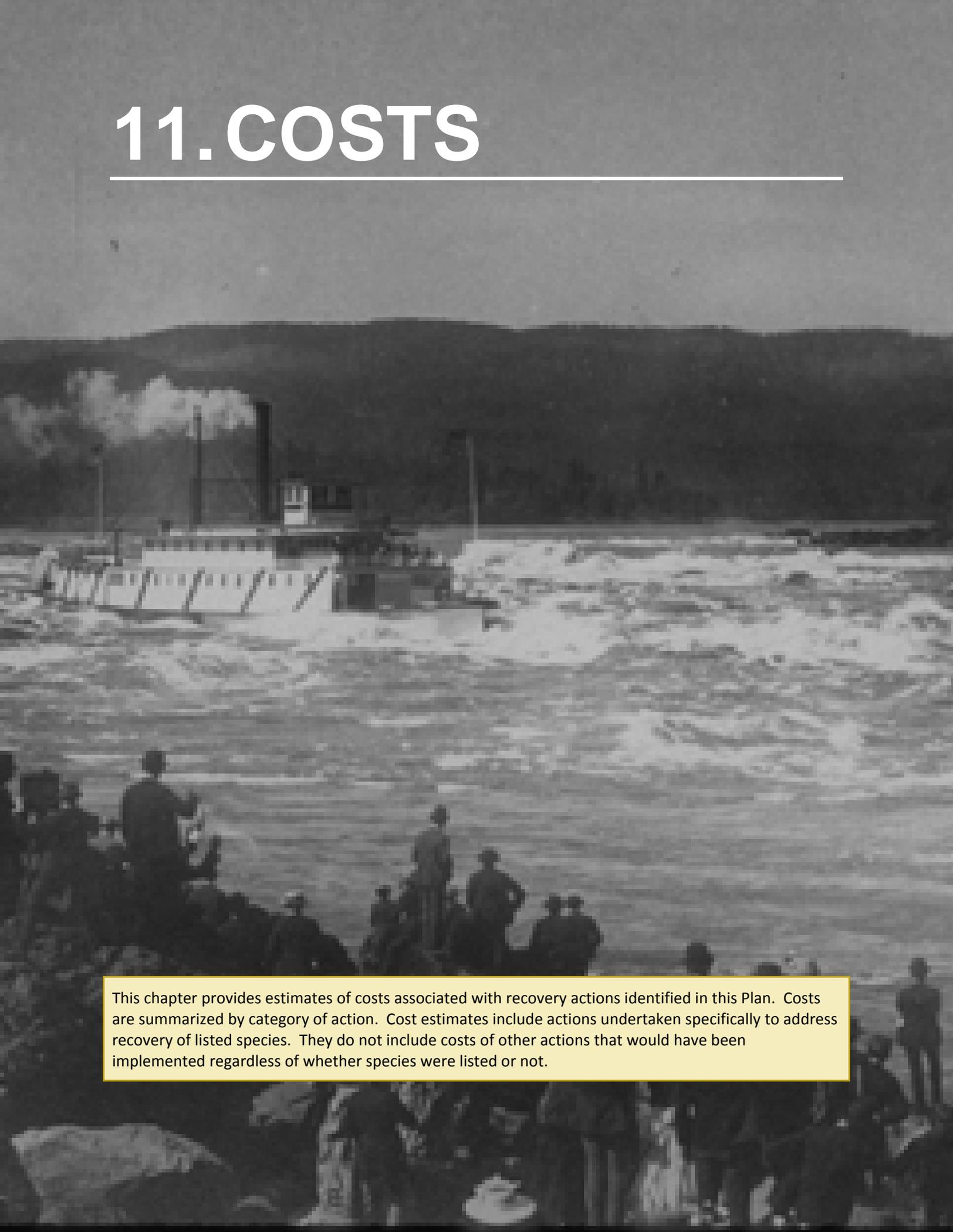


11. COSTS

A black and white photograph of a dam with people watching the water flow. The dam is a large concrete structure with a central spillway. Water is cascading over the spillway, creating white foam. In the foreground, a group of people are silhouetted against the bright water, looking towards the dam. The background shows a forested hillside under a clear sky.

This chapter provides estimates of costs associated with recovery actions identified in this Plan. Costs are summarized by category of action. Cost estimates include actions undertaken specifically to address recovery of listed species. They do not include costs of other actions that would have been implemented regardless of whether species were listed or not.

11. COSTS

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11.1 Overview

The ESA directs that recovery plans incorporate to the maximum extent practical “estimates of the time required and the cost to carry out those measures needed to achieve the plan’s goal and to achieve intermediate steps toward that goal.” [Sec. 4(f)(1)(B)(iii)]. This chapter provides estimates costs of actions undertaken solely to address recovery of listed species. This does not include costs for actions or programs that may be critical to recovery efforts but are mandated or required by statutes, laws, regulations, or policy directives other than the ESA. ESA section 7 consultation costs are not included. Costs of actions that would have been implemented regardless of whether species were listed are considered “baseline” costs.

Estimates are based on direct costs. Costs are represented as ranges reflecting estimation uncertainties. Estimates are provided for actions to be implemented for the 25 year duration of the Plan (beginning with 2004 when the interim Plan was completed). Costs are distinguished by near term (next 5-10 years) and long term (11-25 years). Long term estimates are less certain than near term estimates. Indirect costs are not included but Appendix D provides a broader discussion of the economic context of fish recovery.

Costs of implementing actions to address each threat category (stream habitat, dams, fisheries, hatcheries, ecological factors) are discussed in this chapter. Costs for recovery implementation coordination and administration and for monitoring, evaluation, and reporting per Recovery Plan Chapter 10 are also discussed. Table 11-1 illustrates how recovery and baseline costs were identified for each threat category.

Stream Habitat. Recovery-driven stream habitat costs include stream habitat protection and restoration projects developed to provide multi-species benefits in high value stream reaches based on fish production potential and fish population priorities for recovery. Stream habitat project costs are based on cost per mile for projects identified in on-the-ground watershed assessments of selected subbasins. Recovery of stream habitat also depends on the effective implementation of a suite of land and natural resource management and regulatory measures. Since these measures are mandated under laws, statutes, regulations, or policy directives other than the ESA, their costs are considered baseline costs and are not included in this Plan.

Estuary & Columbia Mainstem Habitat. Estuary actions and associated costs are detailed in the Columbia River Estuary Salmon and Steelhead Recovery Module prepared by NMFS. Estuary costs identified in the estuary module are presented in this chapter for informational purposes.

Hydro. The costs associated with hydropower operations on the Columbia mainstem and tributaries are not identified in this Plan because they are effectively treated elsewhere. For the Columbia River mainstem, hydropower costs are addressed in the Federal Columbia River Power System Biological Opinion and regional hydro module prepared by NMFS. These would include baseline costs under current operations and additional costs identified in Reasonable and Prudent Alternatives specified by the FCRPS Biological Opinion. Tributary hydropower operation costs supporting recovery are identified through FERC licensing requirements and associated agreements.

Table 11-1. Examples of actions that are specifically undertaken to address recovery of listed species and actions that would have been implemented regardless of whether species were listed or not.

Category	Recovery/ESA specific	Not Recovery/ESA specific (Baseline Cost)
Stream Habitat	LCFRB Habitat Protection & Restoration Projects Watershed Assessments to identify & prioritize projects	Watershed Management Plan Implementation USFS management plans DNR Habitat Conservation Plans Critical Areas Ordinances
Estuary & Mainstem	See Estuary Module	See Estuary Module
Dams	FCRPS BiOp RPAs	Baseline FCRPS operations for fish & fish mitigation Cowlitz & Lewis relicensing agreement actions
Fisheries	Development of alternative fishing methods Expanded monitoring needed for population-level impact assessments	Baseline monitoring to estimate harvest, of index stocks
Hatcheries	Natural broodstock management Expanded weir programs for escapement management Expanded population-level effectiveness evaluations of hatchery contributions	Baseline production, maintenance & operations Traditional operational monitoring, CWT index marking & escapement indexing Fish marking programs for selective fisheries
Ecological	--	Bird, Pikeminnow & marine mammal predation assessments & management programs Invasive species programs
Monitoring & Research	Comprehensive stream habitat baseline assessment Expanded subbasin level habitat monitoring Expanded population level biological monitoring	Baseline index level monitoring biological programs Baseline habitat monitoring on Federal lands Current Intensively Monitored Watershed Program
Implementation	LCFRB base program Periodic Action implementation reviews Periodic Action effectiveness reviews Periodic Biological & Habitat status reviews Recovery Plan Implementation & Science Teams	

Fisheries. Recovery-driven fishery costs are limited to specific actions needed to reduce interim fishery impacts on listed populations to benchmark levels and that are outside of base fishery management programs. These include development of alternative fishing methods for selective harvest of hatchery fish. Costs were estimated by WDFW. Hatchery fish marking costs to support selective fisheries are baseline costs that are not included. Indirect costs including those of foregone harvest opportunity for the protection of listed fish are not included, although potentially significant.

Hatcheries. Hatchery costs related to recovery include costs associated with reducing hatchery fish on spawning grounds, reducing competition and other adverse interactions among hatchery and natural origin fish, and supporting supplementation and reintroduction efforts consistent with population recovery goals. Routine hatchery operations and maintenance and associated capital improvement

costs are not included. These costs estimates have been provided by WDFW based on recent Conservation and Sustainable Fishery Plans.

Monitoring & Research. Monitoring needs identified in this Plan will be met largely through a combination of currently ongoing monitoring efforts by federal and state agencies, local governments and research organizations. The costs associated with these ongoing programs are considered baseline costs. The cost of monitoring efforts to fill gaps in existing programs in order to fully meet the needs identified in this Plan will be recovery costs. Since monitoring programs for recovery are currently in the early stages of development, it is not possible to estimate their cost at this time.

Implementation. These include costs associated with coordination, direction and tracking of implementation efforts, periodic assessments of implementation and recovery progress, adaptive management and maintenance of the Recovery Plan.

This chapter includes approximate estimates of recovery costs for specific categories of actions but does not attempt to undertake a comprehensive assessment of the complex of economic considerations and impacts associated with fish recovery. Appendix D provides examples of a variety of economic considerations that might be involved in fish recovery but is intended to serve as an example to highlight the complexity of economic considerations rather than a comprehensive assessment of the direct and indirect costs associated with fish recovery.

11.2 Habitat - Streams

For the purposes of cost estimation, habitat recovery measures are divided into four categories: stream habitat projects, water resources measures, watershed measures, and dedicated programs. Habitat improvements needed to meet recovery targets will require significant contributions from each of these categories of actions. Species-specific benefits vary among categories of actions. These projects typically provide multi-species benefits. Stream habitat projects include active site-specific projects including riparian rehabilitation, off/side channel enhancement, importation of large woody debris, engineered log jams, bank stabilization/protection, etc. Water resources measures include stream flow and water quality-related actions including those described in Watershed Management Plans. Watershed measures include land use controls, management practices, habitat conservation plans, etc. Dedicated programs include other measures such as hydro relicensing mitigation actions, chum salmon spawning habitat enhancement.

Stream habitat projects and some dedicated programs are generally assumed to be Recovery/ESA-related. Watershed and water use actions and program generally fall under the category of baseline actions that contribute to recovery but that would otherwise have to be implemented under other plans and requirements even if the fish were not listed under the ESA.

11.2.1 Stream Habitat Projects

Stream habitat project costs were estimated based on habitat improvement targets identified for each population and projects necessary to reach habitat targets. For each population of each species, this Recovery Plan identifies habitat improvement targets needed to reach population improvement objectives that collectively meet recovery goals. Habitat improvement targets were based on equitable distribution of the “recovery burden” among threat categories in proportion to the magnitude of the impacts that limit each population. The Recovery Plan describes a 50 year schedule for realization of the benefits of habitat protection and restoration actions and assumes that all substantive actions will be implemented within 25 years.

Under the direction of the LCFRB, efforts to identify potential site-specific restoration actions have been completed for several Washington Lower Columbia River subbasins including Abernathy and Germany basins, the Lower East Fork Lewis River basin, the Lower Cowlitz River basin, and the Lower Grays River basin. Stream habitat protection and restoration projects were identified in each subbasin based on Reach Tier priorities, significant limiting factors identified in EDT analyses, and site specific, on-the-ground conditions. Cost estimates contained in these plans are the basis for total stream habitat project cost estimates throughout the region.

Restoration plans focused on high priority reaches identified for each population and subbasin as detailed for each subbasin in volume II in this Recovery Plan. Reach priorities were based on species present, population recovery priority, and reach-specific fish production value. Population priorities were as identified in the recovery scenario (e.g. Primary, Contributing, and Stabilizing). Fish production value (high, medium, low) was estimated using the Ecosystem Diagnosis and Treatment (EDT) model. High value reaches included those accounting for approximately one third of the potential production of a species production when reaches sorted in order of decreasing potential. Medium value reaches included those accounting for the 2nd third. Low value is the 3rd third. Reaches were categorized into 4 tiers:

- Tier 1: All high priority reaches (based on EDT) for one or more primary populations.
- Tier 2: All reaches not included in Tier 1 and which are medium priority reaches for one or more

primary species and/or all high priority reaches for one or more contributing populations.

- Tier 3: All reaches not included in Tiers 1 and 2 and which are medium priority reaches for contributing populations and/or high priority reaches for stabilizing populations.
- Tier 4: Reaches not included in Tiers 1, 2, and 3 and which are medium priority reaches for stabilizing populations and/or low priority reaches for all populations.

Cost-effective habitat actions were developed for the restoration plans based on reach priorities related to current and potential fish production values by stream reach and limiting habitat factors identified in each reach. Restoration plans ranked project opportunities according to LCFRB’s Habitat Strategy and Evaluation Criteria. Planning-level cost estimates were determined for each project based on unit costs established based on project assessments in other areas (Table 11-2). In some cases, a cost range was developed.

Table 11-2. Example of unit costs used in the Abernathy and Germany creeks treatment plan (based on the Puget Sound Shared Strategy 2003 cost model).

Project Type	Units	Unit Cost		
		Min	Max	Mean
Off/ Side Channel Enhancement	per acre	\$76,020	\$108,600	\$92,310
LWD Enhancement (Wood from Riparian)	per acre	\$10,860	\$32,580	\$21,720
LWD Enhancement (Imported Wood)	per mile	\$21,720	\$54,300	\$38,010
Engineered Log Jams	per structure	\$21,720	\$43,440	\$32,580
Riparian Enhancement (Underplanting)	per acre	\$10,860	\$38,010	\$24,435
Riparian Rehabilitation	per acre	\$48,870	\$70,590	\$59,730
Bank Stabilization/ Protection	per foot	\$65	\$109	\$87
Culvert Replacement	per structure	\$21,720	\$43,440	\$32,580
Bridge Removal	per structure	\$16,290	\$54,300	\$35,295

Mean value is based on midpoint of minimum and maximum values.

Total costs of habitat protection and restoration projects include a suite of project types designed to substantially affect limiting factors in high priority reaches. The implicit assumption is that the suite of identified projects addresses the major limiting habitat conditions and sites in the designated reach and is expected to have reach-wide benefits that extend beyond the project footprint. For instance, in the Mill, Abernathy, and Germany (MAG) subbasin, the restoration plan ultimately identified a total of 56 stream habitat projects addressing 18.8 miles of Tier 1 and Tier 2 reaches at an estimated cost of \$10.9 million (Table 11-3). Project miles refer to the aggregate length of reaches in which projects are identified (as opposed to the combined length of project footprints or total length of all tier 1 and 2 reaches). Application of the per project costs to stream miles makes an implicit assumption that the types and density of the per acre and per structure projects is comparable between reaches where specific projects were identified and similar reaches where additional costs were inferred.

Table 11-3. Estimated costs of habitat protection and restoration projects based in watershed assessments of limiting factors and project opportunities in high priority stream reaches.

Subbasin	Tier	Reach miles	Projects	Cost	Cost/mile
L. Grays	1 & 2	19.5		\$24,500,000	\$1,260,000
MAG	1 & 2	18.8	56	\$10,900,000	\$580,000
L. Cowlitz	1 & 2	47.1		\$33,200,000	\$705,000
L. EF Lewis	1 & 2			\$14,400,000 to \$19,000,000	\$780,000 to \$910,000

Costs of habitat treatment actions throughout the region were extrapolated from basins where assessments and plans have already been completed. Abernathy and Germany cost estimates (\$580,000/mile) were used for comparable smaller river and stream systems and the upper portions of larger river systems. A composite of the Lower Cowlitz, Lower Grays, and Lower East Fork Lewis cost estimates will be used for comparable lower sections of larger river systems in the region. Habitat restoration project costs were estimated at approximately \$1 million per mile for these larger river systems.

For each subbasin, habitat improvement targets identified for each species were used to estimate miles of stream treatment consistent with recovery. Fish improvement benefits of any given project or suite of projects depend on the area of affect, the quality of improvement, the spatial relationship and habitat conditions in adjacent areas, and project integration with stream habitat forming processes. For the purposes of this assessment, it was assumed that stream habitat projects were capable of restoring 50% of the degradation from historical conditions. Remaining improvements will be met by watershed and water resource improvements. Current (patient) and historical (template) habitat conditions summarized in EDT provided a systematic basis for estimating the potential scope for improvement in fish production due to habitat improvements in any given reach. While the 50% assumption is uncertain, it does provide a testable hypothesis to be addressed by future monitoring, research and evaluation.

Stream habitat project costs include the initial costs of project implementation and long term costs related to maintenance and replacement (Table 11-4). Additional actions will be required for maintenance and replacement of stream habitat treatment projects. Project function, effectiveness, and lifespan will obviously vary among project types and depend on restoration of functional watershed forming processes. For the purposes of cost estimation, we assumed annual maintenance and replacement costs equivalent to 2% of the interim project cost total for a period of 15 years. This assumes all projects will be completed within 10 years.

Table 11-4. Estimated costs of stream habitat preservation and restoration projects.

Subbasin	Stream miles		Costs (\$ million)		
	Total	Targeted	Construction	Maintenance	Total
Abernathy	28.8	12.4	7	2	9
Mill	21.4	4.7	3	1	4
Germany	20.8	6.5	4	1	5
Coweeman	85.6	7.2	7	2	9
Cowlitz	371.9	130.0	92	28	120
Cowlitz (Upper)	150.6	50.0	50	15	65
Elochoman	45.8	7.6	8	2	10
Skamokawa	41.7	9.5	7	2	9
Grays	98.3	31.6	25	8	33
Lower gorge tributaries	14.7	10.6	6	2	8
Kalama	107.5	23.8	20	6	26
Lewis	96.3	9.9	10	3	13
Lewis EF	182.5	44.2	44	13	57
Lewis	143.7	67.6	43	13	56
Salmon Creek	74.3	0.0	0	0	0
Tilton	53.1	28.2	16	5	21
Toutle	317.3	57.9	58	17	75
Washougal	99.5	24.1	21	6	27
			\$421	\$126	\$548

11.2.2 Water Resource Actions

Water resource actions affecting stream flow and surface water are summarized in the Recovery Plan and detailed in Water Resource Inventory Area Management Plans. The need for these actions was addressed by the 1998 Washington Watershed management Act. Consequently related costs are classified as baseline (non-recovery/ESA related). However, actions are expected to make significant contributions to fish recovery.

11.2.3 Watershed Actions

Watershed actions affecting stream habitat forming processes are summarized in the Recovery Plan and addressed by a variety of federal, state, or local programs or initiatives such as the Clean Water Act, DNR or Forest and Fish Habitat Conservations Plans, etc. For the purposes of cost estimation, it is assumed that watershed needs will be met by existing programs if programs are fully implemented. Costs associated with these programs are baseline costs.

11.2.4 Other Dedicated Projects

Dedicated habitat projects focus on specific needs not addressed by stream habitat projects, water resources actions, or watershed actions. Examples include targeted chum salmon spawning habitat restoration projects needed to augment multi-species habitat project efforts, and off-channel habitat restoration efforts targeting fall Chinook rearing areas in close proximity to river mouths along the Columbia River. Lower tidal reaches of streams were typically not assigned a high priority for habitat actions in the LCFRB watershed assessments based on EDT analysis but these areas have been identified as critical rearing areas for species including fall Chinook and chum. Costs of these programs are counted as ESA/recovery costs unless otherwise ascribed to other plans or programs. Cost estimates assumed one project for each of the Primary chum and fall Chinook populations (Table 11-5). Costs of chum spawning channels were estimated from preliminary planning and project proposals by WDFW based on previous experience with the enhancement of chum spawning habitat in the East Fork Lewis and lower gorge systems. Fall Chinook off-channel rearing habitat costs are assumptions to serve as placeholders for more detailed assessments of needs and opportunities during the plan implementation process.

Table 11-5. Estimated costs of dedicated habitat projects.

Project	Number of projects	Cost per project	Cost
Chum spawning channels	6	\$1 million	\$6 million
Fall Chinook off-channel rearing	6	\$5 million	\$30 million
			\$36 million

11.3 Habitat – Estuary & Columbia Mainstem

Cost of estuary habitat actions were estimated in the regional habitat module (NMFS 2009). Estuary habitat actions benefit listed salmon and steelhead species throughout the basin, particularly including those from the lower Columbia River recovery domain. For information purposes, costs identified in the estuary module for high priority management actions are reprinted in Table 11-6 below.

Table 11-6. Costs of estuary habitat actions identified in Table 7-4 of the regional estuary module (NMFS 2009).

Management Actions Sorted by Estimated Cost			
#	Action	Cost of Action	Cost per Group of Actions
CRE-10	Breach or lower dikes and levees.	\$75 million	~\$332 million, or 63% of total
CRE-09	Protect/restore high-quality off-channel habitat.	\$68 million	
CRE-22	Monitor and restore or mitigate contaminated sites.	\$60.5 million	
CRE-21	Identify and reduce sources of pollutants.	\$46 million	
CRE-04	Adjust the timing, magnitude, and frequency of flows.	\$44.5 million	
CRE-01	Protect/restore riparian areas.	\$38 million	
CRE-08	Remove or modify pilings and pile dikes	\$27.25 million	~\$108 million, or 20% of total
CRE-02	Operate the hydrosystem to reduce reservoir heating.	\$20 million	
CRE-23	Implement stormwater BMPs.	\$19.5 million	
CRE-14	Reduce predation by pinnipeds.	\$15 million	
CRE-13	Manage pikeminnow and other piscivorous fish.	\$13 million	
CRE-12	Reduce vessel wake stranding.	\$13 million	~\$88 million, or 17% of total
CRE-15	Reduce invasive plants.	\$12.5 million	
CRE-17	Redistribute cormorants.	\$10.5 million	
CRE-20	Implement pesticide/fertilizer BMPs.	\$12.5 million	
CRE-03	Establish minimum instream flows.	\$10 million	
CRE-16	Redistribute Caspian terns.	\$10 million	
CRE-05	Mitigate entrapment of fine sediment in reservoirs.	\$8 million	
CRE-06	Use dredged materials beneficially.	\$6 million	
CRE-11	Reduce over-water structures.	\$5.8 million	
CRE-18	Reduce shad abundance.	\$5.5 million	
CRE-07	Reduce entrainment/habitat effects of dredging and ballast.	\$4.5 million	
CRE-19	Prevent aquatic invertebrate introductions.	\$3 million	
Total:		\$528.05 million	

11.4 Dams

The costs associated with hydropower operations on the Columbia mainstem and tributaries are not identified in this Plan because they are effectively treated elsewhere. For the Columbia River mainstem, hydropower costs are addressed in the Federal Columbia River Power System Biological Opinion and regional hydro module prepared by NMFS. These would include baseline costs under current operations and additional costs identified in Reasonable and Prudent Alternatives specified by the FCRPS Biological Opinion. Tributary hydropower operation costs supporting recovery are identified through FERC licensing requirements and associated agreements.

11.5 Fisheries

Recovery-driven fishery costs are limited to specific actions needed to reduce interim fishery impacts on listed populations to benchmark levels and that are outside of base fishery management programs.

Included are:

- ❑ development of alternative fishing methods for selective harvest of hatchery fish.
- ❑ expanded management needed for regulation of population-level impacts.

Not included are:

- ❑ baseline management efforts necessary to regulate harvest of index stocks.
- ❑ the costs of foregone harvest opportunity for the protection of listed fish.

Costs of alternative fishing methods are based on preliminary planning and project proposals by WDFW for monitoring and research related to implementation and assessments of alternative fishing methods project. They do not include the full scope of costs by fisherman to obtain or adapt fishing gears to implement alternative fishing methods. These costs are unknown at this point in time and will be contingent on results of initial evaluations. Costs of population-level management are assumptions to serve as placeholders for more detailed assessments of needs and opportunities during the plan implementation process.

While the indirect costs of many recovery actions are recognized to be very significant in all sectors, they are extremely difficult to quantify and were not estimated in this plan for fisheries or other affected sectors. Fishery communities have clearly borne a heavy cost due to the decline of salmon and steelhead, and the associated burden of recovery. However, it is particularly difficult to express the social costs associated with economic displacements related to the implementation of fish recovery measures as well as decisions regarding the allocation of recovery burden among different sectors of the economy. In addition, economic conditions are dynamic and estimates of future values of things like market conditions for salmon can be subjective assumptions at best. Additional information on the economic values of fisheries and the direct and indirect costs of fish declines on lower Columbia River salmon fisheries and communities may be found in IEAB (2005), Martin (2005), WDFW (2008), NMFS (2009a, 2009b).

Table 11-7. Costs of recovery-related fishery actions.

	Period	Unit cost	10 year total	11-25-year total
Alternative Fishing Methods	Annual	\$1,250,000	\$12,500,000	--
Population-level Management	Annual	\$1,000,000	\$10,000,000	\$15,000,000
			\$22,500,000	\$15,000,000

11.6 Hatcheries

Hatchery costs related to recovery include:

- ❑ Development of integrated broodstock programs. Integrated broodstock include contributions from naturally-produced fish in order to avoid hatchery domestication and maintain wild population when significant numbers of hatchery-origin fish spawn in the wild.
- ❑ Improvements in infrastructure of hatcheries to minimize take of listed fish management.¹
- ❑ Expanded weir programs to control hatchery fish in natural spawning areas.
- ❑ Expanded population-level effectiveness evaluations of hatchery contributions.
- ❑ Fish marking programs for selective fisheries.

Not included are:

- ❑ Baseline production, maintenance & operations.
- ❑ Any associated capital improvement costs.
- ❑ Traditional operational monitoring, CWT index marking & escapement indexing.

Costs estimates were provided by WDFW based on recent Conservation and Sustainable Fishery Plans. The facility improvements are one-time costs that would probably occur in the next 10 years. As time goes on, facilities grow older and operating criteria change; therefore, additional facility improvements will likely be required due to ESA for some time beyond the next decade. However, these future costs are uncertain and were not identified. Weir operation and mass marking costs are annual costs. Future numbers do not include increases due to inflation.

Table 11-8. Costs of recovery-related hatchery actions.

	Period	Unit cost	10 year total	11-25-year total
Facility improvements	One-time	\$34,000,000	\$34,000,000	--
Weir construction	One-time	\$500,000	\$500,000	--
Weir operation	Annual	\$500,000	\$5,000,000	\$7,500,000
Mass mark hatchery production	Annual	\$1,100,000	\$11,000,000	\$16,500,000
			\$50,500,000	\$24,000,000

¹ This includes replacement of hatchery water intakes that are not currently meeting NMFS operational requirements put in place to benefit wild fish and promote recovery of listed populations. There are actual takes of listed fish occurring at these intakes because juvenile fish are being entrained into the hatchery water supply by the intake. Also included are fish ladder improvements where adult collection at the hatchery captures both hatchery fish and listed fish. The listed fish handling is not very efficient and increases stress on the listed fish being sorted and returned to the river. Handling may impact long-term survival to spawning grounds. These improvements will eliminate the negative impacts to listed fish at hatchery intake ladders.

11.7 Monitoring & Research

Monitoring needs identified in this Plan will be met largely through a combination of currently-ongoing and new monitoring efforts by federal and state agencies, local governments and research organizations. The costs associated these ongoing programs are considered baseline costs.

The cost of monitoring efforts to fill gaps in existing programs in order to fully meet the needs identified in this Plan will be recovery costs. New work includes implement of a regional monitoring program, consistent with NMFS's Guidance Document (NMFS 2009), to measure key parameters in accordance with population designations. Since new monitoring programs for recovery are currently in the early stages of development, it is not possible to estimate their cost at this time.

Costs estimates will be developed as detailed monitoring programs are developed.

11.8 Coordination & Administration

Implementation costs are those associated with coordination, direction and tracking of implementation efforts, periodic assessments of implementation and recovery progress, adaptive management and maintenance of the Recovery Plan as discussed in the Chapter 10 (Table 11-9). Key functions include:

- Developing and revising a 6-year regional implementation plan;
- Assisting implementation partners to develop and implement their individual 6-year implementation plans;
- Preparing and issuing clarifications or interpretations of Recovery Plan provisions when needed;
- Preparing and issuing revisions or updates to the Recovery Plan;
- Developing and implementing the regional public education and outreach program;
- Conducting implementation and biological evaluations in accordance with the adaptive management provisions and benchmarks set forth in this Plan;
- Tracking implementation of measures, actions, programs, and projects and issuing annual progress reports;
- Facilitating and assisting partners in resolving technical and policy issues that arise during implementation;
- Facilitating communications and the exchange of information and data among implementation and oversight partners;
- Coordinating the collection, management, synthesis, and evaluation of fish and habitat monitoring results collected by the partners; and
- Developing implementation partnerships and agreements.

Estimates of implementation and coordination costs are assumptions by the LCFRB intended to serve as placeholders for more detailed assessments of requirements during the plan implementation process.

Table 11-9. Implementation coordination and administration costs.

Assessment	Period	Unit cost	10 year total	11-25 year total
Implementation coordination & direction	annual	\$700,000	\$7,000,000	\$10,500,000
Action implementation & compliance	2 years	\$20,000	\$100,000	\$140,000
Action effectiveness & threat reduction	6 years	\$50,000	\$50,000	\$150,000
Fish & habitat status	12 years	\$100,000	--	\$200,000
Science teams	annual	\$20,000	\$200,000	\$300,000
Total			\$7,350,000	\$11,290,000

11.9 Total Costs of Recovery

Total direct costs of recovery actions identified in this chapter are estimated to be 1.23 billion dollars over the next 25 years. This would be a conservative estimate of direct costs that does not include hydro or monitoring and evaluation costs. Nor does this estimate reflect costs of baseline programs that will also be critical to recovery or indirect costs of recovery-related actions.

Table 11-10. Summary of estimated recovery costs by category (millions of dollars).

Action category	Estimated cost		
	Years 1-10	Years 11-25	Total
Stream habitat preservation and restoration projects	\$421	\$126	\$548
Dedicated stream habitat projects	--	--	\$36
Estuary & Columbia River mainstem habitat	--	--	\$528
Dams		Not included	
Fisheries methods & management	\$11.25	\$15	\$26.25
Hatcheries	\$50.5	\$24	\$74.5
Monitoring & research		Not included	
Implementation Coordination & Administration	\$7.35	\$11.19	\$18.64
Total			\$1,231.39