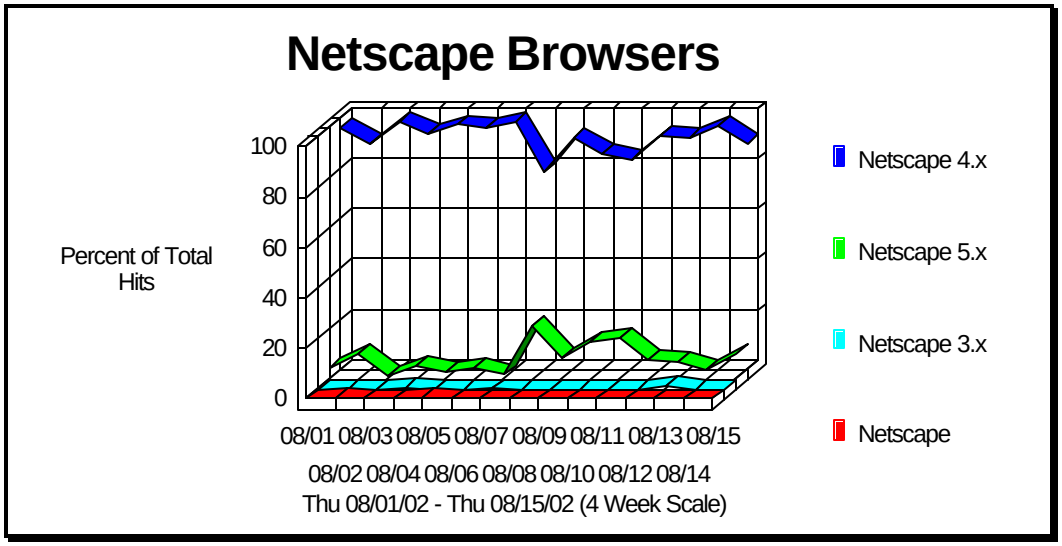
This section identifies the most popular WWW Browsers used by visitors to the site. This information will only be displayed if your server is logging the browser/platform information.



Most Used Browsers				
	Browser	**Hits**	**% of Total Hits**	**User Sessions**
1	Microsoft Internet Explorer	184,769	86.7%	12,776
2	Netscape	23,483	11.01%	1,253
3	Other Netscape Compatible	2,412	1.13%	319
4	Googlebot/2.1 (http://www.googlebot.com/bot.html)	438	0.2%	213
5	MSProxy/2.0	390	0.18%	90
6	Mercator-2.0	264	0.12%	19
7	LinkWalker	235	0.11%	4
8	ia_archiver	216	0.1%	64
9	contype	149	0.06%	6
10	Dual Proxy	137	0.06%	1
	Total For Browsers Above	**212,493**	**99.71%**	**14,745**

Netscape Browsers

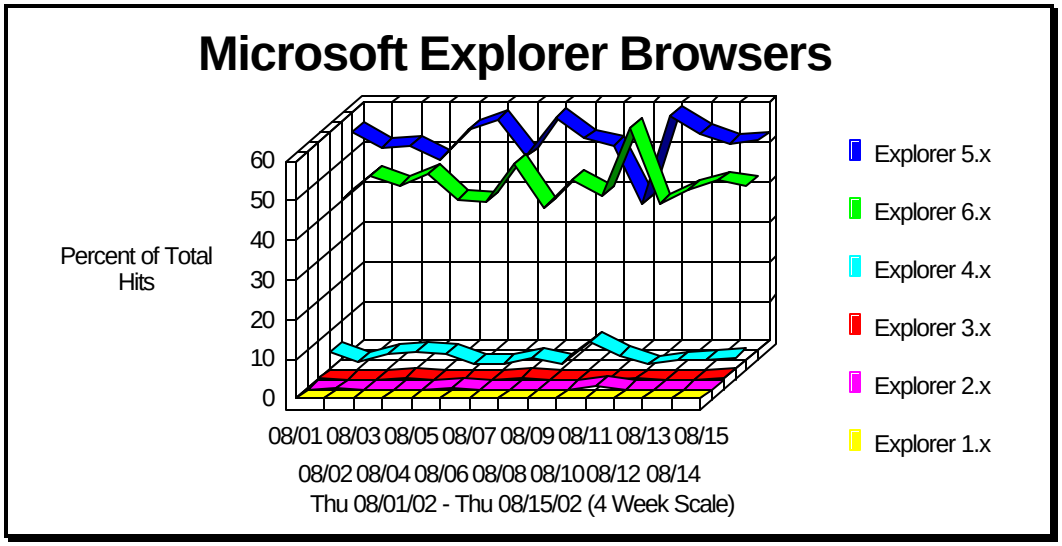
This section gives you a breakdown of the various versions of Netscape browsers that visitors to the site are using.



Netscape Browsers				
	Browser	**Hits**	**% of Total Hits**	**User Sessions**
1	Netscape 4.x	21,625	92.08%	1,044
2	Netscape 5.x	1,808	7.69%	203
3	Netscape 3.x	45	0.19%	5
4	Netscape	5	0.02%	1
	Total For Browsers Above	**23,483**	**100%**	**1,253**

Microsoft Explorer Browsers

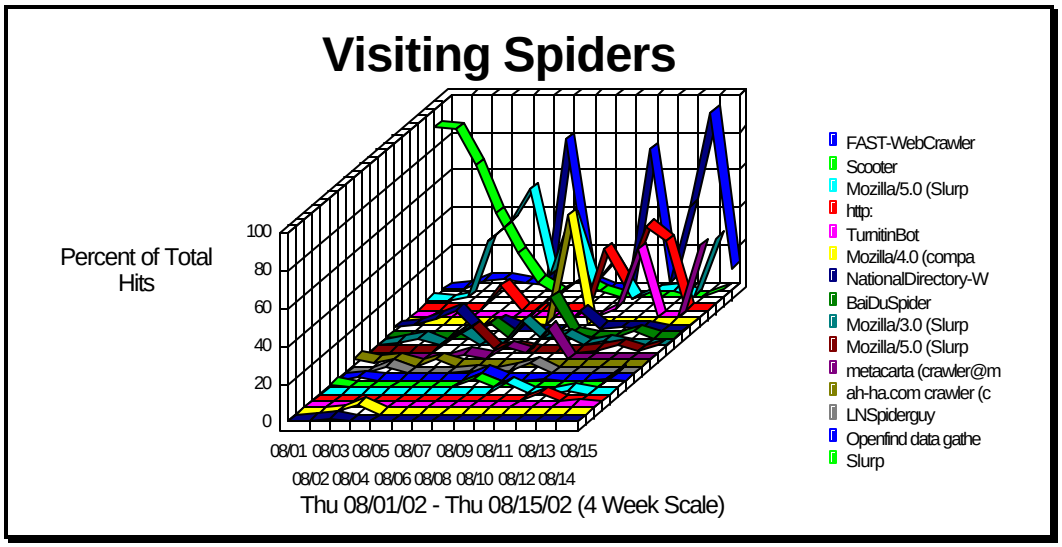
This section gives you a breakdown of the various versions of Microsoft Explorer browsers that visitors to the site are using.



Microsoft Explorer Browsers				
	Browser	**Hits**	**% of Total Hits**	**User Sessions**
1	Explorer 5.x	98,976	53.56%	7,146
2	Explorer 6.x	80,535	43.58%	5,241
3	Explorer 4.x	5,007	2.7%	330
4	Explorer 3.x	143	0.07%	36
5	Explorer 2.x	101	0.05%	18
6	Explorer 1.x	7	0%	5
	Total For Browsers Above	**184,769**	**100%**	**12,776**

Visiting Spiders

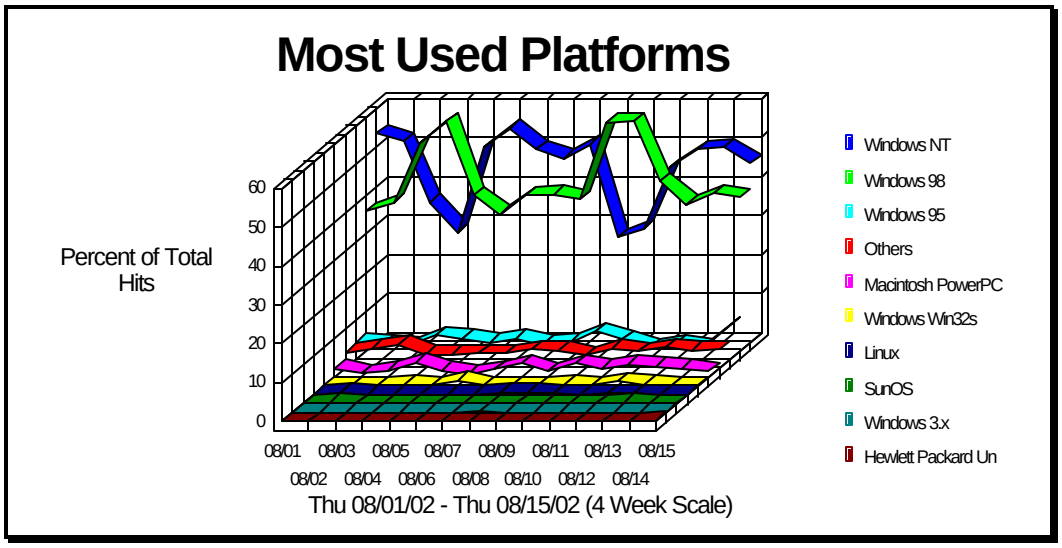
This section identifies all robots, spiders, crawlers and search services (i.e. Alta Vista, Lycos, and Excite) visiting the site.



Visiting Spiders				
	Spider	**Hits**	**% of Total Hits**	**User Sessions**
1	FAST-WebCrawler	630	41.31%	42
2	Scooter	345	22.62%	107
3	Mozilla/5.0 (Slurp/cat; slurp@inktomi.com; http://www.inktomi.com/slurp.html)	153	10.03%	148
4	http:	130	8.52%	18
5	TurnitinBot	65	4.26%	5
6	Mozilla/4.0 (compatible; MSIE 5.5; Windows NT 4.0; 3COM U.S. Robotics)	37	2.42%	2
7	NationalDirectory-WebSpider	31	2.03%	31
8	BaiDuSpider	29	1.9%	14
9	Mozilla/3.0 (Slurp/si; slurp@inktomi.com; http://www.inktomi.com/slurp.html)	18	1.18%	9
10	Mozilla/5.0 (Slurp/si; slurp@inktomi.com; http://www.inktomi.com/slurp.html)	16	1.04%	16
11	metacarta (crawler@metacarta.com)	14	0.91%	14
12	ah-ha.com crawler (crawler@ah-ha.com)	13	0.85%	12
13	LNSpiderguy	7	0.45%	4
14	Openfind data gatherer, Openbot	6	0.39%	6
15	Slurp	6	0.39%	3
16	Mozilla/4.0 (compatible; MSIE 4.01; Windows NT; MS Search 4.0 Robot) Microsoft	5	0.32%	4
17	Scooter-3.2.PDF	4	0.26%	1
18	Lycos_Spider_(modspider)	2	0.13%	0
19	Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; MSIECrawler)	2	0.13%	2
20	Mozilla/4.0 (compatible; MSIE 4.01; MSIECrawler; Windows 95)	2	0.13%	2
	Total For Spiders Above	**1,515**	**99.34%**	**440**

Most Used Platforms

This section identifies the operating systems most used by the visitors to the site.



Most Used Platforms				
	Platform	**Hits**	**% of Total Hits**	**User Sessions**
1	Windows NT	100,507	47.16%	6,077
2	Windows 98	87,649	41.12%	6,481
3	Windows 95	9,791	4.59%	696
4	Others	9,321	4.37%	1,309
5	Macintosh PowerPC	4,328	2.03%	324
6	Windows Win32s	681	0.31%	7
7	Linux	573	0.26%	46
8	SunOS	139	0.06%	5
9	Windows 3.x	66	0.03%	26
10	Hewlett Packard Unix (HP9000)	56	0.02%	1
	Total For Platforms Above	**213,111**	**100%**	**14,972**

This report was generated by WebTrends.