Nez Perce Tribe Harvest Monitoring Program
-2009 Snake River Basin Spring and Summer Chinook Sampling Plan-

Version Dated: May 6, 2009

Authors: Joseph Oatman (Nez Perce Tribe)
Rishi Sharma (Columbia River Inter-Tribal Fish Commission)

1. Introduction

The Nez Perce Tribe will conduct fishery sampling and catch estimation for planned treaty fisheries targeting Snake River spring and summer Chinook during the 2008 run year. The Snake River Basin treaty fisheries are expected to be conducted consistent with Nez Perce Tribal Code and law, the Treaty of 1855, and the established United States v. Oregon harvest management framework. The primary objective of the Harvest Division is to develop and implement a biologically sound harvest monitoring program through the collection of more precise treaty catch data for fishing areas on the reservation lands, ceded lands, and at all "usual and accustomed" areas of the Nez Perce Tribe.

Harvest monitoring activities for the Tribe covers tribal treaty fishing activities in tributaries located in southeast Washington, northeast Oregon, and a majority of central Idaho. Within this area, the Tribe can access 50% of the hatchery fish available for harvest. The Tribe generally can implement fisheries that result in greater wild fish impacts than those allowed for state fisheries because of our treaty reserved fishing right and traditional methods of catching fish. The catch and harvest information generated from this sampling plan will be used to insure that proposed harvest is biologically and legally sound and that it occurs (i.e. take numbers, locations, dates and gear types) in the manner designed.

The development of a harvest management system for the Nez Perce Tribe addresses some of the management issues as identified in Section D.5 of the 2000 Northwest Power Planning Council's (NPPC) Fish and Wildlife Program (FWP). Specifically, the NPT is incorporating management practices that include the following key objectives identified by the FWP: manage harvest to ensure risk of imprecision and error in predicted run size does not threaten survival and recovery of naturally spawning populations; monitor in-river fisheries (escapement, catch, and expand monitoring programs to reduce critical uncertainties); manage for data integration and availability; and manage harvest consistent with the protection and recovery of the naturally spawning populations. Implementation of this sampling plan for spring and summer Chinook will provide critical adult information necessary for stock assessment and management.

The primary strategy for the FWP is to assure that subbasin plans are consistent with harvest management practices and increase opportunities for harvest—like those envisioned by the Nez Perce Tribe—wherever feasible. The Council's program calls for subbasin plans to deal explicitly with harvest management plans, of which this sampling plan is considered one important subcomponent to Nez Perce Tribe harvest planning, implementation and management.

It is expected that the harvest information derived from the implementation of this sampling plan will continue to provide accounting of core Nez Perce harvest in the Snake River Basin. Harvest monitoring will produce catch data useful to the co-managers to determine annual adult abundance, escapement, and relationship of hatchery production to meet harvest objectives in specific tributaries in the Snake Basin.

This sampling plan will be implemented using funding sources from the Lower Snake River Compensation Plan (LSRCP) and the Bonneville Power Administration (BPA), of which each respective contract establishes deliverables consistent to the fishing locations in Table 1 below. It is worth noting that the identified fisheries do not include all Nez Perce "usual and accustomed" fishing sites reserved to the Tribe under the Treaty of 1855. This plan encompasses only those tributary fishing locations where level of fishing pressure, listing status, co-management priority, and/or contract deliverables necessitate prioritized monitoring of tribal catch.

The three sampling methods as described below (creel survey, direct inseason interview survey, and post-season interview survey) will be reviewed to see if harvest sampling data accurately characterizes the true number of Chinook salmon harvested in each tributary we identified for data collection.

2. Sampling Design

The annual Snake River Spring and Summer Chinook Sampling Plan is designed to cover six geographic management areas that comprise the Nez Perce Tribe Snake River Basin (SRB) treaty management area. These management areas include the mainstem Snake River, Tucannon River, Clearwater River, Salmon River, Imnaha River, and the Grande Ronde subbasins.

The foundation for the Tribe's spring and summer Chinook fisheries is our treaty reserved fishing rights in the Snake Basin and its tributaries. Snake River spring/summer Chinook are listed under the Endangered Species Act (ESA). Tribal fisheries occurring in these management areas have the potential to affect Snake River (SR) spring and summer Chinook salmon listed under the Endangered Species Act (ESA) in hatchery-influenced or natural production areas located in these respective subbasins. The basic consideration undertaken by the Harvest Monitoring Program in collecting harvest data has been to determine what statistical sampling design provides the best quantitative estimate of the tribal fishery characteristics. The information to collect and sampling area to cover will include the reservation and specific "usual and accustomed" fishing areas located in the above mentioned subbasins that are open to tribal fishing. A goal of the Nez Perce Tribe is to manage treaty harvest consistent with the conservation needs of the fish and recovery of naturally spawning populations.

The primary focus is on collecting catch information necessary to calculate tribal fishing effort (observed catch per hour (OCPH) or harvest per unit effort (HPUE)) which is used to estimate total catch or harvest for a particular tributary. For the above fishery parameters, the harvest estimates will be stratified into week day and weekend fishing profiles. Inseason monitoring of the catch composition of hatchery (unlisted and listed) and wild/natural (unlisted and listed) fish

(dependent upon existence and type of mark) will be conducted so that harvest guidelines and wild fish impact limits can be determined and appropriate steps to modify or close each given fishery can be taken when necessary. Annual fishery proposals by the Nez Perce Tribe will generally include details of expected run size composition (hatchery and wild/natural fish), selected harvest rates for Snake River spring/summer Chinook stocks, location, timing, and a description of anticipated total take limits (hatchery and wild/natural fish). The season structure and sampling strategies may change (e.g, increase or decrease sampling effort per tributary) as the original preseason Snake River Basin spring and summer Chinook forecast is updated.

Table 1. 2009 tributary season structure and sampling strategies.

Tributary	Fishing Period	No. of Samplers	Sampling Method
North Fork Clearwater River	24	1	Creel Survey
Clear Creek	24	1	Inseason Interview
Rapid River	24	2	Creel Survey
South Fork Salmon River	24	2	Inseason Interview
Lostine River	24	2	Inseason Interview
Lookingglass Creek	24	(Included w/ Lostine River)	Inseason Interview
Imnaha River	24	2	Inseason Interview

The management timeframes for the above tributaries are summarized by respective subbasin in Table 2 below. The Harvest Division will structure monitoring shifts for each tributary based on expected run timing, levels of harvestable fish, and tribal member fishing preference.

2.1. Sampling Area and Strategies

The sampling design is customized to tributary listing status and attempts to fit the spatial and temporal characteristics of the drainages and tribal fishing activities to the extent practicable. The Nez Perce Tribe authorizes spring and summer Chinook treaty seasons that are considered "opened until closed," and typically do not implement those seasons with timing closures (i.e., daylight fishing only or weekends only).

For tribal harvest monitoring purposes Harvest Division anticipates the following sampling strategies will be implemented to guide our monitoring of the 2009 treaty salmon fisheries based on the expected run timing of fish for this year (Table 2).

Table 2. Annual Snake River Basin spring and summer Chinook sampling timeframe.

Management Week	Date	Salmon River Subbasin	Clearwater River Subbasin	Imnaha River Subbasin	Grande Ronde River Subbasin
1	May 11 - May 17	**x**	**x**		
2	May 18 - May 24	**x**	**x**		
3	May 25- May 31	**x**	**x**		
4	Jun 1 - Jun 7	**x**	**x**		
5	Jun 8 - Jun 14	**x**	**x**		
6	Jun 15 - Jun 21	**x**	**x**	**x**	**x**
7	Jun 22 - Jun 28	**x**	**x**	**x**	**x**
8	Jun 29 - July 5	**x**	**x**	**x**	**x**
9	Jul 6 - Jul 12	**x**	**x**	**x**	**x**
10	Jul 13 - Jul 19	**x**	**x**	**x**	**x**
11	Jul 20 - Jul 26	**x**	**x**	**x**	**x**
12	Jul 27 - Aug 2	**x**	**x**	**x**	**x**
13	Aug 3 - Aug 9				

The run timing of fish in the Snake Basin has been late the last few years. The Harvest Division will continue to monitor dam counts and updated run forecasts from the other fishery co-managers and the Technical Advisory Committee (TAC) of United States v. Oregon.

2.1.1. Clearwater River Subbasin

2.1.1.1. North Fork Clearwater/Clear Creek Fisheries

Depending upon actual level of adult run size and broodstock attainment, this system may be sampled by an on-site monitor for three week days and two weekend days for the North Fork Clearwater River and Clear Creek tribal fisheries. The samplers will collect information each management week according to the creel survey method for North Fork Clearwater River and inseason interview survey method for Clear Creek. Catch data by these methods will be used to calculate total treaty catch.

2.1.1.2. Other Clearwater River Subbasin Fisheries

If staff level permits, a roving monitor will be collecting catch data for other Clearwater River tributary fisheries. These may include the mainstem Clearwater, Lochsa, Selway, and South Fork Clearwater rivers.

2.1.2. Salmon River Subbasin

2.1.2.1. Rapid River Fishery

The sampling strategy for this tributary includes the use of 2 monitors to work 8 days on/6 days off in an alternating basis for the duration of the fishing season. The samplers will collect information according to the creel survey method to determine the overall treaty catch. Sampling effort will focus on catch composition (hatchery versus wild/natural fish) and whether or not it is a listed fish (dependent upon existence and type of mark). The harvest estimate will be conducted so that harvest guidelines and wild fish impact limits can be determined and appropriate steps to modify or close the fishery can be taken when necessary.

2.1.2.2. South Fork Salmon River Fishery

The sampling strategy for this tributary includes the use of 2 monitors to work 8 days on/6 days off in an alternating basis for the duration of the fishing season. The collection of harvest data for hatchery and wild/natural summer chinook is developed to determine the overall treaty catch. Inseason monitoring of the catch composition (hatchery versus wild/natural fish) and whether or not it is a listed fish (dependent upon existence and type of mark) for South Fork Salmon River fishery will be conducted so that harvest guidelines and constraints can be determined and appropriate steps to modify or close the fishery can be taken when necessary.

2.1.2.3. Other Salmon River Subbasin Fisheries

If staff level and time permits, an on-site monitor for Rapid River and South Fork Salmon River will collect catch data for other Salmon River tributary fisheries. The Harvest Division does not expect any other tributary fishery to occur in the Salmon River subbasin this year. However, the on-site monitors at Rapid River/South Fork Salmon areas will interview tribal members for fishing in these other areas. These may include the Secesh River, East Fork South Fork Salmon River, Johnson Creek, and Big Creek.

2.1.3. Imnaha River Subbasin

2.1.3.1. Imnaha River Fishery

The sampling strategy for this tributary includes the use of 2 monitors to work 8 days on/6 days off in an alternating basis for the duration of the fishing season. The collection of harvest data

for hatchery and wild/natural spring Chinook (dependent upon existence and type of mark) will be done to determine the overall treaty catch.

Inseason interview survey method will be used to determine if tribal harvest guidelines and/or wild fish impact limits have been reached for the Imnaha River, so the Tribe can take appropriate steps to modify or close the fishery when necessary.

2.1.4. Grande Ronde River Subbasin

2.1.4.1. Grande Ronde River Fishery

The sampling strategy for this tributary includes the use of 2 monitors to work 8 days on/6 days off in an alternating basis for the duration of the fishing season. The monitors will conduct majority of the monitoring in the Lostine River. Interviews will be performed on tribal fishers who are fishing at Lostine River (including Imnaha River) for tribal catch at Lookingglass Creek. The collection of harvest data for hatchery and wild/natural spring Chinook (dependent upon existence and type of mark) is developed to determine the overall treaty catch.

Inseason interview survey method will be used to determine if tribal harvest guidelines and/or wild fish impact limits have been reached for either the Lostine River or Lookingglass Creek tribal fisheries, so the Tribe can take appropriate steps to modify or close a fishery when necessary.

2.1.4.2. Other Grande Ronde River Subbasin Fisheries

The Harvest Division does not expect any other tributary fishery to occur in the Grande Ronde subbasin this year. However, the on-site monitors at Lostine/Lookingglass areas will interview tribal members for fishing in the lower Grande Ronde, Wallowa, Wenaha, and Minam rivers.

2.1.5. Tucannon River Subbasin

2.1.5.1. Tucannon River Fishery

The Harvest Division does not expect any other tributary fishery to occur in the Tucannon River subbasin. No monitoring will be done this year.

3. Methods of Harvest Estimation and Statistical Analysis

The 2008 monitoring surveys were developed as a simple random design by stratification of week day versus weekend fishing time preference or by constant weekly survey times (for certain tributaries the monitors will sample each day of the work week). The Nez Perce treaty fisheries are open from the arrival of the fish in the tributaries to the time that seasons are closed

due to reaching a tribal harvest allocation, reaching a specific wild fish impact limit, or fish begin spawning, whichever comes first.

Information to be collected in the proposed fisheries will include the following: 1) number of fishers, 2) hours fished, 3) fishing effort, 4) species harvested, 5) number of hatchery or wild/natural spring and summer Chinook released, and 6) number of hatchery or wild/natural spring and summer Chinook harvested.

3.1. Creel Survey

The creel survey method will be used for those tributaries and fisheries where the Tribe expects a large number of fish to return. Typically, we see majority of our fishing effort and catch in Rapid River and North Fork Clearwater River. Data will be collected for by direct observation on specific days selected randomly or systematically from a seven-day timeframe (Monday-Sunday). Typically, this seven-day timeframe is open continuously with no time closure restriction in effect. Attachment A provides the sampling protocol for the creel survey method.

For those tributaries identified for this method, sampling data will be collated and entered into a spreadsheet by hour increments contained in a 24 hour (h) sampling period that represents the 24 hour fishing period. The monitors will survey an 8-h segment from a 24-h fishing period. Generally, the Harvest Division will assign sampling shifts based upon an Excel-derived scheduling format which identifies sampling time strata (days and hours).

An 8-h segment of time will be selected randomly from three time periods (See Table 3). The time periods have expected sampling day coverage time.

Table 3. Weekly creel sampling segments.

Strata	No. of Days	Available Daily 8-h Segments	Total 8-h Segments	No. of Sample Segments	Total No. of Sample Hours	Total Available Hours	Sample Rate Base on Hours
Weekend Fishing Days	2	3	6	2	16	48	33%
Week Fishing Days	5	3	15	5	40	120	33%

There are a total of 21 8-h segments (6 weekend and 15 week time segments) in a standard sampling week. This revised sampling strategy still seeks to define what times of the fishing season (categorized into week and weekend strata) there is high and low fishing intensity.

From the sampling data, an expansion will be calculated by the following equation (Rishi Sharma, personal communication, November 2, 2006):

$$\hat{C}_E = \frac{C_o}{F_f} \times \left[\frac{H_T}{H_{OB}} \right] \qquad (1)$$

Where, $C_o = \sum_{i=1}^{n} CPH_i$ or is the observed catch per hour (OCPH),

F_f = estimate of the number of fishers in area (*s*), and time (*t*) for any given hour,
H(T) = Total number of hours the fishers are fishing, and
H(Ob)= Observed sample hours when the fishery is taking place

Or expressed as,

$$\hat{C}_E = \frac{\sum_{i=1}^{n} CPH_i}{F_f T_f} \qquad (2)$$

Where T_f = # of hours sampled/total number of hours open in the fishery for a particular strata

The variance of the creel estimate will be calculated by the following equation (pers comm. Rishi Sharma on November 13, 2008), the portion of the equation was changed from *Var(cph)* to *Var(C_o)* to be consistent with the estimate formula which was based on catch observed (C_o):

$$Var(\hat{C}_E) = Var(C_o) x \left(\frac{1}{F_f} \right)^2 \left(\frac{1}{T_f} \right)^2 \qquad (3)$$

Where,

$$\left(\frac{1}{F_f} \right) = \frac{\#ofF_o}{\#ofF_{Total}}$$

is the number of Fisherman observed/Number of total fisherman (an effort fraction),

$$\left(\frac{1}{T_f}\right) = \frac{H_{OB}}{H_T}$$

and T_f = (# of hours sampled/total number of hours open in the fishery for a particular strata).

Statistical analysis of creel catch data and the calculation of harvest expansions for each tributary and strata will give a measure of variance, which could then be used to calculate the level of uncertainty for each catch estimate. Calculating the standard deviation and 95% confidence interval for each tributary and strata will produce upper and lower values to weekly catch harvest estimate.

The task is to estimate confidence intervals (CI), precision (indicator of data quality), and variance (indicator of monitoring effort) in catch for the SRB tributary fisheries that use data produced from the creel survey method.

3.1.1. Analysis Method

Comparison of the CI, precision, and variance values for weekly expansions are used to determine where majority of variability in the monitoring of catch occurs for this method. The following statistical measures for each respective fishery that uses the creel survey method will be calculated:

- The sample mean is sum of the catch observed in a specific area and time (observed catch per hour) over number of fishers (observed in area (*s*), and time (*t*) for any given hour) by the sampling fraction.
- The estimate of standard error (SE) of the sample mean is used to measure the level of precision for an estimate (assuming normality of the catch data). Our attempt is to produce a SE value that is equal to or less than 20% of the estimate, to ensure that the 95% confidence intervals surrounding the estimate is kept within a statistically desirable range.
- The range, sample variance (s^2), and sample standard deviation (SD), are measures of dispersion of data that describe sampling variation. These statistical procedures characterize the spread of sample measurements about the sample mean (used to express central tendency). The variability of the sample mean is denoted by $Var(\hat{C}_E)$ in the equation (no variance associated with the estimate of the number of fishers in specified area and time, the number of hours the fishery is open, and the proportion of the fishers sampled).

3.2. Inseason Interview Survey

The inseason interview survey method will be used for tributaries that we expect low to moderate fish returns and harvest allocation. For these particular tributaries the Harvest Division expects relatively modest fishing effort and catch for the duration of the season. This survey method will collect data by direct observation and through interviews for fisheries that require extensive travel and time to cover or for tributary fisheries that will not be assigned a sampler because of insufficient amount of funding (see Table 1 above). For tributaries identified for this method, data will be collected on-site on a daily basis for the duration of the fishery season and monitoring schedule (8 days on/6 days off). Tributaries not assigned an on-site sampler will rely on samplers operating within the same subbasin to interview fishers for catch data. Attachment A provides the sampling protocol for the creel survey method.

The monitors will survey an 8-h segment for each sampling day to collect data on catch that may have occurred during a 24-h fishing period. The sampling period is designed to directly observe and interview tribal members for their catch (# of tribal fishers, # of hours fished, # of fish caught), and to interview the individual fishers for catch during times in the fishing period that was unsampled. This is to off-set the potential for not directly observing specific fishers between sampling periods and to collect harvest data that might have accrued during the time sampling was not conducted.

From the interview data, the calculation of harvest per unit effort (HPUE) will be based on the total-ratio estimator as described by the following steps:

Total-ratio estimator: HPUE=h/e,

$$\hat{R}_2 = \frac{\sum_{i=1}^{n} h_i}{\sum_{i=1}^{n} e_i}$$

$\sum_{i=1}^{n} h_i$ = sum fish harvested per fisher (h_i) over all fishers interviewed (n).

$\sum_{i=1}^{n} e_i$ = sum hours fished per fisher (e_i) over all fishers interviewed (n).

Catch by species and origin will be generated for the unsampled fishers using the equation below (pers. communication Rish Sharma November 20, 2008):

$$\hat{C}_{s,t} = C_o \times \left[\frac{N_{S,t}}{N_{S,o}} \right] \left(\frac{H_{S,t}}{H_{S,o}} \right)$$

Where $\hat{C}$ is the catch in area (*S*) over time (*t*),

Co = the catch observed in area

Ns,t = the total number of fishers in area S and at time *(t)*

Ns.o = the number of sampled (observed) fishers in area (*S*) at time (*t*)

Hs,t = the total number of hours fishery was open in area (*S) at a time (t)*

Hs,o = the total number of hours fishery was observed in area (*S) at a time (t)*

Variance for the catch estimate is dependent on the variance of catch observed (C_o) by all sampled fishers and the sampling fraction (*sf*). So, if C_o has mean (μ) and variance (σ^2) then,

$$Var\ (\hat{C}_{s,t}) = Var\ (C_o) \times \left(\frac{N_{S,t}}{N_{S,o}} \right)^2 \left(\frac{H_{S,t}}{H_{S,o}} \right)^2$$

Sf = (total fishers/total sampled fishers)*(Total hours in fishing period/total sampled hours)

$Var(C_o)$ = variance of the catch

The task is to estimate confidence intervals (CI), precision (indicator of data quality), and variance (indicator of monitoring effort) in catch for the SRB tributary fisheries that use data produced from the inseason interview survey method.

3.2.1. Analysis Method

Comparison of the CI, precision, and variance values for weekly expansions are used to determine where majority of variability in the monitoring of catch occurs for this method. The following statistical measures will be calculated for the harvest estimates produced from the inseason interview method:

- The sample mean is sum of the catch efficiency rate observed in a specific area and time (for the observed number of fishers) multiplied by the number of unsampled fishers for the number hours the fishery is opened.
- The estimate of standard error (SE) of the sample mean is used to measure the level of precision for an estimate (assuming normality of the catch data). Our attempt is to produce a SE value that is equal to or less than 20% of the estimate, to ensure that the 95% confidence intervals surrounding the estimate is kept within a statistically desirable range.
- The range, sample variance (s^2), and sample standard deviation (SD), are measures of dispersion of data that describe sampling variation. These statistical procedures characterize the spread of sample measurements about the sample mean (used to express central tendency). The variability of the sample mean is denoted by $Var(\hat{C}_{S,t})$ in the

equation (variance for the catch is dependent on the variance of *R* multiplied by the number of hours the fishery is open and the number of unsampled fishers).

An assumption is that the majority of fishers will be contacted and a ratio estimate of total harvest over the duration of the fishing season can be produced. The differences in daily fishing effort acts as a self-weighting factor for harvest estimates produced by this method. The harvest information contributed by individual fisher that is used in the total-ratio estimator are weighted by the amount of fishing effort expended, and therefore is the appropriate estimator to use for calculation of total harvest when completed trip data is used.

3.3. Post-Season Interview Survey

The Harvest Division if necessary will conduct a post-season interview survey method to derive a harvest estimate for areas where inseason interviews for certain fishing locations were not conducted or had incomplete harvest information. The post-season interview method will utilize fishing profiles (low, medium, and high) to estimate the level of harvest for a particular tributary. The fishing profiles will be developed using existing harvest data for that particular tributary (when incomplete information exists) or catch information that has been collected at other Snake River Basin tributary fisheries that the Harvest Division anticipates to have similar fishing characteristics (numbers of fishers, fishing effort, and fish abundance/escapement).

The harvest monitors will routinely conduct interviews with the tribal fishers after a fishery has closed and submit the data collection sheets for tabulation in the spreadsheet on a weekly basis. The monitors will also inquire about other tribal fishers that were fishing and observed by interviewed fishers. A list of known fishers will be determined through a number of methods: (1) direct contact with tribal fishers by harvest monitors assigned to a specific tributary during inseason interview and/or creel duties, (2) contact with fishers post-season, and (3) list of fishers known to have fished a particular tributary in previous years. The post-season interview survey data will be documented on a weekly basis to avoid counting the same fish over in subsequent interviews with tribal fishers.

From the sampling data an expansion will be calculated by the following equation (Rishi Sharma, personal communication, March 24, 2004):

$$\hat{C}_S = \frac{\sum C_{i,s}}{n} \times \hat{N}_s$$

or ,

$$\hat{C}_S = CPH \times \hat{N}_s$$

Where $\hat{C}$ is the estimate of catch in area (S),

n = the number of fishers sampled by profile- high, medium, and low fishing profile,
C = the catch observed from fisher i sampled by fishing profile,
CPH = the average observed catch per fisher, and
N_s = estimate of the number of fishers by strata (s) – high, medium, and low fishing profile.

Mean catch per hour (CPH) expanded by fisher effort data (number of fishers in area sampled by high, medium, and low fishing profiles) will be used to derive weekday and weekend estimated catch. The expansion will produce a harvest estimate for that specific fishing location and season duration. The results generated from monitoring are to be used to evaluate the statistical effectiveness of the sampling design.

If $CPH \sim Normal(\mu(1), \sigma(1)^2)$, and there is no variance associated with N, then the variance of the catch estimate is:

$$Var\ (\hat{C}_S) = Var\ (CPH\ ) X \left[\frac{1}{\left(\frac{n}{\hat{N}_s} \right)} \right]^2 ,$$

$$\sqrt{Var\ (\hat{C}_s)} = S.E.(\hat{C}_s) \quad \text{, and}$$

95% Confidence Interval = $\hat{C}_S \pm 1.96$ (S.E.($\hat{C}_S$)).

3.3.1. Analysis Method

Comparison of the CI, precision, and variance values for weekly expansions are used to determine where majority of variability in the monitoring of catch occurs for this method. The following statistical measures will be calculated for the harvest estimates produced from the inseason interview method:

- The sample mean is sum of the catch efficiency rate observed in a specific area and time (for the observed number of fishers) multiplied by the number of unsampled fishers for the number hours the fishery is opened.
- The estimate of standard error (SE) of the sample mean is used to measure the level of precision for an estimate (assuming normality of the catch data). Our attempt is to produce a SE value that is equal to or less than 20% of the estimate, to ensure that the 95% confidence intervals surrounding the estimate is kept within a statistically desirable range.

- The range, sample variance (s^2), and sample standard deviation (SD), are measures of dispersion of data that describe sampling variation. These statistical procedures characterize the spread of sample measurements about the sample mean (used to express central tendency). The variability of the sample mean is denoted by $Var(\hat{C}_S)$ in the equation.

An assumption is that the majority of fishers will be contacted and that the mean catch per fisher hour (CPH) value can be determined for the low, medium, and high fishing profiles. The differences in weekly fishing effort acts as a self-weighting factor for harvest estimates produced by this method. The harvest information contributed by individual fisher that is used in this harvest estimator are weighted by the amount of fishing effort expended, and therefore is the appropriate estimator to use for calculation of total harvest when collecting harvest information for specific tributaries where creel survey or inseason interview surveys were not conducted, or conducted to a limited extent.

3.4. Sampling Objective

The management objective of the sampling design is to estimate tribal catch or harvest with a coefficient of variation value of 0.3 for 95% of the sampling time. This CV value assures that we are adequately sampling the fishery. Certain critical ESA stocks of spring and summer chinook in the SRB may require higher sampling effort to obtain this value. The harvest of these critical stocks will be determined using the inseason interview as facilitated by on-site harvest monitors (as described above).

The results of this sampling plan will be evaluated post-season to determine the efficacy of the sampling strategies in producing precise harvest estimates. The overall goal is to create a complementary harvest monitoring system that increases the precision and accuracy of annual tribal catch or harvest estimates and to allow the evaluation of sampling plan effectiveness.

4. Reporting

The NPT recognizes that significant interaction and cooperation with other tribal, state, and federal fish managers will need to occur in order fulfill co-management obligations for harvest management.

The Nez Perce Tribe Harvest Division will attempt to provide to the co-managers harvest updates for the treaty fisheries sampled under this sampling plan (inseason management goal is to report tributary harvest estimates no less than three times a month). A final report for the 2009 Nez Perce Tribe spring and summer chinook season will be provided to the co-managers.

REFERENCES

Brown, M.L., and D.J. Austen. 1996. Data management and statistical techniques. Pages 17-62 *in* B.R. Murphy and D.W. Willis, editors. Fisheries Techniques, 2nd edition. American Fisheries Society, Bethesday, Maryland.

Malvestuto, S.P. 1996. Sampling the recreational creel. Pages 591-623 *in* B.R. Murphy and D.W. Willis, editors. Fisheries Techniques, 2nd edition. American Fisheris Society, Bethesday, Maryland.