

Pacific Coastal Salmon Recovery Fund: Program Evaluation

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1. INTRODUCTION

This report provides a program evaluation of the Pacific Coastal Salmon Recovery Fund (PCSRF) at the program's six year mark. The purpose of the evaluation is to examine the extent to which PCSRF is on track to achieve its long term outcome of ensuring the sustainability of Pacific salmon by restoring endangered and threatened salmon and preventing depletion of healthy salmon populations.

Because the program has not been in existence long enough to judge program outcomes in terms of effects on salmon populations, this evaluation examines program outputs thought to be linked to those outcomes. The evaluation is separated into five parts corresponding to five program categories or sets of categories¹: habitat restoration, protection, access, and quality; watershed planning and assessment and recovery planning and implementation; salmon enhancement and harvest management; research, monitoring, and evaluation; and outreach, education, and technical assistance. The report also includes a section on how the program can position itself to undertake a more thorough outcome-oriented evaluation of program effectiveness in the future.

Available data indicate that many PCSRF investments are producing the intended programmatic outputs and are therefore contributing to the program's long-term goal of ensuring the sustainability of Pacific salmon. Available data also indicate, however, that there is significant work to do to refocus some current activities and pursue future activities. Equally important, there are a number of areas in which the program cannot, at this time, be evaluated because of a lack of information and data. This evaluation provides a number of recommendations regarding additional information collection.

The report begins with a discussion of evaluation methodology and describes the rationale for the approach taken for this assessment. The report then proceeds through each of the program categories or sets of categories, answering key evaluation questions and identifying recommendations related to program outputs and information collection. This discussion is followed by a discussion of how to leverage program activities to put PCSRF in a position to do an outcome-oriented evaluation in the future. The report ends with a summary of conclusions and recommendations.

2. EVALUATION METHODOLOGY

There are a number of different approaches for conducting program evaluations. One type of evaluation—impact evaluation—is favored by the Office of Management and Budget (OMB) through its Program Assessment and Rating Tool (PART). OMB expects that all federal

¹ Program categories are identified in the PCSRF performance measures framework and are grouped in this report as follows: 1) "habitat restoration, protection, access, and quality" includes categories habitat restoration, habitat protections, habitat access, water quality, and water quantity; 2) "watershed and planning and assessment and recovery planning and implementation" includes the category watershed planning and assessment and the category recovery plans and implementation; and 3) "salmon enhancement and harvest management" includes categories hatcheries/enhancement and harvest management. "Research, monitoring, and evaluation" and "Outreach, education, and technical assistance," as used in this report, refer to categories of the same names in the performance measures framework.

programs, including PCSRF, can ultimately undergo such an evaluation. Impact evaluations focus on the extent to which a program has met the outcomes identified in its mission and long-term goals. Impacts are measured as program outcomes that would otherwise not have occurred without program intervention; this implies an evaluation approach that compares outcomes in the presence of the program with a counter-factual or control group that is unaffected by the program. In the case of PCSRF, an evaluation of this type would ideally measure the extent to which the program has contributed to “overall sustainability of Pacific salmon” compared to a situation in which the program doesn’t exist.

There are many factors that make an impact evaluation consistent with the model described above difficult for PCSRF, including:

- Given the salmon lifecycle, most salmon populations that may have been affected in their early lifecycle by habitat restoration efforts have not yet returned to spawning streams, meaning that the effects on salmon populations can’t be measured and that current population and trend data are not highly related to PCSRF activities;
- Leading indicators at the ESU level that correlate with anticipated returning salmon populations (e.g., an indicator of habitat condition) are not available;
- Many types of projects—such as those focused on education and outreach—have effects that are diffuse (e.g., posited to affect many populations) and effective only over the long term; and
- Measuring all of the factors that affect salmon populations—both in areas affected by the program and in control areas—is extremely data intensive, and much of these data do not currently exist. The science needed to identify and analyze these measures is still very much in development.

Given these realities, the approach taken for this evaluation focuses on program outputs rather than outcomes. However, where possible, outputs were selected based on whether there was credible evidence that they will ultimately be linked to long-term sustainability outcomes. For example, the evaluation of habitat restoration projects focused on the extent to which projects addressed “Major Habitat Limiting Factors,” which have been identified by substantial scientific assessments as being critical to recovering salmon populations.

To cover all aspects of the program, evaluation questions and metrics were developed for the following program categories or sets of categories:

- Habitat Restoration, Protection, Access, and Quality;
- Watershed Planning and Assessment and Recovery Planning and Implementation;
- Salmon Enhancement and Harvest Management;
- Research, Monitoring, and Evaluation; and
- Outreach, Education, and Technical Assistance.

The evaluation approach is summarized in Table 1. The ability to actually assess the extent to which PCSRF has accomplished its goals for each category or set of categories—or is likely to accomplish them—varied widely. Data for the assessment came primarily from the PCSRF database, reports to Congress, and supplemental materials provided by PCSRF grantees.

Table 1: Summary of PCSRF Output-Oriented Evaluation Approach by Category or Set of Categories

Category or Set of Categories	Evaluation Questions	Metric	Units of Analysis
Habitat Restoration, Protection, Access, and Quality	To what extent are PCSRF habitat projects addressing the highest priority habitat limiting factors in each ESU/DPS?	The percent of habitat projects, by ESU/DPS, that involve activities related to "Major Habitat Limiting Factors" (MHLF) as identified for each ESU/DPS in the PCSRF performance measurement framework.	ESU/DPS
Watershed Planning and Assessment and Recovery Planning and Implementation	Have PCSRF planning and assessment activities been sufficient to identify major habitat limiting factors for each ESU/DPS in which there are listed species?	Presence or absence of identified major habitat limiting factors	ESU/DPS
	To what extent have PCSRF planning and assessment activities been sufficient to develop draft recovery plans that satisfy ESA requirements?	Presence of a draft recovery plan that satisfies ESA requirements?	ESU/DPS+
Salmon Enhancement and Harvest Management	To what extent are PCSRF salmon enhancement and harvest management projects addressing the highest priority salmon enhancement and harvest management needs?	Metric not available because salmon enhancement and harvest management activities have not been prioritized.	Grantee
Research, Monitoring, and Evaluation	Does monitoring account for at least 10% of total funding?	% of PCSRF funds for monitoring projects.	Grantee
	Is a "comprehensive monitoring program" in place that is sufficient to provide answers to questions about the state of salmon populations and what is affecting them (including program interventions)?	The presence of monitoring programs that comprehensively measure salmon outcomes (e.g., populations, habitat quality).	Recovery Domain
Outreach, Education, and Technical Assistance	To what extent are PCSRF outreach, education, and technical assistance projects going to the highest priority outreach, education, and technical assistance needs?	Metric not available because outreach, education, and technical assistance activities have not been prioritized.	Grantee
	Are the majority of outreach, education, and technical assistance activities effective?	Evaluated outreach, education, and technical assistance activities that have been deemed effective divided by total number of evaluated outreach, education, and technical assistance activities.	Grantee

Note: Listed salmon populations are identified as evolutionarily significant units (ESUs) or distinct population segments (DPS) in the case of steelhead (hereafter, these are referred to as ESU/DPS).

3. PCSRF ASSESSMENT AND RECOMMENDATIONS

The following sections describe the evaluation approach for each of five program categories or sets of categories and the related results. Because the evaluation is focused largely on program outputs, it is important to note up front some characteristics of the program that affect the nature and distribution of outputs. These are:

- Alaska does not have listed species of salmon in the state's watersheds and therefore does not undertake the planning, habitat restoration, and other activities pursuant to the Endangered Species Act. Instead, Alaska focuses on salmon enhancement and harvest management and other activities intended to maintain healthy salmon populations and sustainable harvests.
- Oregon Coast Coho have recently been de-listed, meaning that they are no longer a focus for planning, restoration, or other ESA-related activities; this former Recovery Domain is now referred to as a "Restoration Area" (for ease of explication, it is still included in tables in this report under the heading of "Recovery Domains").
- One of California's Recovery Domains, the Central Valley, receives no PCSRF funding (in accordance with the Memorandum of Understanding with California) because of the availability of funding from CalFed, another federal program. Although it is included in tables in this document, no conclusions are made about the Central Valley Recovery Domain.
- Idaho only began receiving PCSRF funds in 2004.

When these issues affect conclusions of this report, it is noted in the text.

Habitat Restoration, Protection, Access, and Quality

The evaluation of habitat restoration, protection, access, and quality activities focused on the following question:

- To what extent are PCSRF habitat projects addressing the highest priority habitat limiting factors in each ESU/DPS²?

The metric used to answer this question was the percent of total habitat projects, by ESU/DPS, that involve activities related to "Major Habitat Limiting Factors" (MHLFs) for each ESU/DPS as identified in the PCSRF performance measures framework. The MHLFs have been identified through scientific assessments as being the main factors affecting salmon recovery in each area. Data for this portion of the evaluation come from the 1,088 habitat projects undertaken in 2003 and 2004 as identified in the PCSRF database.

In order to identify which MHLFs are addressed for each project, it was necessary to extrapolate from project-level data regarding the type of habitat project³ and use the performance measures framework to link habitat project types to MHLFs.⁴ It should be noted that this approach is likely

² There are two different names and acronyms used in this paper for "limiting factors." They are Major Habitat Limiting Factor (MHLF) as identified in the PCSRF performance measures framework and Limiting Factors (LF), which are identified in the PCSRF database.

³ Habitat project types are: instream habitat, instream flow, fish passage, fish screening, upland habitat, riparian habitat, wetland habitat, estuarine habitat, land acquisition, and water quality.

⁴ Specifically, the analysis involved the following steps: 1) All habitat projects for 2003 and 2004 were identified for each ESU/DPS based on project work sites; if a project spanned two (or more) ESUs, it was counted for each (all) ESU/DPS. 2) Each project was classified by type of project (e.g., instream habitat,

to overestimate the extent to which actual projects address the MHLFs identified for their ESUs/DPSs. Some project types are very general (e.g., instream habitat projects) and are linked to multiple MHLFs. Actual projects may not be addressing all of the MHLFs identified. This issue is compounded by the fact that individual projects are often identified as being of multiple project types. In spite of these characteristics, the approach taken here is somewhat more transparent than an alternative approach based on Limiting Factors entered in the PCSRF database by grantee and project staff.⁵

Table 2 summarizes the results of the assessment of habitat projects by ESU/DPS. For ESUs in which there were at least 5 projects undertaken in 2003 and 2004, between 17% and 100% of the projects in a given ESU/DPS were of a type linked to one or more MHLFs for that ESU/DPS. In five of these ESU/DPS's, less than half of the projects were linked to MHLFs and in another 5 of these ESUs, more than 90% of projects were linked to MHLFs. Weighted by the number of projects in a particular ESU/DPS, the average percent of projects linked to MHLFs was 73%.⁶

Table 2: Habitat Projects Addressing Relevant MHLFs for each ESU/DPS (2003-2004)

Recovery Domain	ESU/DPS	No. of Projects in ESU/DPS	No. of Projects Linked to at Least One ESU/DPS MHLF	% Projects Linked to MHLF
Puget Sound	Puget Sound Chinook	87	41	47%
	<i>Ozette Lake Sockeye</i>	2	2	100%
	Hood Canal Summer Chum	18	3	17%
Willamette/ Lower Columbia	Columbia River Chum	29	20	69%
	Upper Willamette River Chinook	51	33	65%
	Lower Columbia River Chinook	42	27	64%
	<i>Lower Columbia River Steelhead</i>	0	--	--
	<i>Upper Willamette River Steelhead</i>	1	1	100%
Interior Columbia	Middle Columbia River Steelhead	125	86	69%
	<i>Snake River Sockeye</i>	1	0	0
	<i>Snake River Fall Chinook</i>	2	0	0
	Snake River Spring/Summer Chinook	33	14	42%
	Snake River Steelhead	36	16	44%
	Upper Columbia River Spring Chinook	15	8	53%
	Upper Columbia River Steelhead	17	6	35%
Oregon Coast	Oregon Coast Coho	99	65	65%
Southern Oregon/ Northern California Coast	Southern Oregon/Northern California Coast Coho	115	106	92%
North-Central California Coast	California Coast Chinook	95	92	97%
	Northern California Steelhead	80	77	96%

etc.). If any worksite for a project involved a project of "type X", then the whole project was classified as a project of "type X". Individual projects could be identified with many project types. 3) Project types were linked to MHLFs for each Recovery Domain using the PCSRF performance measures template. 4) The number of projects addressing any MHLF for an ESU/DPS was calculated and compared with the total number of projects for that ESU/DPS.

⁵ Project-level information included in the PCSRF database is intended to identify the Limiting Factors (LF) that will be addressed by a given project. Several problems exist with these data, however, including inconsistent data entry and data gaps, an incentive to identify limiting factors when entering project data and inconsistencies between the LFs identified in the PCSRF database and the MHLF in the PCSRF performance measures framework.

⁶ This number was arrived at by taking the percent of projects linked to an MHLF in each ESU/DPS, multiplying it by a weighting factors ([number of projects in ESU/DPS] / [sum of all projects in ESUs/DPSs]), and adding the weighted percentages.

Recovery Domain	ESU/DPS	No. of Projects in ESU/DPS	No. of Projects Linked to at Least One ESU/DPS MHLF	% Projects Linked to MHLF
	<i>Central California Coast Steelhead</i>	0	--	--
	Central California Coast Coho	50	50	100%
Central Valley	<i>Central Valley Spring Chinook</i>	0	--	--
	<i>Sacramento River Winter Chinook</i>	0	--	--
	<i>Central Valley Steelhead</i>	0	--	--
South-Central/ Southern California Coast	South-Central California Coast Steelhead	6	5	83%
	Southern California Coast Steelhead	16	16	100%

Note: Results for ESUs with less than five projects in 2003 and 2004 are in italics. Data comes from information provided by NOAA on 3/21/06 as modified by data received from NOAA on 3/23/06.

These results need to be interpreted with caution. On the one hand, a high percentage may mean that projects are being effectively targeted to the habitat limiting factors that are most important in a given area. On the other hand, a high percentage may also mean that many MHLFs have been identified for a particular ESU/DPS and any given project, then, is likely to address at least one of the MHLFs.⁷ In short, it is easier to target projects to any given problem if there are many problems to address. This is particularly true when many projects in an ESU/DPS are identified as “instream habitat projects” which are linked to many MHLFs.

It should also be noted that 420 out of the 1,088 habitat projects analyzed did not have a designated ESU/DPS in the PCSRF database and 403 of these did not have a Recovery Domain. According to NOAA staff, some of these projects are not identified with an ESU/DPS because they don't have good location data⁸ and some are so large that they can't be associated with any given location; the reasons that other projects are not identified with an ESU/DPS or Recovery Domain were not available for this assessment.

The analysis of habitat restoration projects could be substantially improved by better linking individual projects to habitat limiting factors in the PCSRF database. The analysis could be further refined by identifying the relative importance of each habitat limiting factor for each ESU/DPS, if possible. Ranking of MHLFs would help refine whether projects are focused on the key priorities for each ESU/DPS. It may be that limiting factors are linked in such a way that they are all equally important for recovery within an ESU/DPS. In this case, greater granularity of limiting factors (e.g., to watersheds)—as well as the work sites of particular projects—would be required to refine the analysis.

Summary of Conclusions and Recommendations

Assuming that the assessment linking projects to MHLFs is an accurate depiction of how well projects are targeted to the problems in each ESU/DPS, some areas are being targeted well and others need substantial work, particularly given that the percentage is likely to be overestimated due to the methodology used here. Although there is no threshold for what percentage of habitat projects *should* address MHLFs in a given area, the program should explain why some habitat projects do not address priority MHLFs in the ESA-listed ESUs/DPSs.

⁷ There is some statistical evidence for the conclusion that a high percentage of projects linked to MHLFs derives from having identified many MHLFs from an ESU/DPA. For ESUs/DPSs in which more than five projects were undertaken, the correlation between the percentage in the right column of Table 2 and the number of MHLFs was 0.69.

⁸ For the 2003 and 2004 habitat projects, 26 don't have location data sufficient to identify them with a particular ESU/DPS or Recovery Domain (communication with Brendan Sylvander, NOAA, 3/21/06).

Watershed Planning and Assessment and Recovery Planning and Implementation

The evaluation of watershed planning and assessment and recovery planning and implementation activities focused on the following questions:

- Have PCSRF planning and assessment activities been sufficient to identify major habitat limiting factors for each ESU/DPS?
- To what extent have PCSRF planning and assessment activities allowed the development of draft recovery plans that satisfy ESA requirements?

The metric used to answer the first question is the presence or absence of identified MHLFs for each ESU/DPS. As shown in Table 3, MHLFs have been identified for all ESUs/DPSs as documented in the PCSRF performance measurement framework.⁹

The metric used to answer the second question is the presence of draft recovery plans that satisfy ESA requirements. Under the ESA, NMFS is required to develop recovery plans for listed species. These recovery plans are intended to identify actions needed “‘for the conservation and survival’ of threatened and endangered species to the point that they no longer need the Act’s protection.” Recovery plans are often locally developed, with input from Technical Recovery Teams, and they require NMFS approval. To gain NMFS approval, the ESA requires that plans must include the following:

- Objective, measurable criteria which, when met, would result in a determination that the species is no longer threatened or endangered¹⁰;
- Site-specific management actions necessary to achieve the plan’s goals; and
- Estimates of the time required and the costs to implement recovery actions.

NMFS generally adds a supplement to locally developed plans that documents how the plan meets these criteria and notes any necessary additions or qualifications.

NMFS approves two types of plans as meeting ESA criteria:

- Proposed ESA Recovery Plan, which covers an entire ESU/DPS .
- Interim Regional ESA Recovery Plan, which covers a portion of an ESU/DPS.

Table 3 documents the presence or absence of these types of plans for each of the PCSRF ESUs/DPSs and provides other information on the status of plan development. Of the 26 ESU/DPS’s, one has a Proposed ESA Recovery Plan regarded by NMFS as meeting ESA requirements. An additional eight ESUs/DPSs have completed draft or final Interim Regional ESA Recovery Plans, covering a portion of each ESA, that are regarded by NMFS as meeting ESA requirements. One additional ESU—Oregon Coastal Coho—is no longer listed and another three ESUs—all in the Central Valley Recovery Domain—don’t receive PCSRF funds. The remaining 13 ESUs/DPSs still need ESA-consistent recovery plans. Of these, some have state plans or strategies in place and some do not.

⁹ The 2006 Report to Congress identifies an additional ESU, Lower Columbia River Coho ESU, which is not in the performance measurement framework. No MHLFs have been identified for this ESU, and it does not have a recovery plan.

¹⁰ These “category or set of categories, measurable criteria,” according to the ESA, are based on: 1) the present or threatened destruction, modification, or curtailment of [a species] habitat or range, 2) over-utilization for commercial, recreational, scientific or educational purposes; 3) disease or predation; 4) the inadequacy of existing regulatory mechanisms, and/or 5) other natural or manmade factors affecting its continued existence.

Table 3: Recovery Plans by Recovery Domain

Recovery Domain	ESU/DPS	MHLFs ID'ed?	Recovery Plan Status	NMFS approved plan that meets ESA Requirements? ¹¹
Puget Sound	Puget Sound Chinook	Yes	Proposed ESA Recovery Plan completed. Final expected in June 2006	Yes
	Ozette Lake Sockeye	Yes	Draft Interim Regional ESA Recovery Plan being developed. Not yet completed (status=initial draft)	No
	Hood Canal Summer Chum	Yes	Draft Interim Regional ESA Recovery Plan being developed. Not yet completed (status=initial draft)	No
Willamette/ Lower Columbia	Columbia River Chum	Yes	Final Interim Regional ESA Recovery Plan completed (Washington management unit only; OR expected in late 2006)	Partial
	Upper Willamette River Chinook	Yes	In development—expected mid 2007	No
	Lower Columbia River Chinook	Yes	Final Interim Regional ESA Recovery Plan completed (Washington management unit only; OR expected in late 2006)	Partial
	Lower Columbia River Steelhead	Yes	Final Interim Regional ESA Recovery Plan completed (Washington management unit only; OR expected in late 2006)	Partial
	Upper Willamette River Steelhead	Yes	In development—expected mid 2007	No
Interior Columbia	Middle Columbia River Steelhead	Yes	Draft Interim Regional ESA Recovery Plan completed. Final interim plan being developed. (Eastern Washington Lower Snake Management Unit only)	Partial
	Snake River Sockeye	Yes	Draft Interim Regional ESA Recovery Plan completed. Final interim plan being developed. (Eastern Washington Lower Snake Management Unit only)	Partial
	Snake River Fall Chinook	Yes	Draft Interim Regional ESA Recovery Plan completed. Final interim plan being developed. (Eastern Washington Lower Snake Management Unit only)	Partial
	Snake River Spring/Summer Chinook	Yes	Draft Interim Regional ESA Recovery Plan completed. Final interim plan being developed. (Eastern Washington Lower Snake Management Unit only)	Partial
	Snake River Steelhead	Yes	Draft Interim Regional ESA Recovery Plan completed. Final interim plan being developed. (Eastern Washington Lower Snake Management Unit only)	Partial
	Upper Columbia River Spring Chinook	Yes	Draft Interim Regional ESA Recovery Plan being developed. Not yet completed (status=initial draft)	No
	Upper Columbia	Yes	Draft Interim Regional ESA Recovery Plan being developed. Not yet completed	No

¹¹ “Yes” means that a Proposed ESA Recovery Plan has been approved by NMFS as meeting ESA requirements. “Partial” means that a Draft or Final Interim Regional ESA Recovery Plan has been approved by NMFS as meeting ESA requirements.

	River Steelhead		(status=initial draft)	
Oregon Coast	Oregon Coast Coho	Yes	A state plan has been developed (Oregon Coast Coho Plan). However, a 2001 District Court ruling (the Alsea decision) removed ESA legal protection for the Oregon Coast Coho ESU in March 2004 and NMFS announced in January 2006 that the ESU is not warranted for listing under the ESA. ¹²	N/A
Southern Oregon/ Northern California Coast	Southern Oregon/Northern California Coast Coho	Yes	A state plan has been developed and published in 2004 (California Coho Recovery Strategy) ¹³	No
North-Central California Coast	California Coast Chinook	Yes	No NMFS-approved plan (detailed information not available for this assessment).	No
	Northern California Steelhead	Yes	No NMFS-approved plan (detailed information not available for this assessment).	No
	Central California Coast Steelhead	Yes	No NMFS-approved plan (detailed information not available for this assessment).	No
	Central California Coast Coho	Yes	A state plan has been developed and published in 2004 (California Coho Recovery Strategy)	No
Central Valley	Central Valley Spring Chinook	Yes	No NMFS-approved plan (detailed information not available for this assessment).	No
	Sacramento River Winter Chinook	Yes	No NMFS-approved plan (detailed information not available for this assessment).	No
	Central Valley Steelhead	Yes	No NMFS-approved plan (detailed information not available for this assessment).	No
South-Central/ Southern California Coast	South-Central California Coast Steelhead	Yes	No NMFS-approved plan (detailed information not available for this assessment).	No
	Southern California Coast Steelhead	Yes	No NMFS-approved plan (detailed information not available for this assessment).	No

Sources: PCSRF 2006 Report to Congress and the NOAA Northwest Regional Office website (<http://www.nwr.noaa.gov/Salmon-Recovery-Planning/ESA-Recovery-Plans/Draft-Plans.cfm>).

¹² <http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Alsea-Response/Alsea-OCC.cfm>

¹³ <http://www.dfg.ca.gov/nafwb/CohoRecovery/RecoveryStrategy.html>

Table 4 shows the amount of funding for watershed planning and assessment and recovery planning and implementation by Recovery Domain, which helps explain some of the differences in the status of ESUs/DPSs with regard to planning.

Table 4: Funding for Watershed Planning and Assessment and Recovery Planning and Implementation, by Recovery Domain

Recovery Domain	Total PCSRF and State Matching Funds for Watershed Planning and Assessment and Recovery Planning and Implementation (\$ Millions)		
	2002	2003	2004
Puget Sound	5.83	3.82	4.76
Willamette/Lower Columbia	1.72	0.25	2.45
Interior Columbia	1.3	0.4	1.98
Oregon Coast	1.57	0.22	1.04
Southern Oregon/Northern California Coast	2.22	0.67	1.95
North-Central California Coast	1.61	0.18	0.42
Central Valley	0	0	0
South-Central/Southern California Coast	0.7	0.15	0.3

Summary of Conclusions and Recommendations

The process of watershed planning and assessment and recovery planning and implementation is underway with the identification of MHLFs for each of the ESUs. However, only one of the ESUs/DPSs has a comprehensive Proposed ESA Recovery Plan that is deemed by NMFS to meet ESA criteria. Partial draft and final Interim Regional ESA Recovery Plans are in place for ESUs in eight additional ESUs/DPSs. Continued effort to develop NMFS-approved plans for all ESUs/DPSs, and ultimately all Recovery Domains, is needed.

Salmon Enhancement and Harvest Management

The assessment of salmon enhancement and harvest management activities focused on the following question:

- To what extent are PCSRF salmon enhancement and harvest management projects addressing the highest priority salmon enhancement and harvest management needs?

Although data on the types of individual salmon enhancement and harvest management projects are available, there is no formal approach for identifying priorities similar to the habitat MHLFs that can be used for prioritizing salmon enhancement and harvest management projects. This means that a metric to answer the evaluation question for salmon enhancement and harvest management is not available.

As shown in Table 5, the amount of funds going to salmon enhancement and harvest management is highest for Alaska, in both dollar terms and as a percent of total funding. This is due to the fact that salmon are not listed in Alaska and therefore habitat projects, recovery plans, and other activities related to ESA listing are not undertaken in the State.

Table 5: Salmon Enhancement and Harvest Management Project Funding and Percent of Total PCSRF Funding (2004)¹⁴

Grantee	Salmon Enhancement and Harvest Management Funds (\$ Millions)	ALL PCSRF project funds (\$ Millions)	% Salmon Enhancement and Harvest Management
Alaska Department of Fish and Game	8.08	18.88	43%
California Department of Fish and Game	.09	23.98	<1%
Idaho Office of Species Conservation	0	7.58	0%
Oregon Watershed Enhancement Board ¹⁵	0	21.12	0%
Washington Office of the Interagency Committee	1.7	35.03	5%
Columbia River Tribes	.81	2.66	30%
Pacific Coastal Tribes	0.43	7.16	6%

Note: For states, total funds include PCSRF funds and matching state funds.

In terms of evaluation, the key need is to be able to demonstrate that salmon enhancement and harvest management funds and activities are going to the highest priority salmon enhancement and harvest management projects that will ultimately lead to the outcome of sustainable salmon populations. This is a particular need for Alaska, given the concentration of its funded activities on salmon enhancement and harvest management.¹⁶ Table 6 shows the breakout of the types of salmon enhancement and harvest management projects in 2002, 2003, and 2004. One approach would be to prioritize these activities for particular geographic regions.¹⁷

Table 6: Types of Alaska Salmon Enhancement and Harvest Management Projects 2002-2004

Project Type	2002	2003	2004
Supplementation Projects	6	3	3
Fish Mark Technology Projects	2	3	3
Production Technology Projects	1	3	3
Fisheries Management Projects	0	1	1
Rebuild Weak Stock Enhancement Projects	2	0	0

¹⁴ Although not shown, the relative magnitude of salmon enhancement funding was similar for 2002 and 2003.

¹⁵ No 2004 salmon enhancement or harvest management projects for Oregon are included in the PCSRF database. Data for 2003 are provided instead.

¹⁶ Following are some examples of salmon enhancement and harvest management projects in Alaska in 2004: 1) Complete a functional design for a hatchery to be constructed within the City of Fairbanks (\$3,332,560). 2) Construct Phase I of a new small boat harbor in Adak to provide dock and moorage for boats that will participate in developing fisheries (\$1,440,987). 3) Refine and revise the draft Southeast Revitalization Association (SRA) seine permit reduction plan in advance of seeking substantial grant and loan funds with which to accomplish the buyback (\$144,099). 4) Improve angler access to Ship Creek following removal of culverts (\$185,000).

¹⁷ The challenge of allocating funds to priority activities is heightened by the fact that the majority, and sometimes all, of the funds are earmarked for particular salmon enhancement and harvest management projects in Alaska. In 2002, 38% of PCSRF funds were earmarked; in 2003, 57% were earmarked, and in 2004, 100% were earmarked (2005 Report to Congress).

Project Type	2002	2003	2004
AK Fishing Industry Projects	6	7	7
Infrastructure Projects	3	0	4
Marketing Projects	3	2	3
Product Quality Projects	0	4	3
Salmon Enhancement and Harvest Management Projects (Total)	12	13	12

Note: Individual project types sum to more than total number of projects because single projects can be classified as multiple types. Not all projects reported metrics in each year (in 2002 and 2003, 11 projects reported metrics; in 2004, 10 projects reported).

Summary of Conclusions and Recommendations

It is not possible to evaluate whether salmon enhancement and harvest management efforts are being directed at the highest priority activities. A key recommendation of this report is to develop a transparent and consistent approach for prioritizing types of salmon enhancement and harvest management projects for the purpose of selecting projects and directing earmarks. This is a particularly acute need for Alaska because of the relative magnitude of salmon enhancement and harvest management activities as part of overall PCSRF activity.

Research, Monitoring, and Evaluation

The assessment of research, monitoring, and evaluation (RME) activities focused on the following questions:

- Does monitoring account for at least 10% of total funding?
- Is a “comprehensive monitoring program” in place that is sufficient to provide answers to questions about the state of salmon populations and what is affecting them (including program interventions)?

The first question reflects a programmatic benchmark intended to encourage RME activities that are sufficient to guide future restoration projects activities. It is measured here as the percent of total PCSRF and state matching funds used for RME activities from 2000 to 2005. As shown in Table 7, all of the grantees except Idaho Office of Species Conservation and California Department of Fish and Game meet this 10% benchmark.

Table 7: Percent of Research, Monitoring and Evaluation Funding vs. Total Funding for FY2000-2005 (in millions)

Grantee	Research, Monitoring, and Evaluation (RME) Funds	Total Funds	% RME
Alaska Department of Fish and Game*	41.53	107.91	38.5%
Washington Office of the Interagency Committee*	29.21	206.62	14.1%
Idaho Office of Species Conservation*	1	11.76	8.5%
Oregon Watershed Enhancement Board*	27.42	177.36	15.5%
California Department of Fish and Game*	9.88	115.07	8.6%
Pacific Coastal Tribes	12.89	38.64	33.4%
Columbia River Tribes	3.79	15.86	23.9%

*Funds include PCSRF and state matching funds.

Note: Totals do not include program administration funds.

The second evaluation question examines the sufficiency of RME activities for supporting recovery activities through a comprehensive monitoring program. One way to think about a

comprehensive monitoring program is its ability to answer the following questions posed by the Pacific Northwest Aquatic Monitoring Partnership: “Does the collective effect of restoration and/or management actions result in improved watershed condition and fish response? Why or why not? What are the causes of those responses?”¹⁸

Two programs, described below, represent efforts to address these types of questions by intensively assessing salmon conditions and the factors affecting them, including the effectiveness of program interventions.¹⁹

Intensively Monitored Watersheds. Funded by the Washington State Salmon Recovery Funding Board (SRFB), the Intensively Monitored Watersheds (IMW) program is a public/private effort seeking to answer the question “Are restoration actions actually creating more salmon within the watersheds where restoration projects are being funded?” Assessments of salmon abundance in watersheds where habitat projects have been ongoing are compared to watersheds where there have been no such projects. Activities are centered in four areas of the state, and a landscape classification system is expected to allow extrapolation of results to other watersheds. The project began in 2004 with preliminary results expected in 2007 and final results in 2010.

Oregon Coastal Coho Assessment Project. This effort, conducted in a partnership between the State of Oregon and the NMFS, is intended to assess efforts aimed at conserving and rebuilding coastal Coho salmon populations. An explicit part of the project is evaluating the effectiveness of conservation efforts. It is seen as a core foundation for the development of the Coastal Coho Conservation and Recovery Plan. As noted above, however, the Oregon Coastal Coho ESU has been de-listed.

Summary of Conclusions and Recommendations

Most grantees are exceeding the 10% benchmark for investment in RME, and Idaho and California are close to the threshold at around 8.5%. However, there are relatively few examples of monitoring programs that are comprehensive enough to answer key questions about the status of the salmon populations and the effectiveness of programmatic interventions on salmon recovery. The most comprehensive of these, Washington’s Intensively Monitored Watershed program, is still in its pilot phase. These pilot efforts should continue, and, as lessons are learned, the monitoring programs should be broadened. Oregon has also made strides in comprehensive monitoring, but only for its Coastal Recovery Domain. No programs were identified in the PCSRF database for California. Both for the programmatic necessity of monitoring and for the ongoing need to evaluate the program (see Section 4 below) development of comprehensive monitoring programs should be a continuing priority of PCSRF.

Outreach, Education, and Technical Assistance

The assessment of outreach, education, and technical assistance activities focused on the following questions:

- To what extent are PCSRF outreach and education projects going to the highest priority outreach, education, and technical assistance needs?
- Are the majority of outreach, education, and technical assistance activities effective?

¹⁸ <http://www.reo.gov/PNAMP/Meeting%20Info/PNAMP%20IMW%20Plan%20April%205%202005.doc>

¹⁹ A third program, the California North Coast Watershed Assessment Program, appears to have a detailed approach to assessing conditions but does not include a component of assessing the effectiveness of program interventions.

Neither of these questions can be answered with available data. For the first question, there is no formal approach for identifying priorities similar to the habitat MHLFs that can be used for prioritizing outreach, education, and technical assistance activities.²⁰ There does not even appear to be an approach for categorizing such activities.

For the second question, the program is moving toward evaluating individual outreach, education, and technical assistance projects, but these systems for evaluation are not yet in place.

Summary of Conclusions and Recommendations

No conclusions can be made about the targeting of outreach, education, and technical assistance activities based on current data. A key recommendation is to develop a transparent and consistent approach for prioritizing these activities given the needs in a particular area. The program should also continue its efforts to undertake and report on individual evaluations of outreach, education, and technical assistance projects.

4. PREPARING THE PROGRAM FOR FUTURE EVALUATION

Over time, PCSRF will be able to undertake a more comprehensive outcome-oriented evaluation of the program than is described in this report. Such an evaluation would document the effectiveness of program-funded projects on salmon population outcomes while controlling for other factors that affect salmon populations.²¹ The program has a distinct advantage in achieving this goal in that its research, monitoring, and evaluation activities are also seeking to produce information on salmon populations and what factors, including program activities, affect those populations. The Intensively Monitored Watershed program is one such example. The program should proceed with these research, monitoring, and evaluation efforts with a conscious eye to generating information that will be useful for program evaluation as well. Four areas stand out as important, as described below.

Measuring salmon population and trends. Ultimately, the program must demonstrate its accomplishments in terms of the sustainability of salmon populations as documented by salmon populations and trends. This is the key “outcome” of the program as identified in the performance measures framework, and it is the measure by which program effectiveness will ultimately be judged. Data must be gathered over enough spawning cycles to credibly establish a trend.

Project inputs. Individual funded projects and the specific interventions they implement are the key programmatic inputs into any assessment of program outcomes for PCSRF. Key information will be the geographic extent, type, and expected outcomes of individual projects at a much more detailed and disaggregated level than is currently available. For habitat projects in particular, it

²⁰ Examples of such projects from 2004 include: 1) The [Salmonid Restoration Federation] Field School will teach bioengineering techniques to key audiences in order to restore riparian habitat, control erosion, and stabilize banks (\$19,130). 2) Create web-based Case Studies of stream crossing-fish passage improvement projects (\$23,450). 3) Continue to develop and implement... watershed restoration and education project, focusing on our student and adult community regarding the habitat requirements, economic and cultural importance of our salmon population (\$25,000).

²¹ Under its PART guidance, OMB would likely characterize such an approach as “quasi-experimental.” Other, more sophisticated approaches cited by PART—randomized controlled trials and direct controlled trials—are infeasible for a program like PCSRF, largely because of the difficulty of assigning salmon populations to randomized control groups.

will also be necessary to identify what level of activity will ultimately be sufficient to correct habitat impairments for each unit of analysis. For example, the significance of removing a single culvert depends on whether removing 10 or 1,000 similar culverts is necessary to provide access to the entire habitat in an area.

Other factors affecting salmon sustainability. Any outcome-oriented program evaluation is going to have to distinguish between the effects of the program and the effects of all other factors affecting salmon sustainability. The detail and quality of the data on these intervening factors will have to be sufficient to distinguish programmatic effects.

“Control group” sufficient to measure program effectiveness. A key aspect of outcome oriented evaluations, particularly those most favored by OMB, is having a control group. Ideally, target areas are randomly assigned to treatment and control groups and comparisons made between the two. Given the nature of PCSRF and the heterogeneity of river habitats and salmon populations, this approach to controls will not be possible for PCSRF. However, the program will need to develop an approach for identifying controls (as is already being done with the Intensively Monitored Watershed program) that is sufficiently rigorous for use in program evaluation.

The program may want to consider allocating some of the research, monitoring, and evaluation funding specifically for developing a framework and methodology for program evaluation and collecting the data necessary to conduct it. Such an effort would complement progress PCSRF has already made in developing the PCSRF database and in the increasingly outcome-oriented nature of the annual reports to Congress. An approach for enhancing information useful for evaluation could include:

- Research to better characterize and collect needed data on the specific interventions conducted by projects, and the “outputs” of those projects;
- More effective and efficient salmon population monitoring techniques; and
- Improved analysis methodologies to differentiate the effects of the program and other causal factors on observed habitat and salmon population trends.

The framework could cover different scenarios for evaluation, including baseline information collected on all program areas and specialized information for selected representative areas. Note that while the goal of assessing program effectiveness will imply a specific set of priorities for these activities, all of them should also directly or indirectly support better management and program effectiveness.

5. CONCLUSION

Available data indicate that many PCSRF investments are producing the intended programmatic outputs, putting the program on a trajectory towards its long-term goal of ensuring the sustainability of Pacific salmon. However, there is still significant work to do, including:

- Better targeting habitat projects to the key MHLFs in each ESU and working towards refining the identification of habitat needs for smaller geographic units.
- Developing ESA-consistent recovery plans for all ESUs/DPSs and Recovery Domains; and
- Increasing the scope and intensity of monitoring in each Recovery Domain so that it is sufficient to understand the status of salmon populations and the effectiveness of interventions.

Particularly for habitat projects, there is a key need to improve the link between individual projects and the MHLFs they address. Current methods suffer from a number of flaws that may well lead to an overestimate of how targeted the projects are to the needs of a given area.

For other PCSRF program categories, large information gaps mean that the program can not be fully evaluated. This is true of the salmon enhancement and harvest management category and the outreach, education, and technical assistance category. In both cases, the program needs to develop consistent and transparent metrics and approaches for prioritizing activities related to these categories.

Finally, the program needs to put itself in a position where it can eventually evaluate program outcomes rather than outputs by building on existing research, monitoring and evaluation efforts with an eye to developing a framework, methodology and data for impact evaluation. Key areas on which to focus are measuring outcomes in terms of salmon populations, measuring program inputs, measuring other factors affecting salmon recovery, and developing an approach to controls that is sufficient to examine the effectiveness of PCSRF activities.

Table 8 summarizes this report's conclusions and recommendations as a set of action items that the program should undertake in the short term (less than one year) and longer-term (more than one year).

Table 8: Summary of Action Items

Category or Set of Categories	Short-term Action Items (less than one year)	Longer-term Action Items (more than one year)
Habitat Restoration, Protection, Access, and Quality	<ul style="list-style-type: none"> • Improve linkage between individual habitat projects and habitat limiting factors in the PCSRF database. • Provide a rationale for habitat projects that do not address priority MHLFs in the ESA-listed ESUs/DPSs. 	<ul style="list-style-type: none"> • To the extent feasible, identify the relative importance of each habitat limiting factor for each ESU/DPS and use these to prioritize habitat projects. • To the extent feasible, identify habitat limiting factors at more detailed geographic scales (e.g., to watersheds) and use these to prioritize habitat projects.
Watershed Planning and Assessment and Recovery Planning and Implementation	<ul style="list-style-type: none"> • Continue ongoing efforts to develop NMFS-approved plans for all ESUs/DPSs. 	<ul style="list-style-type: none"> • Develop NMFS-approved plans for all Recovery Domains.
Salmon Enhancement and Harvest Management	<ul style="list-style-type: none"> • Develop a transparent and consistent approach for prioritizing types of salmon enhancement and harvest management projects for the purpose of allocating grants and directing earmarks. 	<ul style="list-style-type: none"> • Annually select salmon enhancement and harvest management projects according to the approach described at left.
Research, Monitoring, and Evaluation	<ul style="list-style-type: none"> • Continue current pilot research, monitoring, and evaluation efforts (e.g. Washington’s Intensively Monitored Watershed program). 	<ul style="list-style-type: none"> • Institute comprehensive monitoring for all Recovery Domains.
Outreach, Education, and Technical Assistance	<ul style="list-style-type: none"> • Develop a transparent and consistent approach for prioritizing outreach, education, and technical assistance activities given the needs in a particular area. • Continue efforts to undertake and report on individual evaluations of outreach, education, and technical assistance projects. 	<ul style="list-style-type: none"> • Annually select outreach, education, and technical assistance activities according to the approach described at left. • Undertake and report on individual evaluations of outreach, education, and technical assistance projects.
Program Evaluation	<ul style="list-style-type: none"> • Build on current research, monitoring, and evaluation efforts to prepare the program for undertaking a comprehensive outcome-oriented evaluation in the future. To this end, the following short-term action items should be undertaken: <ul style="list-style-type: none"> • Develop a framework and methodology for program evaluation and collecting the data necessary to conduct it. • Put the program in a position to generate comprehensive data on salmon populations and trends for cohorts that would be expected to be affected by program activities. • Improve information on the geographic extent, type, and expected outcomes of individual PCSRF projects • For habitat efforts, identify what level of activity will ultimately be sufficient to correct habitat impairments for each unit of analysis. • Put the program into a position to develop data on other 	<ul style="list-style-type: none"> • Systematically and regularly collect the data described at left. • Conduct a comprehensive outcome-oriented program evaluation of PCSRF.

Category or Set of Categories	Short-term Action Items (less than one year)	Longer-term Action Items (more than one year)
	<p>factors affecting salmon populations that are of sufficient detail to distinguish between the effects of the program and the effects of all other factors affecting salmon sustainability.</p> <ul style="list-style-type: none"> • Develop an approach for identifying controls that is sufficiently rigorous for use in program evaluation. 	