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May 27, 2010

VIA ELECTRONIC FILING

Honorable Kimberly D. Bose, Secretary, and
Nathaniel J. Davis, Sr., Deputy Secretary
FEDERAL ENERGY REGULATORY COMMISSION
888 First Street, NE
Washington, DC 20426

Re: **Lake Chelan Hydroelectric Project No. 637**
Article 404 – Lake Chelan Fishery Forum 2010 Annual Work Plan dated April 14, 2010

Dear Secretary Bose and Deputy Secretary Davis:

The Federal Energy Regulatory Commission (Commission) issued the “Order Modifying and Approving Lake Chelan Fishery Plan, Article 404” on December 4, 2007. The Plan satisfied the License Article 404 requirement of the “Order on Offer of Settlement and Issuing New License”¹ (License) and “Order on Rehearing”² for the Lake Chelan Hydroelectric Project (Project) on November 6, 2006, and April 19, 2007, respectively.

Under Ordering Paragraph (B) modifying the Plan under Article 404, Chelan PUD is required to file the following report with the Commission.

(B) The licensee shall file with the Commission by June 1, beginning 2008, their Annual Fish Stocking Report. If any recommended fish enhancement measures are proposed to be implemented in place of stocking, the licensee’s report shall be filed for Commission approval. The licensee shall allow the Lake Chelan Fisheries Forum 30 days to provide comments and/or recommendations on their report before filing the report with the Commission. The filing shall include comments and/or recommendations from the Lake Chelan Fisheries Forum and the licensee’s response to any comments. Based on review of the report, the Commission reserves the right to require changes to the project to ensure compliance with the license.

¹ 117 FERC ¶ 62,129

² 119 FERC ¶ 61,055

In accordance with the above Order requirement, Chelan PUD hereby files the Final Lake Chelan Fishery Forum 2010 Annual Work Plan of which Section 3.3 describes the fish stocking implementation measures in detail. No measures were proposed to be implemented in place of stocking.

On December 9, 2009 and February 18, 2010 the Lake Chelan Fisheries Forum (LCFF) convened meetings to discuss the fish stocking plan and management objectives for 2010. The LCFF recommended that the draft plan be finalized with suggested edits at the February 18, 2010 meeting.³ On May 6, 2010, the final work plan was distributed to the LCFF.⁴ No comments to date were received regarding Section 3.3.

Please do not hesitate to contact me or Jeff Osborn (509-661-4176) of my office regarding any questions or comments regarding this plan.

Sincerely,



Michelle Smith
Licensing and Compliance Manager
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(509) 661-4180

cc: Erich Gaedeke, FERC-PRO

Enclosure: Lake Chelan Fishery Forum 2010 Annual Work Plan, Final

³ This correspondence is available at the following Internet address:
http://www.chelanpud.org/documents/34355_LCFF_meeting_minutes_21810.pdf

⁴ This correspondence is available at the following Internet address:
http://www.chelanpud.org/departments/licensingCompliance/lc_implementation/comm/corres/34779.pdf

LAKE CHELAN FISHERY FORUM 2010 ANNUAL WORK PLAN

**LICENSE ARTICLE 404
SETTLEMENT AGREEMENT CHAPTER 6**

FINAL

April 14, 2010

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, 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 MONITORING AND EVALUATION MEASURES

The following list of potential monitoring and evaluation measures is meant to capture projects that could be done in the future and will be evaluated annually by the LCFE. Specific measures to be implemented in 2010 are described in Section 3.

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

- 1) WSCT 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 WSCT must escape harvest and recruit to the spawning run in order to substantially increase natural production.
- 3) The catchable size WSCT 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.

2.1.1 Comprehensive Creel Surveys

To ensure results from creel surveys on Lake Chelan are useful and relevant the survey methods must be comparable to those used in the past by Duke Engineering and Services (DES 2000a), 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 fish species and origin (naturally produced or hatchery released) contributing to the sport fishery; and 2) determine what species of fish anglers prefer to catch.

Annual creel surveys are designed to monitor and determine the contribution of WSCT, RBT, lake trout, kokanee, smallmouth bass and burbot to the sport fishery in the entire lake including that portion of the lake in the Lake Chelan National Recreation Area (LCNRA). It is important to determine how much annual angling opportunity is being provided by WDFW fishery management efforts in the recreation area of the National Park. Surveys should be conducted every three years beginning in 2009.

2.1.2 Spring Tributary Trout Spawning Surveys, US Forest Service

Beginning in 2009, tributary WSCT and RBT abundance surveys will be conducted once every 3 years in some of the following tributaries: 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 cutthroat trout spawning populations prior to treatment of fish passage barriers in tributary streams.

During the spawning season (April-June) Forest Service fish biologists will perform spawning ground surveys in the adfluvial zones of Prince, Fish, and Safety Harbor Creeks according to the methodology of the Lake Chelan Comprehensive Management Plan (Viola and Foster 2002). Survey frequency is expected 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.

As in 2009 (Johnson and Archibald 2009), Forest Service surveyors will conduct snorkel surveys in each stream at the end of July to search for young-of-the-year. Snorkelers will survey, at least, 150-meter adfluvial zone segments that contain representative habitat units (pools, tailouts, and riffles). Surveyors will attempt to capture several fish per stream by hook-and-line for sample-in-hand confirmation of species identifications by snorkelers.

Estimated Budget and Schedule:

Year	Task	Total \$	Requested \$	USFS Matching \$
2010 Apr-Jun	Install temperature data loggers and Conduct weekly spawning surveys at 3 tributary adfluvial zones. (GS11 Fish Bio for total of 6 crew-days)	\$1,490	\$745	\$745
July	Conduct snorkel surveys in 3 adfluvial tributary zones. (GS9 & GS11 Fish Bios for total of 3 crew-days)	\$1,555	\$777	\$778
Apr-Jul	USFS boat fuel	\$500	\$250	\$250
Apr-Jul	USFS boat driver	\$2,336	\$1,168	\$1,168
Nov-Dec	Data Mgt. and Reporting (GS11 Fish Bio. for 5 person-days)	\$1,240	\$620	\$620
	2010 Estimated Totals	\$7,001	\$3,500	\$3,501

2.1.3 Tributary Estimates of Juvenile Cutthroat and Rainbow Trout Abundance

Beginning in 2010 and continuing into 2011, and every third and fourth year thereafter, WDFW will sample First, Mitchell, Fish, Grade, Gold, Prince, and Safety Harbor Creeks to obtain information on adfluvial WSCT and RBT population abundance, age class composition and other biological characteristics. If time and manpower allow all or some of the following additional seven creeks may also be sampled in 2010: Twenty-five Mile, Pyramid, Graham Harbor, Coyote, Castle, Deep Harbor and Lone Fir creeks. If not, these creeks will be surveyed in 2011. This sequence of sampling effort will begin again in 2013 and continue into 2014.

Electrofishing techniques similar to those described in Brown (1984) and DES (2000a) will be used to sample tributary abundance of juvenile WSCT and RBT. Results from data gathered will be compared to those conducted by Brown (1984) and DES (2000a) to estimate population dynamics of WSCT since year 2000; the intent being to evaluate the effectiveness of recent management actions to increase WSCT abundance.

Estimated Budget and Schedule:

Year	Task	Total \$	Requested \$	WDFW Matching \$
Fall 2010 (every 3 years)	Conduct estimates of juvenile cutthroat and rainbow trout abundance in seven selected tributaries (2 Scientific Technicians and 1 Biologist for a total of 42 man-days)	\$12,705	\$6,353	\$6,353
	Travel (Lodging when needed and per diem)	\$1,050	\$1,050	-0-
	Boat and Vehicle (0.5 months)	\$740	\$370	\$370
	Supplies and equipment	\$1,050		\$1,050
	Data Mgt. and Reporting (1-Biologist for 5 man-days)	\$1,155	\$578	\$578
	2010 Estimated Totals:	\$16,700	\$8,351	\$8,351

2.1.4 Monitor Progress Toward Restoration of Native Westslope Cutthroat Trout in the Stehekin River.

2.1.4.1 Stehekin River cutthroat and rainbow trout spawner surveys:

Objectives: The objective is to monitor trends in abundance of cutthroat and rainbow trout spawners (May 1- June 30) at 12 tributary and side-channel index reaches in the lower 8 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 Stehekin River.

Methods: During 2009, initial habitat surveys (Anthony and Glesne 2010; in preparation) of all side-channels and tributaries of the lower 8 miles of the Stehekin River were conducted for the purpose of selecting cutthroat and rainbow trout spawner index reaches. Twelve index reaches, 10 to 20 channel widths long, were selected based on presence of suitable spawning gravels and flows. Other considerations included the

feasibility of conducting snorkel surveys during the May – June period of high flows and potential stability of candidate index sites for long-term monitoring. Four rainbow and cutthroat trout spawning surveys were conducted between May 4th and June 24th, 2009 (Anthony 2010, in preparation). Fish were observed at 5 of the 12 index reaches. Cutthroat trout were not observed during any of the surveys. A total of 11 adult rainbow trout and one unidentified fish were observed during the four surveys. Thirteen redds were observed in the 4 index reaches and two of these had rainbow trout spawners holding over them.

Spawner surveys will be repeated during 2010. Four to five snorkel and/or visual observation spawner and redd surveys will be conducted at each of the index sites during May through June. In addition, exploratory snorkel surveys will be conducted in order to locate a few suitable lower mainstem Stehekin River index sites. Suitable sites will be selected based on substrate particle size (10-70mm), the observation of spawners and/or redds, and feasibility of conducting snorkel and/or visual observation surveys during the period of higher flows occurring in the late spring.

Estimated Budget and Schedule: Lower Stehekin River Cutthroat and Rainbow Trout Spawner Surveys

Year	Task	Total \$	Requested \$	NPS Matching \$
2010 (Annual)	Conduct biweekly spawner surveys at all index sites. (1-GS/7 Ecologist and 1-GS/5 Bio Tech for total of 40 person-days)	\$6900	\$6900	-0-
	Travel (Ferry and per diem)	\$1400	\$1400	-0-
	Vehicle (1.25 months @ \$800/month)	\$1000	-0-	\$1000
	Supplies and equipment	\$700	-0-	\$700
	Data Mgt. and Reporting (1- GS11 Ecol. for 10 man-days)	\$3400	-0-	\$3400
	2010 Estimated Totals	\$13,400	\$8300	\$5100

2.1.4.2 Monitor frequency of non-native rainbow genetic introgression in native cutthroat trout in the Stehekin River:

Objectives: Monitor the level and frequency of hybridization between non-native rainbow trout and native cutthroat trout at five Stehekin River locations distributed throughout the drainage. Results will be compared with baseline data reported by Ostberg and Rodriguez (2006) to evaluate cutthroat trout status and progress towards cutthroat trout restoration in the watershed.

Methods: Non lethal tissue samples will be collected from 50 fish at each of five sampling locations. Sites were selected to represent the gradient of introgression ranging from pure cutthroat trout to a mixture of pure fish, F1 and post-F1 hybrids to mostly pure rainbow trout as previously documented in the Ostberg and Rodriguez (2006) publication. Sampling locations correspond to reach numbers designated in Ostberg and Rodriguez (2006) publication (Figure 1, page 7).

- Location 1 (upper Stehekin; SR6 and SR7- pure westslope cutthroat)
- Location 2 (Stehekin River above Bridge Creek confluence; SR3 and SR4 - primarily pure cutthroat and post-F1 hybrids)
- Location 3 (Bridge Creek between McAlester and South Fork tribs; BR5 - primarily pure cutthroat with some post-F1 hybrids)
- Location 4 (Stehekin River below Bridge Creek confluence; SR1 and SR2, and Lower Bridge Creek; BR1- primarily post-F1 hybrids with a mixture of pure rainbow, pure cutthroat, and F1 hybrids)
- Location 5 (lower Stehekin River below confluence of Agnes Creek; previously unsampled- expected to be primarily rainbow trout)

Fifty fish will be collected by electrofishing and angling at each of the five locations. Genetic analyses will determine the frequency of rainbow trout alleles and percent admixture of rainbow trout for each sample area following methods in Ostberg and Rodriguez (2006). This project is proposed to be completed at least once every 5 years. The initial sampling occurred between 2001 and 2003 and it is recommended that it is repeated in 2010. Results will be compared with those from Ostberg and Rodriguez (2006) to determine the status of rainbow trout introgression with native westslope cutthroat trout.

Estimated Budget and Schedule: Stehekin River Cutthroat and Rainbow Trout Genetic Introgression.

Year	Task	Total \$	Requested \$	NPS Matching \$
2010	Collect fish samples at all five locations. (3 –GS5/6/7 Bio Techs for total of 30 person-days and USGS-BRD Biologist)	\$5000	\$1000	\$4000
	Travel (Ferry and per diem)	\$800	\$400	\$400
	Vehicle (0.25 months @ \$800/month)	\$200	-0-	\$200
	Supplies and equipment	\$800	-0-	\$800
	USGS –BRD Lab analyses, Data Mgt. and Reporting (250 samples @ \$30/sample)	\$7500	\$7500	-0-
	2010 Estimated Totals:	\$14,300	\$8900	\$5400

Genetic Introgression in Cutthroat Trout

(Ostberg and Rodriguez 2006)

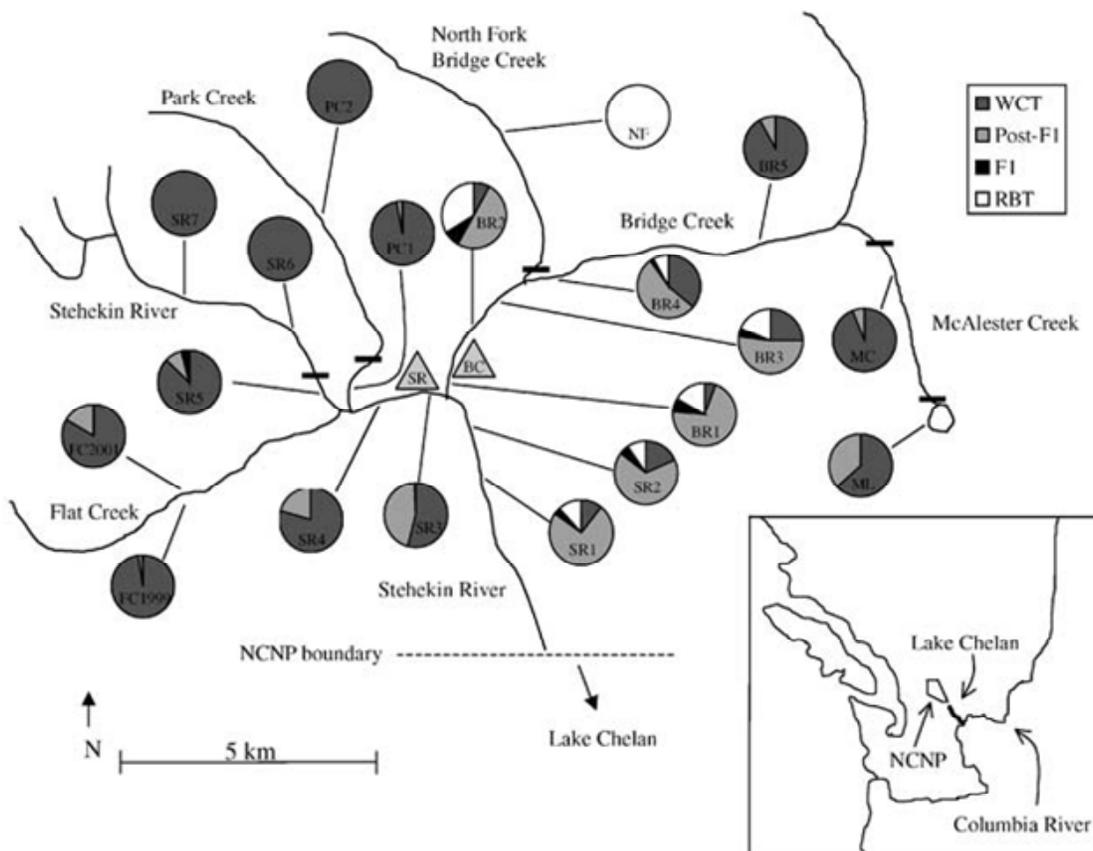


Figure 1. Genetic Introgression in cutthroat trout in the Stehekin River Basin

2.2 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 maintain this, 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.

2.2.1 Comprehensive Creel Surveys

Comprehensive creel surveys will be conducted every three years beginning in 2010. Surveys are designed to: 1) monitor the contribution of West Slope cutthroat, rainbow trout, lake trout, kokanee, smallmouth bass and burbot to the sport fishery in the entire lake including that portion of the lake in the Lake Chelan National Recreation Area; and 2) determine what species of fish anglers prefer to catch.

Of particular importance is the collection of data to evaluate cutthroat replacement of rainbows in the sport harvest. Equally important is annual sampling of kokanee population abundance and age composition. This information is needed to guide development of a Lake Chelan Kokanee Management Plan. In 2010 the kokanee survey will be part of the comprehensive creel survey.

Sampling of kokanee size by age, population composition by age and catch-per-unit-effort (CPUE) of the current population during the spring fishing season should provide an estimate of the up-coming fall spawning escapement. All of the fish that become spawners in the fall are available for harvest each spring. This information will be used to predict the upcoming fall spawner abundance and determine whether eggs should be collected from spawning kokanee, taken to Chelan Hatchery, reared to fry size and released back into Lake Chelan to supplement natural kokanee production. In addition other information collected will assist with various fish management decisions.

Creel survey methods:

To ensure results from creel surveys on Lake Chelan are useful and relevant 2010 methods will be comparable to those used by Duke Engineering and Services (DES 2000a), Hagen 1997, and Brown 1984. The two main objectives are: 1) determine the relative composition of fish species and origin (naturally produced or hatchery released) contributing to the sport fishery; and 2) determine what species of fish anglers prefer to catch. The survey will conduct periodic effort counts, together with roving on-lake angler interviews every other week beginning in April and continue until mid October. Both effort counts and angler interviews will be on a stratified random basis. Strata should include weekdays, weekends; A.M. (0700 –1400 hours) and P.M. (1400 – 2100 hours) time periods, upper-lake (uplake from Safety Harbor) and lower-lake (downlake from Safety Harbor). At least two randomly chosen weekdays and one non-random weekend day, alternating between Saturday and Sunday, will be sampled every other week. Effort surveys will count and record the date and time of the survey and the number of boats observed (independently for the upper and lower portions of the lake). Angler interviews should be designed to collect information on angler effort (hours fished), fish caught and kept (or released) by species, fish length, weight, scales samples; (otoliths from burbot) for age analysis; all fin clips or other identifying marks should be recorded. Stomach samples can be obtained by offering to clean anglers' fish. Stomachs should be preserved in a 10% solution of formalin for future analysis. A questionnaire designed to learn angler species preference and satisfaction can be handed out during interviews with a return mail addressed envelope. Anglers will be asked to answer the questions when they have time and return the questionnaire by mail.

Estimated Budget and Schedule:

Year	Task	Total \$	Requested \$	WDFW Matching \$
2010	Conduct a comprehensive Creel survey every other week April 1 – October 15 Two Scientific technicians for 3 days/week x 14 weeks = 84 man days.	\$13,608	\$6,804	\$6,804
	Fish age determination from scale and/or otoliths samples	\$500	\$250	\$250
	Boat and Vehicle fuel costs	\$3,500	\$1,750	\$1,750
	Supplies and equipment	\$300	-0-	\$300
	Data Mgt. and Reporting (1-Biologist for 3 man-days)	\$1,250	\$625	\$625
	Travel (Lodging when needed and per diem)	\$1,103	\$1,103	-0-
	2010 Estimated Totals:	\$20,261	\$10,532	\$9,729

2.2.2 Fall Index Stream Kokanee Spawning Surveys

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.

Surveys have been conducted approximately twice monthly between August 31 and October 30. 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).

The LCFE has requested that Chelan PUD continue to conduct these annual kokanee spawning grounds surveys beginning in the fall of 2007. Chelan PUD will continue to conduct these surveys to maintain sampling method continuity and comparability in the long record of estimated kokanee escapement that has been established through the past license term.

2.2.3 Mainstem Stehekin River and Side Channel Kokanee Spawning Surveys

The intent of the snorkel surveys is to develop a better estimate of the total number of kokanee being produced in the Stehekin River and to track changes in distribution of spawners in the watershed. Initial kokanee spawning snorkel surveys have been conducted in side channel habitat of the mainstem Stehekin River (Reed Glesne, pers. com.). Kokanee spawning surveys conducted during the previous license focused on index reaches of tributaries to Lake Chelan and the Stehekin River (Fielder 2000; Stone

and Fielder 2004). Significant kokanee production could be emanating from the mainstem and side channel habitat of the Stehekin River that is not being assessed using current survey methods (DES 2000b).

To assess this additional potential kokanee production, snorkel surveys will be conducted every 3 to 5 years, beginning in 2010, in side channels and mainstem reaches of the Stehekin River. A probabilistic sample of index reaches will be selected that facilitates estimation of the entire kokanee escapement in the Stehekin River.

Background and Objectives: The vast majority of kokanee spawning in the Lake Chelan watershed occurs in the lower 8 to 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. (DES 2000b, NPS files). 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 8 to 10 miles of the river. In order to accomplish this, sample reaches must be selected at random from the overall extent of spawning habitat in the river. Results can be used to calibrate annual index station escapement to total escapement and to evaluate spawner distribution in the study area.

Methods: During 2010, and every 3 to 5 years after (on approval by the LCFF), snorkel surveys and/or visual observation surveys will be completed for a representative random sample of spawner survey segments drawn from the target population of all mainstem habitat, side channels, and tributaries of the Stehekin River having suitable kokanee spawning habitat. Kokanee spawner habitat suitability for Stehekin side channels and tributaries was initially surveyed in 2000 (NPS-North Cascades National Park files) and re-surveyed during 2009 (Anthony and Glesne 2010; in preparation). From these surveys approximately 20 to 25 km of side channel and tributary habitat were deemed suitable for kokanee spawning based on flow and substrate size. A random sample of approximately 30% of all suitable habitat will be selected for spawner counts. Three to four biweekly spawner surveys will be conducted at all sites during September and October. Mainstem channel habitat suitability for kokanee spawning, reach delineation and random selection of survey reaches will be completed prior to the 2010 spawning season. Approximately 30% of the suitable mainstem habitat will be surveyed at three dates surrounding the expected peak spawning period (mid September to early October). The total number of kokanee spawning in the selected sample reaches throughout the course of the spawning season will be estimated using area-under-the-curve (AUC) techniques (Beidler and Nickelson 1980). The sample estimate will be extrapolated to represent all suitable spawning habitat within the target population.

Additionally, park staff will assist in the evaluation of the contribution of hatchery kokanee to the run size by looking for adipose clipped hatchery fish during the spawner surveys.

Estimated Budget and Schedule: Estimate Stehekin River Kokanee Escapement

Year	Task	Total \$	Requested \$	NPS Matching \$
2010 (Every 3-5 yrs.)	Conduct Kokanee Spawner Surveys (2 – GS7 Bio Techs for total of 30 man-days)	\$6300	\$6300	-0-
	Travel (Ferry and per diem)	\$2000	\$2000	-0-
	Vehicle (1.5 months @ \$800/month)	\$1200	-0-	\$1200
	Supplies and equipment	\$800	-0-	\$800
	Data Mgt. and Reporting (1- GS11 Ecol. for 10 man-days, 1- GS11 GIS Specialist for 5 -days, 1-GS5/6/7 Bio Tech for 5 man-days)	\$6000	-0-	\$6000
2009 Estimated Totals:		\$16,300	\$8300	\$8000

2.3 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.

2.4 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.

2.5 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, and location of fish within Lake Chelan during these occurrences should be documented and provided to the LCFF for review.

2.6 Bioenergetics Food Web Model

The LCFF intends that development of the bioenergetics food web model will continue into the future after Chelan PUD funding (\$115,000) was exhausted in 2009. Information collected during implementation of the Monitoring and Evaluation program will be used to update the model. Additionally, the LCFF may choose to fund aspects of food web model development in future years using funds dedicated to implementing the Monitoring and Evaluation program.

SECTION 3: MEASURES TO BE IMPLEMENTED IN 2010

The following are Monitoring and Evaluation Program measures that will be implemented in 2010.

3.1 Bioenergetics Food Web Model Development

In 2009 funding for model development was exhausted with the expenditure of the remaining balance of \$20,000. The UW research team's final Lake Chelan Bioenergetics Food Web Report is due to be submitted to the Chelan PUD and LCFF in early 2010. The final report will be posted on the Lake Chelan Implementation Web site.

3.2 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 Regional Stream Restoration Assistance Team (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 effect 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 WSCT 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 2009 included the following:

1. A photographic reconnaissance of the main tributaries in February 2009. The new lake level operating regime for the Lake Chelan Project has been in effect since September 2007. The intent of the new regime was to draft the lake lower in the fall in order to allow winter freshets to carve out sediment at the mouths of tributaries to prevent formation of barriers (depth, velocity, gradient) to upstream adult fish passage, primarily Westslope cutthroat trout, in the spring for spawning. Changes in tributary mouths were noted, particularly at Fish, Prince, and Safety Harbor Creeks. Obvious barriers to upstream passage were documented in March 2008. These barriers appear to have been removed in Fish, Prince and Safety

Harbor Creeks by freshets that occurred during the winter of 2008-2009. Other tributaries appear also to be “healing themselves,” with better fish passage conditions documented in the February 2009 photographs. A storm event occurred the first week in January 2009 that raised the discharge from the Stehekin River significantly. It is expected that the tributaries to the lake followed a similar pattern. This event, and preceding ones during winter 2008-2009, may be responsible for the changes noted in the 2009 photographs. These data are preliminary, but give an indication that the new lake level operating regime may be providing the desired benefits of preventing tributary mouth barrier formation and removing existing barriers to upstream adult fish passage.

2. As planned, a site visit was conducted on April 2, 2009 when the lake surface elevation was approximately 1,086 feet relative to mean sea level, near the annual low operating level and when the stream discharge was low. Attending were members of the Fisheries Forum with consultant team members Chris Fairbanks, fisheries biologist, Craig Cooper, fluvial geomorphologist, and Pat Powers, fisheries engineer. The objectives of the site visit were to make a qualitative determination of the extent and nature of upstream fish passage barriers at each of the four creeks and to explore alternatives for enhancing or creating upstream fish passage. The four tributaries included: Mitchell, Gold, Grade, and Safety Harbor Creeks. Excerpts from field notes (complete field notes and photos can be viewed at www.chelanpud.org/lc-Resource-Documents-LCFF):

Mitchell Creek - The field team consensus was that upstream fish passage was impeded primarily by shallow water depth. A solution to improve upstream passage was to confine the stream flow to a narrower channel that would provide depth with some step-pools to allow resting stations. Large angular rocks would be the most appropriate materials that would be most resistant to movement by high stream flows or by campground guests. Large woody material would not be an appropriate material.

Gold Creek - The Gold Creek channel has been very stable since the 2000 field season. The creek has remained confined to a channel that extends from the full pool level through the alluvial fan to the lake surface. Large rocks along the right bank (looking downstream) keep the stream channel confined. The overall grade of the stream channel in the alluvial fan was 10% with a short cascade of 16.7%. The group consensus was that fish passage was impeded by grade and water velocity that could be improved with rock weirs. Rock weirs would create step pools which would reduce the overall grade and water velocity. The step pools would also provide resting stations for upstream migrating fish. Additional parameters that were discussed to reach consensus include: tributaries should be passable above lake elevation of 1,086 feet to ensure upstream passage for spring spawners; design criteria should target 8-10 inch cutthroat and rainbow trout.

Grade Creek - A challenging site. The overall grade of the stream channel in the alluvial fan was 19% with few step pools for resting stations for upstream

migrating fish. The channel appears to be fairly similar to the 2000 field season (and 2008 photos). The team consensus was that fish passage was impeded by the steep slope and by high water velocity with few resting stations for upstream migrating fish. Several ideas to lengthen the stream channel were discussed. However, physical constraints of the site's geology and stream energy make alterations of the stream channel unfeasible. Placement of prefabricated fishways was considered as a method to provide upstream passage. The fishways would be costly to construct and would need frequent monitoring and servicing to ensure that rock and woody material is not blocking fish passage. At a subsequent LCFE meeting, USFS Fish Biologist Phil Archibald recommended that enhanced upstream passage in Grade Creek be assigned a very low priority for the previously noted reasons in addition to limited adfluvial habitat that could be made accessible (220 m) and the presence of only rainbow trout (no cutthroat) in the creek.

Safety Harbor Creek - The stream channel of Safety Harbor Creek has been greatly down cut compared to the 1999 and 2000 field seasons and 2008 photos. The grade, water velocity, and water depth appear to be appropriate for upstream fish passage. The group consensus was that fish passage was unimpeded except for temporary obstacles presented by floating woody material that has accumulated near the full pool level. Group members removed several key pieces to allow natural processes to keep a section of the channel clear of debris and with adequate water. By the end of July 2009, most of the wood had been flushed from the mouth of the creek.

3. Initial designs for barrier removal were submitted to CPUD by the consultant team on 6/26/2009 and reviewed and discussed by the LCFE on 7/14/2009. The LCFE reached consensus on proceeding with modified designs for Mitchell and Gold Creeks. Final designs were submitted to CPUD on 8/20/2009 and agreed to by the LCFE.
4. Chelan PUD initiated acquisition of all required permits and contract bid package to conduct barrier removal and stream mouth restoration projects in Mitchell and Gold Creeks in 2011.

3.3 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 (WSCT) and triploid rainbow trout (RBT)).

In 2009, WDFW released approximately 50,000 WSCT (at a size of 15 fish/pound) at Lakeside and Mill Bay in March, and approximately 70,000 triploid RBT (at a size of 3 fish/pound) at Lakeside in August and September (Art Viola, WDFW, pers. com.). Approximately 227,000 kokanee fingerlings, taken from broodstock collected in fall 2006 from the Stehekin River, were released into Lake Chelan near the Yacht Club in May (at a size of 75 fish/lb.). Additionally, approximately 175,000 WSCT fry were released into Twenty-five Mile, Mitchell, Prince, Safety Harbor, Fish, Grade, and First creeks (at a size of 600 fish/lb.) in June and July.

The stocking plan from WDFW for 2010 is shown in the following table (Art Viola, WDFW, pers. com.).

2010 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	50,000	15	March
		ad clipped	(80%)		
	Kokanee	Lake Chelan	80,000	80	Mid May
	Triploid Rainbows	Spokane	50,000	3	August-September
Mill Creek					
	Cutthroat	Twin LK	3,000	Fry	June or July
	Triploid Chinook ¹	summer	50,000	Fry	March

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

3.4 Monitoring and Evaluation Program

3.4.1 Fall Index Stream Kokanee Spawning Surveys

Chelan PUD will conduct annual fall spawning surveys for kokanee and land-locked Chinook salmon in 2010, 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). The cost of conducting kokanee spawning surveys in 2010 is estimated to be \$12,000.

3.4.2 Spring Tributary Trout Spawning Surveys, US Forest Service

Beginning in 2009, and continuing in 2010, tributary WSCT and RBT abundance surveys will be conducted once every 3 years in some of the following tributaries: 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 cutthroat trout spawning populations prior to treatment of fish passage barriers in tributary streams. (See Section 2.1.2).

3.4.3 Mainstem Stehekin River and Side Channel Kokanee Spawning Surveys

The vast majority of kokanee spawning in the Lake Chelan watershed occurs in the lower 8 to 10 miles of the Stehekin River. An ongoing long term annual assessment of kokanee spawner counts (3.4.1 above) has been used to evaluate trends in abundance from a set of non-randomly 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 8 to 10 miles of the river (see Section 2.2.3).

3.4.4 Lower Stehekin River Cutthroat Trout and Rainbow Trout Spawning Surveys

Continue to monitor trends in abundance of cutthroat and rainbow trout spawners (May through June, 2010) at 12 index sites in the lower 8 to 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 2.1.4.1).

3.4.5 Tributary Estimates of Juvenile Cutthroat and Rainbow Trout Abundance

Beginning in 2010 and continuing into 2011, and every third and fourth year thereafter, WDFW will sample First, Mitchell, Fish, Grade, Gold, Prince, and Safety Harbor creeks to obtain information on adfluvial WSCT and RBT population abundance, age class composition and other biological characteristics. If time and man power allow all or some of the following additional seven creeks may also be sampled in 2010: Twenty-five Mile, Pyramid, Graham Harbor, Coyote, Castle, Deep Harbor and Lone Fir creeks. If not, these creeks will be surveyed in 2011. This sequence of sampling effort will begin again in 2013 and continue into 2014 (see Section 2.1.3).

Electrofishing techniques similar to those described in Brown (1984) and DES (2000a) will be used to sample tributary abundance of juvenile WSCT and RBT. Results from data gathered will be compared to those conducted by Brown (1984) and DES (2000a) to estimate population dynamics of WSCT since year 2000; the intent being to evaluate the effectiveness of recent management actions to increase WSCT abundance.

3.4.6 Comprehensive Creel Surveys

Comprehensive creel surveys will be conducted every three years beginning in 2010. Surveys are designed to: 1) monitor the contribution of West Slope cutthroat, rainbow trout, lake trout, kokanee, smallmouth bass and burbot to the sport fishery in the entire lake including that portion of the lake in the Lake Chelan National Recreation Area; and 2) determine what species of fish anglers prefer to catch.

Of particular importance is the collection of data to evaluate cutthroat replacement of rainbows in the sport harvest. Equally important is annual sampling of kokanee population abundance and age composition. This information is needed to guide development of a Lake Chelan Kokanee Management Plan.

WDFW will sample the current kokanee population abundance, age composition and fin-clipped fish by conducting a creel survey annually sometime between May 1 and June 31. Data analysis from the survey will allow an estimate of CPUE, mean size, and age composition of harvested fish. This information can be used to predict the up-coming fall spawner abundance (see Section 2.2.1). In 2010 the kokanee survey will be part of the comprehensive creel survey.

3.4.7 Fish Stocking Monitoring and Evaluation

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 \$5,000 annually.

3.4.8 Monitor Frequency of Non-Native Rainbow Trout Genetic Introgression in Native Cutthroat Trout in the Stehekin River

Monitor the level and frequency of hybridization between non-native rainbow trout and native cutthroat trout at five Stehekin River locations distributed throughout the drainage. Results will be compared with baseline data reported by Ostberg and Rodriguez (2006) to evaluate cutthroat trout status and progress towards cutthroat trout restoration in the watershed. (see Section 2.1.4.2).

Summary of 2010 LCFP Expenditures

Measure	Estimated M&E Cost	Amount to be provided by Chelan PUD	Agency Cost-share	Task
Fall Index Stream Kokanee Spawning Surveys (PUD)	\$12,000	\$12,000		Section 3.4.1
Spring Tributary Trout Spawning Surveys (USFS)	\$7,001	\$3,500	USFS \$3,501	Section 3.4.2
Mainstem Stehekin River and Side Channel Kokanee Spawning Surveys (NPS)	\$16,300	\$8,300	NPS \$8,000	Section 3.4.3
Stehekin River Cutthroat and Rainbow Trout Spawning Surveys (NPS)	\$13,400	\$8,300	NPS \$5,100	Section 3.4.4
Tributary Juvenile Trout Abundance Surveys (WDFW)	\$16,690	\$9,760	WDFW \$6,930	Section 3.4.5
Comprehensive Creel Survey (WDFW)	\$20,250	\$10,830	WDFW \$9,420	Section 3.4.6
Fish Stocking M&E (fin clipping) (WDFW)	\$5,000	\$5,000		Section 3.4.7
Monitor Genetic Introgression in Stehekin Cutthroat (NPS)	\$14,300	\$8,900	NPS \$5,400	Section 3.4.8
Total Survey Costs	\$104,941	\$66,590	\$38,351	
Tributary Barriers			N/A	Section 3. 2
Fish Stocking	\$30,000	\$30,000	N/A	Section 3. 3
TOTAL	\$ 134, 941	\$ 96,590	\$38,351	

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