

Lookingglass Creek Salmonid Evaluation Studies

Lower Snake River Compensation Plan

Statement of Work for October 1, 2013 through September 30, 2014

Prepared by

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Overview and Background

CTUIR Management Objectives are to:

- 1) reestablish a naturally-reproducing, self-sustaining population of spring Chinook salmon in Lookingglass Creek of an average annual run size of 500 adults (ages 4 and 5) using Catherine Creek captive broodstock as the donor stock,
- 2) provide for a minimum annual tribal harvest of 100 returning adults,
- 3) retain production and life history characteristics similar to the natural Catherine Creek stock,

The preceding goals and objectives are consistent with the overall mission statement of the CTUIR Department of Natural Resources:

“To protect, restore, and enhance the First Foods; water, salmon, deer, cous, and huckleberry - for the perpetual cultural, economic, and sovereign benefit of the CTUIR. We will accomplish this utilizing traditional ecological and cultural knowledge and science to inform: 1) population and habitat management goals and actions; and 2) natural resource policies and regulatory mechanisms.”

Tribal goals fit within the framework of goals established for spring Chinook salmon and summer steelhead within the Lower Snake River Compensation Plan for spring Chinook salmon. These are to 1) establish adequate broodstock to meet annual production needs, 2) restore and maintain natural spawning populations, 3) reestablish historic tribal and recreational fisheries, 4) establish annual returns of 5,820 (spring Chinook salmon) and 9,184 (summer steelhead) adults, 5) maintain endemic wild populations of spring Chinook salmon in the Minam and Wenaha rivers, and 6) minimize impacts of hatchery programs on resident stocks of game fish. Annual reports describing the historical efforts at reestablishing natural production of spring Chinook salmon in Lookingglass Creek are available at <http://www.fws.gov/lsnakecomplan/Reports/CTUIRreports.html>

Declining numbers of spring Chinook salmon were seen throughout the Snake River and Grande Ronde basins in the 60's and 70's in part as a result of construction of hydroelectric facilities, overfishing, and loss of critical habitat. The native Lookingglass Creek stock of spring Chinook salmon was extirpated within a few years after establishment of Lookingglass Hatchery (LH) in 1982. Prior to LH being built, Lookingglass Creek had the second highest number of redds in the Grande Ronde River Basin. The start-up of LH represented the beginning of large-scale hatchery intervention in the Grande Ronde River Basin, with the exceptions of the Wenaha and Minam rivers that remain wild fish only. CTUIR, along with comanagers, began efforts in the early 1990s to reestablish natural production of spring Chinook salmon in Lookingglass Creek. Several stocks, including remnants of the endemic stock, Imnaha River, Wind River (Washington), Carson Hatchery (Washington), and Rapid River (Idaho) were used before comanagers selected Rapid River. The Rapid River stock was replaced with Catherine Creek stock (native to the Grande Ronde River Basin) beginning in 2001. Lookingglass Creek is within the "usual and accustomed" areas of gathering for the Confederated Tribes of the Umatilla Indians (CTUIR). The present management goal is to reintroduce spring Chinook salmon into Lookingglass Creek using Catherine Creek captive brood stock to support natural population restoration, tributary harvest, and maintain genetic diversity of a gene bank for the Catherine Creek stock.

Lookingglass Creek provides a unique study opportunity to observe and evaluate natural production from an endemic stock vs two different supplementation treatments. The reference condition (endemic stock) and two treatments in this unplanned experiment occur in the same stream over different time periods. The study takes place in a stream within a relatively healthy watershed with much less effect from human activities (e.g. grazing, water withdrawals, mining, and logging) that are common to other streams in the Basin. The Lookingglass Hatchery weir affords near complete control over fish that move upstream to spawn. In addition to this project on Lookingglass Creek, other supplementation projects in the Grande Ronde River Basin using local stocks include the Upper Grande Ronde River, the Lostine River, and Catherine Creek.

Burck (1993) studied the endemic stock (control) from late 1963 through late 1974 (Study Era 1). Metrics from juvenile and adult life history and production were reported. Rapid River stock (supplementation treatment 1) were used in a reintroduction effort from 1992-2000 (Study Era 2). The Rapid River stock was used in several streams in the Basin. Metrics

similar to Burck (1993) were contained in annual reports that can be accessed at <http://www.fws.gov/lsnakecomplan/Reports/CTUIRreports.html>. Catherine Creek captive broodstock progeny (supplementation treatment 2) have been used since 2001 (Study Era 3).

This study will describe productivity and life history characteristics of Catherine Creek captive brood stock. The previous Rapid River stock was replaced with Catherine Creek stock because Catherine Creek stock is a local within-basin brood source with similar life history characteristics to the extirpated endemic stock, with sufficient number of fish available. Catherine Creek captive broodstock were collected as parr, hatchery-reared until maturity, and spawned. Those progeny were hatchery-reared, marked, and released in Lookingglass Creek as presmolts beginning in September 2001. Subsequent releases have usually been in the spring as smolts. Captive broodstock adults returning to Catherine Creek were released above the Lookingglass Hatchery weir to spawn naturally beginning in 2004. The first natural-origin returns of production above the Lookingglass Hatchery weir occurred as age 3 in 2007, age 4 in 2008, and age 5 in 2009.

Study Area

The Lookingglass Creek watershed is in the Blue Mountains of northeast Oregon with the headwaters at an elevation of 1,484 m above sea level (Figure 1). Flow is to the southeast for 25 river km (rkm) through the Umatilla National Forest and through private land before entering the Grande Ronde River at rkm 137, at an elevation of 718 m above sea level. Lookingglass Creek has one major (Little Lookingglass Creek) and four minor (Lost Creek, Summer Creek, Eagle Creek, and Jarboe Creek) tributaries. Nearly all spring Chinook salmon spawning occurs in Lookingglass Creek and Little Lookingglass Creek. Lookingglass Hatchery is located at approximately rkm 4.0 on Lookingglass Creek. Access to private lands to conduct work is obtained by verbal agreement, or in the case of Hancock Properties LLC lands, an annual written agreement and fee.



Figure 1. Map of Lookingglass Creek watershed.

Monitoring and Evaluation Objectives and Tasks

The purpose of monitoring and evaluation objectives is to determine success in meeting the previously described management goals. The CTUIR shall furnish all supervision, labor, services, materials, tools, and equipment necessary to conduct an evaluation of LSRCP programs in their ceded and usual and accustomed areas to fulfill the objectives outlined below:

Objective 1. Describe life history of juvenile spring Chinook salmon in Lookingglass Creek in order to evaluate supplementation success.

Approach: Outmigrating brood year 2012 natural-origin (unmarked) juvenile spring Chinook salmon above the Lookingglass Hatchery weir will be progeny of either F₁

(marked) or F₂ (unmarked) Catherine Creek captive broodstock. We will sample outmigrating natural-origin juvenile spring Chinook salmon in order to describe life history and production characteristics by snorkel/seining and operating a rotary screw trap about 0.2 km below the adult weir and trap near the Lookingglass Hatchery (LH) water intake at rkm 4.1.

Snorkel/seine sampling

We will snorkel/seine to collect 50 parr from 5 standard sites to describe seasonal growth and condition. Parr will be collected on the 20th (+/- 5 d) of June, July, August and September, anesthetized, measured (FL mm), and weighed (0.1 g). Scale samples and genetics samples will be taken from any precocial parr collected.

From 500-1,000 BY 2012 parr will be snorkel/seined from the major nursery area several km above the LH weir, anesthetized, PIT-tagged and released where captured during the first week in August 2013. Standard data (FL, mm, weight 0.1 g) will also be collected from these fish. Precocials will be measured and weighed and scale samples taken but not PIT-tagged.

Rotary screw trap sampling

Outmigrant production will be estimated for the adults liberated to spawn above the Lookingglass Hatchery weir in 2012. Outmigrants collected in the rotary screw trap will be enumerated, measured (FL, mm) and weighed (0.1 g). Unmarked fish from 40-60 mm FL will receive partial fin clips (lower caudal) and unmarked fish ≥ 61 mm will receive PIT tags (TX1411SST). Marked fish will be released above the screw trap to estimate trap efficiency, total outmigrants, and outmigration timing. PIT tags used for outmigrants collected in the screw trap will be provided by the CSS project (Jack Tuomikoski, personal communication). Outmigrant abundance will be estimated for each month of the migration year using DARR 2.0 for R (Bjorkstedt 2005). Observations at sites in the Columbia/Snake River hydrosystem will be used to estimate survival probabilities and arrival timing to Lower Granite Dam for the three seasonal groups (fall, winter, and spring) delineated by McLean and Lofy (2000).

Analysis

Estimates of survival and migration timing for parr PIT-tagged in early August 2012 and outmigrants PIT-tagged and released at the screw trap during July 2012-June 2013 will be made using PitPro (Westhagen and Skalski 2009) or SURPH (Lady et al. 2013) and the PTAGIS database maintained by the Pacific States Marine Fisheries Commission. Estimates of smolt equivalents will be obtained for the fall, winter, and spring groups of migration year 2012 by adjusting the seasonal outmigrant estimates by the survival probability to Lower Granite Dam for that period. Smolt equivalents will be used to estimate the smolt-to-adult ratio for brood year 2012 (migration year 2014). Precocials collected in the screw trap will be measured, weighed, scale samples collected and opercle-punched to distinguish recaptures and provide genetics tissues. Precocials will not be used in population estimates of outmigrants or

Estimates of outmigrant abundance, outmigration timing, growth, and condition will be compared to the extirpated endemic stock as well as the previous hatchery reintroduction effort (Rapid River). Estimates of outmigrant abundance, outmigration timing, growth, condition, and survival and arrival timing to Lower Granite Dam will be compared to other Grande Ronde Basin stocks and any hatchery releases into Lookingglass Creek in 2013.

Genetics tissues (lower caudal fin clips) from approximately 3 times the number of redds in brood year 2012 will be collected from migration year 2014 (outmigrating from July 2013-June 2014) juveniles. Samples will be collected proportionately throughout the migration period, placed on Whatman filter paper sheets and dried. Samples will be sent with necessary data to the Columbia River Intertribal Fish Commission genetics laboratory at Hagerman, Idaho, for a study of relative reproductive success (BPA Project 2009-009-00).

We will synthesize juvenile life history and production data from Lookingglass Creek spring Chinook salmon with data from other streams in the Grande Ronde and Columbia River basins. We will compare juvenile metrics to place performance of the current reintroduced stock in historical, local, and regional contexts, including the 3 stock comparison (extirpated endemic, Rapid River reintroduction, current reintroduction).

Task 1.1. Check the rotary screw trap every 2-3 days or more frequently if needed and enumerate, examine for marks, and interrogate for PIT tags all juveniles collected.

Completed

Task 1.2. Mark (PIT-tag and/or fin clip) and release 25-50 fish per week for estimating trapping efficiency. **Completed**

Task 1.3. Collect FL and weight data from a representative sample of at least 25 outmigrants per week. **Completed**

Task 1.4. Collect and preserve genetics samples equivalent to approximately 3 times the number of redds in 2013, distributed proportionately between the three seasons of the migration year (fall, winter, spring). **Completed**

Task 1.5. PIT-tag and release at least 600 Chinook collected in the screw trap for each season of the migration year (spring and fall). **Partial Completion, we did not catch as many fish in the screw trap this year to allow us to tag 600 each season.**

Task 1.6. PIT-tag and release approximately 500-1,000 spring Chinook salmon parr captured by snorkel seining from several locations in the primary nursery area above the Lookingglass Hatchery weir. **Completed, we captured and tagged 1,058.**

Task 1.7. Tabulate numbers of parr (non-precocial and precocial) at the various sites during completion of Task 1.5. **Completed**

Task 1.8. Collect and sample (FL (mm) and weight (0.1 g)) 50 parr per month at established sites above and below the hatchery weir. **Completed**

Task 1.9. Describe migration timing out of Lookingglass Creek and migration timing and survival to Lower Granite for fish PIT-tagged after capture at the screw trap (Tasks 1.5 and 1.6). **Completed.**

Task 1.10. Validate and upload all PIT tag data to the PTAGIS database. **Completed**

Task 1.11. Collect life history data on precocial, natural-origin fish caught during summer parr PIT-tagging and screw trap operations (FL (mm), weight (0.1 g), genetics tissues, scales). **Completed**

Task 1.12. Mount, press and read any scales collected from juvenile spring Chinook salmon. **Partial Completion, will be done by December 31, 2014**

Task 1.13. Collect water temperature data using recording thermometers in Little Lookingglass Creek and at the screw trap. **Completed**

Task 1.14. Perform quality control on all data collected and enter into databases developed to make data web-accessible. **Partial Completion, not all data is posted to website**

Task 1.15. Compare life history metrics (outmigrant abundance, outmigration timing,

size, condition factor, and survival and arrival timing to Lower Granite Dam) within the three stock scenario of Lookingglass Creek (extirpated endemic, Rapid River reintroduction, and current reintroduction (Catherine Creek captive brood) stocks), current hatchery-origin releases into Lookingglass Creek, and natural-progeny of other Grande Ronde Basin stocks. **Will be in 2014 Annual Report.**

Task 1.16. Compare productivity metrics (smolts/redd, smolt-to-adult ratios) within the three stock scenario of Lookingglass Creek (extirpated endemic, Rapid River reintroduction, and current reintroduction (Catherine Creek captive brood) stocks), current hatchery-origin releases into Lookingglass Creek, and natural-progeny of other Grande Ronde Basin stocks. **Will be in 2014 Annual Report.**

Objective 2. Describe life history and production of adult spring Chinook salmon in Lookingglass Creek in order to evaluate supplementation success.

Approach: Catherine Creek spring Chinook salmon (captive broodstock) was selected by comanagers as the donor stock to reintroduce the species into Lookingglass Creek. The initial liberation of Catherine Creek captive broodstock occurred as ad-clipped presmolts released into Lookingglass Creek in September 2001. Since that time, additional liberations of ad-clipped donor stock juveniles have occurred as they were available. Releases of returning donor stock adults above the Lookingglass Hatchery weir to spawn naturally have occurred beginning in 2004. Additionally, some returning adults have been spawned at Lookingglass Hatchery and their progeny liberated into Lookingglass Creek as ad-clipped juveniles.

Adults returning in 2014 will include ad-clipped hatchery-origin and unmarked progeny of ad-clipped adults that returned to Lookingglass Creek and spawned naturally. Ad-clipped returns used as hatchery broodstock means that two successive generations of captive broodstock will be cycled through the hatchery, a practice not allowed for the other three streams in the Grande Ronde basin (Lostine River, Catherine Creek, and the upper Grande Ronde River) due to the high potential for negative consequences. As time progresses, there will be substantial numbers of unmarked and marked returns, and the program will become more clearly a supplementation program.

Adult returns below the Lookingglass Hatchery weir will probably be dominated by the donor stock or their progeny, but will also include some strays (hatchery- and natural-

origin) from other streams.

CTUIR will obtain adult life history data and tissues from returning adults collected at the Lookingglass Hatchery weir and trap, barrier weir, and on spawning ground surveys (or Catherine Creek returns, if they are to be used for spawning or release above the Lookingglass Hatchery weir). ODFW Lookingglass Hatchery staff installs and operates the Lookingglass Hatchery weir and trap and collect data and tissues from returning adult spring Chinook salmon. CTUIR and ODFW staff will collect data and tissues from fish destined for release above the Lookingglass Hatchery weir before release. Data and tissues will include FL (mm), sex, marks/tags, scales (for age determination), and opercle punches (for estimating the population spawning above the hatchery weir and relative reproductive success study). We will obtain information on adults from the coded wire tag and PIT tag databases maintained by the Pacific States Marine Fisheries Commission and other sources. If harvest is permitted, data for tribal fishers will be collected by CTUIR and NPT harvest biologists and for sport fishers by ODFW.

Some returning adults collected in the adult trap at Lookingglass Creek will be released above the Lookingglass Hatchery weir to spawn naturally in 2014. Some returning adults captured at the Catherine Creek adult trap may also be released into Lookingglass Creek. The precise number of fish and their origin depends on the number of adults returning to Lookingglass Creek and Catherine Creek and application of the sliding scale used for broodstock management. Some fish may be kept and held at Lookingglass Hatchery for use as conventional broodstock and their progeny later released in Lookingglass Creek. Until an effective water treatment facility is in operation for all life stages of spring Chinook salmon reared at Lookingglass Hatchery, CTUIR will recover carcasses by frequent wading surveys. A barrier weir will also be constructed and maintained by ODFW staff about 0.6 km above the hatchery weir in order to keep carcasses from accumulating near the hatchery water intake.

We will synthesize adult life history and production data from Lookingglass Creek spring Chinook salmon with data from other streams in the Grande Ronde and Columbia River basins. We will compare adult metrics to 1) determine whether we have been successful in meeting management goals, and 2) place performance of the current reintroduced stock in historical, local, and regional contexts, including the 3 stock comparisons (extirpated endemic, Rapid River reintroduction, current reintroduction).

Task 2.1. Coordinate sampling of data and tissues (FL, sex, marks/tags, scales, genetics samples) with Lookingglass Hatchery staff for all spring Chinook salmon collected at the adult trap that are released above the Lookingglass Hatchery weir to spawn naturally in 2014. **Completed**

Task 2.2. Conduct spawning ground surveys throughout the stream once a week during the spawning season, enumerating redds and logging locations with GPS and collecting carcass data and tissues. **Completed**

Task 2.3. Mount, press and age scales collected from natural-returns. **Partial Completion, to be complete by December 31,2014**

Task 2.4. Link carcass data and snouts and provide data and snouts to ODFW for transfer to the ODFW CWT lab in Clackamas. **Not Complete, they are ready to send as soon as Clackamas is ready for them.**

Task 2.5. Obtain CWT ages from the RMIS database. **Not complete, snouts have not been sent due to an overload of carcasses this year. They are ready to send as soon as Clackamas is ready for them.**

Task 2.6. Estimate total redds, redd distribution, fish/redd, sex ratio, age composition, run timing, spawn timing, total escapement, and length frequency of adults, and progeny-per-parent ratios for natural-origin spawners above the Lookingglass Hatchery weir. **Completed**

Task 2.7. Enumerate redds and describe carcass characteristics for spawners below the Lookingglass Hatchery weir. **Completed**

Task 2.8. Describe hatchery-origin strays recovered on spawning ground surveys above and below the Lookingglass Hatchery weir. **Not Complete until we are able to get snouts back from Clackamas.**

Task 2.9. Perform quality control on all data collected and enter into databases developed to make data web-accessible. **Partially completed, some data has not been posted to the CTUIR website.**

Task 2.10. Compare adult life history metrics (run and spawn timing, redd distribution, sex ratio, age composition, length-at-age, prespawning mortality) within the three stock scenario of Lookingglass Creek (extirpated endemic, Rapid River reintroduction, and current reintroduction (Catherine Creek captive brood) stocks), current hatchery-origin releases into Lookingglass Creek, and natural-progeny of other Grande Ronde Basin stocks. **In annual report.**

Task 2.11. Compare adult productivity (progeny-per-parent) within the three stock

scenario of Lookingglass Creek (extirpated endemic, Rapid River reintroduction, and current reintroduction (Catherine Creek captive brood) stocks), current hatchery-origin releases into Lookingglass Creek, and natural-progeny of other Grande Ronde Basin stocks. *In annual report.*

Objective 3. Determine what effects result from using Catherine Creek stock F₁ generation captive broodstock returns as broodstock in Lookingglass Creek.

Task 3.1. Compare life history, survival and production metrics of Catherine Creek stock F₁ generation conventional broodstock (derived from conventional and natural crosses) versus Catherine Creek stock F₁ generation captive broodstock used for Lookingglass Creek conventional broodstock. *In annual report.*

Task 3.2. Compare life history, survival and production metrics of Catherine Creek stock F₁ generation captive broodstock returns utilized to spawn in nature (Catherine Creek program or adult outplants to Lookingglass Creek) versus F₂ generation which are used to spawn in nature (Lookingglass program utilizes F₁ captive broodstock returns as broodstock then F₂ returns spawn in the wild). *In annual report.*

Objective 4. Assist comanagers and cooperators in completing LSRCP-related project tasks as time and budget allow.

Approach: Various tasks of this and related projects are completed more efficiently and effectively by working collaboratively with comanagers and cooperators. As time and budget allow, CTUIR will continue to provide staff and equipment assistance to comanagers and cooperators.

Task 4.1. Assist ODFW in completing spring Chinook salmon spawning ground surveys in the Grande Ronde Basin. *Completed*

Task 4.2. Assist ODFW in collecting data and tissues during spawning of spring Chinook salmon broodstock at Lookingglass Hatchery. *Completed*

Task 4.3. Assist ODFW in pretransfer sampling of juvenile spring Chinook salmon reared at Lookingglass Hatchery. *Completed*

Task 4.4. Assist ODFW in other LSRCP-related activities when CTUIR staff and equipment are available. *Completed*

Objective 5. Synthesize and disseminate project information.

Approach: Project information will be disseminated through annual reports, peer-reviewed publications and presentations, website(s), and informal consultations and correspondence. Authorizations for take of ESA-listed fish will be obtained (bull trout through comprehensive CTUIR permit from USFWS and spring Chinook salmon and summer steelhead through Lookingglass Creek HGMP process) and data reported.

Task 5.1. Submit Performance Report for the 2013-2014 contract with objectives, tasks, and completion status by 31 December 2014. ***This report submitted.***

Task 5.2. Submit final copy of the 2011 annual report to LSRCP and comanagers for review by 31 December 2013. ***Under internal CTUIR review.***

Task 5.3. Analyze data and synthesize in annual report for the 2011-2012 contract using standard scientific format. ***Under internal CTUIR review.***

Task 5.4. Submit a draft annual report for the 2011-2012 contract to reviewers by 31 August 2013. ***Under internal CTUIR review.***

Task 5.5. Submit final copy of the annual report for the 2011-2012 contract to LSRCP and managers by 30 September 2013. ***Under internal CTUIR review.***

Task 5.6. Make project information and reports available over the Internet. ***Some data available. Working with CTUIR Database Manager and Data Coordinator to complete.***

Task 5.7. Consult with other professionals to improve project efficiency and work products. ***Completed***

Task 5.8. Complete final project funding proposal, statement of work and budget for the 2014-2015 contract year by 1 September 2014. ***Completed.***

Task 5.9. Report bull trout take to Joe Krakker, USFWS as requested. ***Complete, data is ready to submit by December 31, 2014.***

Task 5.10. Report take of spring Chinook salmon and summer steelhead in annual report. ***Will complete in 2014 Annual Report.***

Task Schedule

Task	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
1.1	X	X	X	X	X	X	X	X	X	X	X	X
1.2	X	X	X	X	X	X	X	X	X	X	X	X

1.3	X	X	X	X	X	X	X	X	X	X	X	X
1.4	X	X	X	X	X	X	X	X	X	X	X	X
1.5	X	X	X	X	X	X	X	X	X	X	X	X
1.6											X	
1.7											X	
1.8									X	X	X	X
1.9	X	X	X	X	X	X	X	X	X	X	X	X
1.10	X	X	X	X	X	X	X	X	X	X	X	X
1.11	X	X	X	X	X	X	X	X	X	X	X	X
1.12	X	X	X	X	X	X	X	X	X	X	X	X
1.13	X							X	X	X	X	X
1.14	X	X	X	X	X	X	X	X	X	X	X	X
1.15	X	X	X	X	X	X	X	X	X	X	X	X
1.16	X	X	X	X	X	X	X	X	X	X	X	X
2.1								X	X	X	X	X
2.2											X	X
2.3												X
2.4												X
2.5	X	X	X									
2.6	X	X	X	X	X	X	X	X	X	X	X	X
2.7	X	X	X	X	X	X	X	X	X	X	X	X
2.8	X	X	X	X	X	X	X	X	X	X	X	X
2.9	X	X	X	X	X	X	X	X	X	X	X	X
2.10	X	X	X	X	X	X	X	X	X	X	X	X
2.11	X	X	X	X	X	X	X	X	X	X	X	X
3.1	X	X	X	X	X	X	X	X	X	X	X	X
3.2	X	X	X	X	X	X	X	X	X	X	X	X
4.1											X	X
4.2											X	X
4.3					X							
4.4	X	X	X	X	X	X	X	X	X	X	X	X
5.1	X	X	X									
5.2	X	X	X	X	X	X	X	X	X	X	X	X
5.3	X	X	X	X	X	X	X	X	X	X	X	X
5.4	X	X	X	X	X	X	X	X	X	X	X	
5.5	X	X	X	X	X	X	X	X	X	X	X	X
5.6	X	X	X	X	X	X	X	X	X	X	X	X
5.7	X	X	X	X	X	X	X	X	X	X	X	X
5.8								X	X	X	X	
5.9												X

5.10													X
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Sciences, Seattle, WA. Available at: <http://www.cbr.washington.edu/paramest/pitpro/>