
PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Yakima [Fish] Screens - Phase 2 - O&M

BPA project number: 9200900

Contract renewal date (mm/yyyy):

10/1999

Multiple actions?

Business name of agency, institution or organization requesting funding

Washington Dept. of Fish & Wildlife, Yakima Screen Shop

Business acronym (if appropriate)

WDFW, YSS

Proposal contact person or principal investigator:

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NPPC Program Measure Number(s) which this project addresses

7.11B.1

FWS/NMFS Biological Opinion Number(s) which this project addresses

NA

Other planning document references

NA

Short description

YSS performs preventative maintenance and operational adjustments on completed Yakima Phase 2 fish screen facilities to assure optimal fish protection performance and to extend facility life, thereby protecting BPA's capital investment.

Target species

spring and fall chinook, steelhead, coho, bull trout, rainbow trout, whitefish

Section 2. Sorting and evaluation

Subbasin

Yakima

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more	If your project fits either of these	Mark one or more categories

caucus	processes, mark one or both	
<input checked="" type="checkbox"/> Anadromous fish <input type="checkbox"/> Resident fish <input type="checkbox"/> Wildlife	<input checked="" type="checkbox"/> Multi-year (milestone-based evaluation) <input type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Watershed councils/model watersheds <input type="checkbox"/> Information dissemination <input checked="" type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input type="checkbox"/> Research & monitoring <input type="checkbox"/> Implementation & management <input type="checkbox"/> Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9107500	Yakima Phase II Screens - Construction (USBR)	Determines number of Phase 2 screen facilities requiring O&M services
9105700	Yakima Phase 2 [Fish] Screen Fabrication (WDFW, YSS)	" " " "
8506200	Evaluate the Effectiveness of Fish Screens (Battelle, PNNL)	Adaptive management feedback from independent research group re: screen O&M procedures and fish protection effectiveness
9503300	O&M of Yakima Fish Protection, Mitigation & Enhancement Facilities (USBR)	Cooperative assistance between YSS and USBR to provide optimal O&M on Yakima Phase 1 and Phase 2 fish screen facilities

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
1998	new O&M sites: Younger, Old Union	Yes--new screens complying with FSOC regional criteria and intensive O&M provide superior protection for juvenile salmonids
1997	new O&M sites: Bull, Ellensburg Mill, Clark, Lindsey, Union Gap	" " " "
1996	new O&M sites: Fruitvale, Naches-Selah, Emerick, Stevens, Anderson	" " " "
1994	new O&M sites: Congdon, Kelly-Lowry	" " " "
1993	new O&M sites: Glead, New Cascade, Holmes, Snipes-Allen, Taylor	" " " "
1992	new O&M sites: Naches-Cowiche, Kiona (now abandoned)	" " " "

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Perform Phase 2 screen O&M necessary to optimize fish protection & extend facility life	a	Perform operational adjustments to minimize screen approach velocity & maximize fish bypass efficiency
		b	perform preventative maintenance and repairs to facility components

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	10/1999	10/2000			100.00%
				Total	100.00%

Schedule constraints

Delays in screen construction caused by water rights uncertainty or property acquisition (easements, fee title, etc.) affects the number of new Phase 2 projects completed each year, and thus the total number of projects requiring O&M services.

Completion date

On-going

Section 5. Budget

FY99 project budget (BPA obligated): \$156,100

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel	field and shop O&M labor costs	%46	61,571
Fringe benefits	@ 31% of labor costs	%14	19,087
Supplies, materials, non-expendable property	includes: metered/non-metered equipment charges; WA sales tax @7.8%	%6	8,537
Operations & maintenance		%0	
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%0	
NEPA costs		%0	
Construction-related support		%0	
PIT tags	# of tags:	%0	
Travel	service vehicle mileage charges	%6	7,800
Indirect costs	YSS indirect costs @ \$300/man-month	%5	6,831
Subcontractor	diversion owner reimbursements for	%6	7,500

	approved O&M services		
Other	Admin. overhead @ 20% of above subtotal	% 17	22,265
TOTAL BPA FY2000 BUDGET REQUEST			\$133,591

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
Individual diversion owners	Routine (daily) O&M services; variable \$ amounts negotiated w/ each owner based on pre-existing annual O&M obligation under state law	%0	0
		%0	
		%0	
		%0	
Total project cost (including BPA portion)			\$133,591

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	\$140,000	\$150,000	\$150,000	\$155,000

Section 6. References

Watershed?	Reference
<input type="checkbox"/>	Bates, K. and R. Fuller. 1992. Salmon fry screen mesh study. Wa. Dept. of Fisheries Rept., Olympia, Washington.
<input type="checkbox"/>	Beecher, H. and G. Engman. 1995. Screen mesh size effectiveness for excluding trout fry from water diversions. Wa. Dept. of Fish & Wildlife Rept., Olympia, Washington.
<input type="checkbox"/>	Blanton, S. L., D. A. Neitzel, and C. S. Abernethy. 1998. Washington Phase II Fish Diversion Screen Evaluations in the Yakima River Basin, 1997. Prepared for the Bonneville Power Administration by Pacific Northwest Laboratory, Richland, Washington.
<input type="checkbox"/>	Eddy, B. R. 1988. Wapatox Canal fish screen facility passage effectiveness evaluation: 1986-87. Pacific Power & Light Co. Rept., Portland, Oregon .
<input type="checkbox"/>	Mueller, R. P., C. S. Abernethy, and D. A. Neitzel. 1995. A fisheries evaluation of the Dryden fish screening facility. 1994 Annual Report. DOE/BP-00029-2, Bonneville Power Administration, Portland, Oregon.
<input type="checkbox"/>	Smith, L. S. and L. T. Carpenter. 1987. Salmonid fry swimming stamina data for diversion screen criteria. Fisheries Research Institute, University of Washington, Seattle, Washington.

PART II - NARRATIVE

Section 7. Abstract

Obsolete fish screens from the 1930's, 40's, 50's and 60's are being replaced or updated under the Yakima Phase 2 fish screen construction program to comply with current, regional fish screen biological protection criteria adopted by CBFWA's Fish Screening Oversight Committee (FSOC) in 1995. The objective of the Phase 2 program is to provide mortality and injury protection

approaching 100% for all species and life stages of anadromous and resident salmonids. Old screens in the Yakima basin may provide fair protection for large (4-6 inch long) yearling smolts, but poor protection for fry and fingerling life stages. Mortality of fry and fingerlings at irrigation diversions may reduce subsequent smolt production and hamper efforts to restore depressed salmon and steelhead populations through natural production or hatchery supplementation. Biological and hydraulic evaluation of completed Phase 2 fish screen facilities by PNNL under Project# 8506200 has quantified survival and guidance rates approaching 100% (range: 90-99%), provided that an adequate, on-going operation and maintenance program is implemented following construction. The main objective of this project is to assure that the potential benefits of BPA's capital investment in fish screens are realized by performing operations that assure optimal fish protection and long facility life through a rigorous preventative maintenance program.

Section 8. Project description

a. Technical and/or scientific background

Survival and fish bypass effectiveness at Yakima Basin fish screens constructed in the 1930's, 40's, 50's, 60's and even as recently as the 1970's, is inadequate to assure that gravity water diversions are not depressing anadromous salmonid egg-to-smolt survival rates. Survival and bypass guidance at Pacific Corps. Wapatox Canal hydropower/irrigation diversion on the Naches R. were quantified by Eddy (1988). This pre-Phase 2 facility (500 cfs, circa 1936) was studied in 1986 and 1987 and shown to guide less than 10 percent (0-7%) of marked, acclimated, hatchery-reared chinook fry (<60 mm FL) safely back to the river. Fingerling (60-90 mm) and yearling smolt size chinook (>90 mm) experienced incrementally better guidance that was clearly size related; 40-60 percent for fingerlings and 70-75 percent for yearlings. Low survival/guidance for small fish was attributed to canal entrainment caused by over-sized screen mesh openings and screen impingement caused by: 1) high approach velocity at the screen face, 2) perpendicular screen orientation relative to canal flow, and 3) poor hydraulic conditions at the fish bypass entrances. This electric-drive, drum screen facility, with an average approach velocity of 1.0 feet/sec (range: 0.8 -1.4 feet/sec) and 0.25 inch screen mesh openings, was designed primarily to protect larger, yearling size fish. These obsolete design criteria are representative of most pre-Phase 2 fish screens in the Yakima Basin and throughout WA. Some paddlewheel-driven drum screens were designed based on a 1.5 feet/sec approach velocity, necessary to provide adequate power to turn the paddlewheel, with total disregard for the biological needs of the fish.

At about the same time as the Wapatox Screen Evaluation Study, the Wash. Dept. of Fisheries (WDF), Dept. of Wildlife and Centralia City Light Dept. contracted with the Univ. of Wash., Fisheries Research Institute to perform laboratory swimming stamina tests of several salmon species including steelhead and resident rainbow trout (Smith and Carpenter, 1987). The research revealed that a design screen approach velocity of 0.4 feet/sec was necessary to protect emergent fry of the weakest species (steelhead, rainbow trout, pink & chum salmon) at low spring-time water temperatures (3-4° C). WDF adopted the 0.4 feet/sec approach velocity criteria in 1988. Oregon Dept. of Fish and Wildlife and NMFS concurred with the findings and also adopted this conservative criteria.

In 1992, WDF conducted research on salmon fry entrainment through various types and sizes of screen material (Bates and Fuller, 1992). The results showed that that mesh openings greater than 0.125 inches allowed entrainment of salmon emergent fry. A similar study performed by Beecher and Engman (1995) testing steelhead and resident rainbow trout fry determined that a 3/32 inch (0.094) criteria was necessary to prevent entrainment of these smaller fry. This conclusion was supported by an evaluation of the Dryden Canal fish screen (Wenatchee R.) in 1994 by the Pacific Northwest National Laboratory (PNNL) (Mueller et al. 1995).

Although the Dryden screen was designed using the 0.4 feet/sec approach velocity criteria, it was constructed in 1993 using the then applicable 0.125 inch mesh opening criteria. PNNL found that 6 percent of wild summer chinook fry and in excess of 40 percent of rainbow trout were entrained through the profile bar screen.

Together these studies represent the scientific basis for the current regional fish screening criteria adopted in 1995 by NMFS and the WA, OR and ID fish screening programs (the principal regulatory agencies on the Columbia Basin Fish & Wildlife Authority's Fish Screening Oversight Comm.).

On-going evaluations conducted under Proj# 8506200 by PNNL confirm that Yakima Phase 2 fish screens constructed to the current criteria and properly operated and maintained, protect fry from injury/mortality and achieve high bypass guidance rates.

b. Rationale and significance to Regional Programs

The NPPC and BPA have made substantial investments in Yakima Basin anadromous fish recovery. These investments are considered Aoff-site≡ mitigation for habitat losses elsewhere in the Columbia River and are predicated on the fact that substantial wild salmon production potential still exists because large amounts of accessible, high quality spawning and rearing habitat still exists in parts of the basin. The Yakima/Klickitat Fisheries Project (YKFP) experimental supplementation facilities are the latest major investment of the FWP. The objective of the YKFP is to supplement and enhance recovery of naturally-produced salmon and steelhead. Improved juvenile fish survival at Yakima Basin gravity water diversions is widely believed to be important in improving overall egg-to-smolt survival of critically depressed stocks of naturally-produced spring chinook, fall chinook and steelhead. This also applies to the progeny of future returning adult YKFP supplementation fish that will naturally reproduce on the spawning grounds. Completion of the Phase 2 fish screen construction program, and on-going preventative screen maintenance addressed by Proj.# 9200900, are complementary Ainfrastructure≡ investments intended to safeguard and enhance the other FWP anadromous fish recovery investments in the basin.

c. Relationships to other projects

Annual O&M expenditures are linked to progress in completing new Phase 2 screen facilities. Site completions depend on Proj.# 9107500, Yakima Phase 2 screen civil works construction managed by the Bureau of Reclamation (USBR) and Proj# 9105700, screen fabrication (metalwork) performed by WDFW-YSS. Despite construction delays, new projects are being added each year which result in additional O&M responsibilities and costs.

Completed projects are periodically evaluated by fishery scientists from the Pacific Northwest Labs (PNNL) under Project# 8506200. Independent evaluation, both hydraulic and biological, by an independent third party not directly involved in screen construction or O&M, provides valuable Aadaptive management feedback≡ used by YSS, USBR and the Passage TWG to improve screen fabrication and O&M procedures with the objective of providing optimum protection of juvenile salmonids at gravity water diversions (see Blanton et al. 1998 in Project History, Sec. 8.d.).

In 1999, the BPA-funded Yakima/Klickitat Fisheries Project (YKFP) hatchery supplementation program (Proj.# 9701300) will begin releasing experimental and control groups of spring chinook salmon smolts from acclimation/release ponds. YKFP experiments and fish production will benefit from a rigorous O&M program for completed Phase 2 screen projects by reducing injury, delay and mortality of hatchery smolts.

d. Project history (for ongoing projects)

Since FY93, YSS has performed preventative maintenance and major repairs on the majority of Phase 2 fish screen facilities. Through FY99, cumulative costs total \$586,049. Currently, YSS is responsible for 26 sites (FY99) with two additional YSS-assigned sites going operation in FY2000. Remaining sites are Bureau of Reclamation (USBR) responsibility. Duties also include acting as BPA's local liaison with the diversion owners. WDFW monitors and verifies diversion owner performed "routine" maintenance eligible for BPA reimbursement and processes claims for payment (\$7,500 budget allotment in FY2000).

Quarterly or semi-annual progress reports document work performed at each screen facility. The reports summarize the number of site visits, man-hours worked and significant events or accomplishments during the report period. Progress reports 1 through 13 are available from the YSS project leader on request and will also be available for downloading from the WDFW fish passage/fish screening web page in early 1999 (see Sec. 10). Progress reports are available for the following time periods: #1: 5/93 - 8/93; #2: 9/93 - 12/93; #3: 1/94 - 5/94; #4: 6/94 - 12/94; #5: 1/95 - 6/95; #6: 7/95 - 12/95; #7: 1/96 - 6/96; #8: 7/96 - 12/96; #9: 1/97 - 6/97; #10: 7/97 - 12/97; #11: 1/98 - 3/98; #12: 4/98 - 6/98; #13: 7/98 - 9/98.

PNNL's comprehensive evaluation of nineteen Phase 2 screens in 1997 (Blanton et al. 1998) generally showed that screens were being well maintained and that fish would not be impinged or experience delays in returning to the river via the bypass system. A few sites developed small gaps in side or bottom seals during the season, although every facility was checked for tight seals "in the dry" before watering up in the spring. This potential problem was discovered using underwater video equipment (YSS is now equipped with this technology). The videotapes also revealed that rotating drum screens are more prone to submerged, woody debris accumulation which may result in seal damage and attracts predatory fish that may prey on target juvenile salmonids. The authors recommended in-season periodic removal of woody debris, based on underwater video monitoring, to prevent these problems.

PNNL's 1997 evaluation also included extensive approach and sweeping velocity measurements using a bi-directional flow meter. The measurements confirmed an unproven assumption--- that flat plate screens equipped with vertical louver flow porosity baffles generally exhibit superior hydraulic conditions compared to drum screens. Flat plate screen approach and sweeping velocities were more likely to be within criteria and uniform across the entire screen surface. Good hydraulic conditions are critical to successful fry impingement protection. These results are being used by the Yakima Passage TWG in selecting screen type for pending sites.

e. **Proposal objectives**

YSS will perform biologically-oriented screen/fish bypass operations and preventative maintenance services for the following Phase 2 facilities projected to be operational in FY2000 (includes site name, brief description of facility, date of first operation):

- 1) **Naches-Cowiche:** 2 - 5' x 12' Electric Drums (ED); 4/92
- 2) **Gleed:** 4 - 6.5'(wide) x 10' Traveling Belt (TB); 4/93
- 3) **New Cascade:** 8 - 6.5' x 10' ED; 4/93
- 4) **Holmes:** 1 - 2' x 4' Portable, Paddlewheel Drum (PD); 4/93
- 5) **Snipes & Allen:** 2 - 4' x 12' ED; 4/93

- 6) **Taylor:** 2 - 2.5' x 8' ED; 10/93
- 7) **Congdon:** 3 - 4' x 12' ED; 4/94
- 8) **Kelly-Lowry:** 2 - 4' x 12' ED; 4/94
- 9) **Fruitvale:** vertical flat plate w/ cleaner; 4/96
- 10) **Naches-Selah:** vertical flat plate w/ cleaner; 4/96
- 11) **Emerick:** 1 - 2' x 4' Portable, PD; 5/96
- 12) **Stevens:** 1 - 2' x 4' PD; 6/96
- 13) **Anderson:** 1 - 2.5' x 4' Portable, PD; 10/96
- 14) **Bull:** vertical flat plate w/ cleaner; 4/97
- 15) **Ellensburg Mill:** vertical flat plate w/ cleaner; 4/97
- 16) **Clark:** 1 - 3' x 8' PD; 4/97
- 17) **Lindsey:** 1 - 3' x 12' ED; 4/97
- 18) **Union Gap:** vertical flat plate w/ cleaner; 4/97
- 19) **Old Union:** vertical flat plate w/ cleaner; 4/98
- 20) **Younger:** vertical flat plate w/ cleaner; 4/98
- 21) **Johncox:** 2 - 3.0' x 10' ED; 4/99
- 22) **Ballard:** 1 - 2.5' x 6' Portable, PD; 7/99
- 23) **Musetti:** 1 - 2.5' x 6' Portable, PD; 7/99
- 24) **Chapman-Nelson:** 1 - 2.0' x 6' Portable, PD; 8/99
- 25) **Big Creek:** 2 - 1 cfs PW, rotary wiper flat plate screens; 8/99
- 26) **Fogarty:** 3 - 3.0' x 10' ED; 4/00
- 27) **Selah-Moxee:** vertical flat plate w/ cleaner; 4/00
- 28) **Moxee-Hubbard:** vertical flat plate w/ cleaner; 4/00

In addition, quarterly progress reports detailing O&M activities at each site in narrative form will be prepared and submitted to BPA's project technical representative (COTR) and posted on the WDFW fish passage/fish screening web page.

f. Methods

YSS uses current, state-of-the-art equipment, methods and materials to operate and maintain Phase 2 fish screen facilities to provide optimal fish protection and long

equipment service life. As an example, underwater video equipment purchased for this project is used to check side and bottom seals and for submerged debris that can cause seal problems. "Real time" monitoring during the irrigation season was not possible until this technology became available.

g. Facilities and equipment

WDFW's Yakima Screen Shop is a fully-equipped and staffed metal fabrication and fish screen repair shop with the capability to build nearly anything out of mild steel, stainless steel or aluminum. The acquisition of high-production fabrication equipment with previous BPA and state funding and the hiring of highly skilled metal fabricators has allowed the mission of the YSS to expand from primarily O&M of existing fish screens (prior to 1985) to include "production-level" fabrication of new rotating drum, traveling belt and flat plat fish screens. In addition to adequate shop space and equipment, the program has a new, state-purchased 12-1/2 ton boom truck, a back-hoe, 2 - 10 yd. dump trucks, assorted trailers and other equipment necessary for a wide variety of field O&M activities. A heavy duty (3-ton), 4WD service truck with a walk-in, enclosed utility bed capable of carrying all tools, equipment and materials needed to perform any type of Phase 2 screen installation/field maintenance was budgeted and approved for purchase under this project in FY1999. The purchase order has been submitted and YSS anticipates delivery in the second quarter of 1999.

h. Budget

The FY2000 budget request is \$22,509 less than FY99 because there are no major capital equipment purchases this year. In FY99, a one-time request of \$34,000 was approved to purchase a Phase 2 O&M 4WD service truck with walk-in utility box. The budget does reflect the addition of two, relatively large facilities to the list of screens being serviced. Seventy-eight percent (78%) of the budget will be used to provide on-the-ground O&M services; overhead accounts for 22% of the budget (5% YSS; 17% WDFW Admin. O/H).

Section 9. Key personnel

John A. Easterbrooks, WDFW Fish Screening Program Manager/Fish Biologist

2 man-weeks/yr

Duties: Periodic Phase 2 screen facility site visits to assess O&M procedures from a biological perspective; annual project proposal and outyear budgeting.

Resume: John Easterbrooks has been the manager of the WDFW Fish Screening Program since 1983. The program designs, fabricates (metalwork), constructs (civil works), modifies, inspects, operates and maintains fish passage and protection facilities at surface water diversionsXprimarily in anadromous fish areas of the Columbia Basin. Mr. Easterbrooks has expertise in the design, operation, maintenance and hydraulic/biological evaluation of all types of fish passage/protection facilities. Mr. Easterbrooks has provided project oversight for BPA-funded, YSS screen fabrication beginning in 1984 with the Yakima Phase 1 fish passage construction program and continuing with Yakima Phase 2 in 1992. Mr. Easterbrooks represents WDFW on the Yakima Basin Passage Technical Work Group (Passage TWG) and CBFWA=s regional Fish Screening Oversight Committee (FSOC). Both groups are charged with implementing fish passage/screening construction programs critical to restoration of Columbia River salmon and steelhead. Mr. Easterbrooks holds a B.S. degree in Wildlife Management from the Univ. of Maine (1974), and an M.S. degree in Fishery Resources from the Univ. of Idaho (1981).

Patrick C. Schille, Construction & Maintenance Superintendent

8 man-weeks/yr

Duties: Project estimator and detailed budget preparation, project cost tracking, field O&M personnel supervisor, periodic site visits to assess O&M procedures from a mechanical perspective.

Resume: Pat Schille has 10 years of combined experience as a fish screen fabricator and supervisor at the YSS. Mr. Schille was the first welder/fabricator hired specifically to work on BPA-funded screen projects in 1987 (Yakima Phase 1). Pat has 20 years of fabrication experience and 8 years in a supervisory capacity. Technical training includes: fabrication layout, advanced welding, blueprint reading, applied hydraulics, personnel management, project estimation and management, personal computer training (word processor and spreadsheet).

Jose (Joe) Molano, Sr., Plant Mechanic

20 man-weeks/yr

Duties: Field and shop O&M of upper Yakima Basin (Kittitas Valley) Phase 2 screen facilities (9 sites).

Resume: Joe Molano has 17 years experience in screen maintenance and fabrication at the YSS. Qualifications and/or training include: fabrication layout, welding, blueprint reading, basic electrical wiring and motor repair, heavy equipment operation (trucks, backhoes, boom trucks, etc.). Joe holds a Class A Commercial Drivers License (CDL) necessary for heavy equipment operation on the road.

Bill Werst, Plant Mechanic

16 man-weeks/yr

Duties: Field and shop O&M of lower Yakima R. and Naches R. Phase 2 screen facilities (19 sites).

Resume: Bill Werst has 23 years experience in construction and maintenance trades, including 10 years of fabrication and O&M experience with the YSS. Bill was a pipe fitter and quality control inspector at the Hanford Nuclear Reservation for 7 years prior to coming to the YSS. Qualifications and/or training include: fabrication layout, welding, blueprint reading, basic electrical wiring and motor repair, heavy equipment operation (trucks, backhoes, boom trucks, etc.). Bill holds a Class A Commercial Drivers License (CDL) necessary for heavy equipment operation on the road.

Section 10. Information/technology transfer

YSS is constantly looking for ways to enhance screen quality, durability and fish protection effectiveness -- both from a fabrication and long-term O&M perspective. YSS is particularly interested in refinements in: 1) rotating drum and traveling belt screen [fish] seals and drive systems, and 2) active cleaning systems for fixed plate screens.

R&D innovations are shared with USBR, NMFS, ODFW, IF&G and anyone requesting technical assistance or advice concerning fish screening. Shop sketches and/or detailed engineering drawings are provided on request. YSS technical information exchange capability improved dramatically in 1998 with the combination of full AutoCAD capability and e-mail. Two-way transmission of AutoCad drawings via the Internet is now the standard for information exchange. Another recent development to foster information exchange is the addition of a fish passage/fish screening web page to the WDFW site: <http://www.wa.gov/wdfw/hab/engineer/habeng.htm> . Technical documents, including Phase 2 O&M quarterly or semi-annual progress reports for this project, and fabrication AutoCad drawings of general interest to fish screening practitioners will be added to the web page in 1999.

New developments are also shared between the WA, OR, ID screening program coordinators at AFish Screening Oversight Committee≡ (FSOC) meetings (FSOC is a standing CBFWA committee). In addition, improved fish screening technology is shared among the Ahands-on≡ fabrication and O&M personnel of the state and federal agencies and tribes at the Pacific Northwest Fish Screening Fabrication, Operation & Maintenance Workshop held annually since 1992. This workshop is co-sponsored by BPA & CBFWA (FSOC) and hosted by the three state screening programs on a

revolving basis. In 1999, FSOC is planning to extend the workshop to California to exchange ideas and information with USBR, CA F&G, NMFS and others working on Sacramento-San Joaquin Basin fish screening and salmonid recovery.

Congratulations!