LAKE CHELAN FISHERY FORUM
2015 ANNUAL WORK PLAN

LICENSE ARTICLE 404
SETTLEMENT AGREEMENT CHAPTER 6

Final

April 1, 2015

Developed by the
National Park Service, USDA Forest Service, and
Washington Department of Fish and Wildlife
in coordination with, and adopted by, Chelan PUD

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SECTION 1: INTRODUCTION

On November 6, 2007, Public Utility District No. 1 of Chelan County (Chelan PUD) filed the Lake Chelan Fishery Plan (LCFP) pursuant to Article 404 of the Federal Energy Regulatory Commission Order on Offer of Settlement and Issuing New License dated November 6, 2006 for the Lake Chelan Hydroelectric Project. This report satisfies Article 404 requirements for annual reporting of activities associated with the following:

1. Tributary Barrier Removal
2. Fish Stocking
3. Entrainment Sampling
4. Monitoring and Evaluation Program

The Federal Energy Regulatory Commission (FERC) approved the LCFP on December 4, 2007. A component of the Lake Chelan Settlement Agreement (SA) and Lake Chelan Fishery Plan is for the National Park Service (NPS), USDA Forest Service (USFS), and Washington Department of Fish and Wildlife (WDFW) to develop and adopt an annual work plan describing monitoring and evaluation measures in Lake Chelan to be implemented in the upcoming year and a report on activities completed the previous year.

It is a requirement of Chelan PUD's Lake Chelan license to make available $20,000 each year, plus an additional $20,000 in matching funds, to be used for implementing measures contained in the annual Lake Chelan Fish Monitoring and Evaluation Plan.

This annual work plan, developed in coordination with Chelan PUD and adopted by the NPS, USDA Forest Service, and WDFW, describes the methods and schedule used to demonstrate compliance with efforts to restore and enhance, where feasible, native fisheries in Lake Chelan and its tributaries, and to support the lake's recreational fishery.

The goals of the LCFP are to: 1) provide guidance for the management of the fishery resources in Lake Chelan; 2) protect native fish populations while maintaining a healthy recreational sport fishery in Lake Chelan; and 3) develop a monitoring and evaluation program to assess the efficacy of management actions.

The primary Lake Chelan Fishery Forum (LCFF) management objectives are to:

1. Emphasize restoration/enhancement of native species, where feasible;
2. Support the recreational sport fishery;
3. Manage the lake elevation to enhance tributary production and recreation;
4. Determine compatibility of management actions with potential future bull trout re-introduction;
5. Develop a monitoring and evaluation program that provides flexibility for future changes in both implementation and the monitoring and evaluation program;
6. Monitor and address entrainment of fish from Lake Chelan into the Project intake.

SECTION 2: POTENTIAL AND PAST MONITORING AND EVALUATION MEASURES

The following list of monitoring and evaluation measures includes potential future monitoring projects, monitoring projects that have been implemented and completed, and monitoring projects that have been implemented and are ongoing. Result summaries are reported briefly for past implemented projects. All projects are evaluated annually by the LCFF. Specific measures to be implemented in 2015 are described in Section 3.

2.1 Kokanee Creel Surveys

WDFW conducts annual kokanee creel surveys designed to monitor and determine the contribution of kokanee to the sport fishery. The main purpose of the survey is to: 1) determine the relative composition of kokanee as it relates to age and origin (naturally produced or hatchery released) contributing to the sport fishery; and 2) determine if kokanee continue to be a preferred species to pursue and catch. These surveys will be conducted beginning in March at the earliest and will conclude sometime during the first part of June if catch and effort warrant doing so.

Creel survey methods:

To ensure results from creel surveys on Lake Chelan are useful and relevant, the methods used needed to be comparable to those used in the past by Duke Engineering Service (2000), Hagen (1997), and Brown (1984); the methods outlined here are designed with this in mind.

The main purpose of the survey is to: 1) determine the relative composition of kokanee as it relates to age and origin (naturally produced or hatchery released) contributing to the sport fishery; and 2) determine if kokanee continue to be a preferred species to pursue and catch and; 3) obtain effort and harvest information.

Periodic effort counts i.e. (boat counts), and roving on–lake angler interviews were used beginning in April and continuing until mid-June in an effort to temporally target the traditional time of year when anglers fish for kokanee. Effort and angler interviews took place in the lower Lake Chelan Basin from Wapato Point on down to the City of Chelan. Both effort counts and the angler interviews were scheduled on a stratified random basis. Strata included weekdays, weekends, A.M. (0700 –1400 hours) and P.M. (1400 – 1100 hours) time periods. At least two randomly chosen weekdays and one non-random weekend day, alternating between Saturday and Sunday, were sampled per week. Effort counts consisted of counting the number of boats observed. Angler interviews were designed to collect information on individual angler effort (hours fished), fish caught and kept (or released), fish length, scales samples for age analysis and all fin clips or other identifying marks were recorded.

2014 survey results; Safety Harbor down-lake to Chelan:

WDFW conducted creel surveys using a random stratified approach from April through June of 2014. We interviewed 561 anglers that fished for a total of 2,882 hours (Table 1).

We estimated that 9,935 anglers fished for 45,583 hours and caught a total of 8,561 fish. The kokanee catch was comprised of 1.4% (*N*=124) adipose-clipped hatchery stocked fish and 98.6% (*N*=8,437) wild, naturally produced fish (Figure 1; Table 2). Overall kokanee catch per unit effort (CPUE) was 0.17 (Table 2).

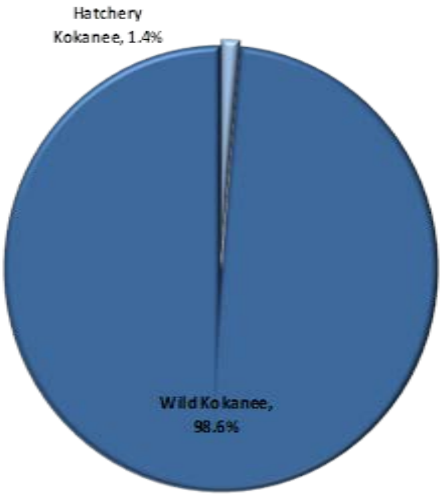

Figure 1: 2014 Lake Chelan Catch Compositions

Table 1: 2014 Lake Chelan Creel Survey Angler Data

Sample Data	April	May	June	Total
Angler Sample Rate:	9.92%	4.20%	2.13%	5.65%
Total Anglers Interviewed:	335	173	52	561
Total Fishing Hours Sampled:	1,717	932	233	2,882
Mean Hours per Trip:	5.13	5.39	4.48	5.14

Table 2: 2014 Lake Chelan Creel Survey Results

Estimated Results	April	May	June	Total
Effort (hrs):	17,262	19,309	14,652	51,223
Angler Trips:	3,378	4,116	2,441	9,935
Wild Kokanee Caught:	1,914	3,939	2,584	8,437
Hatchery Kokanee Caught:	46	54	24	124
Kokanee CPUE:	0.11	0.21	0.18	0.17
Kokanee Total Catch:	***1,960***	***3,993***	***2,608***	***8,561***

Anglers from Chelan (70.6%) and King (13.1%) counties made up the largest portion of those surveyed. Other angler origins ranged from 0.4 - 3.7%, including 2.0% from three other states (Idaho, Oregon and California) (Figure 2).

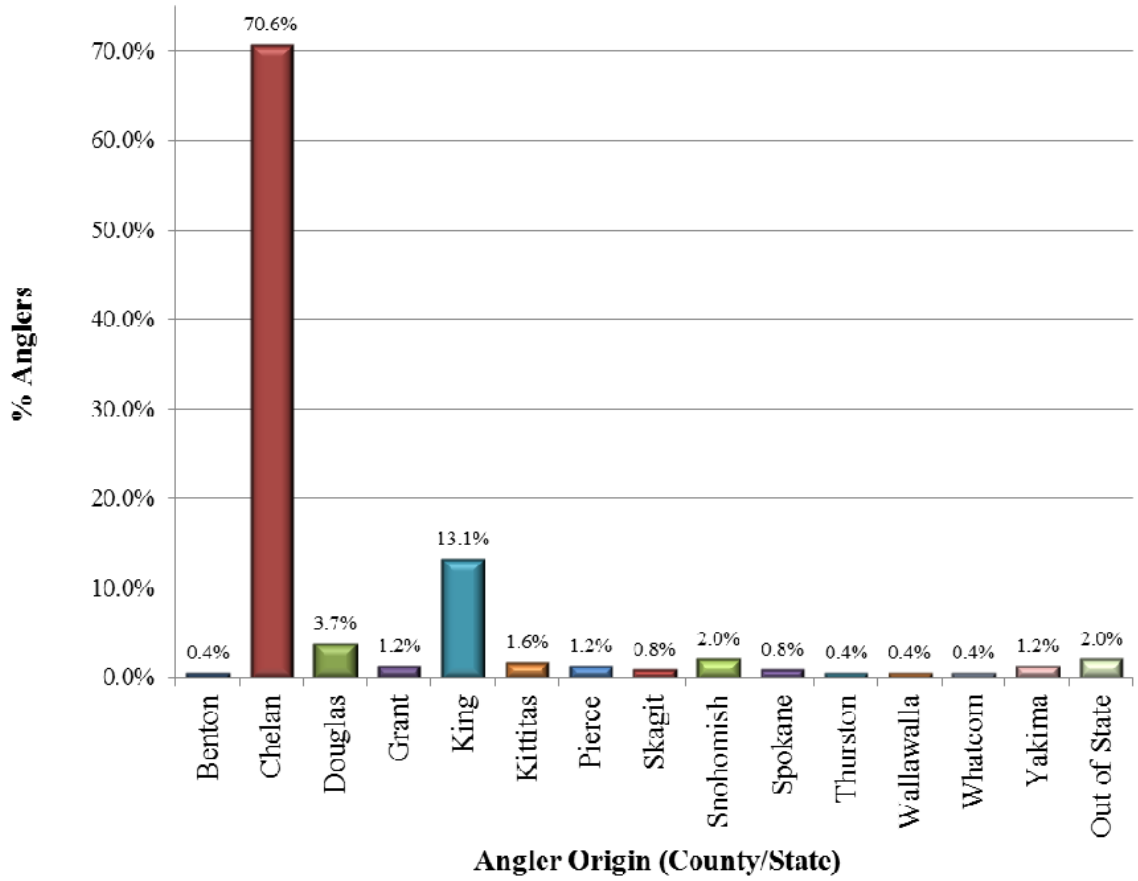

Figure 2: 2014 Angler County/State of Origin

2.2 Westslope Cutthroat Trout

The current ongoing and planned future fish management goal for Lake Chelan is to beneficially alter the abundance and composition of fish species in the lake. Multiple methods are in progress or will be used in the future, such as altered fishing regulations, a change in stocking practices, and removal of lake tributary alluvial barriers to spring spawning fish to accomplish this goal (LCFP 2007). The monitoring and evaluation efforts listed below are needed to determine the success of these fish enhancement efforts and to signal the possible need of adaptive changes.

The goal for westslope cutthroat trout (WCT) is to increase, significantly, the abundance of WCT in lake tributaries and the lake itself, for these fish to eventually replace themselves naturally, and for fish to contribute to the sport fishery. To reach this goal the following objectives must be met:

1) WCT hatched from eyed-egg or fry stocking in lake tributaries must survive to maturity, spawn and contribute to increased natural production.

2) A sufficient number of the catchable size WCT must escape harvest and recruit to the spawning run in order to substantially increase natural production.

3) The catchable size WCT must eventually replace the catchable size rainbow trout (RBT) in the sport fishery.

4) A majority of anglers fishing Lake Chelan need to accept the change in species.

To determine the results of the creel survey and spring spawning surveys a database must be constructed. Data will be analyzed and evaluated to determine if our efforts are meeting the above goal and objectives.

2.2.1 ***Lake Chelan Tributaries Spawning Monitoring and Evaluation, USFS***

Tributary westslope cutthroat trout and rainbow trout spawning monitoring will be conducted in some of the following tributaries: Bear, Big, Cascade, Four-mile, Lightning, Little Big, Riddle, Twenty-five Mile, First, Mitchell, Fish, Grade, Gold, Prince, Safety Harbor, Pyramid, Graham Harbor, Coyote, Castle, Deep Harbor and Lone Fir creeks. Powers and Tanner (2008) strongly recommended evaluation of the current status of Lake Chelan westslope cutthroat trout spawning populations prior to treatment of fish passage barriers in tributary streams. Spawning monitoring and evaluation may occur by conducting spawning ground surveys and/or snorkeling surveys.

During the spawning season (April-June) Forest Service fish biologists may perform spawning ground surveys in the adfluvial zones of selected tributaries according to the methodology of the Lake Chelan Comprehensive Management Plan (Viola and Foster 2002). Survey frequency would expect to be one survey per stream per week. Sexual maturation, the onset of spawning, and embryo development are significantly regulated by the "thermal experience" of the fish population of interest; therefore, water temperature data loggers will be deployed in survey streams starting with the first (pre-spawning) survey and remain in place until late-September. Data loggers will record water temperature every 30 minutes.

Forest Service surveyors may conduct snorkel surveys in each stream in the fall to search for young-of-the-year. Snorkelers will survey, approximately 100-meter adfluvial zone segments that contain representative habitat units (pools, tailouts, and riffles). Surveyors may attempt to capture several fish per stream by hook-and-line for sample-in-hand confirmation of species identifications by snorkelers.

2011, 2012 and 2013 Lake Chelan tributaries spawning monitoring and evaluation results:

Results from the 2011 Lake Chelan tributary trout spawning surveys and snorkel surveys are summarized in Tables 3 and 4. Additional summary information can be found in 2011 Lake Chelan Tributaries Spawning Monitoring and Evaluation (Willard 2011).

Table 3: Cutthroat/Rainbow Trout Redds Observed in Three Lake Chelan Tributaries, 2011

	Survey Dates			
Tributary	4/20/11	5/04/11	5/17/11	Total Redds
Fish Creek	0	0	0	0
Bear Creek	0	0	0	0
Safety Harbor Creek	0	NS[a]	0	0
Lake Chelan Level (ft.msl)	1084.1	1083.1	1084.8	

[a]NS=No survey

Table 4: Snorkel Survey Results for Three Lake Chelan Tributaries, 2011

Tributary	**Survey Dates**	**Lake Chelan level (ft. msl)**	**Survey Reach Length (m)**	**Fish [a] Species**	**Length of Fish (cm)**			
					<3	3-10	10-20	>20
Fish Creek	9/15/2010	1,098	100	RBT	0	18	29	11
				WCT	0	1	1	0
				UNK	3	0	0	0
Bear Creek[b]	9/15/2010	1,098	100	RBT	0	2	1	0
				WCT	0	0	0	0
				UNK	0	0	0	0
Safety Harbor Creek	09/29/2010	1,097	150	RBT	0	7	8	9
				WCT	0	4	4	7
				UNK	7	0	0	0

[a]RBT=rainbow trout; WCT=westslope cutthroat trout; UNK=either RBT or WCT (too small to determine); KOK=kokanee

[b]The water level was too high to effectively conduct a snorkel survey for Bear Creek.

The USFS decided not to survey Lake Chelan tributary spawning grounds in 2012 due to the challenges of logistics, timing, and efficiency. Due to the occurrence of several fires that started in September, the USFS was only able to conduct one snorkel survey in 2012. The survey was conducted on September 12th on Fish Creek; 100 meters were snorkeled and zero fish were observed.

In 2013 and 2014, the USFS was unable to complete the work proposed in 2013 and 2014 work plan due to a change in district staffing. The USFS District Ranger has requested that the work planned for 2014 is rolled over to 2015.

2.2.2 *2014 Lake Chelan Tributary Estimates of Cutthroat and Rainbow Trout Abundance, WDFW*

In August, September and October of 2013, WDFW successfully sampled Pyramid, Cascade, Big and Four Mile creeks (Tables 5 and 6). Information on adfluvial westslope cutthroat and rainbow trout population abundance, age class composition and other biological characteristics was collected. Our attempt to sample Railroad creek was unsuccessful due to high and deep-water flows.

In 2013, fin clips or entire fish of 13 young of the year and 21 yearlings of unknown origin were taken for genetic examination to provide some understanding of the present degree of hybridization between rainbow and westslope cutthroat trout. Genetics results are currently not available. To be conservative unknowns were treated as rainbow during population estimates.

In August, September and October of 2014, WDFW successfully sampled First, Safety Harbor, Twenty-Five Mile, Grade and Mitchell creeks (Tables 5 and 7). Information on adfluvial westslope cutthroat and rainbow trout population abundance, age class composition and other biological characteristics was collected. Three attempts were made to sample Railroad Creek using electrofishing techniques consistent with methods used on other tributaries. Unfortunately, all attempts were unsuccessful due to high and deep-water flows. However, some limited data was able to be obtained via hook and line as well as random electrofishing.

Electrofishing techniques used in 2014 were similar to those described in Brown (1984). All trout were identified as rainbow, cutthroat or unknown. Also two trout were identified as obvious rainbow/cutthroat hybrids; one from Mitchell Creek (185mm) and one from Grade Creek (160mm). These fish are in addition and not included in population estimated in Table 6 and 8. The scarcity of hybrids sampled precluded any meaningful estimate of hybrid population size. Perhaps results from future genetic examination will provide sufficient numbers to accomplish an estimate of hybrids. Genetic results are currently not available. To be conservative unknowns were treated as rainbow during population estimates. In 2014, fifty-five young of the year of unknown origin were taken for genetic examination to provide some understanding of the current degree of hybridization between rainbow and westslope cutthroat trout.

Table 5: Estimated 2013 Lake Chelan Tributary Rainbow Trout Density and Population Abundance

Tributary	Sample Site Est.		Site Area (M^2)	Rainbow Per (M^2)	Available[2] Area (M^2)	Estimate
	All RB	YOY[1]				
Pyramid	13.0[a]	6.0 [a]	54.9	0.237	1,056	250
	(13-14.9)[3]	(9-11.2) [3]				
Cascade	3.0	3.0	46.1	0.065	341	22
	(3-6.1)	(3-6.1)				
Four Mile	10.0	3.0	139.6	0.072	10,470	750
	(10-12.5)	(4-8.7)				
Big	1.0	0.0	65.6	0.015	234	4
	ENP	NA				

[a]Mean number of fish estimated.
[1]YOY = young of the year
[2]Estimated total accessible square meters of habitat in the entire stream; calculated as the minimal accessible stream length (Brown 1980) x average stream width (Viola 2012).
[3](95% Confidence Interval)
ENP = Estimate not possible (all fish caught on first pass)

Table 6: Estimated 2014 Lake Chelan Tributary Rainbow Trout Density and Population Abundance

Tributary	Sample Site Est.		Site Area (M^2)	Cutthroat Per (M^2)	Available[2] Area (M^2)	Estimate
	All CT	YOY[1]				
First	20	14	73.2	0.273224	6,208	1,696
	(15.6 – 24.4)	(14 - 16.2)				
Safety Harbor	60	39	201.3	0.298063	1,356	404
	(50.1 -69.9)	(33 - 51.3)				
Twenty-Five Mile	118	74	158.9	0.742605	12,288	9,125
	(108 - 123.9)	(69 - 81.7)				
Grade	24	17	54.3	0.441989	1,168	516
	(24 – 26.4)	(69 - 81.7)				
Mitchell	25	15	36.5	0.684932	1,686	1,155
	(24 - 26.2)	(15 - 15.9)				

[1]YOY = young of the year, as a subset of all rainbow
[2]Estimated total accessible square meters of habitat in the entire stream; calculated as the minimal accessible stream length (Brown 1980) x average stream width (Viola 2012).
[3](95% Confidence Interval)
ENP = Estimate not possible (all fish caught on first pass)

Table 7: Estimated 2013 Lake Chelan Tributary Cutthroat Trout Density and Population Abundance

Tributary	Sample Site Est.		Site Area (M^2)	Cutthroat Per (M^2)	Available[2] Area (M^2)	Estimate
	All CT	YOY[1]				
Pyramid	0.0	0.0	54.9	0.000	1,056	0
	NA	NA				
Cascade	20.0[a]	1.0[a]	46.1	0.434	341	148
	ENP	ENP				
Four Mile	0.0	0.0	139.6	0.000	10,470	0
	NA	NA				
Big	4.0	0.0	65.6	0.061	234	14
	(4-4.7)[3]	NA				

[a]Mean number of fish estimated.
[1]YOY = young of the year
[2]Estimated total accessible square meters of habitat in the entire stream; calculated as the minimal accessible stream length (Brown 1980) x average stream width (Viola 2012).
[3](95% Confidence Interval)
ENP = Estimate not possible (all fish caught on first pass)

Table 8: Estimated 2014 Lake Chelan Tributary Cutthroat Trout Density and Population Abundance

Tributary	Sample Site Est.		Site Area (M^2)	Cutthroat Per (M^2)	Available[2] Area (M^2)	Estimate
	All CT	YOY[1]				
First	2	0	73.2	0.027322	6,208	170
	(2 - 15.2)	ENP				
Safety Harbor	3	0	201.3	0.014903	1,356	20
	ENP	ENP				
Twenty-Five Mile	3	1	158.9	0.018880	12,288	232
	(3 - 6.1)	ENP				
Grade	0	0	54.3	0.000000	1,168	0
	ENP	ENP				
Mitchell	1	1	36.5	0.027397	1,686	46
	ENP	ENP				

[1]YOY = young of the year, as a subset of all rainbow
[2]Estimated total accessible square meters of habitat in the entire stream; calculated as the minimal accessible stream length (Brown 1980) x average stream width (Viola 2012).
[3](95% Confidence Interval)
ENP = Estimate not possible (all fish caught on first pass)

Results from data gathered in First, Safety Harbor, Twenty-Five Mile, Grade and Mitchell creeks during 1982, 2011, 2012, 2013 and 2014 are compared below.

In 2012, tissue samples of young of the year trout of unknown origin were taken for genetic examination to provide some understanding of the present degree of hybridization between rainbow and westslope cutthroat trout. Genetics results indicate that an average of 44% (21 - 71%) of the fish sampled were cutthroat/rainbow hybrids. Therefore, fish identified during sampling as either rainbow or cutthroat may have actually been hybrids.

Results from data gathered in 2014, 2013 2012, and 2011 are compared to those conducted in 1982 by Brown (1984) Tables 9, 10, 11 and 12, respectively. The intent is to evaluate the effectiveness of recent management actions to increase WCT abundance.

Table 9: A Comparison of Species Abundance and Composition 1982 vs. 2014

Tributary	1982			2014		
	All Trout	% RB	%CT	All Trout	%RB	%CT
First	2,483	100%	0%	1,866	91%	9%
Safety Harbor	1,032	98.8%	1.2%	424	95%	5%
25 Mile	7,776	100%	0%	9,357	98%	2%
Grade	824	100%	0%	516	100%	0%
Mitchel	480	100%	0%	1,201	96%	4%

Table 10: A Comparison of Species Abundance and Composition 1982 vs 2013.

Tributary	1982			2013		
	All Trout	% RB	%CT	All Trout	%RB	%CT
Pyramid	522	98%	2%	250	100%	0%
Cascade	453	85%	15%	170	13%	87%
Big	236	99%	1%	18	22%	78%
Four Mile	431	90%	10%	750	100%	0%

Table 11: A Comparison of Species Abundance and Composition 1982 vs. 2012

Tributary	1982			2012		
	All Trout	% RB	%CT	All Trout	%RB	%CT
Fish	1,932	83%	17%	1,909	100%	0%
Gold	4,927	100%	0%	5,285	84%	16%
Prince	3,820	86%	14%	3,627	98%	2%

Table 12: A Comparison of Species Abundance and Composition 1982 vs. 2011

Tributary	1982			2011		
	All Trout	% RB	%CT	All Trout	%RB	%CT
First	2,856	100%	0%	1,949	62%	38%
25-Mile	6,144	100%	0%	2,580	100%	0%
Mitchell	607	100%	0%	455	93%	7%
Grade	572	100%	0%	292	80%	20%
Safety Harbor	1,153	99%	1%	231	71%	29%

All tributaries sampled in 2014, except Grade Creek, showed an increase in the number and percentage of cutthroat compared to 1982, Table 9. Mitchell Creek also showed an increase in the number of cutthroat (although probably not a statistically significant increase) and a decrease in percent of cutthroat as compared to 2011.

All tributaries but Twenty-five Mile Creek showed a decrease in the number and percent of cutthroat as compared to 2011. Twenty-Five Mile creek population abundance of all fish and numbers and percentage of cutthroat increased substantially when compared to fish abundance in 1982 and 2011. This increase is most likely the result of naturally improved habitat conditions compared to those present shortly after the catastrophic flood occurring between 1982 and 2011.

The limited hook and line sampling and random electrofishing conducted in Railroad Creek were only able to provide a relative species composition. In total, only 4 (50%) cutthroat and 4 (50%) rainbow were captured between the two methods. Estimated cutthroat and rainbow abundance in 1982 was 310 (42%) and 430 (58%) respectively. Given the very small sample size collected in 2014, a comparison should not be made with any confidence to the data collected in 1982. In addition, there were nine fish within the genus Cottus (sculpin) that were captured during random electrofishing efforts.

Hybridization between rainbow and cutthroat has and is still occurring. Genetics results from 2012 indicate that an average of 44% (21 - 71%) of the fish sampled were cutthroat/rainbow hybrids. Therefore, fish identified during 2014 sampling as either rainbow or cutthroat may have actually been hybrids. However, most likely many of the fish sampled in 1982 were also hybrids. It is intuitive that this would be the case given the long period of time that both species have coexisted in the lake. Because of rainbow presence we may never completely reestablish pure strain cutthroat as the dominate species. Nevertheless, based on 2014 sampling we can say that we now have a modest increase in cutthroat in First, Safety Harbor, Twenty-five Mile, and Mitchell creeks when compared to cutthroat abundance in 1982

2.2.3 ***Stehekin River Side Channel Trout Spawning Surveys, NPS***

Spawning surveys for rainbow trout (RBT) and westslope cutthroat trout (WCT) were conducted by NPS staff from 2009-2011 in selected Stehekin River side channel and tributary index reaches to evaluate progress towards restoration of adfluvial WCT. The objective was to annually monitor trends in abundance of trout spawners (April 15- June 30) at 12 tributary and side channel index reaches in the lower 13km of the Stehekin River.

No WCT were documented in the 2009-2011 spawning surveys and these surveys were discontinued in 2012. Spring spawner surveys will be reinstated in 2015 to evaluate any improvements resulting from supplemental stocking and/or natural recruitment. A final summary report of 2009-2011 results (Anthony and Glesne 2012) can be found here (accessed 01/02/14).

2.2.4 ***Stehekin River Mainstem Westslope Cutthroat and Rainbow Trout Surveys, NPS***

Despite the apparent lack of spawning WCT in Stehekin River tributary and side channel index sites, a number of large (380-460 mm) WCT were viewed in the mainstem Stehekin River during the autumn 2010-kokanee surveys. Though not observed while spawning, these observations confirm the presence of large, potentially adfluvial WCT in the Stehekin River system. In light of these observations in 2011, it was decided to refocus our efforts to include distribution and abundance surveys of trout during the late summer and early fall during low flow periods. The objectives of these surveys were to gain a better understanding of adfluvial WCT abundance and distribution in the Stehekin River system and to assess management activities designed to increase the WCT population and reduce the population of non-native RBT.

Eight large channel-spanning pools were initially identified in the lower 7 km of the mainstem Stehekin River, which were surveyed once in the early spring, and twice in the late summer/ early fall of 2011. Six of the eight pools located in 2011 were selected for continued surveys from 2012 to 2014. Pool selection was based on documented WCT presence and safety of conducting snorkel surveys under elevated flow conditions. Survey methods and pool location maps were included in the 2009-2011 spawning survey report (Anthony and Glesne 2012) while a comprehensive report covering 2011-2014 mainstem pool results will be completed in the spring of 2015.

Snorkel surveys were conducted by teams of two, with one surveyor counting fish and one surveyor on the channel bank timing the snorkel pass and recording data. Fish were tallied into length groups of less than 150 mm, 150–299 mm, 300–449 mm, and ≥450 mm. Each pool was snorkeled three times and the number of fish observed by species and pass duration was recorded. Of the three snorkel passes, the maximum fish count for each species was compared by date of survey as outlined in Figure 3 below.

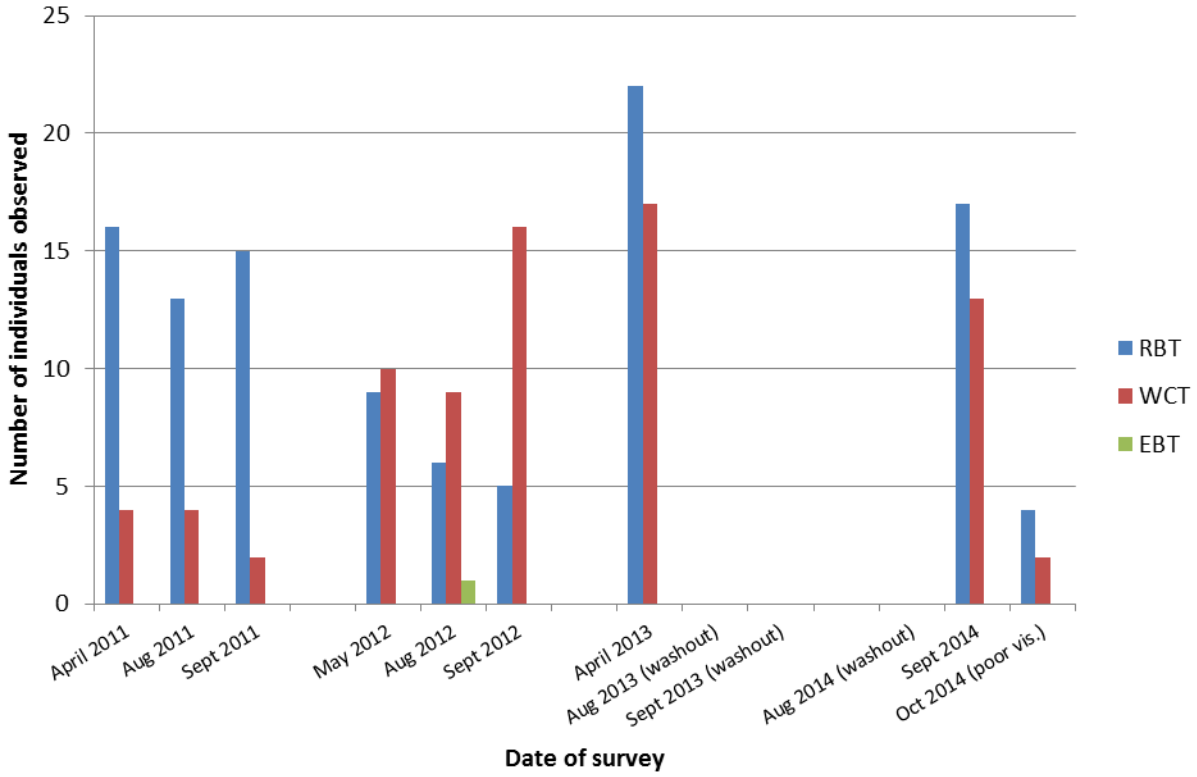

Figure 3: Maximum Count of Greater than Six-Inch Trout Observed within Six Mainstem Pool Index Sites, 2011 – 2014

In 2012 - 2014, North Cascades National Park Biologists conducted exploratory snorkel surveys on two reaches of mainstem riffle habitat to assess the possibility of including this habitat in long term monitoring for WCT presence (Table 13). NPS biologists found that while inclusion of these mainstem riffle sites in late summer abundance surveys may be worthwhile, mainstem riffle surveys would be difficult to perform under flows greater

than 2000 cfs and thus not feasible during much of the spring spawning season. These exploratory surveys will be discontinued in 2015.

Table 13: Number of Greater than Six-Inch Fish Observed and Size Classes within Two Mainstem Riffle Sites, 2012 – 2014

Number of fish observed											
		Westslope Cutthroat Trout			Rainbow Trout			Kokanee			
Survey Date	Site Name	150-299mm	300-449mm	≥450mm	150-299mm	300-449mm	≥450mm	150-299mm	300-449mm	≥450mm	
8/20/2012	Harlequin Bridge	0	0	0	0	0	0	2	0	0	
9/25/2012	Blackberry	0	0	0	0	0	0	97	0	0	
4/25/2013	Harlequin Bridge	0	3	0	0	2	0	0	0	0	
4/26/2013	Blackberry	0	0	0	0	2	1	0	0	0	
9/18/2013	Harlequin Bridge	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	
9/18/2013	Blackberry	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	
9/16/2014	Harlequin Bridge	0	1	0	0	1	0	0	0	0	
9/16/2014	Blackberry	0	0	0	1	0	0	0	0	0	
10/8/2014	Harlequin Bridge	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	
10/8/2014	Blackberry	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	

1 - Due to high river turbidity surveys were not completed on these dates.

2.2.5 ***Stehekin River Side Channel Trout Abundance Surveys, NPS***

The 2009-2011 spring spawning surveys failed to confirm the presence of WCT in any of the index reaches. Subsequent side channel surveys focused on documenting abundance of WCT and RBT during the summer and fall. Beginning in 2011 two surveys were conducted annually in side channel and tributary habitat from late July to mid-September. Visual observation and snorkeling was used to document species presence and their abundance at 11 of the 12-spawner survey index reaches. Results are outlined in Figure 4 below.

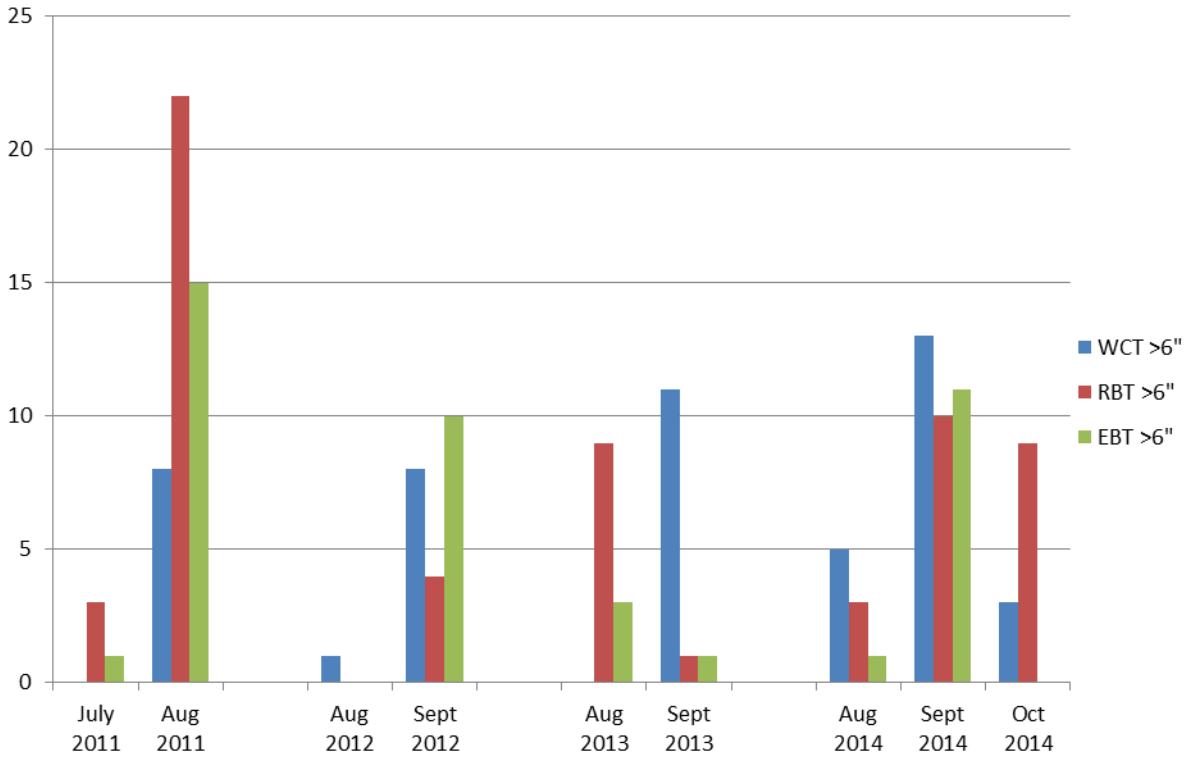

Figure 4: Total Number of Greater than Six-Inch Trout Observed in Eleven-Side Channel Index Sites, 2011 – 2014

An additional sampling effort was made from 2011 – 2014 to collect young-of-year fish for genetic analysis to provide definitive species information about successful trout spawning in index reaches. Species composition of these samples is useful for determining RBT and WCT spawner use of the index reaches, and the occurrence of hybridization. A sample of 25 fry was collected from each of four index reaches in 2011 - 2014. Results from the sampling effort indicated that none of the newly emerged fry were WCT, and hybridization rates ranged from 0% to 40% in the channels surveyed. All non-hybridized fish were determined to be rainbow trout. Genetic analyses of 2013 samples are currently being conducted by Carl Ostberg (USGS Western Fisheries Research Center) following methods in Ostberg and Rodriguez (2006).

2.2.6 Monitor Frequency of Non-Native Rainbow Trout Genetic Introgression in Native Westslope Cutthroat Trout in the Stehekin River, NPS

In 2001, 2002 and 2010 fish tissue samples were collected at Stehekin River locations distributed throughout the drainage to monitor the level and frequency of hybridization between non-native RBT and native WCT. Results indicate that there has not been any significant change in the frequency of WCT, RBT, and hybrids between 2002 and 2010 at any of the locations sampled. It is recommended that we continue to monitor genetic introgression every five to ten years to evaluate the status and progress towards WCT restoration in the watershed.

2.3 Kokanee

Kokanee are the most sought after fish in Lake Chelan (Brown 1984; DES 2000a). Maintaining a popular kokanee sport fishery in Lake Chelan is a high priority; to achieve a successful kokanee sport fishery, kokanee should be managed to maintain their abundance at a mean size acceptable to anglers, but at a level of abundance that does not substantially hinder efforts to restore native species.

Goals and objectives for Lake Chelan are to: 1) produce consistently good fishing; and 2) maintain an abundance of kokanee at a level that does not substantially hinder our efforts to restore native species.

2.3.1 ***Fall Index Stream Kokanee Spawning Surveys, CPUD***

Chelan PUD has conducted annual Lake Chelan spawning ground surveys for kokanee and land-locked Chinook salmon since 1984. The purpose of these surveys is to document the annual trends of kokanee spawning populations within the Lake Chelan drainage (Stone and Fielder 2004). Two tributaries of the Stehekin River, Company Creek and Blackberry Creek, have been used as index reaches since 1984 because a majority of kokanee production from the Stehekin originates from in these tributaries. Additional tributaries to Lake Chelan that have been included in the annual kokanee spawning ground surveys are: Mitchell, Gold, Grade, Safety Harbor, Prince, Fish, First, and Twenty-five Mile creeks.

Prior to 2013, surveys had been conducted approximately twice monthly between August 31 and 2013 due to availability of survey crews. Crews conduct surveys by walking in or along the streams and counting all live kokanee. Tally counters are used to keep track of fish numbers. Large masses of kokanee are estimated in some pools located in Company and Blackberry creeks (Stone and Fielder 2004). Kokanee spawning ground surveys were not conducted in 2013 by Chelan PUD due to: 1) inability to access Company and Blackberry Creek survey index reaches from closure of the road due to slides; and 2) unavailability of Chelan PUD staff. Chelan PUD staff will coordinate with NPS staff to ensure that kokanee spawning surveys can be conducted in 2015 to the greatest extent practicable.

Results of kokanee spawning ground surveys prior to 2013 can be found at the following link that will navigate to the Chelan PUD Lake Chelan License Implementation webpage under Projects, Monitoring and Evaluation Activities:
http://www.chelanpud.org/lc-Resource-Documents-LCFF.cfm

2.3.2 ***Mainstem Stehekin River and Side Channel Kokanee Spawning Escapement Surveys, NPS***

Kokanee spawning surveys conducted during the previous license focused on a set of important subjectively selected index reaches of tributaries to Lake Chelan and the Stehekin River (Fielder 2000; Stone and Fielder 2004). The continuity of this important long-term survey has been maintained in the new license period (Section 2.3.1). However, there is significant kokanee production emanating from the mainstem and side channel habitat of the Stehekin River that is not being assessed using current survey

methods (DES 2000a). An expanded kokanee survey, including a probability sample of all potential kokanee spawning habitat in the mainstem, side channels, and tributaries, was completed in 2010. The intent of the survey was to develop a better estimate of the total escapement of kokanee spawners in the Stehekin River and to track changes in distribution of spawners in the watershed.

In the spring of 2010 North Cascades National Park Service (NOCA) personnel conducted habitat surveys on all fish accessible side channels in the lower 16 km of the Stehekin River. These surveys were based on Forest Service Level 2 habitat surveys with additional criteria for defining suitable kokanee spawning habitat. A total of 9.60 km were deemed suitable for kokanee spawning based on substrate data and channel depths. Of this 9.60 km of suitable habitat, 3.40 km were randomly selected as kokanee spawning survey reaches. Additionally, the mainstem Stehekin River was partitioned into thirty-two 500 m reaches. Of these 500 m reaches, 8 were considered poor kokanee habitat as the river channel is deeply incised and substrate consists of large cobbles and boulders. These reaches were identified in a 2007 NOCA large woody debris survey as "transport zones". Of the remaining 24 reaches, 12 were randomly selected for sampling. All randomly selected mainstem and side channel reaches were sampled four times (two-week intervals) between August 30th and October 15th.

Extrapolation of spawner survey counts to all suitable mainstem and all suitable side channel habitat was determined using the Area Under the Curve method (Beidler and Nickelson 1980). Preliminary results show a total of 50,580 kokanee using the mainstem Stehekin channel and 131,568 kokanee using the side channel habitat. Total kokanee escapement was estimated at 182,148 fish. A detailed report incorporating the 2000 results and the results from the 2010 expanded kokanee side channel spawner survey is available here (accessed 03/23/15).

Replication of this survey is recommended at five-year intervals, with the next survey in 2015. Results will be used to calibrate annual Chelan PUD index reach escapement to total escapement and to evaluate changes in habitat and spawner distribution in the study area.

2.3.3 ***Kokanee Stocking Monitoring and Evaluation, WDFW***

WDFW will clip adipose fins on all kokanee reared and released into Lake Chelan as part of the fish stocking program. Fin clipped kokanee will provide important information regarding the contribution of hatchery-reared kokanee to the sport fishery (especially their survival) as identified through creel surveys versus natural production. The cost of fin-clipping hatchery produced kokanee is estimated to be $6,200 annually.

2.4 Burbot

The LCFF believes that monitoring burbot population dynamics should be an important component to the monitoring and evaluation program. However, methods for assessing the burbot population in Lake Chelan need to be developed. Developing these methods will be a future task for the LCFF.

2.5 Smallmouth and Largemouth Bass

The LCFF believes that monitoring smallmouth and largemouth bass population dynamics should be an important component to the monitoring and evaluation program. However, methods for assessing the bass population in Lake Chelan need to be developed. Developing these methods will be a future task for the LCFF. In 2013, the NPS documented the presence of largemouth bass in the Lucerne Basin of Lake Chelan with photographic evidence of a specimen caught off Purple Point dock.

2.6 Bull Trout

The LCFF believes that the monitoring of any future population and/or individual occurrences of bull trout in Lake Chelan should be an important component to the monitoring and evaluation program. Monitoring of this species at this time should include documentation of incidental occurrences during associated fish monitoring and evaluation program activities. Standard metric measurements, physical condition, photographs, and location of fish within Lake Chelan during these occurrences should be documented and provided to the LCFF for review.

The USFWS prepared the paper entitled "What Happened to bull trout in Lake Chelan? An Examination of the Historical Evidence" (Nelson 2012). The intent of the document was to conduct a "…rigorous examination of the factors that may have lead to the demise of bull trout" prior to considering any reintroduction of bull trout into the Lake Chelan basin. This is a very important management document that should be included by reference into the AWP.

2.7 Tributary Barrier Confirmation and Removal Planning

Tributary barriers identified in the Tributary Barrier Analysis report (DES 2000b) will be reassessed for depth, velocity, and gradient and re-prioritized if necessary. Two methodologies that may be used are: 1) using the Forest Practices Board Emergency Rule and "Oregon Method" used in the 2000 report; or 2) developing a more simplistic method based on the principles of the 2000 methodology to use as a more rapid assessment tool. The USDA Forest Service supports the latter option.

As tributary barriers are documented as either remaining or eliminated, the LCFF will update the tributary barrier removal priority list included in the 2000 report. Once the tributary barrier removal priority list is updated, the LCFF will work with Chelan PUD to implement Lake Chelan Settlement Agreement License Article 6(c) for tributary barrier removal work, such as investigating barrier removal methods, stream channel rehabilitation design at tributary mouths, contractor selection to conduct work, etc. Actual on-the-ground tributary barrier removal efforts will commence in early 2011, depending upon runoff volume and associated lake elevation.

Tributary barrier removal efforts were scheduled originally to begin in 2009. However, the schedule was revised due to delay in selecting a design contractor; need by the design contractor to view tributary mouths in 2009 to observe barriers present and discuss with the consulting team and LCFF potential preliminary design features; time required to secure necessary permits; and time required to secure a construction contractor.

The LCFF conducted a boat tour of tributary mouths in March 2008, touring both the north and south shores from Twenty-five Mile Creek uplake to Fish Creek. During the tour, LCFF members took numerous photographs of the tributary mouths to initiate photo-documentation of existing tributary mouth conditions and barriers to upstream fish passage. Photographs were posted on the Chelan PUD Lake Chelan Implementation Website. After the conclusion of the tour, Forum members reached consensus that virtually all tributaries observed had barriers, either water depth, water velocity, or gradient, to upstream fish passage at the lake elevation of approximately 1083.0 feet that occurred during the site visit.

The LCFF met again on June 17, 2008 to review Statements of Qualifications (SOQs) submitted by potential tributary barrier removal design consultants, select a consultant, and proceed with implementing the Tributary Barrier Removal Project (TBRP). A design consultant, the Fairbanks Environmental Team, was selected by consensus of the LCFF.

The LCFF reviewed pertinent information regarding watershed conditions of tributaries to Lake Chelan, such as the USDA Forest Service Regional Assistance Teams (RATs) assessment report, USDA Forest Service Lake Chelan Basin fire map of areas burned since 1998, and tributary mouth photographs taken in March 2008. Based on this information, the priority tributaries selected by the LCFF at the June 17, 2008 meeting were Safety Harbor, Mitchell, Grade, and Gold creeks.

However, even with the selection of priority tributaries, the LCFF members discussed proceeding cautiously with tributary barrier removal efforts due to the following considerations:

1. Based on the data illustrated by the Lake Chelan basin fire map and recommendations from the RATs, significant watershed instability has been documented in most tributaries to Lake Chelan due to recent fires. The instability of the upper watersheds will likely result in high bedload movements for a number of years during high runoff events, which may thwart barrier removal and stream reconfiguration efforts until the watersheds have time to stabilize to a greater extent;

2. The RATs also recommended giving the new lake level operating regime more time to be in affect that may allow tributaries to carve out alluvial deposits on their own due to high flow events occurring when the lake level will lower than historical elevations during major high runoff events, particularly in the fall and winter; and

3. Allow the WDFW westslope cutthroat trout restoration program additional time to increase tributary WCT populations, thereby producing more spawning age adults that could contribute to natural reproduction in the tributaries.

Efforts to implement barrier removal in Lake Chelan tributaries in 2011 included the following:

1. Chelan PUD staff planned to have the Lake Chelan elevation in 2011 at or below 1086 feet (MSL) by no later than mid-February and remain below 1086 feet through March and, potentially, into early April in order to conduct construction activities in-the-dry.
2. Barrier removal and stream reconstruction activities were conducted in Mitchell and Gold creeks, simultaneously, beginning the week of February 7, 2011 and completed on February 24, 2011.
3. Photographs were taken of Prince, Fish, and Safety Harbor creek mouths on May 25, 2011 at Lake Chelan elevation 1087.48. The intent of the photographs was to document that no barriers to upstream fish passage were present. Presence of barriers to upstream fish passage in these creeks had been documented in previous years. The plausible explanation for these creeks ability to "repair themselves" is that the lake level operation contained in the new license draws the lake down sooner in the fall. The drawdown allowed the energy of the streams during winter freshets to scour out sediment at the tributary mouths to prevent formation of barriers to upstream adult fish passage, No further mechanical treatment is planned for any Lake Chelan tributary at this time. Monitoring will continue in future years to document passage ability for trout between elevations 1086 ft. and 1100 ft.

Efforts to monitor the presence of barriers to upstream fish passage in Lake Chelan tributaries in 2014 included photo-documentation of existing conditions at the mouths of First, Twenty-five Mile, Gold, Mitchell, Safety Harbor, Fish, and Prince creeks in March during lake drawdown. Mechanical treatment was employed at Gold and Mitchell creeks in 2011. Monitoring trips in 2014 verified that access from Lake Chelan to spawning habitat was maintained in all creeks surveyed. Photographs of tributary mouths can be found at the following link of the Lake Chelan Implementation webpage under Projects, Tributary Barriers.
http://www.chelanpud.org/lc-Resource-Documents-LCFF.cfm?year=All

2.8 Entrainment Investigation

As stated previously in his document, License Article 404 *Lake Chelan Fishery Plan* of the Lake Chelan license requires Chelan PUD to conduct entrainment sampling "…to determine the potential for entrainment of adult westslope cutthroat trout at the project intakes." Specific elements for the Entrainment Investigation are described in the Lake Chelan Comprehensive Plan, section 4.6.4 of Chapter 6 Lake Chelan Comprehensive Fishery Management Plan. An excerpt from section 4.6.4 *Entrainment* is as follows:

> Chelan PUD shall conduct no more than 140 days of entrainment sampling over 4 sampling years, using the same methodology used during the 2000 and 2001 field seasons, or another methodology of comparable cost recommended by the LCFF, and approved by WDFW, USFWS, and WDOE. Upon request of WDFW, Chelan PUD shall develop a sampling plan in consultation with USFWS, WDOE, and the LCFF, subject to approval by WDFW. The plan shall specify the sampling years and the allocation of sampling days among such years. The first sampling year shall be not be prior to year seven of the effective date of the New License, and the last sampling year shall be no later than year 35 of the effective date of the New License. The purpose of the sampling is to determine if significant numbers of adult spawnable age/size adfluvial westslope cutthroat trout are entering the power tunnel entrance.

Article 404 of the license includes a requirement for Chelan PUD to develop and file for approval with FERC within one year of issuance of the license a Lake Chelan Fishery Plan that includes measures to address Tributary Barrier Removal, a Fish Stocking Plan, and an Entrainment Sampling Plan. The Lake Chelan Fishery Plan, developed in consultation with the LCFF, was approved by FERC on December 4, 2007. The Entrainment Sampling plan is section 4.2.5 of the Lake Chelan Fishery Plan. Study methods used to investigate entrainment during relicensing baseline studies (DES 2001) were hook-and-line, Oneida trap, gillnet, and video. These same methods, or other methods recommended by the LCFF will be employed for future entrainment investigations. Stated in Article 404 of the license is the following reporting requirement:

> Annual results of any entrainment sampling shall be compiled in a final report and filed with the commission no later than March 1 of the subsequent year. The report shall also contain any recommendations for continued sampling, or other studies to evaluate entrainment of cutthroat trout.

The Lake Chelan Fishery Plan can be found at the following link:
http://www.chelanpud.org/departments/licensingCompliance/lc_implementation/ResourceDocuments/9513_1(2).pdf

Year 7 of the effective date of the license was 2013. However, discussions for conducting an Entrainment Investigation have not occurred yet within the LCFF, primarily due to monitoring and evaluation results indicating that actions taken to date, such as altering fishing regulations, changing fish stocking practices, and removing lake tributary barriers to spring spawning fish (see section 2.2), have not demonstrated a significant increase in the WCT abundance in the lake. Likely, the LCFF will continue discussions in 2015 regarding when entrainment sampling may occur and preferred methodologies to be used for the investigation.

SECTION 3: MEASURES TO BE IMPLEMENTED IN 2015

The following addresses Tributary Barriers, Fish Stocking, and the Monitoring and Evaluation Program measures that will be implemented in 2015.

3.1 Fish Stocking

Article 6(d) and Section 4.6.3 of Chapter 6 of the Comprehensive Plan requires Chelan PUD to make available to the WDFW sufficient funding to rear annually the following resident fish at the Chelan Hatchery for stocking in Lake Chelan:

1. Approximately 5,000 pounds of salmonid fingerlings (for example: 500,000 fish at 100 fish/lb, presently kokanee).
2. Approximately 33,000 pounds of catchable-sized salmonids (for example: approximately 100,000 fish at 3 fish/lb, presently westslope cutthroat trout (WCT) and triploid rainbow trout (RBT).

Planned and actual fish stocking rates for 2011-2014 are shown in Tables 14 - 21 below (Corey Morrison, WDFW, pers. com.). Planned fish stocking for 2015 is outlined in Table 22 (Corey Morrison, WDFW, pers. com.).

Table 14: 2011 Fish Stocking Plan

Location	Species	Stock	Number	No. Fish/lb	Stocking date
Lake Chelan Tributaries					
Four Mile Creek	Cutthroat	Twin LK	10,000	Eyed eggs	June
Cascade Creek	Cutthroat	Twin LK	5,000	Fry	June or July
Bear Creek	Cutthroat	Twin LK	3,000	Fry	June or July
Big Creek	Cutthroat	Twin LK	2,000	Fry	June or July
Lake Chelan	Cutthroat	Twin LK	100,000	15	March
		ad clipped	(80%)		
	Kokanee	Lake Chelan	80,000	80	Mid-May
	Triploid Rainbows	Spokane	1,000	0.4	May - September
	Triploid Rainbows	Spokane	50,000	2.5	August-September
Mill Creek	Cutthroat	Twin LK	3,000	Fry	June or July
	Triploid Chinook[1]	summer	50,000	100	March

1– The triploid Chinook program is not funded by Chelan PUD

Table 15: 2011 Actual Fish Stocking

Location	Species	Stock	Number	No. Fish/lb	Stocking date
Lake Chelan Tributaries					
First Creek	Cutthroat	Twin LK	26,899	Fry	Early September
Lake Chelan	Cutthroat	Twin LK	137,224	Fry	Late September
	Cutthroat	Twin LK	51,949	15	April
		ad clipped	(80%)		
	Kokanee	Lake Chelan	0	N/A	N/A
	Triploid Rainbow	Spokane	1,686	0.4	May - September
	Triploid Rainbow	Spokane	46,829	3.4	August - September
	Triploid Chinook[1]	Summer	22,000	100	March

1– The triploid Chinook salmon program is not funded by Chelan PUD

Table 16: 2012 Fish Stocking Plan

Location	Species	Stock	Number	No. Fish/lb	Stocking Date
Lake Chelan Tributaries					
Twenty Five Mile Creek	Cutthroat	Twin LK	29,091	Fry	June or July
First Creek	Cutthroat	Twin LK	14,545	Fry	June or July
Grade Creek	Cutthroat	Twin LK	3,636	Fry	June or July
Safety Harbor Creek	Cutthroat	Twin LK	2,727	Fry	June or July
Company Creek	Cutthroat	Twin LK	78,750	Fry	June or July
Blackberry Creek	Cutthroat	Twin LK	81,900	Fry	June or July
Lake Chelan	Cutthroat	Twin LK	50,000	15	March
		ad clipped (80%)			
	Kokanee	Lake Chelan	80,000	80	Mid May
	Triploid Rainbow	Spokane	1,000	0.5	May - September
	Triploid Rainbow	Spokane	50,000	2.5	August - September
Mill Creek	Cutthroat	Twin LK	3,000	Fry	June or July
	Triploid Chinook[1]	summer	50,000	100	March

1– The triploid Chinook program is not funded by Chelan PUD

Table 17: 2012 Actual Fish Stocking

Location	Species	Stock	Number	No. Fish/lb	Stocking Date
Lake Chelan Tributaries					
Twenty Five Mile Creek	Cutthroat	Twin LK	29,000	Fry	August
Twenty Five Mile Creek	Cutthroat	Twin LK	7,803	10	June
First Creek	Cutthroat	Twin LK	15,000	Fry	August
Grade Creek	Cutthroat	Twin LK	3,000	Fry	September
Safety Harbor Creek	Cutthroat	Twin LK	3,500	Fry	September
Company Creek	Cutthroat	Twin LK	17,500	Fry	September
Blackberry Creek	Cutthroat	Twin LK	0	Fry	
Lake Chelan	Cutthroat	Twin LK	72,980	15	April
		ad clipped (80%)			
	Cutthroat	Twin LK	1,000	Fry	September
	Kokanee	Lake Chelan	27,200	100	Mid May
	Triploid Rainbow	Spokane	1,898	0.8	October
	Triploid Rainbow	Spokane	39,339	2.5	August - September
Mill Creek	Triploid Chinook[1]	summer	38,940	100	March

1– The triploid Chinook program is not funded by Chelan PUD

Table 18: 2013 Fish Stocking Plan

Location	Species	Stock	Number	No. Fish/lb	Stocking Date
Lake Chelan Tributaries					
Twenty Five Mile Creek	Cutthroat	Twin LK	29,000	Fry	June – August
First Creek	Cutthroat	Twin LK	14,700	Fry	June – August
Grade Creek	Cutthroat	Twin LK	2,700	Fry	June – August
Safety Harbor Creek	Cutthroat	Twin LK	3,200	Fry	June – August
Mitchell Creek	Cutthroat	Twin LK	4,000	Fry	June – August
Fish Creek	Cutthroat	Twin LK	6,000	Fry	June – August
Gold Creek	Cutthroat	Twin LK	1,200	Fry	June – August
Prince Creek	Cutthroat	Twin LK	4,700	Fry	June – August
Company Creek	Cutthroat	Twin LK	30,000	Fry	June – August
Blackberry Creek	Cutthroat	Twin LK	30,000	Fry	June – August
Lake Chelan	Cutthroat	Twin LK	15,000	15	March
		Ad-clipped (80%)			
	Kokanee	Lake Chelan	0		
	Triploid Rainbow	Spokane	1,000	0.5	May - September
	Triploid Rainbow	Spokane	50,000	2.5	August - September
Mill Creek	Triploid Chinook[1]	summer	50,000	100	March

1– The triploid Chinook program is not funded by Chelan PUD

Table 19: 2013 Actual Fish Stocking

Location	Species	Stock	Number	No. Fish/lb	Stocking Date
Lake Chelan Tributaries					
Twenty Five Mile Creek	Cutthroat	Twin LK	29,000	Fry	August – September
First Creek	Cutthroat	Twin LK	19,000	Fry	August – September
Lake Chelan	Cutthroat	Twin LK	2,700	Fry	August – September
Safety Harbor Creek	Cutthroat	Twin LK	3,200	Fry	August – September
Mitchell Creek	Cutthroat	Twin LK	4,000	Fry	August – September
Fish Creek	Cutthroat	Twin LK	6,000	Fry	August – September
Gold Creek	Cutthroat	Twin LK	1,200	Fry	August – September
Prince Creek	Cutthroat	Twin LK	4,700	Fry	August – September
Company Creek	Cutthroat	Twin LK	30,000	Fry	August – September
Stehekin River	Cutthroat	Twin LK	30,000	Fry	August – September
Lake Chelan	Cutthroat	Twin LK	16,953	13 – 9.5	April
		Ad-clipped (80%)			
	Kokanee	Lake Chelan	0		
	Triploid Rainbow	Spokane	2,338	0.5	May – July
	Triploid Rainbow	Spokane	69,993	2.5	September - October

Table 20: 2014 Fish Stocking Plan

Location	Species	Stock	Number	No. Fish/lb	Stocking Date
Lake Chelan Tributaries					
Fish Creek	Cutthroat	Twin LK	6,000	Fry	July – August
Gold Creek	Cutthroat	Twin LK	1,300	Fry	July – August
Prince Creek	Cutthroat	Twin LK	4,700	Fry	July – August
Cascade Creek	Cutthroat	Twin LK	600	Fry	July – August
Four Mile Creek	Cutthroat	Twin LK	2,100	Fry	July – August
Big Creek	Cutthroat	Twin LK	700	Fry	July – August
Pyramid Creek	Cutthroat	Twin LK	2,300	Fry	July – August
Company Creek	Cutthroat	Twin LK	30,000	Fry	July – August
Blackberry Creek	Cutthroat	Twin LK	30,000	Fry	July – August
Lake Chelan	Cutthroat	Twin LK	50,000+	2.5	July - August
		Ad-Clipped (80%)			
	Kokanee	Lake Chelan	70,000	<100	May
	Triploid Rainbow	Spokane	50,000	2.5	August - September
	Triploid Rainbow	Spokane	2,000	0.5	May - September
	Triploid Chinook	Summer	50,000	100	March - June

Table 21: 2014 Actual Fish Stocking

Location	Species	Stock	Number	No. Fish/lb	Stocking Date
Lake Chelan Tributaries					
Fish Creek	Cutthroat	Twin LK	6,000	426	August
Gold Creek	Cutthroat	Twin LK	1,300	557	August
Prince Creek	Cutthroat	Twin LK	4,700	557	August
Cascade Creek	Cutthroat	Twin LK	600	426	August
Four Mile Creek	Cutthroat	Twin LK	2,100	426	August
Big Creek	Cutthroat	Twin LK	700	557	August
Pyramid Creek	Cutthroat	Twin LK	2,300	557	August
Company Creek	Cutthroat	Twin LK	30,000	402	August
Blackberry Creek	Cutthroat	Twin LK	30,000	426	August
Chelan River			2,000	242	October
Lake Chelan	Cutthroat	Twin LK	47,483	3.5	June
		Ad-Clipped (80%)			
	Kokanee	Lake Chelan	70,177	85	May
	Triploid Rainbow	Spokane	728	0.2-0.25	June
	Triploid Rainbow	Spokane	38,846	~2.5	October - November

Table 22: 2015 Fish Stocking Plan

Location	Species	Stock	Number	No. Fish/lb	Stocking Date
Lake Chelan Tributaries					
Twenty Five Mile Creek	Cutthroat	Twin LK	29,000	Fry	July - August
First Creek	Cutthroat	Twin LK	14,700	Fry	July - August
Mitchel Creek	Cutthroat	Twin LK	4,000	Fry	July - August
Grade Creek	Cutthroat	Twin LK	2,700	Fry	July - August
Safety Harbor Creek	Cutthroat	Twin LK	3,200	Fry	July - August
Cascade Creek	Cutthroat	Twin LK	6,00	Fry	July - August
Four Mile Creek	Cutthroat	Twin LK	2,100	Fry	July - August
Big Creek	Cutthroat	Twin LK	700	Fry	July - August
Pyramid Creek	Cutthroat	Twin LK	2,300	Fry	July - August
Company Creek	Cutthroat	Twin LK	30,000	Fry	July - August
Blackberry Creek	Cutthroat	Twin LK	30,000	Fry	July - August
Lake Chelan	Cutthroat	Twin LK	85,000	3.0	July - August
		Ad-clipped (80%)			
	Kokanee	Lake Chelan	80,000	<100	May
	Triploid Rainbow	Spokane	TBD	2.5	August - September
	Triploid Rainbow	Spokane	1,000	0.5	May - September

A significant note for 2014 of actual fish stocked into Lake Chelan was 47,483 westslope cutthroat trout (WCT) at 3.5 fish per pound (FPP) were stocked into the lake. This was the first time that WCT of approximate catchable size were stocked into the lake for recreational fishing. As outlined previously in this document, WCT have been very difficult to rear to catchable size due to eggs originating from wild stock and being much more difficult to culture (more susceptible to disease, reduced growth rates, avoidance/fright behavior, etc.) than more domesticated stocks, such as rainbow trout. However, WDFW and Chelan PUD coordinated alternative rearing practices and facilities for WCT, and were able to produce WCT to catchable size and stock them into Lake Chelan for the first time in 2014. This program, in addition to refinements as more is learned regarding culturing wild-origin WCT, will be continued into the future with the goal of producing the entire license stocking production requirement of trout to be WCT and reducing the stocking of triploid rainbow trout, to the greatest extent practicable

3.2 Monitoring and Evaluation Program

3.2.1 ***Lake Chelan Comprehensive Creel Survey, WDFW***

The Lake Chelan Comprehensive Creel Survey is conducted on a tri-annual basis. This survey was last conducted in 2013 and will be repeated in 2016.

Estimated Budget and Schedule: No funds requested for 2015

3.2.2 ***2015 Lake Chelan Tributaries Spawning Monitoring and Evaluation, USFS***

In the spring, (April-June) Forest Service personnel will install thermographs in six tributaries to predict fry emergence of spring spawning westslope cutthroat trout and rainbow trout. In the fall (September), Forest Service personnel will conduct snorkel surveys in these six tributaries to document the presence/absence of rainbow trout and

westslope cutthroat trout young-of-year. The snorkel survey data will also be combined with the WDFW electrofishing data to obtain a more robust population estimate for selected tributaries. Specific tributaries in which the monitoring will be conducted will be determined and coordinated with WDFW activities (i.e., fish stocking and abundance estimates). Additionally, Forest Service personnel will periodically monitor the mechanical treatment of the outlets of Gold and Mitchell creeks (completed in March 2011).

Table 23: USFS Estimated Lake Chelan Tributaries Spawning Monitoring and Evaluation Budget and Schedule

Year	Task	Total $	Requested $ (LC06b1)	Requested PUD Matching $ (LC06b2)	USFS Matching $
2015 April	Install temperature data loggers (GS11 fisheries biologist)	$360		$180	$180
July-August	Conduct snorkel surveys in 6 adfluvial tributary zones. (GS5 & GS11 Fish Bios for total of 6 crew-days)	$3,640		$1,820	$1,820
April-August	USFS boat fuel	$1,000	$1,000		
April-August	USFS boat driver	$2,380		$1,190	$1,190
Nov-Dec	Data Mgt. and Reporting (GS11 Fish Bio. for 5 person-days)	$1,410		$705	$705
	2015 Estimated Totals	**$8,790**	**$1,000**	**$3,895**	**$3,895**

3.2.3 *Lake Chelan Tributary Estimates of Juvenile Westslope Cutthroat and Rainbow Trout Abundance, WDFW*

Beginning in 2011, WDFW has conducted annual fish abundance surveys on select lake tributaries on a three-year rotational basis. This sequence of surveys will begin again in 2014. These surveys are conducted to obtain information on adfluvial WCT and RBT population abundance, age class composition and other biological characteristics.

Tributaries to be surveyed include First, Twenty-five Mile, Railroad, Mitchell, Fish, Grade, Gold, Prince, Big, Four Mile, Cascade Pyramid, and Safety Harbor Creeks.

WDFW surveyed Fish, Gold, and Prince Creeks beginning in 2012, thus these tributaries will once again be sampled in 2015 as per the three year rotational agreement. In addition to and as time and manpower allows, the following creeks may also be investigated and surveyed; Poison, Lightning, Little Big, Graham Harbor, Coyote, Deep Harbor, Lone Fir, Castle, Bear and Riddle Creeks. Surveys on these creeks have not been conducted since 1982 and so may serve as additional comparative information.

Table 24: WDFW Estimated Juvenile Westslope Cutthroat and Rainbow Trout Abundance Budget and Schedule

Year	Task	Total $	Requested $ (LC06b1)	Requested PUD Matching $ (LC06b2)	WDFW Matching $
2015	Conduct tributary surveys in September & October	$19,000		$9,500	$9,500
2015	Data Mtg. and Reporting.	$1,600		$800	$800
2015	Boat and Vehicle Operating Costs	$1,950	$1,950		
2015	Supplies and Equipment	$2,000	$2,000		
	2015 Estimated Totals	$24,550	$3,950	$10,300	$10,300

3.2.4 ***Stehekin River Cutthroat Trout Spawning, Abundance and Genetic Surveys, NPS***

Due to the absence of WCT spawners in any of the 2009-2011 surveys it is recommended that spawning surveys be discontinued from 2012 to 2014 (see Section 2.2.3). Surveys should be reinstated in 2015 for a period of at least three years.

Monitor trends in abundance of cutthroat and rainbow trout spawners at 10 index sites in the lower 10 miles of the Stehekin River. Results will be used to evaluate progress towards restoration of adfluvial/fluvial westslope cutthroat trout and management efforts directed at reduction of non-native rainbow trout in the lower 8 miles of the Stehekin River (see Section 2.2.3).

Table 25: NPS Estimated Cutthroat Trout Spawning Abundance and Genetic Budget and Schedule

Year	Task	Total $	NPS Requested $ (LC06b1)	Requested PUD Matching $ (LC06b2)	NPS Matching $
2015 May - July	Conduct four to five bi-weekly spawner surveys at 8 side channel index sites (1-GS/9 Ecologist and 1-GS/6 Bio Tech for a total of 52 person-days)	$7,256	$2,856	$2, 200	$2, 200
Aug-Sept	Conduct two snorkel surveys (Aug/Sept) in 8 side-channel/trib. index reaches (1–GS/9 Ecologist and 1-GS/6 Bio Tech for total of 8 person-days)	$1,876	$876	$500	$500
Aug-Sept	Collect cutthroat/rainbow young-of-year for genetic analysis in four side channel reaches (1–GS/9 Ecologist and 1-GS/6 Bio Tech for total of 4 person-days)	$938	$338	$300	$300
Oct-Dec	USGS WFRC Lab analyses, Data Mgt. and Reporting (100 samples @ $55/sample including Overhead)	$5,500	$2,500	$1,500	$1,500
Nov-Dec	Data Mgt. and Reporting (1-GS/9 Ecol. for 12 days, 1-GS/12 Ecol. for 3 days)	$5,496			$5,496
May-Oct	Travel (Ferry and per diem)	$1,556	$1,556		
	Vehicle (1.5 months @ $800/month)	$840	$840		
	Supplies	$1,000	$1,000		
	2015 Estimated Totals:	$24,462	$9,966	$4,500	$9,966

3.2.5 ***Stehekin River Kokanee Escapement; Expanded Lower River Estimate and CCPUD Index Sites, NPS***

The majority of kokanee spawning in the Lake Chelan watershed occurs in the lower 10 miles of the Stehekin River. An ongoing long-term annual assessment of kokanee spawner counts has been used to evaluate trends in abundance from a set of subjectively selected index reaches of tributaries to Lake Chelan and the Stehekin River (Fielder 2000; Stone and Fielder 2004). Significant kokanee production that is not being assessed using current survey methods can be attributed to spawners using the mainstem, side channels, and lower reaches of tributaries of the Stehekin River. The intent of this survey is to develop an estimate of the total escapement of kokanee spawners in the Stehekin

River, including side channels and tributaries, and to track changes in distribution of spawners in the lower 10 miles of the river (see Section 2.3.2)

Table 26: NPS Estimated Stehekin River Kokanee Escapement Budget and Schedule

Year	Task	Total $	NPS Requested $ (LC06b1)	Requested PUD Matching $ (LC06b2)	NPS Matching $
2015 May-July	Survey Stehekin River side channel habitat for expanded Kokanee count (1-GS/09 Ecologist and 3-GS/6 Bio Techs for a total of 24 person-days)	$5,904	$2,304	$1,800	$1,800
Sept-Oct	Conduct Expanded Kokanee Spawner Surveys (1-GS/9 Ecologist, 3- GS/6 Bio Techs for a total of 56 person-days)	$13,132	$5,132	$4,000	$4,000
Sept-Oct	Conduct three to four kokanee spawning surveys at CPUD index sites (1-GS/9 Ecologist and 1-GS/6 Bio Tech for a total of 8 days)	$2,965	$965	$1,000	$1,000
Nov-Dec	Data Mgt. and Reporting (1-GS/6 Biotech for 3 days, 1-GS/9 Ecol. for 12 days, 1-GS/12 Ecol. for 3 days)	$6,096			$6,096
May-Oct	Travel (Ferry and per diem)	$3,244	$3,244		
	Vehicle (1.25 months @ $800/month)	$1,160	$1,160		
	Supplies	$640	$640		
	2015 Estimated Totals:	$33,141	$13,445	$6,800	$12,896

3.2.6 *Assist CPUD with Kokanee Spawning Surveys at Stehekin River Index Sites, NPS*

Due to reduced personnel availability at CPUD, the number of kokanee spawning surveys conducted in Stehekin River index sites was reduced from as many as six surveys in 2008 to three in 2013. While three spawning surveys can provide an accurate estimate of kokanee production within the index reaches, it does not provide the precision of historical surveys. In 2015, the NPS will assist CPUD by conducting three to four kokanee spawning surveys in the Stehekin River index sites in late August to mid-October.

3.2.7 *Fall Index Stream Kokanee Spawning Surveys, CPUD*

Chelan PUD will conduct annual fall spawning surveys for kokanee and land-locked Chinook salmon in 2015, as recommended the NPS, USDA Forest Service, and WDFW in consultation with the LCFF. The LCFF requested, specifically, that Chelan PUD conduct the kokanee spawning surveys due to its unique expertise in conducting such surveys in the Stehekin River and tributaries to Lake Chelan since 1984. Survey methodology is described in the Lake Chelan Kokanee Spawning Ground Surveys, 2007 report (Keesee and Hemstrom, 2007). Chelan PUD will coordinate implementing 2015 surveys with the NPS in order to conduct the surveys and provide sound spawning ground data to the greatest extent practicable with existing staff limitations.

Estimated Budget and Schedule:
The cost of conducting kokanee-spawning surveys in 2015 is estimated to be $10,000. Three surveys will be conducted in September and October around peak kokanee spawning. Historic data can be used to estimate peak spawning date. One survey will be conducted one week prior to peak spawning, one during peak spawning, and one the week after peak spawning. While this method will not yield as precise estimates as survey results from previous years, it will provide an accurate estimate of total adult kokanee returns to the index areas that will be comparable to historic survey data. Surveys will be conducted in index reaches of Blackberry Creek and Company Creek, and from the mouth up to the first impassable barriers in Fish, Prince, Safety Harbor, First, and Twenty-five Mile creeks. One survey per season has been conducted in Mitchell, Gold, and Grade creeks as in previous years. Additional surveys may be conducted in these creeks in 2015 due to increased abundance of spawning kokanee observed in 2012.

3.2.8 ***Kokanee Creel Survey, WDFW***

WDFW will conduct annual kokanee creel surveys designed to monitor and determine the contribution of kokanee to the sport fishery. The main purpose of the survey is to: 1) determine the relative composition of kokanee as it relates to age and origin (naturally produced or hatchery released) contributing to the sport fishery; and 2) determine if kokanee continue to be a preferred species to pursue and catch. These surveys will be conducted beginning in March and will conclude sometime during the first part of June.

Table 27: WDFW Estimated Kokanee Creel Survey Budget and Schedule

Year	Task	Total $	Requested $ (LC06b1)	Requested $ LC06b2	WDFW Matching $
2015	Conduct Kokanee Creel Surveys	$17,970		$8,985	$8,985
2015	Data Management	$1,600		$800	$800
2015	Fish, Age/Origin Determination	$1,500		$750	$750
2015	Vehicle Operating Costs	$1,000	$1,000		
2015	Sampling Supplies	$200	$200		
	2015 Estimated Totals	$22,270	$1,200	$10,535	$10,535

3.2.9 ***Kokanee Stocking Monitoring and Evaluation, WDFW***

When it is determined that kokanee should be stocked back into Lake Chelan, WDFW will clip adipose fins on all kokanee reared and released into the lake as part of the fish stocking program. Fin clipped kokanee will provide important information regarding the contribution of hatchery-reared kokanee to the sport fishery (especially their survival) as identified through creel surveys versus natural production. The cost of fin-clipping hatchery produced kokanee is estimated to be $6,200 annually.

Estimated Budget and Schedule: $6,200 for fin clipping kokanee in 2015.

3.2.10 *Tributary Barrier Confirmation and Removal*

Tributaries to Lake Chelan will be monitored by site visits and photo monitoring in 2015 by the CPUD to ensure that connectivity to the lake and upstream migration access to spring spawning westslope cutthroat trout is maintained. Photographs of tributary mouths will be taken in late March when the lake elevation is near its' lowest point to document tributary mouth upstream passage conditions. On-the-ground reconnaissance may be conducted to ascertain the type and extent of the passage barrier if photo monitoring indicates the presence of a passage barrier (water depth, water velocity, gradient).

Table 28: Summary of 2015 LCFP Expenditures

Measure	**Estimated M&E Cost**	**Amount to be provided by Chelan PUD**	**Agency Cost-share**	**Task**
Comprehensive Kokanee Creel Surveys (WDFW)	$0	$0	$0	Section 3.2.1
Lake Chelan Tributaries Spawning Monitoring and Evaluation (USFS)	$8,790	$4,895	$3,895	Section 3.2.2
Lake Chelan Tributary Estimates of Juvenile Westslope Cutthroat and Rainbow Trout Abundance (WDFW)	$24,550	$14,250	$10,300	Section 3.2.3
Stehekin River Cutthroat Trout Spawning, Abundance and Genetic Surveys (NPS)	$24,462	$14,466	$9,966	Section 3.2.4
Stehekin River Kokanee Escapement; Expanded Lower River Estimate and CCPUD Index Sites (NPS)	$33,141	$20,245	$12,896	Section 3.2.5
Fall Index Stream kokanee spawning surveys (PUD)	$10,000	$10,000	$0	Section 3.2.7
Kokanee Creel Survey (WDFW)	$22,270	$11,735	$10,535	Section 3.2.8
Kokanee Stocking Monitoring and Evaluation – Fin Clipping (WDFW)	$6,200	$6,200	$0	Section 3.2.9
Total M&E Survey Costs	$132,313	$84691	$47,592	
Tributary Barriers			N/A	Section 3.2.10
Fish Stocking	$30,000	$30,000	N/A	Section 3.1
TOTAL	$162,313	$114,691	$47,592	

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