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Columbia River Select Area Fishery Evaluation

Northwest Power Planning Council
Attention: Kendra Phillips
Response to ISRP
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Attached you will find our response to recent ISRP comments on the Select Area Fishery Evaluation project supported by BPA funding (Project Number 199306000). Feel free to contact us with any questions.

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Select Area Fishery Evaluation Project
Project ID: 199306000

A response is required due to the technical deficiencies of this proposal. As stated by the ISRP during the 2000 review "Annual reports are cited in the proposal, but there is little summary material to aid reviewers. The proposal would benefit from a listing of results and accomplishments to date.

See Attachments #2 & 3.

ISRP comment: "*Another ISRP comment in FY00 was that methods were not well described. This proposal lists objectives and tasks with no description of methods. Tasks are listed in very general form*".

See Attachment #1

This project is a major deviation from the original statements made about developing terminal fisheries to better protect ESA stocks. Diverting fishing pressure to new locations could be a very effective conservation program (as has apparently been appreciated in past reviews and reports referred to). However, biological concerns about the expansion of these new fisheries will be related to the ultimate magnitude of these releases, their ecological impact and competition with other population and species, and about the adequacy and accuracy of the assessments conducted.

The Select Area Fisheries Evaluation (SAFE) project initially included three distinct phases of operation: Phase 1 consisted of site evaluation through water quality testing and test fishing, Phase 2 consisted of feasibility evaluation through limited releases and fisheries, and Phase 3 consisted of expansion to full releases and fisheries to maximize benefit for fisheries while maintaining protection to ESA stocks. All sites included in the current project to date have been chosen in large part based on the lack of impacts to ESA stocks and fisheries have been closely monitored to ensure impacts to ESA stocks remain minimal. Based on results from Phase 2 evaluations it has been determined that it would be appropriate to move to Phase 3 for several sites. Transition to Phase 3 will require increased smolt releases that are expected to produce increased adult returns. Increased releases are expected to have minimal to no interaction with ESA stocks due to the locations of the net pen rearing sites. All net pen rearing sites are located in the lower portions or tidewater portions of streams entering the mainstem Columbia River between river miles 12 and 34 and releases consist of smolts only; therefore, SAFE stock fish would have little or no interaction with rearing ESA stocks. If interaction between SAFE stock releases and ESA stocks does occur it would occur during the outmigration period as smolts and only below river mile 34 where a wide variety of stocks comingle prior to entering the ocean. Expansion to full production will only occur in areas where

the fishing fleet will be able to harvest 100% of the returning adults; therefore, adult interaction is not expected to increase significantly above levels observed during Phase 2.

How would you know that 99-100% harvest rates were accomplished in terminal fisheries?

Fisheries and escapement areas are sampled through a variety of state and federal funding sources that allow for a comprehensive sampling program for returning adults. Commercial and sport fisheries in the Columbia River are typically sampled at a 15-25% rate for recovery of CWT's with select area fisheries often sampled at a 50%-100% rate for CWT recovery. Hatcheries in Oregon and Washington are sampled at a 100% rate for CWT recovery purposes. Systematic spawning ground surveys occur in all lower Columbia River tributaries throughout the fall and all dead fish encountered during these surveys are sampled to recover CWT's. Standard run reconstruction techniques using CWT's are used to determine fish landed in fisheries and returning to escapement areas. These data are used to determine harvest rates for Select Area fisheries.

"Further, how are the magnitudes of Phase 3 releases determined, what impact is acceptable, and who makes these determinations?"

Phase three levels of production require consideration of the following criteria: 1) Impact on listed species, (NMFS consultation), 2) Basin wide production cap (NMFS consultation), 3) Benthic and water quality considerations (DEQ consultations), 4) Egg or pre-smolt sources (ODFW and WDFW consultation), 5) Stray rates for the specific sites by species (ODFW, WDFW and PSMFC data), 6) Site permits either original or expanded (DSL, Corps of Engineers), 7) Harvest rates are adequate to insure full harvest of returning adults (Columbia River Compact) and, 8) commercial and sport fish industry input to insure the increases are supported by the community (ODFW and CEDC). Final approval is through the Propagation Section of ODFW which addresses all of the above as well as any potential ecological concerns.

Concern for inadequate description of methods employed.

Expansion of the spring chinook program will require increased availability of eggs as well as fresh water rearing capacity prior to the net-pen part of the life cycle. Three fresh water strategies are being considered. The first methodology is to convert our existing South Fork Klaskanine Hatchery from coho to spring chinook production. The second strategy is to consider converting production of state hatcheries from coho to spring chinook. The third is developing additional rearing ponds in Clatsop County, of which four sites are under consideration. One additional strategy is to pond fry of the year directly into net pens, as currently occurs with fall chinook, with the added protection of vaccination

against Vibriosis and Furunculosis and to monitor closely for any other potential epizootic. Trials will be conducted this summer in two sites to determine if this approach is achievable and under what conditions. Youngs Bay typically reaches twelve parts per thousand sea water and water temperatures of 68° F, while Cathlamet Bay at Tongue Point has salinities around two parts per thousand and is two to four degrees cooler. Both sites will be tested this summer for efficacy of early rearing.

The propagation section of ODFW indicates that sufficient eggs will be available to reach the levels identified without any need for the SAFE project to develop its own brood stock. This means all the smolts reared at the South Fork Hatchery will be trucked to Youngs Bay for short-term net-pen rearing prior to release.

Monitoring refers to sampling for coded-wire tags but where are the costs for tagging accounted for and what M&E is actually deducted?

A combined ODFW & WDFW total of $77,900 is project to be spent on coded wire tagging and fin clipping.

The proposal lists tasks but provides no other insights. Further, several objectives in Sections 5, 6, and 7 are very expensive without adequate description or justification.

There was apparently insufficient detail about some aspects of project spending. The attached Table 1 lists specifics of estimated costs by project phase, objective and task. This should provide a better picture of why projected costs have increased in 2003. As mentioned above, the SAFE project is in transition to its final phase at several locations, where past records have shown that increases can safely be made to full site capacity. The increased budget is reflected mostly in project objective 1 at Youngs Bay, Blind Slough, Tongue Point, and Deep River. For mostly marketing and/or fisherman desirability reasons, this involves mostly an expansion of present coho efforts and a shifting towards spring chinook. Objective 2 reflects both the continuation of presently restricted rearing and fishery activities until data from at least three returns proves positive results.

Section 9g refers to supporting "two state hatcheries completely" but the budget only indicates "in-kind" contributions for these hatcheries. Is BPA paying for the management of these hatcheries or what is meant in that section?

Two state hatcheries (Gnat Creek and Grays River) have been the rearing facilities for the vast majority of the SAFE juveniles, from egg to pen, since Mitchell Act fundings were discontinued to them in about 1997. The projected 2003 budget for the two hatcheries is $761,258, which is included as part of Section 6 (O&M) of the application. An additional $350,000 will be contributed by the management agencies for the rearing of SAFE juvenile salmonids. This

includes S.F. Klaskanine Hatchery (CEDC), Elochomin Hatchery (WDFW), Cowlitz Hatchery (WDFW), Sandy Hatchery (ODFW), Bonneville Complex (ODFW), and Eagle Creek Hatchery (USFWS). BPA is budgeting two hatcheries to both rear project net pen fish only.

An economic analysis should be done on the costs and benefits of this project or portions of it. For example, the development of spring chinook rearing at Tongue Point seems exceedingly expensive for this one location and the investment may be better placed in another activity.

Mr. Hans D. Radtke, Ph.D, is preparing a complete economic analysis of the project for the NWPPC. This review and analysis covers the past five years of the project and considers the project's potential assuming the increases in spring chinook production outlined in the project proposal.

With regard to the Tongue Point portion of the project it should be noted that the present location of our net pens is at the confluence of Cathlamet Bay and the main stem of the Columbia River. Costs have been minimized at this site during the evaluation period in that we have been allowed to attach the net pens to an existing pier. This will be the last year for that arrangement; consequently, we must move the pen array to a new location further up Cathlamet Bay at the Clatsop Community College MERTS site where submerged lands have been secured. In order to accommodate the existing 36 pens as well as the additional 40 pens necessary for production of 1 million spring chinook smolts, we will need to drive 25 piling and purchase forty additional net pens. (See attached cost breakdown). This would be a necessary expenditure regardless of which of the three sites we choose to increase production. Additional production at Blind Slough is likewise being considered and will be addressed in subsequent expansion plans as data is compiled.

Given the market realities, production of additional spring chinook is the most attractive alternative for the commercial fishery. Production increases in Youngs Bay will be accomplished by two methods. First, we have secured approval from ODFW to switch our coho production at our South Fork Hatchery to spring chinook. We anticipate being able to produce 750,000 smolts from that facility. Although some upgrades to the site are necessary, they are minimal compared to securing additional net pens. Second, a previous proven quality net-pen site in Youngs Bay will be available to us by fall of 2002. That site already has 17 piling and will only require an additional eight to allow for another 1.5 million releases. All the necessary DEQ studies have been conducted to allow for this level of production in Youngs Bay.

Appendix #1

ISRP comment: "*Another ISRP comment in FY00 was that methods were not well described. This proposal lists objectives and tasks with no description of methods. Tasks are listed in very general form*".

Response: Additional methods provided for each task as listed below:

OBJECTIVE 1. Maximize production in appropriate select area sites.

Task 1a. Maximize spring chinook production in Youngs Bay and Blind Slough.

Youngs Bay:

- *Obtain and/or upgrade additional piling and acquire access for net pen expansion.*
- *Purchase, construct, and install additional pens needed to increase CHS smolt production from ~480,000 to ~2,000,000 annually.*
- *Investigate full-term net pen rearing as a method for expanding smolt production.*
- *Upgrade smolt production capacity at CEDC's S. Fork Klaskanine Pond 3 facility.*
- *Investigate additional rearing space expansions and oxygen supplementation as a method of increasing smolt production.*
- *Replace 600,000 annual COH smolt production at S. Fork Klaskanine Pond 3 with 800,000 CHS smolts.*
- *Improve incubation water system at S. Fork facility (new ground water filtration system and infra-red purification) to reduce egg loss rate associated with cold-water disease.*

Blind Slough:

- *Expand current CHS smolt production at Gnat Cr. Hatchery from 850,000 to 950,000.*
- *Investigate over-winter net pen rearing as a method for expanding production.*
- *Purchase, construct, and install additional net pens needed to increase annual CHS smolt production from ~320,000 to ~520,000.*

Task 1b. Maximize coho production in Youngs Bay, Tongue Point, Blind Slough, and Deep River.

Youngs Bay:

- *Replace COH smolt production at S. Fork Klaskanine Pond 3 with CHS smolts.*
- *Maintain overall production at below 4 million annually..*
- *Continue net pen towing experiments to evaluate effect on reducing losses to avian predation.*

Tongue Point:

- *Obtain permits and access to a more protected site within the Tongue Point turning basin (approximately 1 mile east of current location).*
- *Install new pilings and docks.*
- *Relocate current net pen complex from current site to new site.*
- *Maintain COH smolt production at ~200,000 annually.*

Blind Slough:

- *Maintain COH smolt production at ~300,000 annually.*

Deep River:

- *Increase COH smolt production from ~400,000 up to 5-600,000 annually.*

OBJECTIVE 2. Continue development of SAFE fisheries in other areas.

Task 2a. Develop spring chinook fishery in Deep River and Steamboat Slough.

Deep River:

- *Increase CHS smolt production from 200,000 to 500,000 annually.*

Steamboat Slough:

- *Initiate production of up to a target of 400,000 CHS smolts released annually if test fishing data indicates this is a viable CHS SAFE area.*

Task 2b. Continue development of SAB fall chinook in Youngs Bay.

- *Purchase, construct, and install additional pens needed to increase SAB smolt production from ~1,500,000 to ~2,500,000 annually.*
- *Maintain egg collection facilities at ODFW's N. Fork Klaskanine hatchery.*
- *Monitor and modify fishery restrictions within Youngs Bay to achieve full production escapement goal of 1,500 adults to Klaskanine hatchery.*
- *Maintain current commercial and recreational opportunities.*
- *Investigate off-site adult collection methods to achieve the full production escapement goal of 1,500 adults.*
- *Continue to evaluate effectiveness of holding adults in net pens to achieve the full production escapement goal of 1,500 adults.*

Task 2c. Investigate appropriateness of releasing spring chinook at a new location near Tongue Point using homing enhancement.

- *Evaluate the use of morpholine to artificially imprint fish and enhance homing instinct.*
- *Rear, mark, tag (CWT), and release 25,000-50,000 CHS smolts annually beginning in 2002.*

- *Imprint with morpholine for 2-4 weeks prior to release.*
- *Evaluate adult stray rate beginning in 2004 through existing CWT recovery programs.*

Task 2d. Develop coho fishery in Steamboat Slough.

- *Maintain annual releases of ≥200,000 COH smolts.*
- *Maintain current commercial harvest opportunities (ongoing since 1999).*

Task 2e. Continue to evaluate other potential sites for select area fisheries, including Coal Creek Slough.

- *Continue evaluation of Coal Creek Site:*
  - *Complete depth surveys.*
  - *Conduct water-quality sampling*
  - *Conduct test fisheries to determine stock composition*
- *Investigate additional sites for new or expanded commercial and recreational fishing opportunities.*
- *Investigate feasibility of creating or expanding small-scale recreational opportunities located within, or adjacent to existing SAFE areas.*

OBJECTIVE 3. Determine suitability of the Deep River, Steamboat Slough, Tongue Point turning basin, Blind Slough, and Coal Creek Slough sites for rearing and release of salmon.

Task 3a. Conduct water quality monitoring program for rearing areas in selected sites for the entire year. Water column parameters, benthic sediment and organisms, and planktonic characteristics to be measured at rearing sites using established schedule.

- *Continue semi-annual collection of benthic Ponar grab samples from beneath and adjacent to SAFE culture sites to monitor effects of propagation.*
- *Sort and identify benthic invertebrates to lowest taxanomic classification.*
- *Continue monthly measurements of six water quality parameters (DO, % saturation, salinity, pH, water turbidity, temperature) at each SAFE site using a Hydro-lab water testing device.*
- *Continue to collect sediment core samples to classify and characterize sediment beneath and adjacent to SAFE culture sites.*

Task 3b. Continue to collect and analyze homing and straying information from current net-pen and lower Columbia River hatchery programs.

Continue to mark and tag representative release groups (25,000 each) of each species at all SAFE sites.

- *Continue to recover CWT's from ocean, Columbia River mainstem, and SAFE commercial fisheries through established, ongoing commercial sampling programs.*

- *Continue to recover CWT's from ocean and Columbia River recreational fisheries through established sampling programs.*
- *Continue collection of CWT's from adult returns to basin hatcheries through established programs.*
- *Continue to recover CWT's during established fall stream survey sampling programs.*
- *Improve sampling of SAFE recreational fisheries.*
- *Complete annual run-reconstructions for each species released at all SAFE sites to monitor adult returns, stray rates, smolt to adult survival rates, ocean distribution, and fisheries contribution.*

OBJECTIVE 4. Coordinate activities with WDFW, ODFW, CEDC, BPA, NMFS, and SFA.

Task 4a. Coordinate all objectives, tasks, and activities undertaken jointly to ensure complementary products and minimal overlap of actions.

- *Evaluate the most efficient program for collecting, analyzing, and reporting bio-monitoring results (scheduled for April 2002).*
- *Coordinate with participants in Select Area fisheries to develop fishing proposals for adoption by the Columbia River Compact. Hold two public meetings annually to discuss a past fisheries and receive public input regarding proposed fisheries.*
- *Coordinate with the Joint Staff of ODFW and WDFW to propose fisheries in Select Areas for adoption by the Columbia River Compact.*
- *Coordinate sampling of Select Area fisheries with established ongoing sampling programs that are funded by a variety of state and federal funding sources.*
- *Monitor adopted fisheries using data collected by established ongoing sampling programs through the Columbia River Compact fishery management process.*
- *Evaluate other joint-tasks at regularly scheduled coordination meetings.*
- *Coordinate dormancy evaluation study with NMFS cooperators.*

Task 4b. Co-host bi-monthly coordination meetings of involved or interested parties to further develop work plans and report on progress.

- *Schedule of proposed meeting dates in April, June, August, and October, 2002 (completed March 2002).*
- *Circulated proposed schedule to interested parties including CEDC, ODFW, WDFW, BPA, CBFWA, NMFS, and Salmon for All (completed March 2002).*

Task 4c. Promote dialogue and participation in all projects that are affected by select area fisheries development.

- *Maintain communication with hatchery propagation staff.*

- *Maintain communication with NMFS staff.*

Task 4d. Respond to NMFS requirements as per SAFE biological opinion.

- *Continue to submit biological opinions as needed regarding SAFE activities.*

Task 4e. Continue practice of cost sharing of project expenses via fisherman/processor contributions.

- *Promote value of 5% voluntary assessment on participating commercial fishers.*
- *Coordinate with commercial fishers regarding collection of a poundage assessment on fish marketed through direct sales.*

OBJECTIVE 5. Compile and report SAFE project results.

Task 5a. Complete current annual report.

- *Complete outline and assignments for 1997-2000 annual report (March 2002).*
- *Circulation of internal draft due 1 May, 2002.*

Task 5b. Begin next annual report.

- *Initiate upon completion of 1997-2000 report.*

Appendix 2. SAFE Project Fact Sheet

Select Area Fishery Evaluation Project

BPA Project No. 199306000

I. BACKGROUND

In its 1993 Strategy For Salmon, the Northwest Power Planning Council recommended that terminal fishing sites be identified and developed to harvest abundant fish stocks while minimizing the incidental harvest of weak stocks. The Council called on the Bonneville Power Administration (BPA) to "Fund a study to evaluate potential terminal fishery sites and opportunities. This study should include: general requirements for developing those sites (e.g., construction of acclimation/release facilities for hatchery smolts so that adult salmon would return to the area for harvest); the potential number of harvesters that might be accommodated; type of gear to be used; and other relevant information needed to determine the feasibility and magnitude of the program."

Beginning in 1993, BPA initiated the Columbia River Terminal Fisheries Project, a comprehensive program to investigate the feasibility of terminal fisheries in Youngs Bay and other sites in Oregon and Washington (BPA, 1993). Now referred to as the Select Area Fishery Evaluation (SAFE) Project, the sponsors are the Washington Department of Fish and Wildlife (WDFW), Oregon Department of Fish and Wildlife (ODFW) and Clatsop County Economic Development Council's (CEDC) Fisheries Project. Terminal fisheries are being explored as a means to increase the sport and commercial harvest of hatchery fish while providing greater protection of weak wild salmon stocks. The goal of the project is to determine the feasibility of creating and expanding known stock fisheries in the Columbia River Basin to allow harvest of strong anadromous salmonid stocks while providing greater protection to depressed fish stocks.

The project has been conducted in three distinct stages: an initial research phase to investigate potential sites, salmon stocks, and methodologies; a second phase of expansion in Youngs Bay and introduction into areas of greatest potential as shown from the initial stage; and a final phase of establishment of terminal fisheries at full capacity at all acceptable sites.

The project was initially operated under the Final Environmental Assessment of Youngs Bay Salmon Rearing and Release Program (BPA, 1993). In May 1994, BPA prepared a Categorical Exclusion to perform research activities to identify and evaluate potential sites for expansion of this program. Currently the project is operating under (BPA, 1993) and the Final Environmental Assessment of Lower Columbia Terminal Fisheries Research Project (BPA, 1995) and the resultant Finding of No Significant Impact (FONSI). Full potential of select area production could provide an annual release of approximately 57 million smolts and a resultant $49 million to the West Coast economy (BPA, 1996).

II. SAFE PROJECT TO-DATE

A. Summary

The SAFE Project is an extension of the existing hatchery system that evaluates the feasibility of utilizing lower Columbia River off-channel sites for net-pen rearing and acclimation of coho, spring chinook, and fall chinook salmon.

An initial research phase to investigate potential sites resulted in selection of four sites in Oregon (Tongue Point, Blind Slough, Clifton Slough, Wallace Slough) and three in Washington (Deep River, Steamboat Slough, Cathlamet Channel). In addition to the seven new sites, the established Youngs Bay site was included for further expansion and Coal Creek Slough (WA) is being given future consideration. Water quality and benthic biomonitoring programs were initiated. Stock selection was based on homing potential, quality, availability, and value to the economy. Test fishing programs were initiated to determine area, time, and gear parameters to maximize harvest of targeted stocks while minimizing impacts on ESA listed species.

The second phase to expand into Youngs Bay and introduce fish to other select areas is nearing completion. Stocks selected for rearing programs are early stock coho, select area bright (SAB) fall chinook (Rogue stock), and lower river spring chinook. Various rearing and release strategies include time and size of release, rearing density, and seasonal feeding regimes. Water quality and bio-monitoring programs are concentrated in the selected fish rearing sites to determine levels of deviation from baseline data by newly established select area fish rearing sites. Test gillnetting was conducted to determine potential of the study sites to harvest targeted species while avoiding non-target species. Using test fishing results, initial SAFE commercial seasons were established in Tongue Point Basin, Blind Slough, and Deep River; and later followed in Steamboat Slough. Harvest goals were met with minimal impacts on listed stocks. Homing and straying rates are being documented through coded-wire tag (CWT) recovery efforts for early stock coho, SAB fall chinook, and spring chinook.

The third and final phase will establish select area fisheries at full capacity at all acceptable sites through adaptive management strategies.

B. Listed Anadromous Species and Critical Habitat

The study area for the SAFE Project currently consists of the lower Columbia River below river mile 49 near Clatskanie, Oregon. Listed stocks in the project area include Upper Columbia River steelhead, Snake River steelhead, and Lower Columbia River steelhead. Proposed-to-be-listed stocks in the project area include Lower Columbia River fall chinook, Upper Willamette River spring chinook, Upper Columbia River spring chinook, Columbia River chum, Upper Willamette River steelhead, and Middle Columbia River steelhead. Snake River stocks are already covered by the 1995-1998 Hatchery Biological Opinion (NMFS, 1995).

The entire Columbia River is a designated critical habitat for the Snake River sockeye salmon, spring/summer chinook salmon, and fall chinook salmon (BPA, 1995). The entire Columbia River is also designated critical habitat for the previously mentioned listed and proposed-to-be-listed stocks.

C. Net-pen Rearing Operations

The net-pen rearing complex at each site is a combination of smaller units: two-pen and four-pen units. A single pen represents a 6.1 m (20 ft) X 6.1 m (20 ft) inside dimension frame of high molecular density polyethylene (33 cm (12 inch)) pipe filled with styrofoam. A wooden walkway of untreated lumber is secured to the frame. Within these frames, 6.1 m (20 ft) X 6.1 m (20 ft) X 3.1 m (10 ft) deep nets are secured and confine the salmon juveniles during the rearing period. Fourteen plastic standpipes secure the perimeter of the net, provide structural support, and minimize water current deformation of the pen during high-flow periods. Actual rearing area is 975 cubic m (3,200 cubic ft). Mesh size of the confinement nets varies from 1/8 in to 3/4 inch, depending on the size of the fish.

There are currently 84 pens at Young Bay, 39 at Tongue Point, 15 at Blind Slough, 27 in Deep River, and 12 at Steamboat Slough. The pens are secured to piling with ramps from shore to the pen structure providing access. The pens are secured in areas with water depth in excess of 12 feet at the lowest tide, allowing at least 3 feet between the bottom of the net and the estuary bottom.

This project involves net-pen culturing several species and stocks; early stock coho, Willamette spring chinook, Cowlitz spring chinook, and SAB fall chinook under varying management and grow-out regimes. All fish culture regimes are conducted under the criteria and policies of the Integrated Hatchery Operations Team (IHOT). Net-pen rearing regimes being evaluated under this project include 2-week net-pen acclimation, over-winter net-pen rearing, and full-term net-pen rearing. Other project studies include rearing densities, release timing, and a winter dormancy feeding regime.

There are no adult collection, egg taking, or incubation activities at the sites, except for a small evaluation program to determine if adults can be held in pens until ripe for egg taking. A small number (about 12 fish each) of coho and fall chinook were held in pens to determine the results of this strategy. Almost all the coho survived and ripened, while almost all the fall chinook died. This activity will continue to determine feasibility of the adult holding strategy for use in times of low adult returns. Fish for the various programs and sites are requested through the Oregon and Washington Departments of Fish and Wildlife. Eggs are taken, incubated, and reared at hatchery facilities until the appropriate time for transfer to the net-pen sites.

<u>Coho</u>
Early stock coho are reared at all sites. Full-term rearing in the pens for coho does not occur because the summer water temperatures in the estuary are too warm (over 70

degrees F.). The rearing regimes are 2-week acclimation and over-wintering. Fish for the over-wintering program are received from hatcheries (Bonneville, Eagle Creek, Oxbow, Sandy, Grays River, and Elochoman) generally during the month of November, or subsequent to the water temperature in the estuary cooling to less than 65 degrees F. The fish are hauled via tanker truck and are about 25 fish per pound when transferred. The fish are fed a commercial ration at a scheduled rate to accommodate the 10 fish per pound release size at the scheduled May - June release time. During the rearing period the fish are monitored for growth and health, and if needed are treated for disease as directed by ODFW and WDFW pathologists. Prior to release a certified pathologist examines the fish. Releases are staggered from the first of May through mid June.

For the two-week acclimation program, the fish are received during the months of May and June and held for two weeks to "acclimate and imprint" before release. The fish are received in the smolt stage between 10 and 15 fish per pound. Feeding occurs during the rearing period at the feed manufacturer's recommended level. Fish are examined by certified pathologists prior to their release.

Spring chinook

The spring chinook stocks used are Willamette and Cowlitz. Full-term net-pen rearing for spring chinook does not occur because of the warm summer-time estuary water temperatures (over 70 degrees F.). The rearing regimes are over-wintering and two-week acclimation. For the Oregon sites, eggs are taken from the Willamette system hatcheries and transferred to ODFW's Gnat Creek Hatchery for incubation and early rearing. Eggs are taken at WDFW's Cowlitz Hatchery for the Deep River site and transferred to the Grays River Hatchery for incubation and rearing. Fingerlings are transferred from the hatchery facilities via tanker truck to the net-pen rearing sites (Youngs Bay, Tongue Point, Blind Slough and Deep River) generally during the month of November after the estuary water temperatures have cooled to below 65 degrees F. Feeding schedules are employed to have the fish reach approximately 12 fish per pound at release. In Youngs Bay and Deep River a winter-dormancy feeding regime is also being evaluated. Basically, no or very little feed is fed during December through mid February and then as the estuary water temperature begins to warm in mid February the feed ration is increased significantly until release. Release timing is also being evaluated with comparative March 1 and April 1 release dates. Fish are continually monitored for growth and health and if needed treated for disease at the direction of ODFW/WDFW pathologists.

Spring chinook two-week acclimation is being evaluated only at the Blind Slough site. The smolts are received from Gnat Creek Hatchery during mid March at about 13 fish per pound, held in the pens until the first of April, and released.

Fall chinook

SAB stock fall chinook are being reared and released only in Youngs Bay. Broodstock is currently from ODFW's North Fork Klaskanine Hatchery in the Youngs Bay drainage. Fall chinook are reared in the pens full-term, from button-up fry to smolt. Button-up fry

are transferred to the pens in February or March at approximately 1100 fish per pound. The fish are reared under a three-density comparison; 1/4 pound of fish per cubic foot rearing area, 1/2 pound per cubic foot, and 3/4 pound per cubic foot; density at release. During the rearing period the fish are monitored for growth and health and fed medication for disease control if needed as directed by ODFW pathologists. Feeding occurs at the manufacturers' recommended level until release. Release is scheduled for August 1st or 70 degree water temperature, whichever happens first. Release size typically ranges from 10 to 20 fish per pound.

D. Harvest Management

The goal of the SAFE project is to "determine the feasibility of creating and expanding terminal, known stock fisheries in the Columbia River Basin to allow harvest of strong anadromous salmonid stocks, while providing greater protection to depressed fish stocks." To accomplish this goal, the project is completing over 7 years of research and development. First accomplished was identifying and prioritizing net-pen sites, selecting suitable species and stocks, and determining methodologies for evaluation. Next, the impacts on various species and stocks were examined at the most desirable select areas.

As part of this evaluation, commercial and sport seasons were set targeting returning adults with a goal of complete (100%) harvest to eliminate straying of unharvested fish. Season setting is an involved process requiring the approval of the NMFS concerning impacts to listed species under the ESA. A favorable Biological Opinion is necessary and is based on Biological Assessments that were historically authored by the Technical Advisory Committee (TAC), organized under the U.S. v. Oregon Columbia River Fish Management Plan (CRFMP). With the expiration of CRFMP in 1999, Biological Assessments concerning lower Columbia River fisheries since that time have been co-authored by the Oregon and Washington Departments of Fish and Wildlife. The Columbia River Compact is the forum that establishes commercial seasons in concurrent jurisdiction waters of Oregon and Washington, while individual state action is required within state waters. Recreational angling seasons and rules are set by state action, with a goal of concurrent regulations for both states.

Harvest management in the new select areas of Tongue Point Basin, Blind Slough, Deep River and Steamboat Slough has been based on the experience gained from fisheries established in Youngs Bay prior to initiation of the SAFE project and the commercial test fishing program that has been conducted since the projects inception. The first seasons in new select areas occurred in the fall of 1996 targeting 1993 brood coho. Commercial regulations were set after careful analysis of test fishing results to determine time, area, and gear parameters to maximize the harvest of targeted coho, while minimizing impacts on ESA listed stocks. This has continued annually, with most sites receiving sufficient fish to support a coho study group.

Monitoring and evaluation of harvest in select area fisheries is the vehicle by which the principles of adaptive management are implemented. The monitoring plan was to

sample 100% of the catch for recovery of CWTs to assess stock composition by species for each select area. Monitoring CWT recoveries from escapement areas including hatcheries and streams is necessary to determine harvest efficiency and extent of straying. Monitoring all CWT recoveries is essential to determine survival rates of each study group to analyze rearing/release strategies and techniques, and also differences attributed to various ecological conditions associated with individual net-pen sites.

Application of results obtained through monitoring CWT recoveries is the basis for adaptively directing future work to ensure harvest and straying issues will not adversely affect the recovery and rebuilding of listed stocks.

Final returns of the 1993-1996 brood coho study groups have produced very positive and significant results:

(1) Select area fisheries contributed over 70% of the total commercial harvest of coho in the Columbia River each year.

(2) Adult survival rates for select area net-pen coho averaged 1.6%, while Columbia River hatcheries generated adult survival rates of less than 1%.

(3) An average of 98.5% (97.6-99.5) of the select area net-pen-released coho were accountable as harvest, while 1% were recovered in nearby hatcheries or streams.

(4) The 1996-1999 fall select area commercial fisheries were successful in minimizing impacts on ESA listed salmon with an average of only 3.1% upriver bright fall chinook caught and less than one Snake River wild fall chinook.

Spring chinook returns during 1997-2000 have produced very positive and significant results.

(1) Select area fisheries produced landings ranging between 1,800 and 6,500 at high ex-vessel values, exceeding $3 per pound in some years.

(2) During 1997-1999 Select Area fisheries provided spring chinook harvest opportunities when target spring chinook fisheries did not occur on the mainstem Columbia River. In 2000 a limited commercial season in the mainstem Columbia River resulted in landings of 500 spring chinook, as compared to the 6,500 spring chinook landed in Select Area fisheries.

(3) Select area spring chinook fisheries effectively target local stocks with 80-90% of the catch being net-pen-released fish.

(4) Based on 1993-1994 brood data an average of 92% of the net-pen-released spring chinook were accountable as harvest, while 8% were recovered in nearby hatcheries or streams.

(5) Spring chinook fisheries have occurred in Select Areas since 1992 and the number of Snake River wild spring chinook landed has not exceeded seven fish or 0.14% of the Columbia River mouth return.

(6) Spring chinook have provided a significant sport fishery in the Blind Slough/Knappa Slough Select Area during 2000 and 2001.

The fall chinook portion of the SAFE Project has provided very positive and significant results.

(1) SAB fall chinook are heavily exploited with 82% of the population being harvested in sport and commercial fisheries and 18% escaping to hatcheries or nearby streams. Escapement includes broodstock need at Klaskanine Hatchery to continue this program.

(2) The Youngs Bay Select Area fisheries effectively target SAB fall chinook with minimal landings of non-local stocks. During 1996-2000 SAB fall chinook comprised 74% of the total chinook catch in the Youngs Bay Select Area fall fishery.

(3) Transferring broodstock from Big Creek Hatchery to Klaskanine Hatchery will effectively drastically reduce stray rate while increasing exploitation rate.

(4) Impacts to listed species has been very low with the Youngs Bay fall fishery having an average impact rate of 0.03% on URB stock fall chinook during 1996-2000.

(5) The Youngs Bay fall chinook program provides fisheries during August through mid-September when limited opportunities exist in the mainstem Columbia River.

III. FUTURE NEEDS AND GOALS

Selective fisheries, such as Select Area fisheries, continue to be a priority in the region. The 2000 draft Biological Opinion refers to Select Area fisheries in Section 9.6.3.3, overview of harvest measures. This section outlines harvest measures that can improve prospect or survival of listed fish. Section 9.6.4.3.3 refers specifically to development of known-stock terminal area fisheries where abundant fish can be harvested with minimal impacts on listed fish.

The first two phases of the SAFE Project were intended to examine the feasibility of developing fisheries in terminal areas. These phases have been completed and results described previously indicate that we can develop known-stock terminal fisheries that have minimal impacts on listed fish. With the first two phases complete there is a need to move forward with the final third phase of this project, establishment of terminal

fisheries at full capacity in all acceptable sites. The Youngs Bay, Deep River, Tongue Point, and Blind Slough sites all have passed successfully through phase two and long-term full capacity fisheries need to be established in these areas. The SAFE Project has advanced the farthest with early run coho salmon. A combination of good stock availability, a short-term life cycle (three years), and immediate cooperation amongst users of the lower Columbia River has helped to establish coho at five locations. SAFE fall fisheries have been conducted and monitored annually since 1996.

The Steamboat Slough site is currently in phase two but initial results show promise for this site also. In the immediate future the project also needs to consider some expansion into a limited number of locations that exhibit potential as future rearing sites and fishing locations. Feasibility testing should not be limited to just sites but to other species also. To date the majority of the focus has been towards coho. In keeping with Biological Opinion's direction to develop small catch fisheries that provide increased economic value (Section 9.6.3.4) this project needs to focus additional attention to establishing spring chinook programs in as many sites as possible. Establishment of SAFE chinook fisheries has been slower mostly because of more limited stock availability and more lengthened life cycle (up to 6 years). SAFE project activities are still in the developmental stage with both fall and spring chinook salmon. The project is encouraged to make a transition to spring chinook in particular, mostly because of commercial harvest value and recreational popularity. In Washington this will include will involve making more spring stocks available (now just Cowlitz) for net-pen rearing.

Some sites have resulted in excessive straying of net-pen-released fish, which has resulted in the loss of some fisheries. Additional work needs to continue with respect to improving homing by relocating pens or use of benign chemicals. Continued research needs to occur in this area in both established sites and proposed sites to ensure maximum return in the Select Area site and minimal impact to naturally spawning populations in streams near the site.

The SAFE Project also represents a unique opportunity to test various hatchery practices (i.e. rearing strategies, feeding studies, release strategies, etc.). Due to the large number of returning adults harvested and the good sampling program in place, large sample sizes will be attained for any experimental release which makes the SAFE project an excellent vehicle for these kinds of studies. Flexibility to perform these kinds of studies needs to be maintained within the SAFE Project.

The goals of the SAFE Project include: 1) establishing all current sites as long-term full capacity sites for all acceptable species, 2) continue to consider expansion into other areas or using other species, 3) maintain minimal impacts to listed fish observed to date, 4) maintain funding stability and fish sources for all acceptable sites, and 5) continue to test alternative rearing and release strategies to increase survival rates and improve homing to net-pen sites.

IV. REFERENCES

Bonneville Power Administration (BPA). 1993. Youngs Bay Salmon Rearing and Release Program, Final Environmental Assessment.

Bonneville Power Administration (BPA). 1995. Lower Columbia River Terminal Fisheries Research Project, Final Environmental Assessment. DOE/EA-1040. 56 pp.

Bonneville Power Administration (BPA). 1996. Columbia River: Terminal Fisheries Research Report, Annual Report 1994. DOE/BP-05409-1. 147 pp.

Bonneville Power Administration (BPA). 1998. Columbia River: Select Area Fishery Evaluation, Annual Reports 1995-1996. 194 pp.

NMFS. 1995. Biological Opinion for 1995 to 1998 Hatchery Operations in the Columbia River Basin. NOAA/NMFS, April 5, 1995. 82 pp.

Table 1. Estimated FY 2003 SAFE project costs, by phase, objective and task.

Proposed SAFE objectives and tasks	Estimated FY '03 Cost (x 1,000)			
	P&D	C/I	O&M	M&E
OBJECTIVE 1. Maximize production in appropriate select area sites.				
Task 1a. Maximize spring chinook production in Youngs Bay and Blind Slough.	5.2	57.3	224.8	
Task 1b. Maximize coho production in Youngs Bay, Tongue Point, Blind Slough, and Deep River.	1.7	41.3	490.3	
OBJECTIVE 2. Continue development of SAFE fisheries in other areas.				
Task 2a. Develop spring chinook fishery in Deep River and Steamboat Slough.		3.1	78.1	49.2
Task 2b. Continue development of SAB fall chinook in Youngs Bay.			193.5	43.2
Task 2c. Investigate appropriateness of releasing spring chinook at Tongue Point at new location using homing enhancement.	5.1	286.7	133.4	11.3
Task 2d. Develop coho fishery in Steamboat Slough.		3.1	117.1	49.2
Task 2e. Continue to evaluate other potential sites for select area fisheries including Coal Creek Slough.	25.4		37.1	
OBJECTIVE 3. Determine suitability of the Deep River, Steamboat Slough, Tongue Point Turning basin, Blind Slough, and Coal Creek Slough sites for rearing and release of salmon.				
Task 3a. Conduct water quality monitoring program for rearing areas in selected sites for the entire year. Water column parameters, benthic sediment and organisms, and planktonic characteristics to be measured at rearing sites using established schedule.				45.6
Task 3b. Continue to collect and analyze homing and straying information from current net-pen and lower Columbia River hatchery programs.				34.3
OBJECTIVE 4. Coordinate activities with WDFW, ODFW, CEDC, BPA, NMFS, and SFA.				
Task 4a. Coordinate all objectives, tasks, and activities undertaken jointly to ensure complementary products and minimal overlap of actions.			115.0	34.0
Task 4b. Co-host bimonthly coordination meetings of involved or interested parties to further develop work plans and report on progress.			65.9	
Task 4c. Promote dialogue and participation in all projects that are affected by select area fisheries development.			57.7	
Task 4d. Respond to NMFS requirements as per SAFE biological opinion.			5.1	9.0
Task 4e. Continue practice of cost sharing of project expenses via fisherman/processor contributions.			5.1	5.2
OBJECTIVE 5. Compile and report SAFE project results.				
Task 5a. Complete current annual report.				35.3
Task 5b. Begin next annual report.				22.5
TOTAL	37.4	391.5	1,523.2	338.8

Table 2. Estimated 2003 Project Costs – Tongue Point Spring Chinook		
Planning and Design (ODFW Mgmt.)		**5,085**
Construction and Implementation		
1000 ft. HDPE pontoon, 12" styrofoam filled	8,300	
10, four-pen units HDPE ex. Familian Industrial Plastics	178,800	
16,000 boardfeet decking	7,800	
Misc. Galvanized hardware	2,200	
Bird cover nets	2,600	
40, 20' X 20' X 10' nylon mesh nets with Flexigard	26,200	
Freight	4,868	
Labor for pen assembly and deployment	16,000	
Rental Butt Fussion Machine, three days	3,300	
500 ft., 6-inch PVC with stainless steel couplings	4,400	
300 ft. HDPE pipe with butt flanges and hardware	2,700	
25, 14-inch driven piling	29,500	
Total Construction / Implementation		**286,668**
Operation and Maintenenace		
Rearing at ODFW facilities prior to transfer to CEDC	83,475	
Feed (after transfer to CEDC)	25,000	
Moorage	541	
Material / Supplies	14,205	
Travel	5,200	
Total Operation / Maintenance		**128,421**
Monitoring and Evaluation		
Benthic sampling contract	7,500	
Supplies	2,089	
Travel	600	
Total Monitoring / Evaluation		**10,189**
Indirect Costs (10% except Capital & ODFW Rearing / Mgmt)		**6,127**
TOTAL		**$436,490**

Table 3. CEDC Site Development Schedule

Site	Species	Release Numbers							
Year		**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Youngs Bay	Spring Chinook	464,650	537,898	425,000	500,000	1,000,000	1,500,000	2,000,000	2,000,000
	Fall Chinook	153,928	205,145	434,000	1,000,000	1,500,000	1,500,000	1,500,000	1,500,000
	Coho	1,819,500	1,724,031	1,710,000	1,725,000	1,750,000	1,750,000	1,750,000	1,750,000
South Fork Hatchery	Coho	610,658	344,738	585,000	600,000	0	0	0	0
	Spring Chinook					600,000	650,000	650,000	800,000
Tongue Point	Coho	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
	Spring Chinook				25,000	50,000	50,000	50,000	50,000
Blind Slough	Spring Chinook	196,401	250,396	421,000	425,000	450,000	1,000,000	1,000,000	1,000,000
	Coho	195,645	299,411	300,000	300,000	300,000	300,000	300,000	300,000
Klaskanine Hatchery	Fall chinook	409,000	671,000	700,000	700,000	700,000	700,000	700,000	700,000
Deep River	Spring Chinook	0	150,000	150,000	200,000	200,000	400,000	400,000	500,000
	Coho	431,143	425,000	350,000	350,000	400,000	500,000	500,000	500,000
Steamboat Slough	Spring Chinook	0	0	0	200,000	200,000	200,000	400,000	400,000
	Coho	193,543	200,000	200,000	400,000	400,000	400,000	400,000	400,000
Total Releases	Spring Chinook	661,050	938,294	996,000	1,150,000	2,450,000	3,750,000	4,450,000	4,700,000
	Fall Chinook	562,928	876,145	1,134,000	1,700,000	1,700,000	1,700,000	1,700,000	1,700,000
	Coho	3,250,489	3,648,793	3,825,000	4,025,000	3,500,000	3,700,000	3,900,000	4,000,000

Table 4. Releases of SAB Fall Chinook from Youngs Bay Net Pens; SAFE Project, 1994-99 Broods.

Brood Year	Study Group	Release Date	Number Released	Number of CWT's	Tag Code	Release Size (Fish/lb)
1994	July 15 or 65º	6-27-95	107,892	49,826	07-07-42	18.2
	Aug 1 or 70º	7-17-95	77,100	49,657	07-09-28	13.6
	0.25 lbs/ft^3 density	7-17-95	116,030	43,518	07-09-29	10.9
	0.56 lbs/ft^3 density	7-17-95	127,936	44,123	07-09-30	11.8
	0.66 lbs/ft^3 density	7-17-95	115,702	42,854	07-09-31	13.8
			544,660	229,978		
1995	0.25 lbs/ft^3 density	7-16-96	64,679	57,523	07-13-42	13.1
	0.67 lbs/ft^3 density	7-16-96	154,593	45,148	07-13-41	14.5
			219,272	102,671		
1996	July 15 or 65º	6-17-97	53,442	52,956	07-13-39	38.0
	Aug 1 or 70º	7-17-97	50,868	50,371	07-13-38	18.1
	0.14 lbs/ft^3 density	7-17-97	116,680	52,468	09-21-36	21.4
	0.33 lbs/ft^3 density	7-17-97	188,948	51,270	09-21-35	17.9
	0.46 lbs/ft^3 density	7-17-97	53,765	52,618	07-13-40	18.4
			463,703	259,683		
1997	July 15 or 65º	7-1-98	25,201	24,853	09-24-54	19.8
	Aug 1 or 70º	7-20-98	25,019	24,896	09-24-53	16.0
	0.27 lbs/ft^3 density	7-20-98	25,036	24,513	09-24-56	14.5
	0.34 lbs/ft^3 density	7-20-98	17,303	16,850	09-24-57	15.8
	0.47 lbs/ft^3 density	7-20-98	25,024	24,931	09-24-55	16.5
			117,583	116,043		
1998	July 15 or 65º	7-12-99	25,811	25,369	09-27-54	17.1
	Aug 1 or 70º	8-2-99	26,000	25,395	09-27-53	12.5
	0.24 lbs/ft^3 density	7-12-99	25,992	25,697	09-27-57	16.6
	0.45 lbs/ft^3 density	7-12-99	25,921	25,106	09-27-56	18.1
	0.57 lbs/ft^3 density	7-12-99	32,410	25,570	09-27-55	17.8
			136,134	127,137		
1999	0.46 lbs/ft^3 +surface	7-5-00	24,944	24,075	09-30-39	17.1
	0.46lbs/ft^3+subsurface	7-5-00	25,079	23,586	09-30-40	17.0
	0.23 lbs/ft^3 +subsurface	7-5-00	24,909	24,167	09-30-41	16.7
	0.27 lbs/ft^3 +surface	7-5-00	24,983	24,344	09-30-42	14.3
			99,915	96,172		

Table 5 Releases of Spring Chinook from Lower Columbia Select Area Net Pen Sites; Willamette Stock from Oregon Sites and Cowlitz Stock from Deep River, Washington, 1993-98 Broods.

Brood Year	Release Date	Release Site	Number Released	Number Of CWT's	Tag Code	Release Size (Fish/lb)
1993	2-7-95	SFK Facility	86,978	51,829	07-03-51	14.4
	2-9-95	Youngs Bay	79,336	39,519	07-03-45	12.1
	3-7-95	Youngs Bay	156,519	52,446	07-03-43	8.1
	3-30-95	Youngs Bay	127,367	52,224	07-03-44	7.4
			450,200	196,018		
1994	1-31-96	SFK Facility	76,618	52,205	07-11-19	14.7
	2-5-96	Tongue Point	100,138	52,119	07-12-38	10.1
	2-29-96	Tongue Point	142,181	48,281	07-12-36	10.8
	2-29-96	Blind Slough	199,389	52,369	07-12-37	9.9
	2-5-96	Youngs Bay	142,976	53,685	07-11-21	11.9
	2-29-96	Youngs Bay	133,517	51,909	07-11-22	10.7
	3-21-96	Youngs Bay	97,945	41,085	07-11-20	10.0
			892,764	351,653		
1995	2-1-97	Youngs Bay	100,680	49,944	09-17-37	18.1
	3-5-97	Youngs Bay	96,540	49,341	09-17-38	15.2
	4-4-97	Youngs Bay	95,396	50,208	09-17-39	14.6
	4-4-97	Youngs Bay	94,612	50,139	09-17-40	12.7
	3-4-97	SFK Facility	76,821	25,149	07-13-37	15.9
	3-5-97	Blind Slough	171,229	58,002	09-17-16	15.2
	3-5-97	Tongue Point	151,905	51,461	09-17-17	16.6
	4-4-97	Tongue Point	149,889	50,309	09-17-18	14.6
			937,072	384,553		
1996	3-3-98	Youngs Bay	149,878	50,865	09-22-16	11.6
	4-1-98	Youngs Bay	153,265	47,147	09-22-14	12.0
	4-1-98	Youngs Bay	153,139	49,392	09-22-15	9.6
	3-3-98	Tongue Point	128,314	46,710	09-22-18	13.8
	4-1-98	Tongue Point	125,456	43,987	09-22-19	13.6
	3-3-98	Blind Slough	198,034	44,452	09-22-17	12.6
	4-1-98	Blind Slough	25,284	24,203	09-20-35	9.6
	4-1-98	Blind Slough	25,396	23,319	09-20-36	11.6
	4-22-98	Deep River	56,414	56,414	63-61-15	5.1
			1,015,180	386,489		
1997	3-4-99	Youngs Bay	165,298	24,415	09-25-34	13.2
	4-1-99	Youngs Bay	158,574	24,253	09-25-33	11.9
	4-1-99	Youngs Bay	102,546	23,566	09-25-36	8.2
	3-3-99	Tongue Point	118,291	23,782	09-25-32	10.0
	4-1-99	Tongue Point	105,986	21,637	09-25-35	8.9
	3-3-99	Blind Slough	148,881	24,644	09-25-30	14.0
	4-1-99	Blind Slough	25,553	25,544	09-25-31	11.0
	4-1-99	Blind Slough	25,573	25,560	09-25-37	10.0
	5-13-99	Deep River	25,205	24,856	63-05-11	6.8
	5-13-99	Deep River	14,473	14,106	63-06-52	6.4
			890,380	232,363		
1998	3-1-00	Youngs Bay	128,656	27,420	09-28-47	15.9
	4-4-00	Youngs Bay	180,695	24,689	09-28-46	18.7
	4-4-00	Youngs Bay	155,299	26,694	09-28-48	14.4
	3-1-00	Tongue Point	132,484	29,028	09-28-50	12.6
	4-4-00	Tongue Point	117,525	23,515	09-28-49	9.8

Appendix 3. SAFE Project Tables.

3-1-00	Blind Slough	143,507	25,656	09-28-45	17.7
4-4-00	Blind Slough	26,393	25,442	09-28-43	13.8
4-4-00	Blind Slough	26,501	25,397	09-28-44	11.9
		911,060	207,841		

Table 6. Releases of Lower Columbia River Early Stock Coho from Select Area Net Pen Sites; SAFE Project, 1993-1998 Broods.

Brood Year	Release Date	Release Site	Number Released	Number of CWT's	Tag Code	Release Size Fish/lb.
1993	5-11-95	Youngs Bay	138,371	28,995	07-15-44	7.8
	5-12-95	Blind Slough	140,267	26,258	07-15-45	8.9
	5-12-95	Tongue Point	130,623	26,426	07-53-29	8.7
	5-12-95	Deep River	201,009	30,535	63-54-44	8.1
			610,270	112,214		
1994	5-7-96	Youngs Bay	216,187	26,274	07-12-22	9.5
	5-6-96	Blind Slough	209,761	24,942	07-59-01	9.0
	5-6-96	Tongue Point	190,032	23,942	07-12-41	8.4
	5-7-96	Deep River	199,817	28,320	63-57-39	9.7
			815,797	103,478		
1995	5-5-97	Youngs Bay	146,818	27,198	07-09-42	13.2
	5-5-97	Blind Slough	196,963	25,104	09-18-18	14.4
	5-5-97	Tongue Point	430,221	26,174	07-13-36	13.9
			774,002	78,476		
1996	5-1-98	Youngs Bay	133,373	25,672	09-23-02	10.4
	5-1-98	Blind Slough	144,958	24,607	09-23-05	11.4
	5-1-98	Tongue Point	119,611	18,355	09-23-06	11.2
	4-23-98	Deep River	208,350	29,474	63-62-47	10.6
			606,292	98,108		
1997	4-28-99	Youngs Bay	158,203	28,809	09-23-34	11.9
	4-28-99	Blind Slough	197,089	26,072	09-25-28	11.3
	4-28-99	Tongue Point	204,143	26,269	09-25-29	11.4
	5-13-99	Deep River	203,284	25,003	63-05-30	11.4
	5-13-98	Deep River	210,824	24,010	63-05-31	13.0
	5-5-99	Steamboat Slough	210,530	24,050	63-05-32	10.4
			1,184,073	154,213		
1998	5-4-00	Youngs Bay	206,377	24,396	09-29-14	11.9
	5-4-00	Blind Slough	195,645	24,624	09-29-12	11.5
	5-4-00	Tongue Point	228,290	24,634	09-29-13	10.8
	5-3-00	Deep River	217,732	26,994	63-12-01	11.8
	5-4-00	Deep River	213,411	30,927	63-12-02	11.3
	4-24-00	Steamboat Slough	193,543	30,032	63-11-17	11.2
			1,254,998	161,607		

Table 7. Number and Distribution of Stray Rogue-Stock Select Area Bright Fall Chinook Originating from Releases at Big Creek Hatchery (1983-94 Broods) and Youngs Bay Net Pens (1989-94 Broods) Based on Expanded Coded-Wire Tag Recoveries.

	Big Creek Hatchery (Broods)														Youngs Bay Net Pens (Brood)					
	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'83-'94 Total		'89	'91	'93	'94	'89-'94 Total	
Home Recoveries [1/]	173	268	294	446	682	492	293	443	493	711	274	95	4,664	(77.8%)	224	30	171	477	902	(92.9%)
Oregon Strays																				
Big Creek H	--	--	--	--	--	--	--	--	--	--	--	--	--		9	1	13	4	27	
NF Klaskanine H. & NS		1							1		2		4		12		7	3	22	
SF Klaskanine H. & NS	89	44	11						1				145		3	3	2	3	11	
Gant Creek NS		1	1										2							
Plympton Cr. NS		1	2			1	4	15	13	15	3		54							
Clatskanie R. NS								1	1				2							
Willamette Falls	3	6	5		6			1	4				25							
Clackamas H.					1								1							
Sandy R. NS			1					1					2							
Bonneville H.							1	3	2				6							
													241	(4.0%)					60	(6.2%)
Washington Strays																				
Grays H. & NS	1	4	3	5	6	4	1		2		1	2	29		1			1	2	
Elochoman H. & NS	14	27	64	24	41	55	24	43	68	124	16	5	505		1				1	
Skamokawa NS	1		4	2				1					8							
Abernathy H. & NS	8	28	24	27	37	53	13	88	48	35	6	1	368				1		1	
Germany Cr. NS				3		6	8	2	2				21							
Mill Cr. NS		2											2							
Cowlitz H. & NS		1	3			4			1	10	1		20					2	2	
Toutle H.										1			1							
Kalama H. & NS	4		3	21		5	3	4	9	4	1	1	55							
Lewis NS.		12			4	6	4	4	3				33							
Washougal H.											2	1	3							
													1,045	(17.4%)					6	(0.6%)
Above Bonneville																				
Bonneville Dam	1												1							
Zone 6 Net		3	13		2		9	5	3			4	39					3	3	
Spring Cr. H..				1				1					2							
Cascade H.										1			1							
White Salmon H. & NS								2				1	3							
Umatilla H.					1								1							
													47	(0.8%)					3	(0.3%)
Total Strays	121	130	134	83	98	134	67	171	158	190	32	15	1,333	(22.2%)	26	4	23	16	69	(7.1%)
Total Escapement	294	398	428	529	780	626	360	614	651	901	306	110	5,997		250	34	194	493	971	

1/ Home recoveries include returns to Big Creek Hatchery for Big Creek releases and catches in Youngs Bay for releases from Youngs Bay net pens.

Table 8. Total Accountability of Expanded Coded-Wire Tag Recoveries for 1993-94 Brood Spring Chinook Releases from SAFE Project Sites.

	1993-94 Broods			1994 Brood			
	Youngs Bay Net Pens		S.F. Klask Hatchery	Tongue Pt. Net Pens	Blind Sl. Net Pens	Grand Total	
Ocean							
WA	5		0	0	0	5	
BC	13	(6)	0	0	0	13	(6)
AK	90	(2)	0	10	2	102	(2)
	108	(8)	0	10	2	120	(8)
Columbia River							
Fisheries							
YB All	1087		25	23	4	1139	
TP All	8		0	7	0	15	
BS All	4		0	4	47	55	
LCR Net	3		2	0	0	5	
Will. Sport	7		0	1	0	8	
Cowlitz Sport	6	(6)	0	0	0	6	(6)
	1115	(6)	27	35	51	1228	(6)
Hatcheries							
SF Klaskanine	17	(8)	22 (4)	0	0	39	(12)
NF Klaskanine	5	(2)	0	0	0	5	(2)
Big Creek	5	(1)	0	9	5	19	(1)
Cascade	0		0	1	0	1	
Clackamas	2		0	0	0	2	
McKenzie	10		0	3	1	14	
Minto	3		0	0	0	3	
Willamette	1		0	0	0	1	
Elochoman	0		0	1	0	1	
Cowlitz	20	(17)	0	4	0	24	(17)
Kalama F.	0		0	2	0	2	
L.W. Salmon NFH	4	(4)	0	0	0	4	(4)
	67	(32)	22 (4)	20	6	115	(36)
Natural Spawn							
McKenzie R.	3		0	0	1	4	
Leaburg Trap	0		0	0	1	1	
	3	(0)	0	0	2	5	
Other							
Alsea Sport	1	(1)	0	0	0	1	(1)
Chiwawa Hatch.	1		0	0	0	1	
	2	(1)	0	0	0	2	(1)
Total Recoveries [1/]	1,295	(47)	49 (4)	65	61	1,470	(51)

[1/] Numbers in parentheses are 2-year olds included in totals.

Table 9. Accountability of Adult Coho from Select Area Fisheries Evaluation (SAFE) Project Net Pen Releases at Youngs Bay, Tongue Point, Blind Slough, and Deep River, 1993-96 Broods.

Brood Year	Site	Total	Ocean	Columbia River				Hatchery/Stream Location
				Fisheries	(SAFE)	Hatcheries	Streams	
1993	Youngs Bay	1,056	59	997	(932)	0	0	
	Blind Slough	511	41	468	(445)	2	0	Big Cr. H. (2)
	Tongue Point	813	67	733	(428)	13	0	Big Cr. H. (12) Elochoman H. (1)
	Deep River	485	60	418	(399)	5	2	Grays R. H. (5)
		2,865	**227**	**2,616**	**(2,204)**	**20**	**2**	Deep R. (1) Grays R. (1)
1994	Youngs Bay	248	3	243	(211)	2	0	Big Cr. H. (1) Klaskanine H. (1)
	Tongue Point	196	5	187	(101)	4	0	Big Cr. H. (4)
	Blind Slough	301	7	290	(225)	3	1	Big Cr. H. (3) Duck Cr. (1)
	Deep River	190	7	171	(142)	8	4	Grays R. H. (7)
		935	**22**	**891**	**(679)**	**17**	**5**	Lewis R. H. (1) Grays R. (2) Deep R. (1) Duck Cr. (1)
1995	Youngs Bay	391	15	374	(349)	2	0	Big Cr. H. (2)
	Tongue Point	139	4	124	(117)	11	0	Big Cr. H. (7) Cowlitz H. (1) Elochoman H. (3)
	Blind Slough	18	0	18	(16)	0	0	
		548	**19**	**516**	**(482)**	**13**	**0**	
1996	Youngs Bay	603	36	567	(473)	0	0	

Table 9. Accountability of Adult Coho from Select Area Fisheries Evaluation (SAFE) Project Net Pen Releases at Youngs Bay, Tongue Point, Blind Slough, and Deep River, 1993-96 Broods.

Brood Year	Site	Total	Ocean	Columbia River				Hatchery/Stream Location
				Fisheries	(SAFE)	Hatcheries	Streams	
	Tongue Point	722	38	681	(297)	3	0	Big Cr. H. (3)
	Blind Slough	397	10	384	(347)	3	0	Big Cr. H. (3)
	Deep River	415	46	364	(303)	5	0	Big Cr. H. (2) Grays R. H. (3)
		2,137	**130**	**1,996**	**(1420)**	**11**	**0**	

Table 10. Stock Composition of the Select Area Commercial Spring Chinook Landings

Stock Component (%)			Snake River			
Year	Fishery	Local	Lower River	Upriver	Total	Wild Impact
1992	Youngs Bay	245 (83%)	44 (15%)	7 (2%)	296	1
1993	Youngs Bay	496 (58%)	343 (40%)	12 (<2%)	851	1
1994	Youngs Bay	128 (82%)	26 (17%)	2 (1%)	156	0
1995	Youngs Bay	187 (93%)	14 (7%)	0 (0%)	201	0
1996	Youngs Bay	705 (89%)	71 (9%)	13(<2%)	789	1
1997	Youngs Bay	1,612 (89%)	189 (10%)	19 (1%)	1,820	1
1998	Youngs Bay	1,920 (90%)	184 (9%)	24 (1%)	2,128	6
	Tongue Point	25 (80%)	3 (10%)	3 (10%)	31	1
	Blind Slough	57 (95%)	3 (5%)	0 (0%)	60	0
		2,002 (90%)	190 (9%)	27 (1%)	2,197	7
1999	Youngs Bay	1,012 (78%)	270 (21%)	16 (1%)	1,298	1
	Tongue Point	167 (84%)	24 (12%)	7 (4%)	198	<1
	Blind Slough	351 (77%)	105 (23%)	2 (<1%)	458	<1
		1,530 (78%)	399 (21%)	25 (1%)	1,954	2
2000	Youngs Bay	3,977 (84%)	703 (15%)	41 (1%)	4,271	3
	Tongue Point	812 (85%)	140 (15%)	6 (<1%)	958	<1
	Blind Slough	726 (89%)	92 (11%)	0 (0%)	818	0
		5,515 (85%)	935 (14%)	47 (<1%)	6,497	3

Table 11. Fall Season Salmon Catch in Select Area Fisheries, 1996-2000.

Year		Youngs Bay	Tongue Point	Blind Slough	Deep *1/* River	Steamboat Slough	Total
1996	Chinook *2/*						
	LRH	110	23	45	47	--	225
	LRW	0	0	0	0	--	0
	BPH	0	0	0	0	--	0
	URB	0	16	0	0	--	16
	SAB	1,366	5	41	3	--	1,415
	Coho	15,783	1,955	2,301	2,240	--	22,279
	Chum	3	0	2	0	--	5
1997	Chinook *2/*						
	LRH	164	86	20	138	--	408
	LRW	0	0	0	0	--	0
	BPH	0	0	0	0	--	0
	URB	4	1	0	0	--	5
	SAB	1,527	93	12	8	--	1,640
	Coho	13,647	861	1,605	515	--	16,628
	Chum	2	1	0	1	--	4
1998	Chinook *2/*						
	LRH	325	152	36	--	--	513
	LRW	0	0	0	--	--	0
	BPH	11	164	0	--	--	175
	URB	26	47	0	--	--	73
	SAB	1,139	74	71	--	--	1,357
	Coho	19,523	3,374	615	--	--	23,512
	Chum	2	1	0	--	--	3
1999	Chinook *2/*						
	LRH	191	111	46	32	--	380
	LRW	0	0	0	0	--	0
	BPH	0	0	0	0	--	0
	URB	17	119	11	0	--	147
	SAB	1,334	52	83	35	--	1,454
	Coho	15,911	3,659	1,958	1,430	--	22,958
	Chum	2	0	0	2	--	4
2000	Chinook *2/*						
	LRH	75	54	1	41	65	236
	LRW	0	0	0	0	0	0
	BPH	110	34	0	0	0	144
	URB	212	141	1	0	2	356
	SAB	1,347	23	132	62	0	1,564
	Coho	33,098	10,731	3,471	13,392	374	61,066
	Chum	3	0	0	1	0	4

1/ In 1998 no season set in Deep River

2/ Chinook stock components from the WDFW fall chinook prediction data base