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Economic Analysis of Critical Habitat Designation for the Southern Distinct Population Segment of Pacific Eulachon

Final Economic Analysis | October 13, 2011

prepared for:

NOAA Fisheries

Northwest Region

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EXECUTIVE SUMMARY

INTRODUCTION

The purpose of this report is to identify and analyze the potential economic impacts associated with the designation of critical habitat for the southern Distinct Population Segment (DPS) of the Pacific eulachon (hereafter, "eulachon"). The analysis examines the potential impacts of restricting or modifying specific land or water use activities to avoid adverse modification or destruction of critical habitat.

This report is intended to assess potential economic impacts of designating each area considered for designation as critical habitat for the eulachon. A separate Biological Report was prepared to analyze the biological conservation benefits of designating critical habitat within each area. To determine which areas to designate as critical habitat, NOAA Fisheries weighs the biological conservation benefits of designation against the economic impacts and other relevant impacts (i.e., impacts to national security and tribal lands) of designation.[1] This weighing process and analysis is documented in the ESA 4(b)(2) report that will support NOAA Fisheries' final critical habitat designation.

APPROACH

This analysis examines the state of the world with and without the designation of critical habitat for the eulachon. The "without critical habitat" scenario represents the baseline for the analysis, considering habitat protections already afforded eulachon under its Federal listing or under other Federal, State, and local regulations, including protections afforded eulachon from other listed species, such as West Coast salmon and steelhead, North American green sturgeon, and bull trout.[2] The "with critical habitat" scenario attempts to describe the incremental impacts associated specifically with the designation of critical habitat for the eulachon. While this analysis provides a qualitative discussion of baseline conservation efforts, including protections provided under the listing of

[1] Section 3(5)(A) of the ESA defines critical habitat as ''(i) the specific areas within the geographical area occupied by the species, at the time it is listed . . . on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed . . . upon a determination by the Secretary that such areas are essential for the conservation of the species.'' Section 4(b)(2) of the ESA requires NMFS to designate critical habitat for threatened and endangered species "on the basis of the best scientific data available and after taking into consideration the economic impact, impact on national security, and any other relevant impact, of specifying any particular area as critical habitat." In addition, "the Secretary may exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he determines that the failure to designate such an area as critical habitat will result in the extinction of the species concerned."

[2] Section 2 presents a comparison of the physical or biological features essential for conservation of the rockfish with those of bull trout, salmon and steelhead.

eulachon, the focus of the analysis is determining the increment of costs that is attributable to critical habitat designation.

To quantify the economic impacts of modifications to land and water uses that result from critical habitat designation, the analysis employs the following three steps:

- Define the geographic study area for the analysis, and identify the units of analysis. In this case, fifth-field hydrologic unit codes that intersect designated stream reaches are defined as the study area to be analyzed for purposes of this analysis.[3]
- Based on the potentially affected economic activities, determine how management, including both project modification and administrative costs, may increase due to the designation of critical habitat for the eulachon.
- Estimate the economic impacts associated with this change in management.

These steps are described in greater detail in Section 2.

RESULTS

A high level of baseline protection already exists for the eulachon under its listing and protections afforded other species such as West Coast salmon and steelhead, North American green sturgeon, bull trout, and marine mammal species. Because of the high level of baseline protection in critical habitat areas, incremental impacts on conservation efforts for activities occurring in critical habitat areas are considered to be unlikely for most areas. In addition, scientific uncertainty regarding eulachon's biological needs over and above those baseline protections may limit NOAA's ability to recommend modifications, at least in the foreseeable future. This analysis qualitatively discusses the potential for incremental impacts on the following activities:

- **Quinault Indian Nation.** The Quinault River, which flows through the Quinault Indian Reservation, is the only area being designated as critical habitat for the eulachon that does not already contain designated critical habitat for other listed salmonids. USFWS has recently designated critical habitat for the bull trout in the portion of the Quinault River in which eulachon habitat is being designated, as well as a substantially longer segment of the Quinault River.[4] Bull trout specific conservation measures were included in the QIN's existing Forest Management Plan (FMP). NOAA has indicated that eulachon may need to be included in this plan in the future in order to streamline the consultation process. NOAA Fisheries states that, in the long term, eulachon may need to be added to

[3] Under section 4(b)(2) of the ESA, the Secretary of Commerce may exclude a "particular area" from critical habitat designation based on a comparison of the benefits of excluding that area and the benefits of including it. The 4(b)(2) exclusion process therefore operates at a geographic scale that (potentially) divides the area(s) under consideration into smaller subareas. The statute does not specify the exact geographic scale of these subareas, nor does it dictate the form of the economic analysis and the nature of the impacts to be included in the analysis. This analysis defines these "particular areas" as fifth field HUCs.

[4] 75 FR 63898 – 64070.

the Tribe's FMP so that the future consultation process with the two agencies can be streamlined. This analysis quantifies additional administrative efforts that may be incurred by the QIN to incorporate eulachon into their existing Forest Management Plan. The Quinault have indicated that they expect additional incremental costs to result from the designation of critical habitat for the bull trout due to delayed timber sales; however, they have not indicated that they expect similar impacts to result from eulachon habitat. For purposes of this analysis, impacts other than administrative impacts are not quantified.

- **Dredging disposal activities in the Lower Columbia River.** According to NOAA Fisheries, eulachon spawning has the potential to be disrupted by the disposal of dredged material in the Lower Columbia River. NOAA Fisheries is currently considering proposals for research on the locations of eulachon spawning sites. Depending on the outcome of this research, NOAA Fisheries may request project modifications to dredge material disposal activity in some areas. Impacts are thought to be limited to disposal activity currently occurring in shallow water areas, which is already quite limited in the Lower Columbia, representing approximately five percent of annual disposal volume. Because costs of this shoreline disposal are relatively high, impacts of requiring another disposal method may have minimal costs. The specific alternatives to current dredging activities and associated costs, however, cannot be determined without knowing the outcome of current research.

  If an alternative is chosen where current beach nourishment is replaced by in-stream disposal, the cost of disposal would be expected to decrease. At Skamokawa Bar, it is possible that reducing beach nourishment could reduce visitation to Skamokawa Vista Park. In addition, cessation of disposal at Sand Island could result in reduced erosion protections for the St. Helens recreational marina. Nonetheless, due to relatively small use of beach nourishment as a disposal option, impacts to current dredged material disposal operations resulting from eulachon critical habitat designation are expected to be small.

- **Dam removal activities on the Elwha River.** Removal of the Elwha Dam and the Glines Canyon Dam on the Elwha River, located on the Olympic Peninsula within Olympic National Park, began in September of 2011. The process of dam removal has the potential to be harmful to anadromous fish, including the eulachon, due to the potential for increased turbidity because of sediment flushing. However, NOAA Fisheries states that because protections are already in place to reduce the impact of the project on anadromous fish habitat, consideration of eulachon critical habitat is unlikely to result in additional recommendations to change the timing of the dam removals. NOAA Fisheries has not identified other incremental conservation efforts likely to result from eulachon critical habitat designation in the Elwha.

- **The Mayfield Dam flow regime.** As outlined in the Proposed Rule for the listing of the eulachon as threatened, dams and water diversions are considered to be moderate threats to the eulachon in the Columbia River Basin. To benefit

salmon and steelhead species, Tacoma Power currently follows an established flow regime for the Mayfield Dam on the Cowlitz River. NOAA does not expect to request alterations to this flow regime for the eulachon. Plans for sediment management at and below that dam, which include the possibility of releasing large volumes of flow to flush sediments, however, have the potential to affect spawning habitat for the eulachon. Changing the flow release schedule has the potential to result in economic impacts for Tacoma Power in the form of, for example, decreased revenues due to a decrease in energy production during peak demand. However, insufficient detail exists with regard to plans for these flows to quantify any potential impacts to them at this time. As such, due to uncertainty regarding the recommended changes to the volume and timing of any potential releases, this analysis is unable to quantify impacts that could be incurred to Tacoma Power as a result of any changes to flushing flows that could be required.

In addition to the qualitative discussion of potential impacts to these activities, this analysis quantifies projected future administrative costs of engaging in section 7 consultation activities that consider the eulachon and its critical habitat. An estimated number of future consultations was developed by consultation type and activity based on the past consultation history for other anadromous fish species in watersheds being designated as critical habitat. Then, using a model of consultation costs built from a survey of NOAA and Action agency efforts, each consultation was assigned an estimated level of administrative effort based on the type of activities considered.

As shown in Exhibit ES-1, total annualized impacts are estimated at $512,000 (discounted at 7 percent), with the greatest impacts occurring in the Lower Mad River and Columbia River – Hayden Island HUCs due to mining activities and water supply activities, respectively. Impacts for all units are presented in Exhibit ES-1. As shown in Exhibit ES-2, the greatest share of impacts is associated with water supply and dam operations, mining, and forest management activities.

EXHIBIT ES-1. SUMMARY OF ANNUALIZED IMPACTS BY UNIT*

HUC	NAME	TOTAL ANNUALIZED IMPACTS		OTHER POTENTIAL UNQUANTIFIED IMPACTS
		3 PERCENT	7 PERCENT	
1708000107	Columbia Gorge Tributary	$29,200	$28,100	Potential increase or decrease in costs of Columbia River dredged material disposal activities
1708000108	Lower Sandy River	$22,300	$21,400	
1708000205	East Fork Lewis River	$31,700	$30,500	
1708000206	Lower Lewis River	$19,800	$19,100	
1708000301	Kalama River	$21,200	$20,400	
1708000305	Skamokawa Creek- Elochoman River	$22,400	$21,600	Potential increase or decrease in costs of Columbia River dredged material disposal activities
1708000307	Columbia River – Cathlamet Channel	$22,100	$21,300	Possible minor decrease in beach visitation at Skamokawa Vista Park
1708000507	Toutle River – Cowlitz River	$24,300	$23,400	Possible reduced erosion/storm protection for small recreational marina at St. Helens
1708000508	Cowlitz River – Coweeman River	$24,400	$23,500	Potential increase or decrease in costs of Columbia River dredged material disposal activities
1708000603	Grays Bay	$27,700	$26,600	
1708000605	Columbia River – Baker Bay	$20,500	$19,700	
1709001205	Columbia River – Hayden Island	$33,500	$32,200	
1708000503	Jackson Prairie	$19,700	$18,900	Potential increase or decrease in costs of dredged materials disposal Potential reduced hydropower revenues related to altering the flushing flow regime at the Mayfield Dam
1710010205	Lower Quinault River	$25,700	$24,700	
1710020507	Mercer Lake Frontal	$23,000	$22,200	
1710030304	Umpqua River – Sawyers Rapids	$20,200	$19,500	
1710030308	Lower Umpqua River	$24,500	$23,600	
1711002005	Elwha River	$21,200	$20,400	Increased costs of Elwha Dam removal due timing issues, but anadromous fish also present

HUC	NAME	TOTAL ANNUALIZED IMPACTS		OTHER POTENTIAL UNQUANTIFIED IMPACTS
		3 PERCENT	7 PERCENT	
1801010201	Redwood Creek	$18,500	$17,800	
1801010204	Lower Mad River	$66,000	$63,500	
1801020911	Turwar Creek – Klamath River	$14,100	$13,600	
	Total	**$532,000**	**$512,000**	

*Notes: Section 3 of the report presents results of the analysis in more detail. Totals may not sum due to rounding.

EXHIBIT ES-2. SUMMARY OF ANNUALIZED IMPACTS BY AFFECTED ECONOMIC ACTIVITY (DISCOUNTED AT 7 PERCENT)

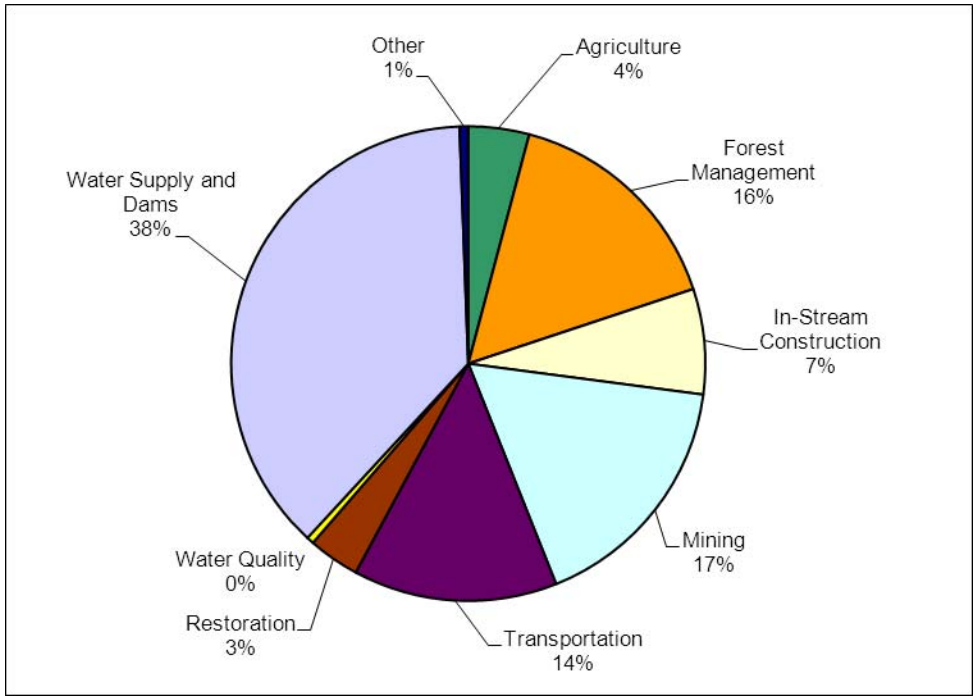
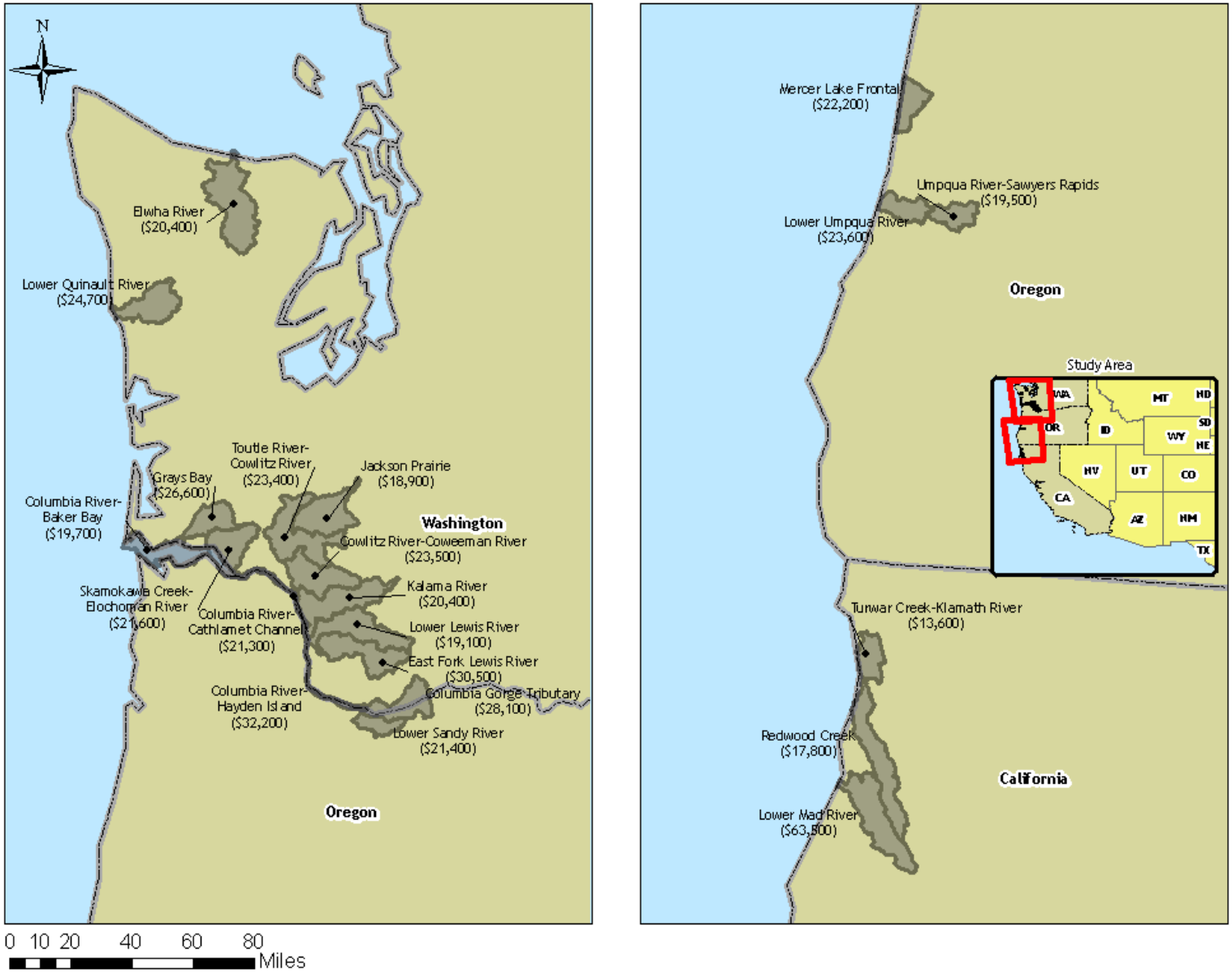


EXHIBIT ES-3. GEOGRAPHIC DISTRIBUTION OF ANNUALIZED IMPACTS BY UNIT



SECTION 1 | INTRODUCTION

1.1 INTRODUCTION

The purpose of this report is to identify and analyze the potential economic impacts associated with the designation of critical habitat for the southern Distinct Population Segment (DPS) of the Pacific eulachon (hereafter, "eulachon"). The analysis examines the potential impacts of restricting or modifying specific land or water use activities to avoid adverse modification or destruction of critical habitat.

This section provides a brief introduction to the critical habitat areas being designation for the eulachon. It includes a summary of threats to the critical habitat, and maps of stream reaches and the surrounding study area. Note that official habitat boundaries are reported in the Final Rule.

1.2 CRITICAL HABITAT DESIGNATION

On March 18, 2010, NOAA Fisheries listed eulachon that spawn south of the U.S./Washington-Canada border as threatened under the ESA.[5] As stated in the rule, eulachon (also called Columbia River smelt, candlefish, or hooligan) are endemic to the northeastern Pacific Ocean, ranging from northern California to southwest and south-central Alaska and into the southeastern Bering Sea. In the portion of the species' range that lies south of the U.S./Washington-Canada border, most eulachon production originates in the Columbia River Basin. The major and most consistent spawning runs return to the mainstem of the Columbia River (from just upstream of the estuary, river mile (RM) 25, to immediately downstream of Bonneville Dam, RM 146) and in the Cowlitz River. Periodic spawning also occurs in the Grays, Skamokawa, Elochoman, Kalama, Lewis, and Sandy rivers (tributaries to the Columbia River). The listing rule states that the primary factors responsible for the decline of the southern DPS of eulachon are the destruction, modification, or curtailment of habitat and inadequacy of existing regulatory mechanisms.

Critical habitat for the eulachon includes 334.4 river miles of coastal riverine habitat in Washington, Oregon, and northern California. The distribution of these river miles is mapped in Exhibit 1-1, and presented in tabular format in Exhibit 1-2. Exhibit 1-3 summarizes the physical and biological features essential for eulachon conservation. This report describes and quantifies potential economic impacts associated with designation of critical habitat for the eulachon, focusing on economic activities and resource uses that NOAA Fisheries has identified as a potential threat.

[5] 75 FR 13012.

EXHIBIT 1-1. EULACHON CRITICAL HABITAT AND STUDY AREA

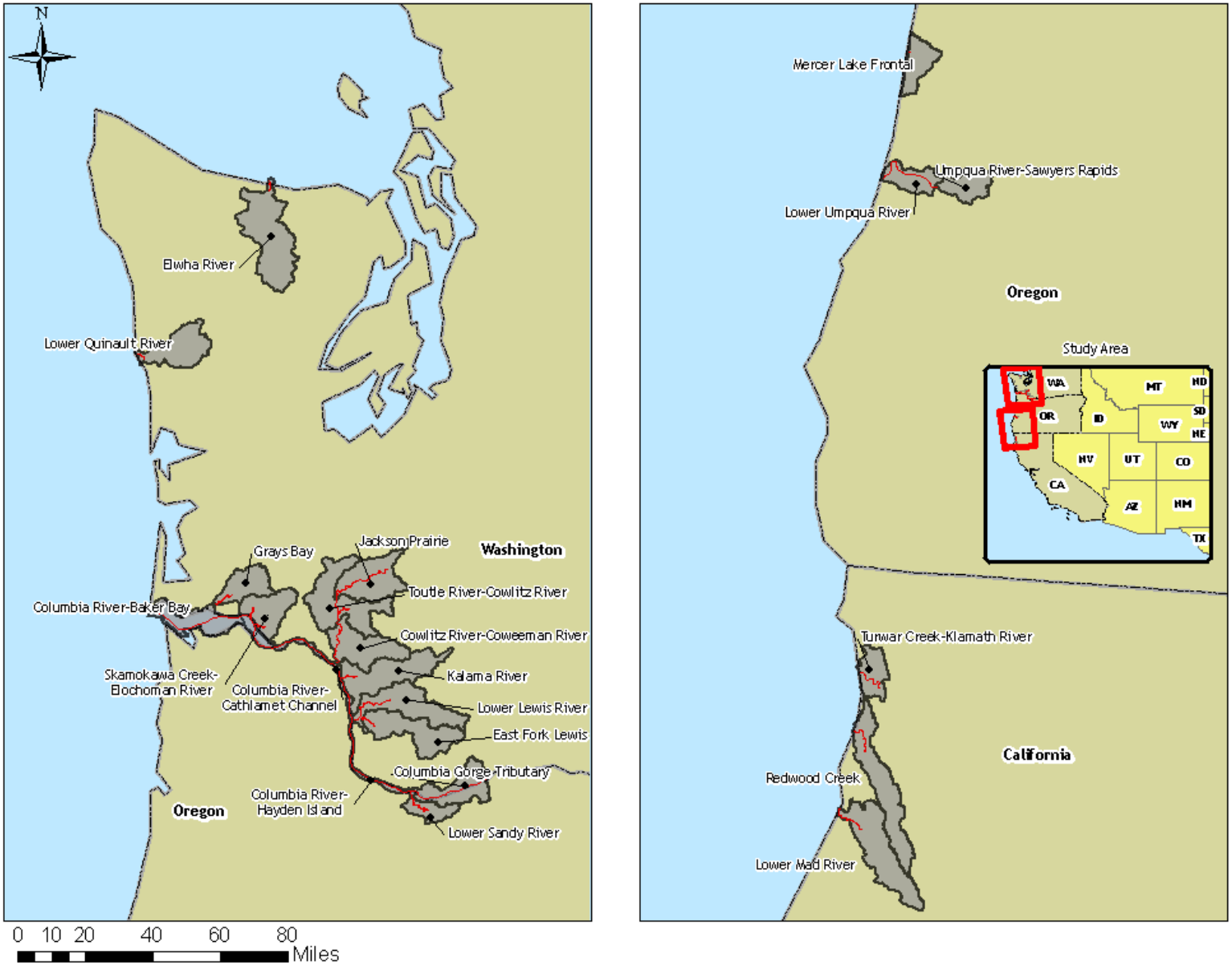


EXHIBIT 1-2. EULACHON CRITICAL HABITAT, SUMMARIZED BY WATERSHED AND RIVER MILES

HUC	NAME	RIVER MILES
1708000107	Columbia Gorge Tributary	24.9
1708000108	Lower Sandy River	14.5
1708000205	East Fork Lewis River	5.7
1708000206	Lower Lewis River	19.1
1708000301	Kalama River	7.6
1708000305	Skamokawa Creek- Elochoman River[1]	9.9
1708000307	Columbia River – Cathlamet Channel	55.7
1708000503	Jackson Prairie	25.8
1708000507	Toutle River – Cowlitz River[2]	13.5
1708000508	Cowlitz River – Coweeman River	17.8
1708000603	Grays Bay	10.0
1708000605	Columbia River – Baker Bay	29.4
1709001205	Columbia River – Hayden Island	33.4
1710010205	Lower Quinault River	3.2
1710020507	Mercer Lake Frontal	0.2
1710030304	Umpqua River – Sawyers Rapids	0
1710030308	Lower Umpqua River	23.8
1711002005	Elwha River	4.8
1801010201	Redwood Creek	12.1
1801010204	Lower Mad River	12.6
1801020911	Turwar Creek – Klamath River	10.6
	Total	**334.4**

[1] This portion consists of 4.7 miles of Skamokawa Creek and 5.2 miles of the Elochoman River.

[2] This portion consists of 6.6 miles of the Toutle River and 6.9 miles of the Cowlitz River.

Note: Totals may not sum due to rounding.

Source: Written communication with NOAA Fisheries, June 28, 2011.

EXHIBIT 1-3. PHYSICAL AND BIOLOGICAL FEATURES ESSENTIAL FOR CONSERVATION OF EULACHON

CATEGORY	DESCRIPTION
FRESHWATER FOR SPAWNING AND INCUBATION	
Substrate	Substrates for egg deposition and development are essential for spawning. Typical spawning substrate ranges from silt, sand or gravel to cobble and detritus. Significant uncertainties remain regarding the effect of substrate size and quality on eulachon spawning success.
Water Quality	Water quality is necessary for spawning, and viability of all life stages. Sublethal concentrations of contaminants affect the survival of aquatic species by increasing stress, predisposing organisms to disease, delaying development, and disrupting physiological processes, including reproduction.
Water Temperature	Suitable water temperatures would include stable water temperatures within spawning reaches (wide fluctuations could increase egg mortality or deformities in developing embryos). Given the range of temperatures that eulachon spawn in throughout their range, the contrast between ocean and river temperatures might be more critical than river temperatures.
Flow	A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of freshwater discharge over time) supporting spawning and survival of all life stages. Sufficient flow may also be needed to flush silt and debris from spawning substrate surfaces to prevent suffocation of developing eggs.
FRESHWATER AND ESTUARINE MIGRATION CORRIDORS	
Migratory Corridor	Safe and unobstructed for adults to pass from estuarine to riverine habitats in order to spawn, and for larval eulachon to migrate downstream from spawning habitats within freshwater rivers to rearing habitats within the estuaries.
Water Quality	Water quality is necessary for survival and migration of spawning adult and larval eulachon. Adult eulachon can take up and store pollutants from their spawning rivers, despite the fact that they do not feed in fresh water and remain there only a few weeks. Eulachon avoid polluted waters when possible.
Flow	A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of freshwater discharge over time) that supports spawning migration of adults and outmigration of larval eulachon from spawning sites.
Water Temperature	Water temperature may influence run timing. The contrast between ocean and river temperatures might be more critical than river temperatures.
Food	Larvae need abundant prey items, especially copepod larvae.
NEARSHORE AND OFFSHORE MARINE FORAGING SITES	
Food	Prey items, in a concentration that supports foraging for juveniles and adults, are needed in the marine environment. Juveniles eat phytoplankton, copepod eggs, copepods and other small zooplanktons, and adults eat euphausiids and copepods.
Water Quality	The water quality requirements for eulachon in marine habitats are largely unknown but they would likely include adequate dissolved oxygen levels and be free of contaminants.

Under section 4(b)(2) of the ESA, the Secretary of Commerce may exclude a "particular area" from critical habitat designation based on a comparison of the benefits of excluding that area and the benefits of including it. The 4(b)(2) exclusion process therefore operates at a geographic scale that (potentially) divides the area(s) under consideration into smaller subareas. The statute does not specify the exact geographic scale of these subareas, nor does it dictate the form of the economic analysis and the nature of the impacts to be included in the analysis.

This analysis defines these "particular areas" for analysis using a standard watershed unit, as mapped by the U.S. Geological Service and described by ten-digit, fifth-field hydrologic unit codes (referred to in this report as HUCs, or simply "watersheds") in Oregon and Washington. For California, the analysis uses the California hydrologic sub-areas (HSAs), which are approximately equivalent to USGS HUC5s, to define the study unit boundaries. In total, the study area covers 21 HUCs comprising 2.3 million acres.

1.3 BRIEF OVERVIEW OF REGIONAL DEMOGRAPHICS

The 21 watersheds that contain proposed critical habitat for the eulachon intersect 19 counties in Washington (9 counties), Oregon (8 counties), and California (2 counties). The overall population of these counties was 2.7 million in 2008, as presented in Exhibit 1-4. The largest population center in the study area counties is the Portland, Oregon area (Multnomah County, Oregon), with a 2008 population of 557,000, or 20 percent of the population in study area counties.[6] Neighboring Clark County, Washington, exhibited the fastest recent population growth of study area counties, increasing population by 23 percent between 2000 and 2008, which is nearly three times the national average. Study area counties as a whole closely paralleled national averages in terms of population growth between 2000 and 2008 (study area counties grew at 8.1 percent, while the U.S. grew at 8.0 percent).

EXHIBIT 1-4. AREA AND POPULATION STATISTICS BY COUNTY

COUNTY	POPULATION (2008)	PERCENTAGE CHANGE (2000-2008)	AREA (SQUARE MILES)	POPULATION DENSITY (PERSONS PER SQUARE MILE)
Washington				
Cowlitz	101,254	8.9%	1,139	81.6
Clallam	71,021	10.7%	1,740	37.1
Jefferson	29,542	12.3%	1,814	14.3
Grays Harbor	71,342	6.2%	1,917	35.1
Pacific	21,271	1.4%	933	22.5
Wahkiakum	4,133	8.1%	264	14.5

[6] US Census data. Retrieved on April 1, 2010. Available at: http://quickfacts.census.gov/qfd/states/01000.html

COUNTY	POPULATION (2008)	PERCENTAGE CHANGE (2000-2008)	AREA (SQUARE MILES)	POPULATION DENSITY (PERSONS PER SQUARE MILE)
Lewis	74,132	8.1%	2,408	28.5
Skamania	10,794	9.3%	1,656	6
Clark	424,733	23%	628	549.7
Oregon				
Clackamas	380,576	12.5%	1,868	181.2
Clatsop	37,404	5.0%	827	43.1
Columbia	49,408	13.4%	657	66.3
Douglas	104,059	3.6%	5,037	19.9
Hood River	21,536	5.5%	522	39.1
Lane	346,560	7.3%	4,554	70.9
Lincoln	45,946	3.3%	980	45.4
Multnomah	714,567	8.2%	453	1,518.4
California				
Del Norte	29,100	5.8%	1,008	27.3
Humboldt	129,000	2.0%	3,572	35.4
Study Area Total	**2,666,378**	**8.1%**	**31,977**	**149**
Washington Total	6,549,224	11.1%	66,544	88.6
Oregon Total	3,790,060	10.8%	95,997	35.6
California Total	36,756,666	8.5%	155,959	217.2
United States	304,059,724	8.0%		

Source: US Census data. Retrieved on April 1, 2010. Available at: http://quickfacts.census.gov/qfd/states/01000.html

1.4 REPORT ORGANIZATION

The remainder of this report includes the following sections:

- Section 2. This section describes the framework and baseline for this analysis.
- Section 3. This section describes potential incremental impacts resulting from the designation of critical habitat for the eulachon.
- Appendix A. This appendix presents the Final Regulatory Flexibility Analysis.
- Appendix B. This appendix summarizes laws and regulations that may provide baseline protection to eulachon.
- Appendix C. This section provides additional cost data on quantified administrative costs.

SECTION 2 | FRAMEWORK AND BASELINE FOR THE ANALYSIS

2.1 INTRODUCTION

This analysis examines the potential impacts of restricting or modifying specific land or water uses or activities, as identified by National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries), to avoid adverse modification or destruction of critical habitat. This chapter presents the framework applied to analyze the economic impacts of critical habitat designation, and includes a description of baseline protections already in place that benefit the species.

2.2 GENERAL FRAMEWORK FOR THE ECONOMIC ANALYSIS

Similar to its analysis of critical habitat designation for West Coast salmon and steelhead, NOAA Fisheries is applying a cost-effectiveness framework to support the designation of critical habitat for the eulachon. This framework supports the section 4(b)(2) decision-making process by allowing NOAA Fisheries to compare an estimate of the "benefits of exclusion" against an indicator of the biological "benefits of inclusion" for any particular area.[7]

This economic analysis addresses the "benefits of exclusion" portion of the weighing process, while the Biological Report and the ESA section 4(b)(2) Report address and compare our results to the "benefits of inclusion" for each particular area considered. These other reports also present more detailed biological information regarding eulachon, including the presence of identified physical or biological features essential for conservation in the designated critical habitat units.

2.2.1 BENEFIT-COST ANALYSIS AND COST-EFFECTIVENESS ANALYSIS

When economic activities have biological effects or other consequences for conservation, analyses of the impacts of regulating those activities can take a number of approaches. Two possible approaches are benefit-cost analysis and cost-effectiveness analysis. Each of these approaches has strong scientific support as well as support from the Office of Management and Budget (OMB) through its guidelines on regulatory analysis.[8] Each also has well known drawbacks, both theoretical and practical, as discussed in the following section in the context of critical habitat designation.

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[7] National Marine Fisheries Service, Northwest Fisheries Science Center. August 2005. Final Economic Analysis of Critical Habitat Designation for 12 West Coast Salmon and Steelhead ESUs. Section 1.2.1 of this report is a reduced form discussion of the framework discussion provided in the West Coast salmon critical habitat analysis by the Northwest Fisheries Science Center.

[8] U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.

Benefit-cost analysis (BCA) is the first choice for analyzing the consequences of a regulatory action such as critical habitat designation.[9] BCA is a well-established procedure for assessing the "best" course or scale of action, where "best" is that course which maximizes net benefits.[10] Because BCA assesses the value of an activity in net benefit terms, it requires that a single metric, most commonly dollars, be used to gauge both benefits and costs. Although the data and economic models necessary to estimate costs may be difficult or costly to gather and develop, expressing costs in dollars is straightforward for most regulatory actions. This is often the case for critical habitat designation, which has direct impacts on activities carried out, funded, or permitted by the Federal government. (Conceptually, quantifying the "benefits of exclusion," which is the language used in section 4(b)(2) of the Endangered Species Act (ESA), is the same as quantifying the "costs of inclusion." These costs of including areas as critical habitat could be used in a benefit-cost framework.)

However, while assessing the benefits of critical habitat designation in a BCA framework is straightforward in principle, it is much more difficult in practice. To the extent that the critical habitat provisions of the ESA increase the protections afforded the eulachon and its habitat, they produce real benefits to the species. In principle, these benefits can be measured first by a biological metric, and then by a dollar metric. A biological metric could take the form of the expected decrease in extinction risk, increase in number of spawners, increase in the annual population growth rate, and so forth. A BCA would then use this metric to assess the state of the species with and without critical habitat designation. This assessment would reveal the biological impact of designation, quantified in terms of the metric. However, the available data are insufficient to quantify the benefits of designating critical habitat for eulachon, particularly with respect to discrete geographical areas.

Recognizing the difficulty of estimating economic benefits in cases like critical habitat designation, OMB has recently acknowledged cost-effectiveness analysis (CEA) as an appropriate alternative to BCA:

> Cost-effectiveness analysis can provide a rigorous way to identify options that achieve the most effective use of the resources available without requiring monetization of all of [the] relevant benefits or costs. Generally, cost-effectiveness analysis is designed to compare a set of regulatory actions with the same primary outcome (e.g., an increase in the acres of wetlands protected) or multiple outcomes that can be integrated into a single numerical index (e.g., units of health improvement).[11]

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[9] Ibid.

[10] Zerbe, R., and D. Dively, 1994. Benefit Cost Analysis in Theory and Practice, New York: HarperCollins.

[11] Ibid.

Ideally, CEA quantifies both the benefits and costs of a regulatory action but uses different metrics for each. A common application of this method is to health care strategies, where the benefits of a strategy are quantified in terms of lives saved, additional years of survival, or some other quantitative, health-related measure.

In principle, conducting a CEA of critical habitat designation proceeds along the same lines identified above for BCA, except that the last step of assigning economic (dollar) values to biological benefits is not taken. Different configurations of critical habitat could be gauged by both metrics, with the cost-effectiveness (ratio of units of biological benefits to monetized cost) evaluated in each case. If alternatives have the same level of biological benefits, the most cost-effective is the one with the highest ratio of biological benefits to cost (either in the form of monetized costs or some other cost metric or cost ranking).

Standard CEA presumes that benefits and costs can be measured with a cardinal or even continuous measure. For critical habitat designations in general, however, constructing such a measure for biological benefits is problematic. Although protecting habitat for eulachon is likely to have benefits, it is not yet possible to quantify the benefits reliably with a single biological metric given the state of the science. In addition, NOAA has limited experience in managing eulachon, and there is general uncertainty about specific management actions likely to be undertaken on behalf of this species. Thus, applying CEA in its standard form is not possible.

The alternative form of CEA being applied to the eulachon analysis is one that develops an ordinal measure of the benefits of critical habitat designation. Although it is difficult to monetize or quantify benefits of critical habitat designation, it is possible to differentiate among habitat areas based on their estimated relative need for special management. For example, habitat areas can be rated as having a high, medium, or low biological value. This exercise is reported in the Biological Report, and is not included as part of the economic analysis. The output to that biological analysis, a qualitative ordinal ranking, may better reflect the state of the science for the geographic scale considered here than a quantified output, and can be done with available information.

In the current methodology, individual habitat areas are assessed using both their biological evaluation and economic cost assessments. Generally, areas with high conservation value and lower economic impacts are given a higher priority for designation, and areas with a low conservation value and higher economic impacts have a higher priority for exclusion. Again, these analyses are discussed in the Biological Report and the ESA section 4(b)(2) report for this rule.

By proceeding in order of these priorities (either in terms of inclusion or exclusion), the proposed critical habitat will minimize, or at least (in practice) reduce, the overall economic costs of achieving any given level of conservation. This form of CEA has two limitations, one of which it shares with the standard form of CEA. First, because CEA does not evaluate benefits and costs in the same metric, the analysis cannot assess whether a given change has benefits that, in monetary terms, are greater than costs. Although this analysis arrives at estimated economic costs on a per area basis, uncertainty

exists with regard to these costs. Nonetheless, because the comparison of costs is to biological values that are classified into high, medium, and low values, the coarseness of the available cost information should suffice to produce an effective tool for balancing costs and benefits. A second limitation of the modified form of CEA is the inability to discern variation in benefits among those areas assigned the same conservation value (i.e., the same ordinal ranking). A likely outcome is that using the modified CEA will lead to an outcome with higher expected costs of achieving any given level of conservation than one produced with standard CEA or BCA. This limitation, however, should be compared to the greater feasibility of the modified CEA.

2.3 IMPACTS THAT ARE THE FOCUS OF THIS ANALYSIS

This analysis examines the state of the world with and without the designation of critical habitat for the eulachon. The "without critical habitat" scenario represents the baseline for the analysis, considering habitat protections already afforded eulachon under its Federal listing or under other Federal, State, and local regulations, including protections afforded eulachon resulting from protections afforded other listed species, such as West Coast salmon and steelhead, green sturgeon, bull trout, and marine mammal species. Also included under the baseline are protections afforded eulachon under the ESA other than critical habitat. The "with critical habitat" scenario attempts to describe the incremental impacts associated specifically with the designation of critical habitat for the eulachon. While this analysis provides a qualitative discussion of baseline conservation efforts, including protections provided under the listing of eulachon, the focus of the analysis is determining the increment of costs that is attributable to critical habitat designation.

The social welfare impacts of critical habitat designation generally reflect "opportunity costs" associated with the commitment of resources required to accomplish species and habitat conservation. For example, if a set of activities that may take place on a parcel of land are limited as a result of the designation or the presence of the species, and thus the market value of that land is reduced, this reduction in value represents one measure of opportunity cost. Similarly, the costs incurred by a Federal action agency to consult with NOAA Fisheries under section 7 represent opportunity costs related to eulachon conservation, as the time and effort associated with those consultations would have been spent on other endeavors absent the listing of the species or critical habitat designation.

At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866, "Regulatory Planning and Review," Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses (i.e., social welfare impacts) in affected markets.[12]

[12] For additional information on the definition of "surplus" and an explanation of consumer and producer surplus in the context of regulatory analysis, see: Gramlich, Edward M., A Guide to Benefit-Cost Analysis (2nd Ed.), Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. Environmental Protection Agency, Guidelines for Preparing Economic Analyses, EPA 240-R-00-003, September 2000, available at http://yosemite.epa.gov/ee/epa/eed.nsf/ webpages/Guidelines.html.

CALCULATING PRESENT VALUE AND ANNUALIZED IMPACTS

This analysis compares economic impacts incurred in different time periods in present value terms. The present value represents the value of a payment or stream of payments in common dollar terms. That is, it is the sum of a series of future cash flows expressed in today's dollars. Translation of economic impacts of future costs to present value terms requires the following: a) projected future costs of critical habitat designation; and b) the specific years in which these impacts are expected to be incurred. With these data, the present value of the past or future stream of impacts (PV_c) from year t to T is measured in 2010 dollars according to the following standard formula:[a]

$$PV_c = \sum_{t}^{T} \frac{C_t}{(1+r)^{t-2009}}$$

C_t = cost of critical habitat conservation efforts in year t

r = discount rate[b]

Impacts for each activity in each unit are also expressed as annualized values. Annualized values are calculated to provide comparison of impacts across activities with varying forecast periods (T). For this analysis, however, all activities employ a forecast period of 20 years, 2011 through 2030. Annualized future impacts (APV_c) are calculated by the following standard formula:

$$APV_c = PV_c \left[\frac{r}{1-(1+r)^{-(N)}} \right]$$

N = number of years in the forecast period (in this analysis, 20 years)

[a] To derive the present value of future impacts, t is 2011 and T is 2030.

[b] The goal in selecting the appropriate discount rate is to choose the rate which individuals, and society, are willing to exchange consumption spending over time. OMB's own guidance on discounting currently recommends using a rate of seven percent, an estimate of the average real pre-tax rate of return generated by private sector investments. Since public use of capital relies on private capital markets, and since government use of investment funding may use funds that would otherwise be available for private borrowing, the market equilibrium interest rate can be used as a discounting rate to apply to public sector investments and/or discounting. This is the logic behind OMB's recommendation of a seven percent discount rate. OMB also recommends the use of an alternate discount rate for comparison, often three percent. Based on historical rates of return on relatively risk-free investments (such as U.S Treasury securities), adjusted for taxes and inflation, a consumption rate of interest measured at two to three percent is justified. Presenting discounted values with both a low and a high discount rate performs a degree of sensitivity analysis for the findings of a particular valuation.

Sources: U.S. Office of Management and Budget, Circular A-4, September 17, 2003 and U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003; U.S. Environmental Protection Agency, Guidelines for Preparing Economic Analyses, September 2000.

2.3.1 BASELINE FOR THE ECONOMIC ANALYSIS

The first step in the economic analysis is to identify the baseline level of protection afforded the eulachon and its habitat. This section provides a description of the methodology used to identify baseline conditions and incremental impacts stemming from the designation of critical habitat for the eulachon.

The baseline for this analysis is the existing state of regulation prior to the designation of critical habitat that provides protection to the species under the ESA and other Federal, State and local laws and guidelines. The baseline includes the protections of sections 7, 9, and 10 of the ESA, and economic impacts resulting from these protections to the extent that they are expected to occur absent the designation of critical habitat for the species, including protections afforded eulachon from protections afforded other listed species, such as salmon and steelhead, green sturgeon, and bull trout species.

- Section 7 of the Act, absent critical habitat designation, requires Federal agencies to consult with NOAA Fisheries to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species. The portion of the administrative costs of consultations under the jeopardy standard, along with the impacts of project modifications resulting from consideration of this standard, are considered baseline impacts.
- Section 9 defines the actions that are prohibited by the Act. In particular, it prohibits the "take" of endangered wildlife, where "take" means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."[13] The economic impacts associated with this section manifest themselves in sections 7 and 10.
- Under section 10(a)(1)(B) of the Act, an entity (e.g., a landowner or local government) may develop a Habitat Conservation Plan (HCP) for a listed animal species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.[14] The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately minimized and mitigated. The development and implementation of HCPs is considered a baseline protection for the species and habitat unless the HCP is determined to be precipitated by the designation of critical habitat, or the designation influences stipulated conservation efforts under HCPs.

The protection of listed species and habitat is not limited to the Act. Other Federal agencies, as well as State and local governments, may also seek to protect the natural resources under their jurisdiction. If compliance with the Clean Water Act or State environmental quality laws, for example, protects habitat for the species, such protective

[13] 16 U.S.C. 1532.

[14] U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning," August 6, 2002, accessed at http://endangered.fws.gov/hcp/.

efforts are considered to be baseline protections and costs associated with these efforts are not quantified as impacts of critical habitat designation. As noted above, where uncertainty exists as to whether particular costs would have already occurred under the baseline, this analysis conservatively includes those costs.

After the critical habitat rule goes into effect, activities affecting eulachon may require modification to avoid destruction or adverse modification of critical habitat. This analysis aims to understand the economic impacts of avoiding adverse impacts to eulachon critical habitat over and above other baseline protections that may already be in place. Because of the close relationship in terms of management requirements under the ESA between eulachon and other listed threatened and endangered salmon and steelhead species, protections for these species may provide the strongest baseline protections to eulachon within critical habitat areas.[15] In addition, a number of regulations, laws, and initiatives have been created specifically to address human-induced impacts on other anadromous fish species. These are summarized in Appendix B.

Salmon and Steelhead Species

Riverine eulachon habitat largely overlaps listed West Coast salmon and steelhead species habitat and also largely overlaps designated critical habitat areas for West Coast salmon and steelhead species, as shown in Exhibit 2-1. While the habitat area affected by the rule supports numerous other listed species, salmon and steelhead are most closely related in terms of threats and habitat management requirements.

Because of the high visibility and regional importance of salmon and steelhead species, numerous protections have already been undertaken on behalf of these species. For example, a critical habitat analysis for salmon and steelhead examined nearly 1,100 consultation actions over three years, or approximately 370 actions annually for salmon and steelhead species. These actions were authorized, funded, or carried out by nearly 30 Federal agencies in addition to NOAA Fisheries.[16]

In addition, NOAA Fisheries provided a detailed consultation history of previous section 7 actions that occurred in watersheds that are being designated as eulachon critical habitat between 2000 and 2009. As presented in Exhibit 2-2, this consultation history includes consultations on 31 listed species and ESUs, most of which are salmon and steelhead ESUs.

[15] NOAA Fisheries, Memorandum re: Economic Analysis for the Proposal of Designated Critical Habitat for Eulachon, February 2, 2010.

[16] NOAA Fisheries, Final Economic Analysis of Critical Habitat Designation for Seven West Coast Salmon and Steelhead ESUs, Long Beach, CA, August 2005.

EXHIBIT 2-1. OVERLAP OF CRITICAL HABITAT STUDY AREA FOR EULACHON WITH CRITICAL HABITAT FOR OTHER MIGRATORY FISH SPECIES

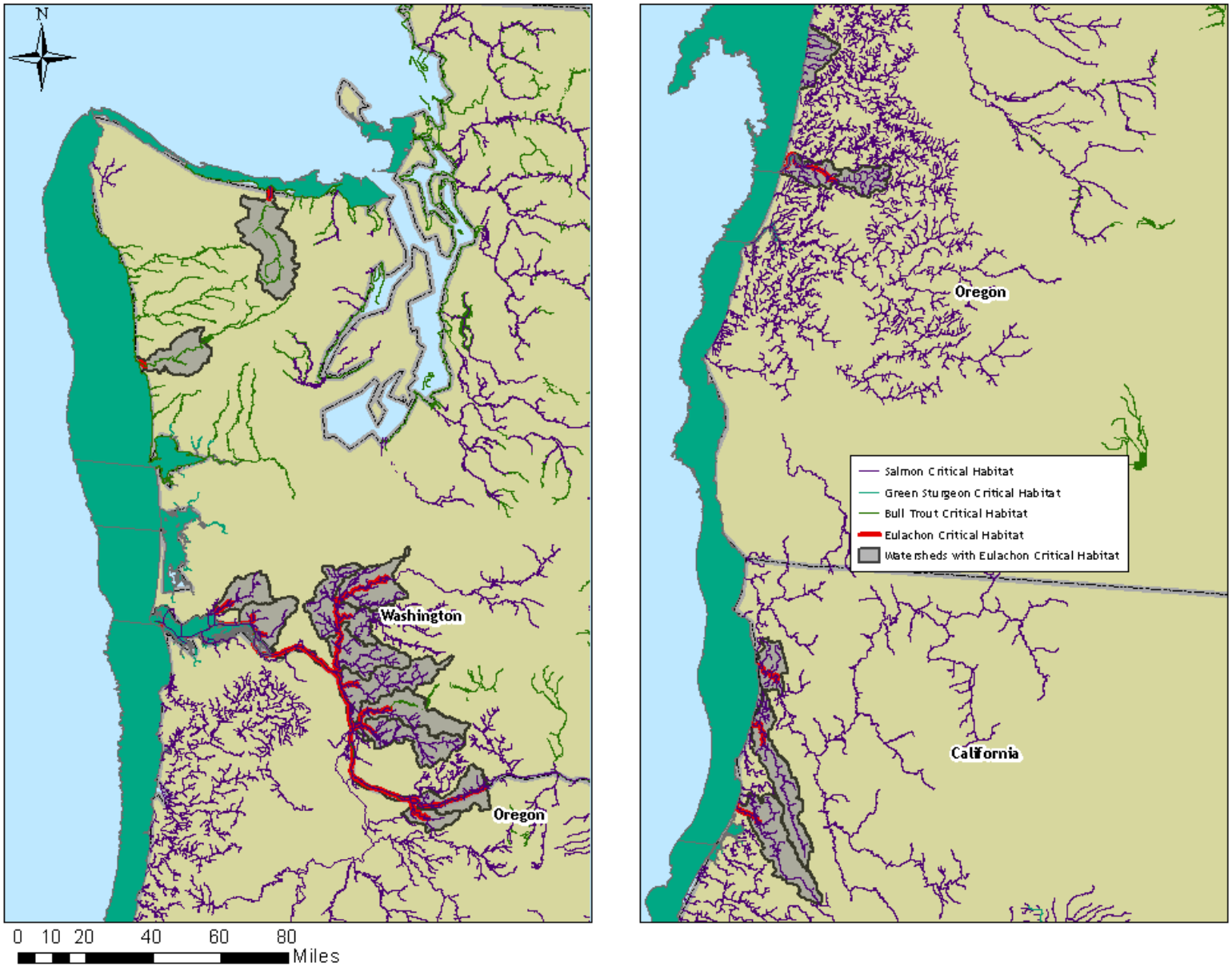


EXHIBIT 2-2. OTHER SPECIES INCLUDED IN SECTION 7 ACTIONS IN EULACHON CRITICAL HABITAT (1994 TO 2009)[17]

SPECIES (ESU)	STATUS	CRITICAL HABITAT STATUS	NUMBER OF SECTION 7 ACTIONS THAT INCLUDE SPECIES
Salmon, Chinook (Lower Columbia River)	Threatened	Designated	184
Salmon, Chinook (California Coast)	Threatened	Designated	unknown
Salmon, Chinook (Upper Willamette River)	Threatened	Designated	113
Salmon, Chinook (Snake River fall run)	Threatened	Designated	113
Salmon, Chinook (Snake River spring/summer run)	Threatened	Designated	123
Salmon, Chinook (Upper Columbia River spring-run)	Endangered	Designated	99
Salmon, Chinook (Puget Sound)	Threatened	Designated	37
Salmon, chum (Columbia River)	Threatened	Designated	165
Salmon, chum (Hood Canal summer-run)	Threatened	Designated	25
Salmon, coho (Lower Columbia River)	Threatened	In process	134
Salmon, coho (Southern Oregon/Northern California Coast)	Threatened	Designated	37
Salmon, coho (Oregon Coast)	Threatened	Designated	76
Salmon, coho (Southwest Washington)	Undetermined	n/a	1
Salmon, sockeye (Ozette Lake)	Threatened	Designated	11
Salmon, sockeye (Snake River)	Endangered	Designated	115
Steelhead (Lower Columbia River)	Threatened	Designated	170
Steelhead (Northern California)	Threatened	Designated	unknown
Steelhead (Upper Willamette River)	Threatened	Designated	104
Steelhead (Upper Columbia River)	Endangered	Designated	90
Steelhead (Middle Columbia River)	Threatened	Designated	131
Steelhead (Puget Sound)	Threatened	n/a	15
Steelhead (Snake River Basin)	Threatened	Designated	117
Sturgeon, green (Southern DPS)	Threatened	Designated	28
Sea lion, Steller	Threatened	Designated	7
Whale, killer (Southern Resident stock)	Endangered	Designated	6
Whale, humpback (Range-wide)	Endangered	Not range-wide	1
Whale, humpback (Eastern North Pacific Stock)	Endangered	n/a	3
Whale, fin (California/Oregon/Washington Stock)	Endangered	n/a	1
Whale, right, North Pacific (Eastern North Pacific Stock)	Endangered	Designated	1
Whale, sei (Eastern North Pacific Stock)	Endangered	n/a	1
Whale, sperm (California/Oregon/Washington stock)	Endangered	n/a	1

[17] Section 7 actions include all completed section 7 consultations categorized as formal, informal, programmatic, conference, implementation, and pre-consultation/technical assistance.

SPECIES (ESU)	STATUS	CRITICAL HABITAT STATUS	NUMBER OF SECTION 7 ACTIONS THAT INCLUDE SPECIES
Whale, blue (Range-wide)	Endangered	n/a	1
Turtle, leatherback sea (Range-wide)	Endangered	Not range-wide	3
Turtle, olive ridley sea (Range-wide)	Endangered	n/a	2
Turtle, loggerhead sea (Range-wide)	Endangered	Not range-wide	2
Turtle, green sea (Range-wide)	Endangered	Not range-wide	1
Turtle, unidentified sea (NA)	Endangered	n/a	1
Notes: These totals do not include consultations occurring in the East Fork Lewis River (HUC 1708000205). "Unknown" indicates that sufficient information was not available for the species.			

Other Fish Species

The analysis considered baseline protections resulting from the presence of other protected fish species, including the Southern DPS of green sturgeon and the bull trout. Critical habitat for the green sturgeon has been designated in riverine, estuarine, and coastal areas in Alaska, Washington, Oregon, and California, while bull trout critical habitat has been designated in riverine, lake, and coastal areas in Washington, Oregon, Idaho, Montana, and Nevada.

While conservation recommendations for these fish species may not always benefit eulachon, conservation recommendations for some activities may provide a measure of protection for eulachon habitat. For example, water quality standards and restrictions on sediment loads may provide protection to eulachon.

Marine Mammals

The analysis also considers baseline protections resulting from the presence of marine mammals such as killer whales, Steller sea lions, other whale species, and turtle species. While conservation recommendations for marine mammals may not always benefit eulachon, conservation recommendations for some activities, particularly those that may affect passage, may provide a measure of protection for eulachon and its habitat. However, because the specific habitat requirements for marine mammals and eulachon are not closely related, no baseline protections for eulachon are assumed to exist in critical habitat areas associated with marine mammal protections. This approach likely underestimates baseline protections that may exist for eulachon in marine mammal habitat areas.

Overlap with Critical Habitat for Other Listed Species

As shown in Exhibit 2-3, the physical or biological features essential for conservation of eulachon critical habitat are similar across a number of salmon and steelhead ESUs as well as bull trout. In some cases, these features are more narrowly defined for the eulachon than for salmon and steelhead species. For example, the salmon requirement for "freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development" is broad, and could encompass many conservation efforts that would also benefit the eulachon. As such, the more broad-sweeping requirements of salmon and steelhead would appear likely to provide protections to the eulachon critical habitat because the physical and biological requirements for these species are similar. Indeed, the consultation record suggests that conservation recommendations for salmon and steelhead species in particular provide protections to eulachon. Exhibit 2-4 provides types of conservation measures that have been recommended for salmon, steelhead, green sturgeon, and bull trout in eulachon critical habitat areas. In a review of past consultations, no addition modifications have been identified for the eulachon that were not otherwise identified for salmon or steelhead species.

EXHIBIT 2-3. COMPARISON OF PHYSICAL AND BIOLOGICAL FEATURES ESSENTIAL FOR CONSERVATION OF EULACHON, SALMON, AND BULL TROUT

EULACHON[1]	WEST COAST SALMON/STEELHEAD[2]	BULL TROUT[3]
FRESHWATER FOR SPAWNING AND INCUBATION		
Substrate. Substrates for egg deposition and development are essential for spawning. Typical spawning substrate ranges from silt, sand or gravel to cobble and detritus. Significant uncertainties remain regarding the effect of substrate size and quality on eulachon spawning success.	**Water Quantity and Quality**. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.	**Substrate**. Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount (e.g., less than 12%) of fine substrate less than 0.85 mm (0.03 in) in diameter and minimal substrate embeddedness of these fines in larger substrates are characteristic of these conditions.
Water Quality. Water quality is necessary for spawning, and viability of all life stages. Sublethal concentrations of contaminants affect the survival of aquatic species by increasing stress, predisposing organisms to disease, delaying development, and disrupting physiological processes, including reproduction.		**Water quality**. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporehic flows) to contribute to water quality and quantity and provide thermal refugia.
Temperature. Suitable water temperatures would include stable water temperatures within spawning reaches (wide fluctuations could increase egg mortality or deformities in developing embryos). Given the range of temperatures that eulachon spawn in throughout their range, the contrast between ocean and river temperatures might be more critical than river temperatures.		**Temperature.** Water temperatures ranging from 2° to 15° Celsius (C) (36° to 59° Fahrenheit (F)), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life history stage and form, geography, elevation, diurnal and seasonal variation, shade, such as that provided by riparian habitat, and local groundwater influence.
Flow. A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of freshwater discharge over time) supporting spawning, and survival of all life stages. Sufficient flow may also be needed to flush silt and debris from spawning substrate surfaces to prevent suffocation of developing eggs.	**Water Quantity**. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility.	**Flow**. Sufficient water quantity such that normal reproduction, growth and survival are not inhibited. A natural hydrograph, including peak, high, low, and base flows within historic or seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph.
	Food. Forage supporting juvenile development.	**Food**. An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

EULACHON[1]	WEST COAST SALMON/STEELHEAD[2]	BULL TROUT[3]
		Lack of Nonnative Species. Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, small mouth bass), inbreeding (brook trout), or competitive (e.g., brown trout) species present.
	Cover. Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks	**Complex habitat.** Complex river, stream, lake, and shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates to provide a variety of depths, gradients, velocities, and structure.
Freshwater and Estuarine Migration Corridors		
Migratory Corridor. Safe and unobstructed for adults to pass from estuarine to riverine habitats in order to spawn, and for larval eulachon to migrate downstream from spawning habitats within freshwater rivers to rearing habitats within the estuaries.	**Migratory Corridor**. Free of obstruction with natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival, including aquatic invertebrates and fishes, supporting growth and maturation.	**Passage.** Minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent or seasonal barriers.
Water Quality. Water quality is necessary for survival and migration of spawning adult and larval eulachon. Adult eulachon can take up and store pollutants from their spawning rivers, despite the fact that they do not feed in fresh water and remain there only a few weeks. Eulachon avoid polluted waters when possible.	**Water Quantity and Quality**. Water quantity and salinity conditions supporting juvenile and adult physiological transitions between fresh and saltwater. Nearshore marine areas free of obstruction with water quality and quantity conditions supporting growth and maturation.	**Water Quantity**. Sufficient water quantity such that normal reproduction, growth and survival are not inhibited.
Flow. A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of freshwater discharge over time) that supports spawning migration of adults and outmigration of larval eulachon from spawning sites.		**Flow Regime.** A natural hydrograph, including peak, high, low, and base flows within historic or seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph.
Temperature. Water temperature may influence run timing. The contrast between ocean and river temperatures might be more critical than river temperatures.		**Temperature**. Water temperatures ranging from 36° to 59° Fahrenheit, with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life history stage and form, geography, elevation, diurnal and seasonal variation, shade, such as that provided by riparian habitat, and local groundwater influence.

EULACHON[1]	WEST COAST SALMON/STEELHEAD[2]	BULL TROUT[3]
Food. Larvae need abundant prey items, especially copepod larvae.	**Food**. Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.	
Nearshore and Offshore Marine Foraging Sites		
Food. Prey items, in a concentration that supports foraging for juveniles and adults, are needed in the marine environment. Juveniles eat phytoplankton, copepod eggs, copepods and other small zooplanktons, and adults eat euphausiids and copepods.	**Food.** Forage including aquatic invertebrates and fishes, supporting growth and maturation	
Water Quality. The water quality requirements for eulachon in marine habitats is largely unknown but they would likely include adequate dissolved oxygen levels and be free of contaminants	**Water Quality.** Water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.	
	Cover. Free of obstruction with natural cover such as submerged and overhanging large wood, aquatic vegetation	**Complex habitat**. Complex marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates to provide a variety of depths, gradients, velocities, and structure.

Sources:
[1] Critical Habitat for the Southern Distinct Population Segment of Eulachon Biological Report, National Marine Fisheries Service, Northwest Region Protected Resources Division, August 2010.
[2] 70 FR 52630; Appendix F, Final Economic Analysis of Critical Habitat Designation for the Bull Trout, prepared for the U.S. Fish and Wildlife Service, September 2010.
[3] 70 FR 52630; Appendix F, Final Economic Analysis of Critical Habitat Designation for the Bull Trout, prepared for the U.S. Fish and Wildlife Service, September 2010.

EXHIBIT 2-4. EXAMPLE CONSERVATION EFFORTS FOR OTHER ANADROMOUS FISH SPECIES (INCLUDING WEST COAST SALMON AND STEELHEAD, BULL TROUT, AND GREEN STURGEON)

ACTIVITY	EXAMPLE MITIGATION MEASURE
Dredging and in-water construction, including transportation	▪ Dredging and dredged material disposal taking place only during the in-water work window from November 1 through February 28. ▪ In-water disposal at a minimum of minus 32 feet mean lower low water (MLLW) to minimize turbidity and impacts to salmonids. ▪ Dredging to be completed in compliance with applicable state water quality standards. ▪ Construction equipment to be serviced, stored, and fueled at least 100 feet away from the shoreline, as practicable. ▪ Water quality monitoring will be conducted during active dredging and in-water placement activities. ▪ Dredging impacts will be confined to the minimum area necessary to complete the project.
Agriculture	▪ Prevent loss or damage to land uses near streams, and support riparian and aquatic habitat functions. ▪ Limit landscape-level discharges caused by the cumulative effects of active cropping/rangeland use and episodic events. ▪ Riparian conservation buffers placed next to wetlands and waterways to provide aquatic habitat features. ▪ Reduce sheet, rill and gully erosion at field edges by trapping sediment. ▪ Reduce polluted surface runoff by trapping pollutants.
Forest Management	▪ Implementing project design features that keep chemicals out of water. ▪ Reporting annual weed control proposals to NOAA Fisheries by April 1, prior to the start of each spray season. ▪ Implementing additional minimization/avoidance measures related to access management. ▪ Visually observe a minimum of five ford crossings before, during, and after a stream crossing annually for 5 years.
Mining	▪ Implement a pollution and erosion control plan to prevent pollution caused by operations, including practices to prevent erosion and sedimentation associated with related shoreline operations. ▪ Develop spill containment and control plan. ▪ Operations will be stopped temporarily if injured, sick, or dead listed species are in the project area.
Restoration	▪ Minimize incidental take from the proposed activity categories. ▪ Ensure the survival of at least 80 percent of plantings used in revegetation activities for at least three years post-planting. ▪ Maintain water quality to the rearing channel.
Water management, including dams and hydropower	▪ Ensure that all instream projects involve a professional fisheries biologist. ▪ Follow ODFW guidelines for timing of in-water work, where relevant, except where the potential for greater damage to fish, water quality and fish habitat exists. ▪ Minimize amount of disturbance to fish by training personnel in survey methods that prevent or minimize disturbance of fish.

ACTIVITY	EXAMPLE MITIGATION MEASURE
Source: NOAA Fisheries, Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery and Conservation Management Act Essential Fish Habitat Consultation on Resource Management Systems for Dry Cropland and Range and Pastureland in Gilliam, Sherman and Wasco Counties, Oregon, #2002/00111, April 22, 2004. NOAA Fisheries, Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Pacific Rock Products Instream Sand and Gravel Mining, #2006/01053, August 25, 2006. NOAA Fisheries, Endangered Species Act Section 7 Formal Programmatic Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Fish Habitat Restoration Activities in Oregon and Washington, CY2007-CY2012, # 2006/0653, April 28, 2007. NOAA Fisheries, Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Boise National Forest South Fork Salmon River Noxious and Invasive Weed Management Program, #2009/05069, November 12, 2009. NOAA Fisheries, Endangered Species Act Section 7 Formal Programmatic Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Salmon-Challis National Forest Travel Plan, #2009/02644, August 12, 2009. NOAA Fisheries< Endangered Species Act Section 7 Formal Programmatic Consultation and Magnuson-Stevens Act Essential Fish Habitat Consultation on Bureau of Land Management, Forest Service, and BIA/Coquille Indian Tribe Actions, # 2002/00879, October 18, 2002.	

2.3.2 TYPES OF ECONOMIC IMPACTS OF CRITICAL HABITAT DESIGNATION

The purpose of the analysis is to determine the impacts on land uses and activities from the designation of critical habitat that are above and beyond those impacts due to existing or planned conservation efforts being undertaken due to other Federal, State, and local regulations or guidelines.

When critical habitat is designated, section 7 requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat (in addition to ensuring that the actions are not likely to jeopardize the continued existence of the species). The added administrative costs of including consideration of critical habitat in section 7 consultations and the additional impacts of implementing project modifications to protect critical habitat are the direct result of the designation of critical habitat. These costs are not in the baseline, and are considered incremental impacts of the rulemaking.

Incremental impacts may include the direct costs associated with additional effort for future consultations, reinitiated consultations, new consultations occurring specifically because of the designation, and additional project modifications that would not have been required to avoid jeopardizing the continued existence of the species. Additionally, incremental impacts may include indirect impacts resulting from reaction to the potential designation of critical habitat (e.g., developing habitat conservation plans (HCPs) in an effort to avoid designation of critical habitat), triggering of additional requirements under State or local laws intended to protect sensitive habitat, and uncertainty and perceptional effects on markets. The nature of these impacts is described in greater detail below.

Direct Impacts

The direct incremental impacts of critical habitat designation stem from the consideration of the potential for destruction or adverse modification of critical habitat during section 7 consultations. The two categories of direct incremental impacts of critical habitat designation are: 1) the administrative costs of conducting section 7 consultation; and 2)

implementation of any project modifications requested by NOAA Fisheries through section 7 consultation to avoid or minimize potential destruction or adverse modification of critical habitat.

Administrative Section 7 Consultation Costs

Parties involved in section 7 consultations for eulachon include NOAA Fisheries, a Federal action agency (the Federal action, such as a permit or other authorization, provides the "Federal nexus" requiring consultation), and in some cases, a private entity involved in the project or land use activity. The Federal action agency serves as the liaison with NOAA Fisheries. While consultations are required for activities that involve a Federal nexus and may jeopardize the continued existence of the species regardless of whether critical habitat is designated, the designation may increase the effort for consultations where the project or activity in question may adversely modify critical habitat. Administrative efforts for consultation may therefore result in both baseline and incremental impacts.

In general, three different scenarios associated with the designation of critical habitat may trigger incremental administrative consultation costs:

- **Additional effort to address adverse modification in a new consultation -** New consultations taking place after critical habitat designation may require additional effort to address critical habitat issues above and beyond the listing issues. In this case, only the additional administrative effort required to consider critical habitat is considered an incremental impact of the designation.
- **Re-initiation of consultation to address adverse modification -** Consultations that have already been completed on a project or activity may require re-initiation to address critical habitat. In this case, the costs of re-initiating the consultation, including all associated administrative and project modification costs are considered incremental impacts of the designation.
- **Incremental consultation resulting entirely from critical habitat designation -** Critical habitat designation may trigger additional consultations that may not occur absent the designation (e.g., for an activity for which adverse modification may be an issue, while jeopardy is not, or consultations resulting from the new information about the potential presence of the species provided by the designation). Such consultations may, for example, be triggered in critical habitat areas that are not occupied by the species. All associated administrative and project modification costs of incremental consultations are considered incremental impacts of the designation.

The administrative costs of these consultations vary depending on the specifics of the project. One way to address this variability is to show a range of possible costs of consultation. Section 3.4 discusses estimated consultation costs in more detail.

As discussed above, NOAA Fisheries provided a detailed consultation history of previous section 7 actions since 1994 in areas being designated as eulachon critical habitat. Based on this consultation history for other anadromous fish species, this analysis forecasts a

future rate of section 7 consultation for the eulachon, assuming that the average rate of consultation per year is unlikely to change due to critical habitat designation for the eulachon.

Section 7 Project Modification Impacts

Section 7 consultation considering critical habitat may also result in additional project modification recommendations specifically addressing potential destruction or adverse modification of critical habitat. For consultations that consider jeopardy and adverse modification, and for re-initiations of past consultations to consider critical habitat, the economic impacts of project modifications undertaken to avoid or minimize adverse modification are considered incremental impacts of critical habitat designation. For consultations that are forecast to occur specifically because of the designation (incremental consultations), impacts of all associated project modifications are assumed to be incremental impacts of the designation.

Indirect Impacts

The designation of critical habitat may, under certain circumstances, affect actions that do not have a Federal nexus and thus are not subject to the provisions of section 7 of the Act. Indirect impacts are those unintended changes in economic behavior that may occur outside of the Act, through other Federal, State, local, or private actions that are caused by the designation of critical habitat. This section identifies common types of indirect impacts that may be associated with the designation of critical habitat. Importantly, these types of impacts are not always considered incremental. If these types of conservation efforts and economic effects would occur regardless of critical habitat designation, they are appropriately considered baseline impacts.

Habitat Conservation Plans

Under section 10 of the Act, landowners seeking an incidental take permit may develop an HCP to counterbalance the potential harmful effects that an otherwise lawful activity may have on a species. The purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately minimized and mitigated. Thus, HCPs are developed to ensure compliance with section 9 of the Act and to meet the requirements of section 10 of the Act.

Application for an incidental take permit and completion of an HCP is not required or necessarily recommended by NOAA Fisheries as a result of a critical habitat designation. In certain situations, however, the new information provided by the proposed critical habitat rule may prompt a landowner to apply for an incidental take permit. For example, a landowner may have been previously unaware of the potential presence of the species on his or her property, and expeditious completion of an HCP may offer the landowner regulatory relief in the form of exclusion from the final critical habitat designation. In this case, the effort involved in creating the HCP and undertaking associated conservation actions is considered an incremental effect of designation.

Other State and Local Laws

Under certain circumstances, critical habitat designation may provide new information to a State or local government about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws. In cases where these impacts would not have been triggered absent critical habitat designation, they are considered indirect, incremental impacts of the designation.

Additional Indirect Impacts

In addition to the indirect effects noted above, project proponents, land managers and landowners may face additional indirect impacts, including the following:

Time Delays - Both public and private entities may experience incremental delays for projects and other activities due to requirements associated with the need to reinitiate the section 7 consultation process and/or compliance with other laws triggered by the designation. To the extent that delays result from the designation, they are considered indirect, incremental impacts of the designation.

Regulatory Uncertainty - NOAA Fisheries conducts each section 7 consultation on a case-by-case basis and issues a biological opinion on formal consultations based on species-specific and site-specific information. As a result, government agencies and affiliated private parties who consult with NOAA Fisheries under section 7 may face uncertainty concerning whether project modifications will be recommended by NOAA Fisheries and what the nature of these modifications will be. This uncertainty may diminish as consultations are completed and additional information becomes available on the effects of critical habitat on specific activities. Where information suggests that regulatory uncertainty stemming from the designation may affect a project or economic behavior, associated impacts are considered indirect, incremental impacts of the designation.

Stigma - In some cases, the public may perceive that critical habitat designation may result in limitations on private property uses above and beyond those associated with anticipated project modifications or regulatory uncertainty. Public attitudes about the limits or restrictions that critical habitat may impose can cause real economic effects, regardless of whether such limits are actually imposed. All else equal, a property that is designated as critical habitat may have a lower market value than an identical property that is not within the boundaries of critical habitat due to perceived limitations or restrictions. As the public becomes aware of the true regulatory burden imposed by critical habitat, the impact of the designation on property markets may decrease. To the extent that potential stigma effects on markets are probable and identifiable, these impacts are considered indirect, incremental impacts of the designation.

These potential impacts are not explicitly addressed in this analysis, but were considered during the development of cost estimates.

2.4 APPROACH TO ANALYSIS OF EULACHON

To quantify the economic impacts of modifications to land and water uses that result from critical habitat designation, the analysis employs the following three steps:

1. Define the geographic study area for the analysis, and identify the units, in this case, fifth-field hydrologic unit codes (HUCs), within the study area to be analyzed for purposes of this designation. The units (HUCs) being analyzed for this analysis are larger than the area being designated as critical habitat, which are comprised solely of river stretches in these HUCs. HUCs are used to identify potential economic impacts because activities occurring in a watershed have the potential to affect the river area being designated. The rule to designate critical habitat analyzes how each area of river in these HUCs meets the definition of critical habitat set forth in Section 3 of the ESA.
2. Based on the potentially-affected economic activities identified by NOAA Fisheries, determine how conservation efforts, including both project modification and administrative costs, may increase due to the designation of critical habitat for the eulachon.
3. Estimate the economic impacts associated with this change in management.

These steps are described in greater detail below.

2.4.1 DEFINE GEOGRAPHIC STUDY AREA

As shown in Exhibit 1-1, the critical habitat study area spans an area from Northern California to the Olympic Peninsula in Washington. IEc applies a watershed-based approach to the stream lengths provided by NOAA Fisheries to determine the area of potential effects of eulachon critical habitat. As discussed in Section 1, to define the watershed areas potentially affected by eulachon critical habitat, this analysis uses a standard watershed unit, as mapped by the U.S. Geological Service and described by ten-digit, fifth-field hydrologic unit codes (referred to in this report as HUCs, or simply "watersheds") in Oregon and Washington. For California, the analysis uses the California hydrologic sub-areas (HSAs), which are approximately equivalent to USGS HUC5s, to define the study unit boundaries. In total, the study area covers 21 HUCs.

2.4.2 IDENTIFY POTENTIALLY AFFECTED ECONOMIC ACTIVITIES AND DETERMINE HOW MANAGEMENT MAY CHANGE

NOAA Fisheries identified three specific activities that it believes may be affected by the designation of critical habitat for the eulachon. Though there are many activities that may be affected by eulachon critical habitat designation, these are the only ones that are not already affected by either the listing of eulachon or the designation of critical habitat for a salmonid. Specifically, these were: (1) potential changes in the timing of the Elwha dams removal project; (2) changes to dredging activities in the Columbia River; and (3) alteration of timing of flushing flows at Mayfield Dam. Activities outside of the 21 HUCs, for example, an upstream dam, are assumed not to affect critical habitat.

This analysis contacted relevant stakeholders to determine how these activities are currently managed for eulachon and other fish species, as well as how that management may change as a result of critical habitat. Using the detailed consultation history for the watersheds being designated as eulachon critical habitat as shown in Exhibit 2-5, this analysis identifies economic activities that may be subject to section 7 consultation, forecasts a future rate of section 7 consultation for the eulachon, and estimates associated administrative costs.

2.4.3 ESTIMATE ASSOCIATED ECONOMIC IMPACTS

A key challenge of this analysis is determining the extent to which the presence of the eulachon and its critical habitat affect the type or level of conservation efforts recommended by NOAA Fisheries for a project or activity. The uncertainty at this stage of the analysis falls into two main categories:

1. **Identifying conservation efforts associated with the listing protections for the eulachon apart from those conservation efforts undertaken specifically due to its critical habitat designation.** For conservation efforts undertaken at least in part for purposes of eulachon conservation, the role of critical habitat in their implementation is unclear. That is, it is uncertain whether project modifications benefitting the eulachon would be the same with or without the critical habitat designation.
2. **Determining the probability that the eulachon and its critical habitat are primary drivers of a conservation effort.** As described in Section 2.3.1, project-specific conservation efforts are frequently undertaken due to the joint presence of multiple species and habitats and may therefore be implemented regardless of the presence of any single species. This further complicates the identification of changes in behavior associated specifically with the eulachon critical habitat.

With regard to the first category of uncertainty, it is difficult to separate potential conservation efforts expected to result from critical habitat from those that would already be expected to occur for eulachon due to the listing of the species. Based on discussions with NOAA Fisheries biologists and other stakeholders, this analysis focuses on conservation measures specifically identified to prevent adverse modification of eulachon habitat.

EXHIBIT 2-5. TOTAL NUMBER OF SECTION 7 ACTIONS BY WATERSHED AND ACTIVITY (2000 THROUGH 2009)[18]

HUC	AGRICULTURE	FOREST MGMT	IN STREAM WORK	MINING	TRANSPORTATION	RESTORATION	WATER QUALITY	WATER SUPPLY	DAMS	OTHER	TOTAL
1708000107	1.3	3.5	11.4	0.6	6.7	4.2	0.6	0.1	0.0	0.1	28.4
1708000108	1.8	4.3	4.1	0.1	1.9	2.2	0.9	0.1	0.0	0.1	15.4
1708000205	0.8	3.0	2.6	1.1	8.4	1.3	0.1	1.1	0.0	5.1	23.4
1708000206	1.8	3.0	1.6	0.1	1.4	1.3	0.1	0.1	0.0	0.1	9.4
1708000301	1.8	3.0	6.6	0.1	1.4	2.3	1.1	0.1	0.0	0.1	16.4
1708000305	0.8	3.0	11.6	0.1	1.4	4.3	1.1	0.1	0.0	0.1	22.4
1708000307	0.8	3.0	9.6	0.1	1.7	1.3	0.4	0.5	0.0	0.1	17.4
1708000503	0.8	3.0	1.6	0.1	1.4	1.3	0.1	0.1	0.0	0.1	8.4
1708000507	1.2	3.0	5.9	0.1	5.7	1.3	1.1	0.1	0.0	0.1	18.4
1708000508	1.3	3.0	10.6	0.1	4.4	2.3	0.6	0.1	0.0	0.1	22.4
1708000603	1.8	3.0	9.6	0.1	6.9	7.8	0.1	0.1	0.0	1.1	30.4
1708000605	0.8	3.0	5.6	0.1	1.4	1.3	0.1	0.1	0.0	0.1	12.4
1709001205	0.8	3.0	19.6	2.1	1.4	1.3	0.1	0.1	0.0	0.1	28.4
1710010205	0.8	5.0	1.6	0.1	1.4	1.3	0.1	0.1	0.0	0.1	10.4
1710020507	0.8	3.0	2.4	0.1	6.2	1.3	0.4	0.1	0.0	0.1	14.4
1710030304	0.8	4.0	3.6	0.1	1.4	1.3	0.1	0.1	0.0	0.1	11.4
1710030308	1.3	5.0	5.9	0.1	3.2	5.2	1.6	0.1	0.0	0.1	22.4
1711002005	0.8	3.0	1.6	0.1	1.4	1.3	0.1	0.1	1.0	0.1	9.4
1801010201	0.0	3.5	3.0	0.0	5.0	5.0	1.0	0.0	5.5	1.0	24.0
1801010204	0.0	0.0	10.0	12.0	2.0	0.0	0.0	2.0	0.0	2.0	28.0
1801020911	0.0	3.0	5.0	1.0	5.0	0.0	2.0	0.0	0.0	1.0	17.0
Total	**20.8**	**66.6**	**133.0**	**17.5**	**69.5**	**48.1**	**11.3**	**5.7**	**6.5**	**11.1**	**390.0**

Note: Totals may not sum due to rounding.

[18] Section 7 actions include all completed section 7 consultations categorized as formal, informal, programmatic, conference, implementation, and pre-consultation/technical assistance. Where a consultation covered multiple activities, it was divided across those activities. For example, a consultation covering both in-stream work and transportation would be counted as 0.5 in-stream and 0.5 transportation. In addition, programmatic consultations, which were not specific to a geographic area, were split evenly across the watersheds in the northwest region.

Regarding the second category of uncertainty, a number of eulachon critical habitat units overlap other anadromous fish species' habitat, particularly listed salmon and steelhead species. Based on the existing history of formal consultations in watersheds being designated as eulachon critical habitat, it appears that conservation efforts that benefit eulachon are most frequently associated with the joint presence of salmonid species. Salmonid species and their associated critical habitats may therefore provide a strong baseline protection for eulachon critical habitat where habitats coexist. This analysis asserts that, for most projects in salmonid habitat, the majority of conservation efforts benefitting the eulachon would be undertaken regardless of the presence of the eulachon or its critical habitat. As such, the presence of salmonid species is considered a primary driver of the implementation of a conservation effort where prior salmon and steelhead listings have been well established. In these cases, considering eulachon in consultations may require little additional effort, and subsequent economic impact, over and above that already expected to occur due to the presence of listed salmonid species.

In general, this analysis examines conservation measures recommended for eulachon over and above those for other anadromous fish species. These types of conservation measures may be related to protection of eulachon and its habitat during spawning, for example. By excluding impacts for which the eulachon is not a key reason for a conservation effort implementation, this analysis focuses the quantification of impacts on those associated specifically with eulachon conservation.

In some cases, eulachon conservation may be a key reason for implementing a conservation effort. This may be true, for example, where few other sensitive species are present. The analysis assumes that when listed salmon or steelhead species are absent, eulachon is the key driver of conservation measures. As noted above, the probability that any given conservation effort is being driven by eulachon conservation as opposed to other species is subject to significant uncertainty.

2.4.4 ANALYTIC TIME FRAME

The analysis estimates impacts based on activities that are reasonably foreseeable, including activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. In general, the time frame over which data are available to project land uses in the study area is 20 years. In most cases, therefore, the analysis estimates economic impacts from 2011 to 2030 (20 years from the expected year of critical habitat designation).

2.4.5 TREATMENT OF UNCERTAINTIES

As discussed throughout this report, many uncertainties exist with regard to potential economic impacts of critical habitat designation for the eulachon. This uncertainty stems from a number of factors, which are summarized in Exhibit 2-6. In summary, because of uncertainty concerning future actions likely to be undertaken specifically for the benefit of eulachon and its habitat, this analysis qualitatively discusses potential impacts to specific projects highlighted by NOAA Fisheries.

EXHIBIT 2-6. KEY SOURCES OF UNCERTAINTY

UNCERTAINTY	ANALYTIC SOLUTION
Conservation efforts for eulachon are uncertain. • NOAA Fisheries has limited experience in managing eulachon, and there is general uncertainty about specific management actions likely to be undertaken on behalf of this species. Because the species was only listed recently, there have been only a limited number of consultations on the species.	The analysis includes a discussion about what is known about past recommendations that NOAA Fisheries has made for eulachon or other species inhabiting the same habitat for each potentially affected economic activity. The analysis also discusses specific conservation measures suggested by NOAA Fisheries biologists and other stakeholders familiar with the projects.
Separating baseline impacts from incremental impacts due to critical habitat designation is difficult. • One of the tasks for this analysis is separating conservation measures that would have been undertaken without eulachon critical habitat from those that are incremental to critical habitat designation.	The analysis provides a qualitative discussion of the high level of baseline protections available in watersheds proposed as critical habitat. It then focuses on conservation efforts highlighted by NOAA Fisheries as protective of eulachon and its habitat over and above those recommended for other anadromous fish species. For example, conservation efforts to protect eulachon during spawning may be different than those for salmonid species.

SECTION 3 | INCREMENTAL IMPACTS

3.1 INTRODUCTION

As discussed in Section 2, this analysis examines the potential impacts of restricting or modifying specific land and water uses or activities to avoid adverse modification or destruction of critical habitat for eulachon. This section presents estimates of the incremental economic impacts of critical habitat designation for eulachon over and above existing baseline protections already due to existing regulations and ESA regulations in place for the eulachon and other species. As discussed in greater detail in Section 2 and Appendix B, protections under the ESA for other fish species such as Pacific coast salmon, steelhead, green sturgeon, and bull trout are expected to offer a high level of baseline protection for the eulachon.[19]

NOAA Fisheries reviewed the recent consultation history in watersheds in which eulachon critical habitat occurs, and identified several specific activities and areas where incremental impacts may occur due to the designation of eulachon critical habitat.[20] This section describes each of these economic activities in terms of its threat to eulachon, specific baseline elements that provide protection to the eulachon, prospective management scenarios, and potential economic impacts of critical habitat. Administrative costs associated with these and other consultation efforts are also discussed.

3.2 SUMMARY OF FINDINGS

Additional administrative costs of considering eulachon critical habitat in future section 7 consultations are expected in designated critical habitat areas. However, incremental project modification efforts for eulachon critical habitat are considered to be unlikely for most areas. In total, incremental costs of eulachon critical habitat are estimated to be $512,000, annualized at a discount rate of seven percent (see Exhibit 3-1), with the greatest estimated costs anticipated to be associated with consultations on water supply and dam operations, along with mining and forest management activities. The Lower Mad River and Columbia River/Hayden Island HUCs have the largest estimated impacts, associated with consultations on mining activities and water supply activities, respectively. This analysis qualitatively assesses the potential for incremental impacts on

[19] NOAA Fisheries, Memorandum re: Economic Analysis for the Proposal of Designated Critical Habitat for Eulachon, February 2, 2010.

[20] One peer reviewer indicated that this analysis does not consider potential impacts associated with altered timing of fishing for eulachon or other fish species in eulachon critical habitat; however, no alterations to permitted fishing timing or volume beyond what is in place for other species are expected to result from the designation of critical habitat for eulachon.

the Quinault Indian Nation (QIN), dredging disposal activities in the Lower Columbia River, dam removal activities on the Elwha River, and the Mayfield Dam flow regime. As discussed in detail in this chapter and summarized below, we find that incremental conservation efforts for these areas appear unlikely. Exhibit 3-1 also summarizes the HUCs in which these activities occur.

- **Quinault Indian Nation.** The Quinault River, which flows through the Quinault Indian Reservation, is the only area being designated as critical habitat for the eulachon that does not already contain designated critical habitat for other listed salmonids. USFWS has recently designated critical habitat for the bull trout in the portion of the Quinault River in which eulachon habitat is being designated, as well as a substantially longer segment of the Quinault River.[21] Bull trout specific conservation measures were included in the QIN's existing Forest Management Plan (FMP). NOAA has indicated that eulachon may need to be included in this plan in the future in order to streamline the consultation process. NOAA Fisheries states that, in the long term, eulachon may need to be added to the Tribe's FMP so that the future consultation process with the two agencies can be streamlined. This analysis quantifies additional administrative efforts that may be incurred by the QIN to incorporate eulachon into their existing Forest Management Plan. The Quinault have indicated that they expect additional incremental costs to result from the designation of critical habitat for the bull trout due to delayed timber sales; however, they have not indicated that they expect similar impacts to result from eulachon habitat. For purposes of this analysis, impacts other than administrative impacts are not quantified.
- **Dredging disposal activities in the Lower Columbia River.** According to NOAA Fisheries, eulachon spawning has the potential to be disrupted by the disposal of dredged material in the Lower Columbia River. NOAA Fisheries is currently considering proposals for research on the locations of eulachon spawning sites. Depending on the outcome of this research, NOAA Fisheries may request project modifications to dredge material disposal activity in some areas. Impacts are thought to be limited to disposal activity currently occurring in shallow water areas, which is already quite limited in the Lower Columbia, representing approximately five percent of annual disposal volume. Because costs of this shoreline disposal are relatively high, impacts of requiring another disposal method may have minimal costs. The specific alternatives to current dredging activities and associated costs, however, cannot be determined without knowing the outcome of current research.

  If current beach nourishment is replaced by in-stream disposal, the cost of disposal would be expected to decrease. At Skamokawa Bar, it is possible that reducing beach nourishment could reduce visitation to Skamokawa Vista Park. However, Park Staff were unable to estimate the level beach visitation at the

[21] 75 FR 63898 – 64070.

Park, or how beach nourishment changes could affect visitation.[22] In addition, cessation of disposal at Sand Island could result in reduced erosion protections for the St. Helens recreational marina. Nonetheless, due to relatively small use of beach nourishment as a disposal option, impacts to current dredged material disposal operations resulting from eulachon critical habitat designation are expected to be small.

- **Dam removal activities on the Elwha River.** Removal of the Elwha Dam and the Glines Canyon Dam on the Elwha River, located on the Olympic Peninsula within Olympic National Park, began in September of 2011. The process of dam removal has the potential to be harmful to anadromous fish, including the eulachon, due to the potential for increased turbidity from sediment flushing. However, NOAA Fisheries states that because protections are already in place to reduce the impact of the project on anadromous fish habitat, consideration of eulachon critical habitat is unlikely to result in additional recommendations to change the timing of the dam removals. NOAA Fisheries has not identified other incremental conservation efforts likely to result from eulachon critical habitat designation in the Elwha.
- **The Mayfield Dam flow regime.** As outlined in the Proposed Rule for the listing of the eulachon as threatened, dams and water diversions are considered to be moderate threats to the eulachon in the Columbia River Basin. To benefit salmon and steelhead species, Tacoma Power currently follows an established flow regime for the Mayfield Dam on the Cowlitz River. NOAA does not expect to request alterations to this flow regime for the eulachon. Plans for sediment management at and below that dam, however, which include the possibility of releasing large volumes of flow to flush sediments, have the potential to affect spawning habitat for the eulachon. Changing the flow release schedule has the potential to result in economic impacts for Tacoma Power in the form of, for example, decreased revenues due to a decrease in energy production during peak demand. However, insufficient detail exists with regard to plans for these flows to quantify any potential impacts to them at this time. As such, due to uncertainty regarding the recommended changes to the volume and timing of any potential releases, this analysis is unable to quantify impacts that could be incurred to Tacoma Power as a result of any changes to flushing flows that could be required.

[22] Personal communication with Staff, Skamokawa Vista Park, September 24, 2010.

EXHIBIT 3-1. SUMMARY OF PROJECTED INCREMENTAL COSTS, BY HUC (2011-2030)

HUC	NAME	TOTAL ANNUALIZED IMPACTS		OTHER POTENTIAL UNQUANTIFIED IMPACTS
		3 PERCENT	7 PERCENT	
1708000107	Columbia Gorge Tributary	$29,200	$28,100	Potential increase or decrease in costs of Columbia River dredged material disposal activities
1708000108	Lower Sandy River	$22,300	$21,400	
1708000205	East Fork Lewis River	$31,700	$30,500	
1708000206	Lower Lewis River	$19,800	$19,100	
1708000301	Kalama River	$21,200	$20,400	
1708000305	Skamokawa Creek- Elochoman River	$22,400	$21,600	Potential increase or decrease in costs of Columbia River dredged material disposal activities
1708000307	Columbia River – Cathlamet Channel	$22,100	$21,300	Possible minor decrease in beach visitation at Skamokawa Vista Park
1708000507	Toutle River – Cowlitz River	$24,300	$23,400	Possible reduced erosion/storm protection for small recreational marina at St. Helens
1708000508	Cowlitz River – Coweeman River	$24,400	$23,500	Potential increase or decrease in costs of Columbia River dredged material disposal activities
1708000603	Grays Bay	$27,700	$26,600	
1708000605	Columbia River – Baker Bay	$20,500	$19,700	
1709001205	Columbia River – Hayden Island	$33,500	$32,200	
1708000503	Jackson Prairie	$19,700	$18,900	Potential increase or decrease in costs of dredged materials disposal Potential reduced hydropower revenues related to altering the flushing flow regime at the Mayfield Dam
1710010205	Lower Quinault River	$25,700	$24,700	
1710020507	Mercer Lake Frontal	$23,000	$22,200	
1710030304	Umpqua River – Sawyers Rapids	$20,200	$19,500	
1710030308	Lower Umpqua River	$24,500	$23,600	

HUC	NAME	TOTAL ANNUALIZED IMPACTS		OTHER POTENTIAL UNQUANTIFIED IMPACTS
		3 PERCENT	7 PERCENT	
1711002005	Elwha River	$21,200	$20,400	Increased costs of Elwha Dam removal due timing issues, but anadromous fish also present
1801010201	Redwood Creek	$18,500	$17,800	
1801010204	Lower Mad River	$66,000	$63,500	
1801020911	Turwar Creek – Klamath River	$14,100	$13,600	
	Total	**$532,000**	**$512,000**	

*__Notes__: Section 3 of the report presents results of the analysis in more detail. Totals may not sum due to rounding.

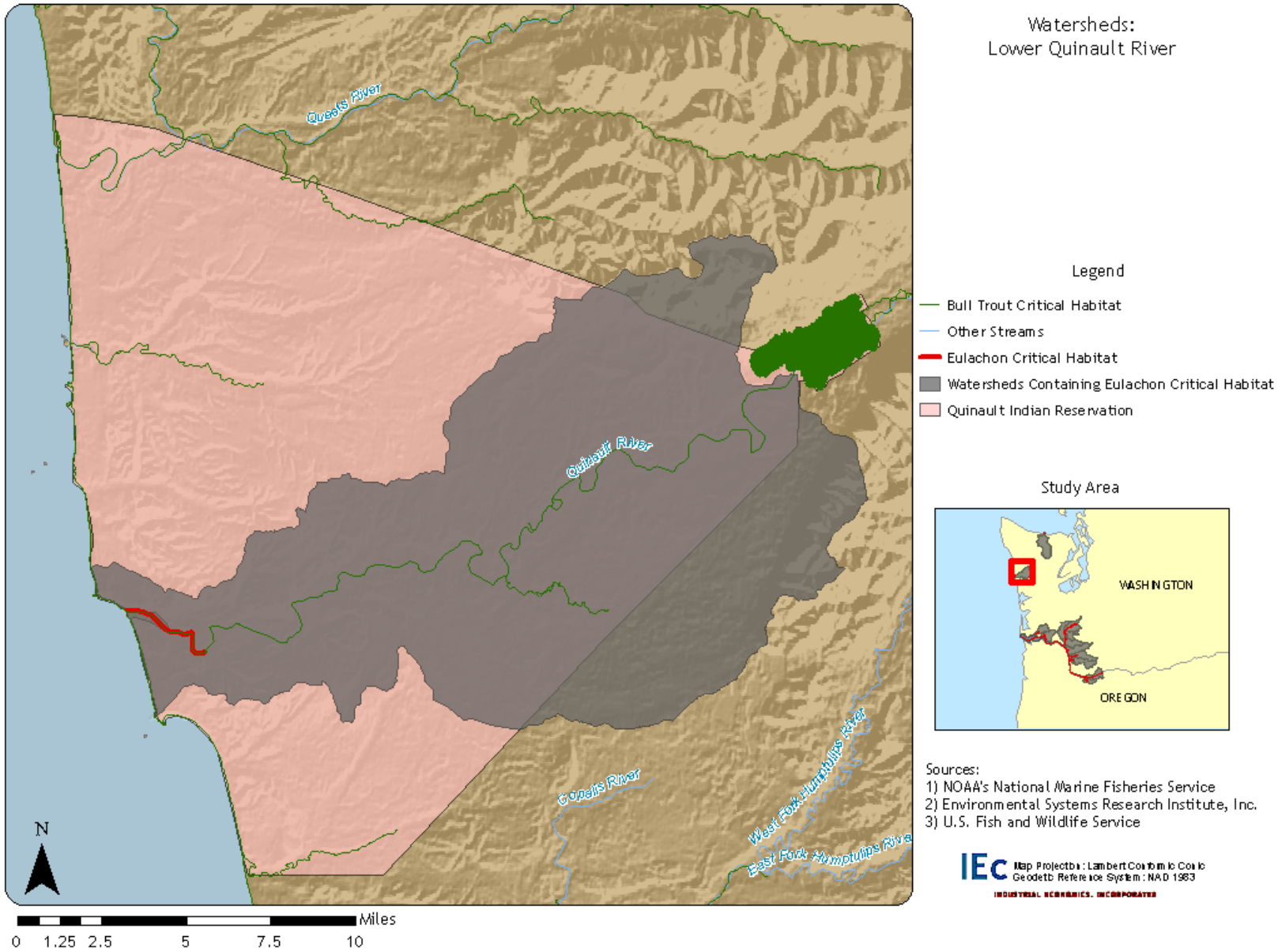
3.3 POTENTIAL INCREMENTAL, NON-ADMINISTRATIVE COSTS

3.3.1 IMPACTS OF EULACHON CRITICAL HABITAT ON ACTIVITIES BY THE QUINAULT INDIAN NATION

The Quinault River, which flows through the Quinault Indian Reservation, is the only area being designated as critical habitat for the eulachon that does not already contain designated critical habitat for other salmonids. USFWS has recently designated critical habitat for the bull trout in the portion of the Quinault River in which eulachon habitat is being designated, as shown in Exhibit 3-2. As shown, the bull trout critical habitat area is substantially longer than that being designated for eulachon.[23]

[23] 75 FR 63898 – 64070.

EXHIBIT 3-2. MAP OF EULACHON CRITICAL HABITAT ON THE QUINAULT RIVER



In a public comment letter submitted in response to the designation of critical habitat for the bull trout, the Quinault Indian Nation (QIN) state that a Forest Management Plan (FMP), on which the FWS prepared a programmatic biological opinion for bull trout, should provide adequate protection for the bull trout.

The FMP, valid through September 2012, takes into account significant restrictions on in-water construction activities imposed by the State of Washington.[24, 25] Project modifications specific to the bull trout included in the biological opinion for the FMP include:

- In-water or near-stream activities, such as road construction across streams, and culvert removal and installation, may only be conducted during the work time windows outlined in the FMP. The FMP work window is from June 1 through October 1;[26]
- Construction of new roads is to be minimized "to the maximum extent practicable" and construction is allowed only after an Interdisciplinary Team concurs;
- Construction of fill roads is allowable only when absolutely necessary, as they have the potential to conflict with natural river flow patterns. If necessary, use of permeable material (gravel or crushed rock) is allowed.[27]

The QIN have stated that, with regard to bull trout, the designation of critical habitat has the potential to impose "substantial additional costs" because it may require additional individual section 7 consultations in place of the existing programmatic biological opinion. The QIN expect that delays associated with additional section 7 consultation requirements would "substantially slow timber harvest reducing income to the Quinault Nation and its members" as well as "entail lost opportunities [SIC] costs when timber harvests are delayed missing spot markets."[28] The QIN, however, have not submitted a public comment indicating the potential for this type of impact in response to the designation of critical habitat for the eulachon.[29] NOAA Fisheries states that, in the long term, eulachon may need to be added to the Tribe's Forest Management Plan so that the future consultation process with the two agencies can be streamlined. NOAA Fisheries

[24] Biological Opinion for Quinault Indian Reservation 10-Year Forest Management Plan, No. 1-3-03-F-1602. U.S. Fish and Wildlife Service. August 25, 2003.

[25] Washington State Law, Chapter 77.55 RCW: Construction projects in State Waters.

[26] Biological Opinion for Quinault Indian Reservation 10-Year Forest Management Plan, No. 1-3-03-F-1602. U.S. Fish and Wildlife Service. August 25, 2003, p. 133. The Service requests that the QIN also follow the established in-water work windows for the Quinault River of July 15 through August 15.

[27] Biological Opinion for Quinault Indian Reservation 10-Year Forest Management Plan, No. 1-3-03-F-1602. U.S. Fish and Wildlife Service. August 25, 2003, p. 134.

[28] Public Comment from Quinault Indian Nation Re: Bull Trout Critical Habitat Designation. March 11, 2011.

[29] In the absence of a public comment, the QIN were contacted directly to inquire about expected impacts from eulachon critical habitat; however, the QIN have not provide additional information on this subject (Personal communication with Mark Mobbs, Environmental Programs, Quinault Indian Nation, on June 22, 2011).

also may recommend creating a "Level 1 Team" that coordinates communication between QIN, FWS, and NOAA Fisheries.[30] For the purposes of this analysis, we assume that eulachon critical habitat will result in incremental administrative consultation costs to QIN. These administrative costs are detailed below in Section 3.4.

3.3.2 POTENTIAL IMPACTS OF EULACHON CRITICAL HABITAT ON DREDGED MATERIAL DISPOSAL ACTIVITIES IN THE LOWER COLUMBIA RIVER

According to NOAA Fisheries, eulachon spawning has the potential to be disrupted by the disposal of dredged material in the Lower Columbia River. The designated critical habitat for eulachon on the Lower Columbia River intersects 13 fifth-field HUCs (see Exhibit 3-3). To determine the extent to which dredged material disposal may affect critical habitat, NOAA is conducting research on the locations of eulachon spawning sites. A three-year research project addressing this topic will begin within the next year. Depending on the outcome of this research, the Service may request project modifications to current dredged material disposal activity.[31]

Though some dredging is conducted by private ports in the Lower Columbia, the majority of dredging is conducted by the USACE as part of the Columbia River Channel Operations and Maintenance Program, concerning which NOAA Fisheries conducts a Biological Opinion every five years.[32] This biological opinion currently addresses the timing and methods of dredged material disposal that is allowable.

To the extent that impacts to eulachon spawning are expected, the 5-year biological opinion for the Army Corps Maintenance Dredging Program will need to be reinitiated and additional project modifications may be developed. A possible alternative action is to move all disposal occurring at depths of 20 feet or less (e.g. all shoreline, or beach nourishment disposal) to either in-stream or upland disposal sites.

According to USACE, of the three types of dredged material disposal (flowlane, upland, and beach nourishment/shoreline), upland disposal is the most expensive, followed by beach nourishment.[33] Flowlane disposal, which is instream disposal at depth in fast moving water, accounts for the majority of dredged material disposal in the Columbia, and the simplest and least costly option for disposal.

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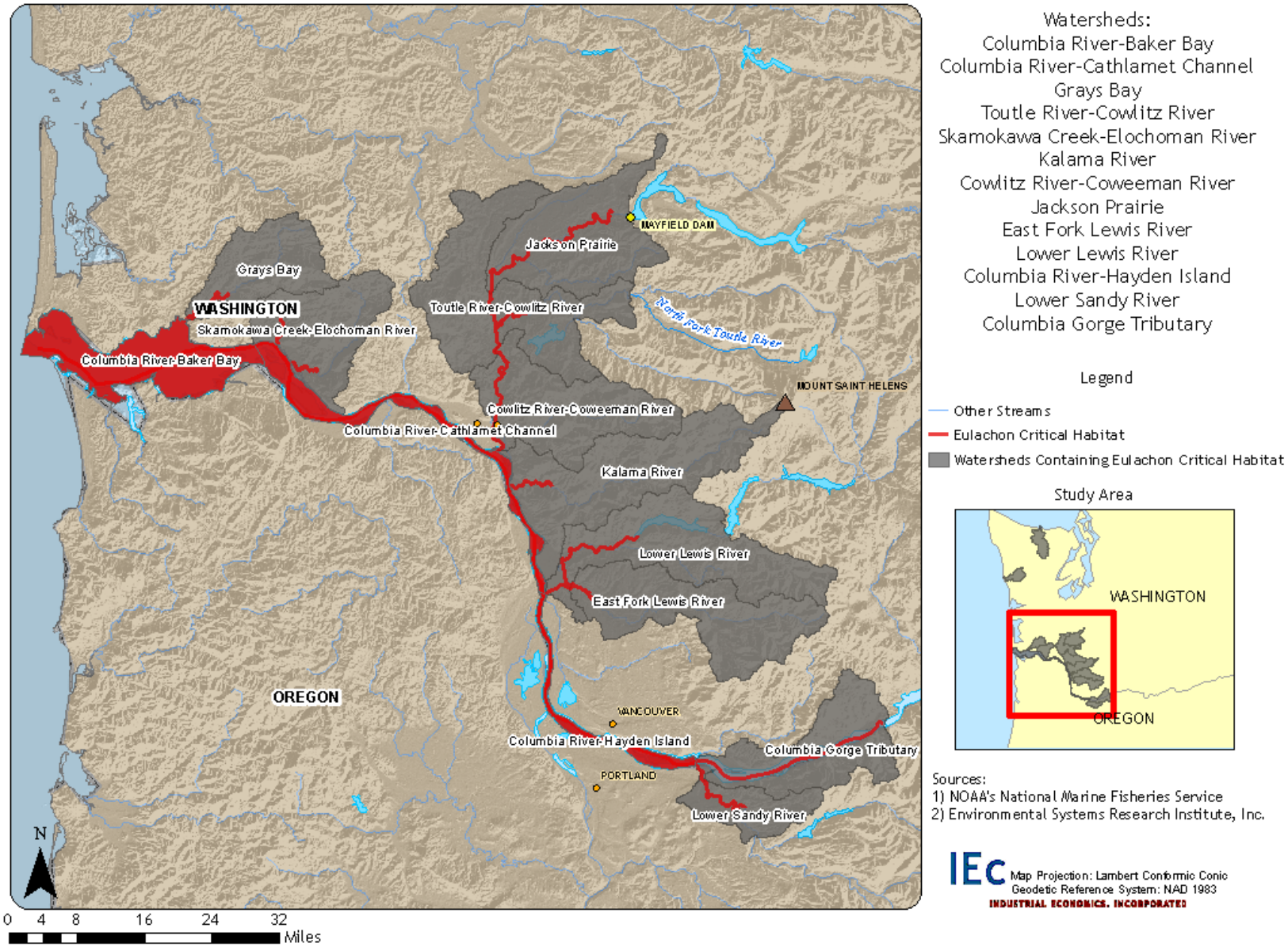
[30] Personal communication with Biologist, FWS Olympia Ecological Services Office, March 17, 2010.

[31] Personal communication NOAA Fisheries on March 25, 2010.

[32] Biological Opinion for the U.S. Army Corp of Engineers Columbia River Channel Operations and Maintenance Program, Mouth of the Columbia River to Bonneville Dam, No. 2004/01041. NOAA National Marine Fisheries Service. March 11, 2005. Biological Opinions conducted by NOAA Fisheries: No. 2007/06961, 2008/01071, 2003/00147, 2009/02644. Personal communication with Shawn Zinszer, USACE Portland District Permits Section Chief, on March 30, 2010.

[33] Personal communication with Jon Gornick, USACE Project Manager for Maintenance Dredging on the Columbia & Lower Willamette on April 2, 2010.

EXHIBIT 3-3. MAP OF COLUMBIA RIVER AND COWLITZ RIVER CRITICAL HABITAT AREAS AND WATERSHEDS



It currently appears that beach nourishment, or shoreline disposal, is the only disposal option that is likely to affect eulachon spawning. Beach nourishment involves pumping dredged material via pipeline to an existing shoreline in sand and water slurry. On shore, the sand is moved using construction machinery to create shorelines graded at 10 to 15 percent. Beach nourishment currently accounts for approximately five percent of all disposal done by the USACE for maintenance dredging (250,000 cy of a total 5.5 million cy, annually in the Lower Colorado River). The USACE currently uses three sites for beach nourishment in the Lower Columbia River:[34]

- **Miller Sands Bar** (RM 23.5). USACE created this disposal site as an environmental project in the mid-1970s for juvenile salmon. The site consists of a lagoon with one open end. Due to resulting benefits for salmon, this site is unlikely to be removed as a disposal option.
- **Skamokawa Bar** (RM 32.6-36.6). This site is located at Skamokawa Vista Park, a 75-acre county-owned park located an hour east of Long Beach, Washington. Beach nourishment benefits local recreation and beach use.
- **Sand Island** (RM 86.2). This site is located at Sand Island Marine Park, a man-made island near St. Helens, OR. Beach nourishment at this location is intended to protect the local recreational marina.

In the event that beach nourishment is disallowed due to impacts to eulachon spawning, the cost of disposal may increase if upland disposal is utilized as the alternative. USACE was unable to estimate by how much costs would increase, stating that, in some cases, upland disposal could cost the same or similar to beach nourishment, as both require some on-shore work.[35] If beach nourishment is replaced by in-stream disposal, the cost of disposal would be expected to decrease. At Skamokawa Bar, it is possible that reducing beach nourishment could reduce visitation to Skamokawa Vista Park. However, Park Staff were unable to estimate the level beach visitation at the Park, or how beach nourishment changes could affect visitation.[36] In addition, cessation of disposal at Sand Island could result in reduced erosion protections for the St. Helens recreational marina. Nonetheless, due to relatively small use of beach nourishment as a disposal option, impacts to current dredged material disposal operations resulting from eulachon critical habitat designation are expected to be small.

In addition, the State of Oregon currently has baseline protections that help to minimize dredged material disposal impacts on eulachon. As a state species of concern, Oregon Department of Environmental Quality prohibits in-water disposal of dredged materials in identified eulachon spawning areas during peak outmigration. Additional research and

[34] Personal communication with Jon Gornick, USACE Project Manager for Maintenance Dredging on the Columbia & Lower Willamette on April 2, 2010.

[35] Personal communication with Jon Gornick, USACE Project Manager for Maintenance Dredging on Columbia & Lower Willamette on April 2, 2010.

[36] Personal communication with Staff, Skamokawa Vista Park, September 24, 2010.

project modifications are required by the state in situations where other disposal options are not plausible.[37]

3.3.3 POTENTIAL IMPACTS OF EULACHON CRITICAL HABITAT ON THE ELWHA DAM REMOVAL

Critical habitat for the eulachon on the Elwha River overlaps entirely with designated critical habitat for salmon species and bull trout, as shown in Exhibit 3-4. Removal of the Elwha Dam and the Glines Canyon Dam on the Elwha River, located on the Olympic Peninsula within Olympic National Park, began in September of 2011. Beginning in the 1980s, the appropriateness of licensing of dams in a national park was questioned. The construction of the Elwha Dam in 1911 and the Glines Canyon Dam in 1927 led to a substantial decrease in the population of salmon and other anadromous fish in the Elwha. The dams are considered the cause of general decline in ecosystem quality throughout the entire Elwha River ecosystem. In 1992, Congress passed the Elwha River Ecosystem and Fisheries Restoration Act (P.L. 102-495) with the intent to restore the ecological function of the Elwha River system within the Olympic National Park. The removal of the dams is the first major step in pursuing restoration of anadromous fish populations and habitat quality.[38]

Since Congress passed the Act, the Department of the Interior, the Olympic National Park, the Lower Elwha Tribe, the Bureau of Reclamation, and other entities have researched the environmental impact of the dam removals, particularly impacts from residual sediment releases on chinook salmon and bull trout.[39] Now, the potential designation of the river as critical habitat for the eulachon may result in the need to consider habitat impacts for this species as well.

Despite the anticipated benefits, the process of dam removal itself has the potential to be harmful to anadromous fish, including the eulachon. Sediment that builds up behind a dam is flushed downstream as a dam is deconstructed, resulting in increased turbidity which can potentially interrupt spawning behavior.[40]

According to NOAA Fisheries, eulachon populations in the Elwha are small, but regularly occurring.[41] If eulachon are present in the river at the time that the dams are removed, the timing of sediment flushes from the dam removal may have to be altered in order to reduce impacts to spawning eulachon. This timing issue, however, would be expected to occur even without designated critical habitat for eulachon.

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[37] Clean Water Act Section 401 Water Quality Certifications for the Columbia River Channel Improvement Project and the Columbia River Operations and Maintenance Dredging (O&M), Oregon Department of Environmental Quality Northwest Region Portland Office, May 30, 2008, accessed on April 5, 2010 at http://www.deq.state.or.us/wq/sec401Cert/docs/columbiariver/certification.pdf.

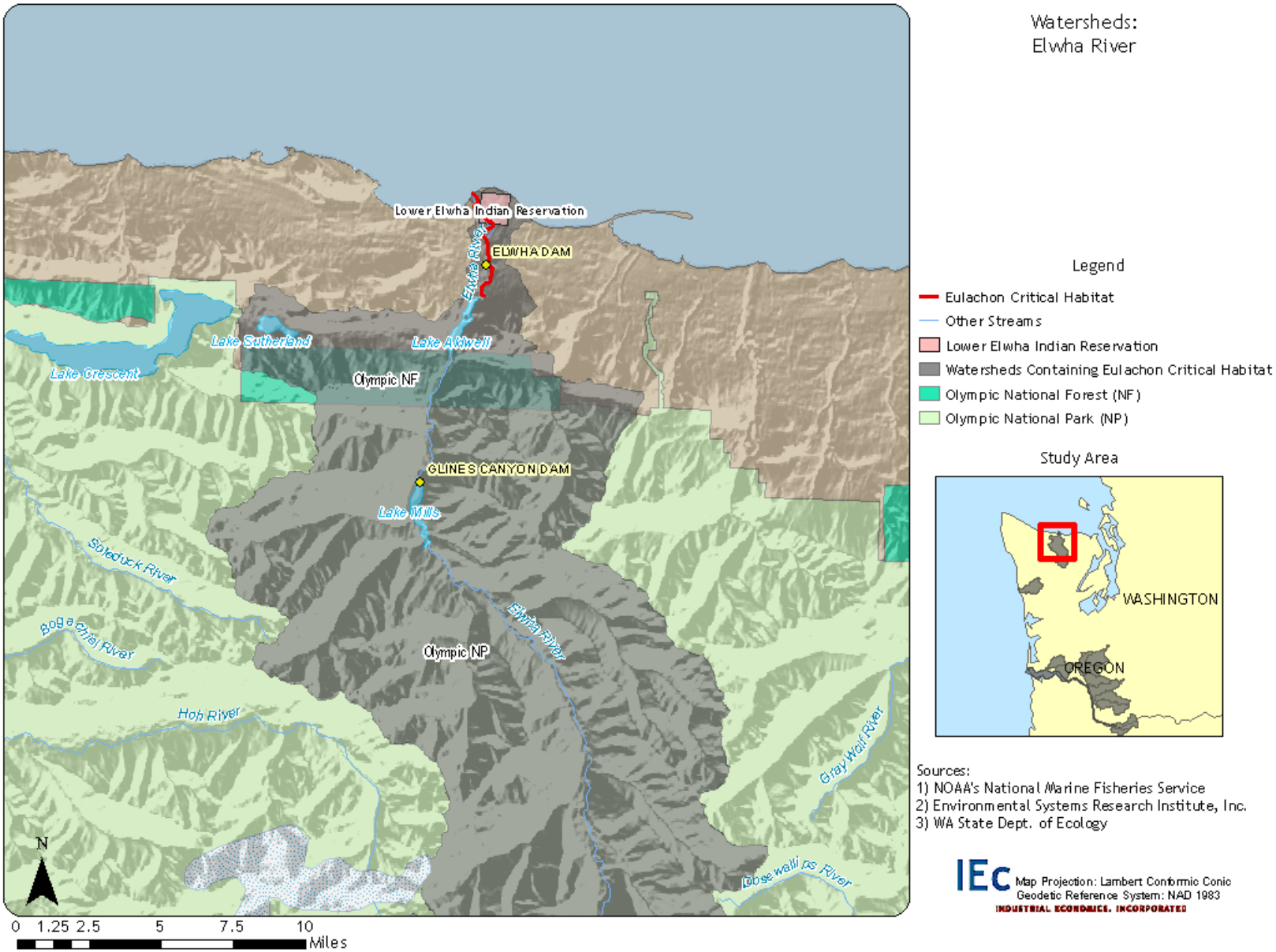
[38] U.S. Department of the Interior, National Park Service. "Elwha River Ecosystem to Restored." Accessed on March 18, 2010 at http://www.nature.nps.gov/water/Homepage/Elwha_River_Ecosystem.cfm.

[39] Biological Opinion for Elwha River Ecosystem and Fisheries Restoration Project, No. 2005/07196. November 20, 2006.

[40] Biological Opinion for Elwha River Ecosystem and Fisheries Restoration Project, No. 2005/07196. November 20, 2006.

[41] Written communication with Biologist, NOAA Protected Resources Division, Portland, OR, on May 20, 2010.

EXHIBIT 3-4. MAP OF ELWHA AND GLINES CANYON DAMS REMOVAL LOCATIONS



In 2006, NOAA Fisheries and FWS each conducted formal consultations on the potential impacts of the Elwha River dam removals on salmon and bull trout. As stated above, on the Elwha, critical habitat for eulachon overlaps entirely with designated critical habitat for salmon species and bull trout. Recommended project modifications for salmon and bull trout included the following:

- "To the extent possible, proposed facilities needed in, or near the water should be constructed during the dry period to minimize impacts to fish.
- Apply best management practices during construction to minimize soil lost to the river; and impacts to water quality through accidental releases of oil, diesel, gas, lubricants, or hydraulic fluids."[42]

If the dam removals are considered to adversely affect the habitat for eulachon, the formal consultation will be reinitiated. NOAA Fisheries states that because protections are already in place to reduce the impact of the project on fish habitat, consideration of eulachon critical habitat is unlikely to result in recommendations to change the timing of the dam removals or clean water timing periods. NOAA Fisheries has not identified other incremental conservation efforts likely to result from eulachon critical habitat designation in the Elwha.

3.3.4 POTENTIAL IMPACTS OF EULACHON CRITICAL HABITAT ON THE MAYFIELD DAM FLOW REGIME

Flushing Flows from Mayfield Dam

Since the eruption of Mount St. Helens in 1980, the North Fork Toutle River has steadily eroded the eruption's large debris avalanche deposit into the Cowlitz River. This erosion has led to sediment buildup at the convergence of the Cowlitz and Columbia Rivers, resulting in increased flood risk to surrounding communities, namely Longview, Kelso, Lexington, and Castle Rock, WA. In 1989, USACE built a Sediment Retention Structure to slow water flow and promote sediment settling; however, after 20 years of holding sediment, the volume of sediment moving past the structure has increased.[43] USACE is currently developing a long-term management plan for the Mount St. Helens sediment. The use of flushing flows as an option under consideration for sediment management is considered a potential incremental threat to the eulachon.

"Flushing flows" are the use of timed releases from upstream hydroelectric dams to flush silt deposits from downstream areas. Flushing flows would likely occur in February in order to take advantage of winter melt and rains, when water volumes are highest.[44] Flushing flows during this time would coincide with spawning periods for eulachon in the Columbia and the Cowlitz Rivers. As discussed in relation to the removal of the Elwha

[42] Biological Opinion for Elwha River Ecosystem and Fisheries Restoration Project, No. 2005/07196. November 20, 2006.

[43] Sowell, Jennifer. USACE. "Mount St. Helens team continues to work on solution for sediment." October 8, 2009. Accessed at http://www.army.mil/-news/2009/10/08/28211-mount-st-helens-team-continues-to-work-on-solution-for-sediment/ on March 18, 2010.

[44] Personal communication with Dan Guy, NOAA Fisheries, on March 18, 2010.

Dams, increased turbidity from sediment releases have the potential to interrupt spawning behavior. The likelihood that flushing flows will be included in the final USACE long-term management plan for Mount St. Helens sediment is unknown. Thus, according to NOAA Fisheries, the ability to indicate whether negative impacts to eulachon habitat will result from the use of flushing flows as a management option are not possible at this time.[45] As such, while impacts to Tacoma Power are possible if changes to the timing of flushing flows are needed to protect eulachon, insufficient detail exists with regard to plans for these flows to quantify any potential impacts to them at this time.

Mayfield Dam Flow Regime

As outlined in the Proposed Rule for the listing of the eulachon as threatened, dams and water diversions are considered moderate threats to the eulachon in the Lower Columbia River basin. Dams threaten anadromous fish habitat by altering the natural hydrograph of river systems.[46] In particular for eulachon, whose outmigration coincides with spring freshets, dams can reduce the magnitude of these flows. Dams are also known to alter bedload movement, which can disturb the river substrates important for eulachon spawning.[47]

In order to accommodate the protection needs of anadromous fish, Tacoma Power currently follows an instream flow regime for the Mayfield Dam. The regime was established under FERC licensing requirements and is outlined in the Cowlitz River Hydroelectric Project Settlement Agreement.[48] NOAA Fisheries consulted on the Settlement Agreement in 2003 for impacts to anadromous salmonids protected under the ESA.[49] The licensing agreement establishes flow minimums that will adequately protect fish, wildlife resources, and water quality. Throughout the spring (March through June), Mayfield Dam conducts pulsing flows once per week in order to transport juvenile fish downstream.[50] NOAA Fisheries Hydropower Branch does not expect to request additional actions beyond what is done to protect salmonids and similar resources for FERC licensing of hydropower projects in the Lower Columbia River Basin related to eulachon.[51]

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[45] Personal communication with Dan Guy, NOAA Fisheries, on March 22, 2010.

[46] 74 FR 10870.

[47] 74 FR 10870.

[48] Personal communication with Mark LaRiviere, Tacoma Power Cowlitz River Project, on March 17, 2010.

[49] Biological Opinion for Operations of Cowlitz River Hydroelectric Project (FERC No. 2016) Through 2038, No. 2001/02045. NOAA Fisheries Northwest Region. March 2004.

[50] Tacoma Power. FERC No. 2016 - Article 13 of Cowlitz River Hydroelectric Project Settlement Agreement. August 10, 2000. Accessed on March 18, 2010 at http://www.ci.tacoma.wa.us/power/parksandpower/hydro_licensing/cowlitz/docs/docs_setag.htm#a13.

[51] Written communication with NOAA Fisheries, Northwest Region Hydropower Branch, January 2010.

3.4 ESTIMATED ADMINISTRATIVE IMPACTS

Section 7(a)(1) of the Act requires that all Federal agencies utilize their authorities to further the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species.

When critical habitat is designated, section 7 requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat (in addition to ensuring that the actions are not likely to jeopardize the continued existence of the species). The added administrative costs of including consideration of critical habitat in section 7 consultations and the additional impacts of implementing project modifications to protect critical habitat are the direct result of the designation of critical habitat. These costs are not in the baseline, and are considered incremental impacts of the rulemaking.

This section describes projected future administrative costs of engaging in section 7 consultation activities that consider the eulachon and its critical habitat. Forecast consultations are also categorized by the type of consultation (e.g., informal versus formal) and assigned to the various economic activities identified by NOAA Fisheries.

3.4.1. THE CONSULTATION PROCESS

Section 7(a)(2) of the Act requires Federal agencies (Action agencies) to consult with NOAA Fisheries whenever activities that they undertake, authorize, permit, or fund may affect a listed species or designated critical habitat. In some cases, consultations will involve the NOAA Fisheries and another Federal agency only, such as the U.S. Army Corps of Engineers. Often, they will also include a third party, such as the recipient of a Clean Water Act section 404 permit.

During a consultation, NOAA Fisheries, the Action agency, and the entity applying for Federal funding or permitting (if applicable) communicate in an effort to minimize potential adverse effects to the species and/or to the critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, and the potential effects to the species and designated critical habitat associated with the proposed activity, the Federal agency, and whether there is a private applicant involved.

Section 7 consultations may be either informal or formal. *Informal consultation*s consist of discussions between the NOAA Fisheries, the Action agency, and the applicant concerning an action that may affect a listed species or its designated critical habitat, and are designed to identify and resolve concerns at an early stage in the planning process. By contrast, a *formal consultation* is required if the Action agency determines that its proposed action may or will adversely affect the listed species or designated critical habitat in ways that cannot be resolved through informal consultation. The formal consultation process results in determination by the NOAA Fisheries as to whether the action is likely to jeopardize a species or adversely modify critical habitat, and includes recommendations to minimize expected impacts. Regardless of the type of consultation

or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants depending on the complexity of the particular Federal action and the potential affects to listed species and/or critical habitat. Programmatic consultations are similar to formal consultations except that they generally evaluate planning documents or broad programs that cover a broad suite of activities or projects (e.g., forest plans or USACE regional general permits).

3.4.2. ADMINISTRATIVE SECTION 7 CONSULTATION COSTS

While consultations are required for activities that involve a Federal nexus and which may adversely affect the species regardless of whether critical habitat is designated, critical habitat designation may increase the level of consultation effort in cases where a project or activity may also adversely modify critical habitat. Consultations considering eulachon may therefore have both baseline and incremental impacts.

In general, three different scenarios associated with the designation of critical habitat may trigger incremental administrative consultation costs:

1. **Additional effort to address adverse modification in a new consultation:** New consultations taking place after critical habitat designation may require additional effort to address critical habitat issues above and beyond the requirements of listing. In this case, only the additional administrative effort required to consider critical habitat is considered an incremental impact of the designation.

2. **Re-initiation of consultation to address adverse modification:** Consultations that have been completed on a project or activity may require re-initiation to address the requirements of critical habitat. In this case, the costs of re-initiating the consultation, including all associated administrative and project modification costs are considered incremental impacts of the designation.

3. **Incremental consultation resulting entirely from critical habitat designation:** Critical habitat designation may trigger additional consultations that would not occur absent the designation (e.g., for an activity for which adverse modification may be an issue, while jeopardy is not, or consultations resulting from the new information about the potential presence of the species provided by the designation). Such consultations may, for example, be triggered in critical habitat areas that are not occupied by the species. All associated administrative and project modification costs of incremental consultations are considered incremental impacts of the designation. For bull trout, all consultations resulting entirely from critical habitat designation are assumed to occur in unoccupied areas.

The administrative cost estimates presented in this section take into consideration the level of effort of the NOAA Fisheries and the Action agency, as well as the varying complexity of the consultation. These estimates are based on an informal survey conducted by NOAA Fisheries as part of the 2005 salmon and steelhead re-designations (see Exhibit 3-5). To estimate costs borne by NOAA Fisheries, NOAA biologists in the Northwest regional office estimated time in weeks spent on individual salmon and steelhead consultations during one year. These estimates were then sorted by activity type and translated them into typical dollar amounts per consultation for all types of activity using standard labor rates. To estimate per-consultation costs borne by other Federal agencies that participate in consultations, relevant staff at agency offices across the region that are involved in salmon consultations were contacted. Agencies that provided data for this effort include:

- U.S. Army Corps of Engineers, Seattle District and Walla Walla Districts
- Bureau of Land Management, Salem District
- U.S. Bureau of Reclamation, Mid-Pacific Region Division of Environmental Affairs
- Federal Energy Regulatory Commission, Hydropower Compliance Division
- Federal Aviation Administration, Office of Environment
- U.S. Forest Service, Pacific NW Region
- Washington Department of Transportation, Threatened and Endangered Species Department

Exhibit 3-5 presents estimates of per-consultation costs that resulted from the interviews with NOAA Fisheries and other Federal and State agency personnel. It should be noted that agencies have learning curves, which may affect consultation costs over time. If an agency repeatedly engages in consultations with NOAA Fisheries for listed species, they are likely to become more familiar with the process and to incorporate these concerns earlier in the project planning process, thereby streamlining future administrative costs. Thus, these estimates may overstate future administrative costs to these agencies.

Using these per-consultation cost estimates, annual consultation costs are estimated by multiplying the number of annual past consultations for each activity (e.g. hydropower) and type (e.g. informal) and consultation type (formal, informal, etc.), by their estimated cost per consultation. To estimate the fractions of the total administrative consultation costs that are baseline and incremental, the following assumptions were applied:

- Costs associated with an incremental consultation (one occurring because of the designation of critical habitat) would be attributed wholly to critical habitat;[52]

[52] The only completely incremental consultations forecast for the eulachon occurs within HUC 1710010205 – Lower Quinault River, as this HUC is not also habitat for other NOAA Fisheries-listed species. While the Quinault is designated as critical

- Efficiencies exist when considering both jeopardy and adverse modification at the same time (e.g., in staff time saved for project review and report writing). As shown in Exhibit 3-5, this analysis assumes that the additional effort to address adverse modification of habitat is equivalent to one third of the effort to consider the species. That is, for every three hours spent on eulachon, an additional hour would be needed to consider eulachon critical habitat. This is based on estimates of additional U.S. Fish and Wildlife Service effort for bull trout consultations in the northwest region, and which was considered approximately relevant to the current critical habitat designation.[53]

habitat for bull trout, NOAA Fisheries would likely need to undertake a new consultation in these areas to consider eulachon.

[53] Written communication from the U.S. Fish and Wildlife Service, Region 1, October 14, 2009; and concurrence by NOAA Fisheries, Portland, OR, on August 31, 2010.

EXHIBIT 3-5. ADMINISTRATIVE CONSULTATION COSTS PER EFFORT (2010 DOLLARS)

ACTIVITY	FORMALS			PROGRAMMATIC			INFORMALS			TECH. ASSIST
	NOAA	ACTION AGENCY	TOTAL	NOAA COSTS	ACTION AGENCY	TOTAL	NOAA	ACTION AGENCY	TOTAL	TOTAL
Consultation Considering Jeopardy (Does Not Include Consideration of Adverse Modification)										
Dams (Hydropower)	$41,000	$7,026	$48,026	$41,000	$2,453,660	$2,494,660	$600	$18,514	$19,114	$600
Water Supply	$42,300	$7,026	$49,326	$42,300	$2,453,660	$2,495,960	$4,500	$18,514	$23,014	$3,800
Forest Management	$19,200	$4,238	$23,438	$19,200	$22,864	$42,064	$3,800	$2,008	$5,808	$11,500
Agriculture	$19,200	$4,238	$23,438	$19,200	$22,864	$42,064	$3,800	$2,008	$5,808	$11,500
In-Stream Construction	$3,300	$4,127	$7,427	$3,300	$13,607	$16,907	$2,300	$3,123	$5,423	$12,200
Restoration	$3,300	$4,127	$7,427	$3,300	$13,607	$16,907	$2,300	$3,123	$5,423	$12,200
Mining	$58,900	$91,566	$150,466	$58,900	$267,672	$326,572	$1,300	$3,123	$4,423	$1,300
Transportation	$7,700	$22,529	$30,229	$7,700	$38,924	$46,624	$5,500	$18,179	$23,679	$5,400
Other	$5,100	$5,130	$10,230	$5,100	$0	$5,100	$2,600	$2,565	$5,165	$5,100
Additional Effort to Address Adverse Modification in a New Consultation										
Dams (Hydropower)	$13,667	$2,342	$16,009	$13,667	$817,887	$831,553	$200	$6,171	$6,371	$200
Water Supply	$14,100	$2,342	$16,442	$14,100	$817,887	$831,987	$1,500	$6,171	$7,671	$1,267
Forest Management	$6,400	$1,413	$7,813	$6,400	$7,621	$14,021	$1,267	$669	$1,936	$3,833
Agriculture	$6,400	$1,413	$7,813	$6,400	$7,621	$14,021	$1,267	$669	$1,936	$3,833
In-Stream Construction	$1,100	$1,376	$2,476	$1,100	$4,536	$5,636	$767	$1,041	$1,808	$4,067
Restoration	$1,100	$1,376	$2,476	$1,100	$4,536	$5,636	$767	$1,041	$1,808	$4,067
Mining	$19,633	$30,522	$50,155	$19,633	$89,224	$108,857	$433	$1,041	$1,474	$433
Transportation	$2,567	$7,510	$10,076	$2,567	$12,975	$15,541	$1,833	$6,060	$7,893	$1,800
Other	$1,700	$1,710	$3,410	$1,700	$0	$1,700	$867	$855	$1,722	$1,700

Sources: Median cost estimates resulting from interviews with NOAA Fisheries and other federal and state agency personnel conducted for NOAA Fisheries, Final Economic Analysis of Critical Habitat Designation for 12 West Coast Salmon and Steelhead ESUs, Seattle, WA, August 2005; Estimates of additional administrative effort for critical habitat for bull trout, U.S. Fish and Wildlife Service, Region 1, October 14, 2009.

3.4.3. METHODOLOGY

This section presents the methodology used to: (1) estimate the number of future consultations; (2) classify these consultations by economic activity; (3) assign each consultation to a HUC; and (4) calculate anticipated baseline and incremental impacts.

- **Step 1: Classify Consultations by Economic Activity.** While the eulachon was not listed until March 18, 2010, NOAA Fisheries has an extensive consultation history for other anadromous fish species in the watersheds being designated as critical habitat (see Exhibit 2-3). NOAA Fisheries identifies the specific economic activities covered by each consultation. This analysis aggregated these specific activities into general activity groups: agriculture, forest management, in-stream construction, transportation, restoration, water quality, water supply, dams, and other activities. For example, consultations that NOAA Fisheries identified with the activity "waterway--dredging" and "waterway--boat/dock/pier" both would be classified as in-stream construction.

  Multiple consultations affected more than one activity. For example, a bridge project that requires pile-driving in a river may fall within both the transportation and in-stream construction categories. Because the administrative effort needed may be lower or higher depending on the type of activity considered, this analysis divides consultations across multiple categories as needed. The bridge project example above would, therefore, be counted as half transportation and half in-stream construction.

- **Step 2: Assign Consultations by Critical Habitat Unit.** For formal, informal, and technical assistance consultations, NOAA Fisheries provided consultation history by HUC. However, programmatic consultations may cover activities taking place over multiple HUCs (e.g., a regional general permit from USACE). Because programmatic consultations cannot be assigned to a specific area, this analysis uniformly distributes them across all HUCs in the NOAA Fisheries Northwest Region.

- **Step 3: Estimate Future Consultations.** This analysis assumes that, for eulachon, the frequency of consultation and the activities considered will be the same as this consultation history on a per watershed basis. That is, it assumes that eulachon consultations in a particular watershed will occur at the average rate of consultation for other fish species over the past ten years in that watershed.[54]

- **Step 4: Calculate Anticipated Incremental Administrative Costs.** With the exception of consultations in the Quinault HUC, all consultations are expected to incur incremental costs associated with only the additional effort needed to address potential adverse modification of habitat for eulachon (see Exhibit 3-6). The analysis assumes that the administrative effort to address

[54] For the Quinault, this consultation history was supplemented with Fish and Wildlife Service consultations on the bull trout.

jeopardy forms part of the baseline effort to consider other NOAA Fisheries-listed species present in these HUCs (i.e., West Coast salmon and steelhead). As a result, the only incremental administrative effort in these watersheds is to address potential adverse modification.

Because there are no other NOAA Fisheries-listed fish species in the Quinault HUC to provide a consultation baseline, this analysis assumes that, as a result of critical habitat, NOAA Fisheries would need to initiate a new consultation in these areas solely to consider eulachon. Without other NOAA Fisheries-listed species present and without designated critical habitat, NOAA Fisheries may not undertake section 7 consultation in this HUC unless the eulachon was determined to be present in the project area at the time. As a result of designating critical habitat for the eulachon, NOAA Fisheries would need to initiate consultation on projects occurring within this HUC in order to consider potential adverse modification regardless of whether the eulachon is present. Therefore, the full costs of the section 7 consultation are assigned to eulachon critical habitat (i.e., considered to be incremental costs).

The annual number of total section 7 actions forecast is shown by watershed and by activity in Exhibit 3-6. As calculated using the steps outlined above**,** total estimated incremental administrative impacts are summarized in Exhibit 3-7.

EXHIBIT 3-6. FORECAST ANNUAL NUMBER OF FUTURE SECTION 7 ACTIONS BY WATERSHED AND ACTIVITY[55]

HUC	AGRICULTURE	FOREST MGMT	IN STREAM WORK	MINING	TRANSPORTATION	RESTORATION	WATER QUALITY	WATER SUPPLY	DAMS	OTHER	TOTAL
1708000107	0.1	0.3	1.1	0.1	0.7	0.4	0.1	0.0	0.0	0.0	2.8
1708000108	0.2	0.4	0.4	0.0	0.2	0.2	0.1	0.0	0.0	0.0	1.5
1708000205	0.1	0.3	0.3	0.1	0.8	0.1	0.0	0.1	0.0	0.5	2.3
1708000206	0.2	0.3	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.9
1708000301	0.2	0.3	0.7	0.0	0.1	0.2	0.1	0.0	0.0	0.0	1.6
1708000305	0.1	0.3	1.2	0.0	0.1	0.4	0.1	0.0	0.0	0.0	2.2
1708000307	0.1	0.3	1.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	1.7
1708000503	0.1	0.3	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.8
1708000507	0.1	0.3	0.6	0.0	0.6	0.1	0.1	0.0	0.0	0.0	1.8
1708000508	0.1	0.3	1.1	0.0	0.4	0.2	0.1	0.0	0.0	0.0	2.2
1708000603	0.2	0.3	1.0	0.0	0.7	0.8	0.0	0.0	0.0	0.1	3.0
1708000605	0.1	0.3	0.6	0.0	0.1	0.1	0.0	0.0	0.0	0.0	1.2
1709001205	0.1	0.3	2.0	0.2	0.1	0.1	0.0	0.0	0.0	0.0	2.8
1710010205	0.1	0.5	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	1.0
1710020507	0.1	0.3	0.2	0.0	0.6	0.1	0.0	0.0	0.0	0.0	1.4
1710030304	0.1	0.4	0.4	0.0	0.1	0.1	0.0	0.0	0.0	0.0	1.1
1710030308	0.1	0.5	0.6	0.0	0.3	0.5	0.2	0.0	0.0	0.0	2.2
1711002005	0.1	0.3	0.2	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.9
1801010201	0.0	0.4	0.3	0.0	0.5	0.5	0.1	0.0	0.6	0.1	2.4
1801010204	0.0	0.0	1.0	1.2	0.2	0.0	0.0	0.2	0.0	0.2	2.8
1801020911	0.0	0.3	0.5	0.1	0.5	0.0	0.2	0.0	0.0	0.1	1.7
Total	**2.1**	**6.7**	**13.3**	**1.8**	**6.9**	**4.8**	**1.1**	**0.6**	**0.7**	**1.1**	**39.0**

Note: Totals may not sum due to rounding. Each section 7 action forecast receives costs associated with its consultation type (e.g., formal, informal, programmatic, or technical assistance) and activity. Note, consultations on water quality use the estimated administrative costs for "other" activities as set out in Exhibit 3-6. Additional detail is provided in Appendix C. Estimates are based on the average number of past consultations for other migratory fish species in these watersheds over the last ten years (i.e., 2000 to 2009).

[55] Section 7 actions include all completed section 7 consultations categorized as formal, informal, programmatic, conference, implementation, and pre-consultation/technical assistance.

EXHIBIT 3-7. ANNUAL NUMBER OF CONSULTATIONS FORECAST BY HUC AND TOTAL ANNUALIZED INCREMENTAL CONSULTATION COSTS (DISCOUNTED AT 7 PERCENT)

HUC	FORMAL	INFORMAL	TECHNICAL ASSISTANCE	PROGRAMMATIC	TOTAL COSTS
1708000107	0.80	0.90	0.30	0.84	$28,100
1708000108	0.50	0.10	0.10	0.84	$21,400
1708000205	0.60	0.80	0.10	0.84	$30,500
1708000206	0.00	0.10	0.00	0.84	$19,100
1708000301	0.30	0.50	0.00	0.84	$20,400
1708000305	0.50	0.90	0.00	0.84	$21,600
1708000307	0.30	0.60	0.00	0.84	$21,300
1708000503	0.00	0.00	0.00	0.84	$18,900
1708000507	0.20	0.80	0.00	0.84	$23,400
1708000508	0.30	1.00	0.10	0.84	$23,500
1708000603	0.70	1.40	0.10	0.84	$26,600
1708000605	0.20	0.20	0.00	0.84	$19,700
1709001205	0.80	0.90	0.30	0.84	$32,200
1710010205	0.20	0.00	0.00	0.84	$24,700
1710020507	0.40	0.00	0.20	0.84	$22,200
1710030304	0.10	0.20	0.00	0.84	$19,500
1710030308	0.80	0.30	0.30	0.84	$23,600
1711002005	0.10	0.00	0.00	0.84	$20,400
1801010201	2.40	0.00	0.00	0.00	$17,800
1801010204	2.80	0.00	0.00	0.00	$63,500
1801020911	1.70	0.00	0.00	0.00	$13,600
Total	**13.70**	**8.70**	**1.50**	**15.10**	**$512,000**

Note: Costs are annualized over 20 years. As noted in Exhibit 3-5, forecast administrative costs differ by activity and by consultation type. Total administrative incremental impacts are estimated by HUC by applying these costs to the section 7 actions summarized in Exhibit 3-6 above. Additional detail is provided in Appendix C.

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APPENDIX A | FINAL REGULATORY FLEXIBILITY ANALYSIS AND ENERGY IMPACTS ANALYSIS

This appendix considers the extent to which incremental impacts from critical habitat designation may be borne by small entities and the energy industry. The analysis presented in Section A.1 is conducted pursuant to the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996. The energy analysis in Section A.2 is conducted pursuant to Executive Order No. 13211.

The analyses of impacts to small entities and the energy industry rely on the estimated incremental impacts resulting from the critical habitat designation. The incremental impacts of the rulemaking are most relevant for the small business and energy impacts analyses because they reflect costs that may be avoided or reduced based on decisions regarding the composition of the final rule. Incremental impacts are detailed in Chapter 2 of this analysis.

A.1 FINAL REGULATORY FLEXIBILITY ANALYSIS

This FRFA uses the best available information to identify the potential impacts of critical habitat on small entities. However, a number of uncertainties make specific identification of these impacts difficult, including: 1) the future regulatory burden of critical habitat, in terms on conservation efforts and administrative costs is uncertain, as discussed in the main body of this report; 2) the manner in which the future regulatory burden will be allocated between large and small entities is unknown; 3) the specific locations of small entities is only available at the county level. To account for uncertainty, this analysis utilizes the high end of the estimated range of potential annualized incremental impacts, as reported in the main body of this report. It then uses two scenarios to describe potential impacts to small entities.

A.1.1. SUMMARY OF FINDINGS

Estimated impacts to small entities, by industry, are summarized in Exhibit A-1. Of potentially affected entities, 97 percent are classified as likely to be "small." Total annualized impacts to small entities are estimated to be $510,000, or approximately 99.6 percent of total incremental impacts anticipated as a result of this rule.[54]

[54] Total annualized impacts to small entities is calculated by first taking the portion of administrative costs that may be borne by third parties. This analysis then assumes that the portion of these impacts that may be borne by small entities is equivalent to the percentage of businesses that are considered small. For example, if 97 percent of entities engaged in transportation activities in a given unit are considered small, this analysis assumes that 97 percent of impacts for that unit and industry will be borne by small entities.

Exhibit A-1 also presents the number of potentially affected small entities under two scenarios. These scenarios are intended to provide a measure of uncertainty regarding the number of small entities that may be affected by the designation. Under Scenario 1, this analysis estimates the number of small entities located within areas affected by the designation (approximately 607), and assumes that incremental impacts are distributed evenly across all entities in each affected industry. Under this scenario, a small entity may bear costs up to $3,372, representing between <0.01and 0.1 percent of average revenues (depending on the industry). Under Scenario 2, this analysis assumes costs of each anticipated future consultation are borne by a distinct small business (approximately 39 entities). Under this scenario, each small entity may bear costs of between $1,900 and $158,200, representing between 0.01 and 4.57 percent of average annual revenues, depending on the industry.

A.1.2. FRFA REQUIREMENTS

First enacted in 1980, the RFA was designed to ensure that Federal agencies consider the potential for their regulations to unduly inhibit the ability of small entities to compete. The goals of the RFA include increasing the government's awareness of the impact of regulations on small entities and to encourage agencies to exercise flexibility in their rulemakings to provide regulatory relief to small entities.

When a Federal agency proposes regulations, the RFA requires the agency to prepare and make available for public comment an analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions).[55] For this rulemaking, this analysis takes the form of a final regulatory flexibility analysis (FRFA). Under 5 U.S.C., Section 604(a) of the RFA, a FRFA is required to contain:

i. "a succinct statement of the need for, and objectives of, the rule;

ii. a summary of significant issues raised by public comments in response to the initial regulatory flexibility analysis, a summary of assessment of the agency of such issues, and a statement of any changes in the proposed rule as a result of such comments;

iii. a description of and an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available;

iv. a description of the projected reporting, recordkeeping and other compliance requirements of the rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record; and

v. a description of the steps the agency has taken to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy and legal reasons for selecting the alternative adopted in the final rule and why each one of the

[55] 5 U.S.C. 601 et seq.

other significant alternatives to the rule considered by the agency which affect the impact on small entities was rejected."

EXHIBIT A-1. SUMMARY OF ESTIMATED IMPACTS TO SMALL ENTITIES BY ACTIVITY TYPE

	UNIT NAME	DAMS AND WATER SUPPLY	AGRICULTURE AND GRAZING	IN-WATER CONSTRUCTION & RESTORATION	WATER QUALITY	FOREST MANAGEMENT	TRANSPOR-TATION	MINING	OTHER
[A]	Total Annualized Impacts to Small Entities[1]	$192,220	$20,553	$54,328	$2,154	$80,163	$71,245	$86,254	$3,002
[B]	Estimated Average Annual Revenues for Small Entities[1]	$3,464,000	$492,000	$3,543,000	$3,456,000	$3,859,000	$10,084,000	$3,567,000	$19,445,000
Scenario 1: Assumes All Small Entities within Designated Critical Habitat Share Incremental Costs Equally									
[C]	Estimated Number of Small Entities within Critical Habitat	57	185	53	25	131	63	44	49
[D]	Estimated Impact per Small Entity ([A]/[C])	$3,372	$111	$1,025	$86	$612	$1,131	$1,960	$61
[E]	Impact per Small Entity as Percentage of Revenues ([D]/[B])	0.10%	0.02%	0.03%	0.00%	0.02%	0.01%	0.05%	0.00%
Scenario 2: Assumes All Consultations Involve One Small Entity									
[F]	Estimated Number of Small Entities Expected to Undergo Consultation	1.2	2.1	18.1	1.1	6.7	6.9	1.8	1.1
[G]	Estimated Impact per Small Entity ([A]/[F])	$158,206	$9,866	$3,000	$1,903	$12,043	$10,258	$49,194	$2,712
[H]	Impact per Small Entity as Percentage of Revenues ([G]/[B])	4.57%	2.00%	0.08%	0.06%	0.31%	0.10%	1.38%	0.01%

1. Annual revenues are estimated using Risk Management Association (RMA), *Annual Statement Studies: Financial Ratio Benchmarks 2009 to 2010,* 2009. The following method was used to develop these estimates:

(a) Matched affected economic activities to available NAICS codes in RMA data. The following codes are used for affected industries: Dams (221122), Agriculture (111988, 11211), In-Water Construction and Restoration (237120, 237990, 713930), Water Quality (221310), Forest Management (113310, 113310), Transportation (237310), Mining (212321), and Other (237130, 237110). Where possible, these correspond to the NAICS codes noted in Exhibit A-2.

(b) For each NAICS code, RMA provides the net sales and the number of entities falling within several sales categories: $0 to $1 million, $1 to 3 million, $3 to $5 million, $5 to $10 million, $10 to $25 million, and greater than $25 million. Based on the number of entities and total net sales falling within each sales category, developed an estimate of average net sales (revenues) per small entity. Specifically, the analysis averages data for the sales categories at or below the small business threshold for each industry. For example, if the small business threshold is $7 million, this analysis uses the following sales categories: $0 to $1 million, $1 to 3 million, $3 to $5 million, and $5 to $10 million. For transportation-related activities (threshold of $33.5 million), this analysis used sales categories up to $10 to $25 million. This represents a conservative approach to the analysis, as revenues per entity will appear lower, and therefore impacts higher, than if higher revenue categories were included.

A.1.3. NEEDS AND OBJECTIVES OF THE RULE

NOAA's National Marine Fisheries Service (NMFS) determined that the Southern DPS of eulachon is likely to become endangered in the foreseeable future throughout all its range and listed the species as threatened under the Endangered Species Act (Act) on March 18, 2010.[56]

Section 4(b)(2) of the Act requires NOAA to designate critical habitat for threatened and endangered species "on the basis of the best scientific data available and after taking into consideration the economic impact, impact on national security, and any other relevant impact, of specifying any particular area as critical habitat." The Act defines critical habitat under Section 3(5)(A) as:

> "(i) the specific areas within the geographical area occupied by the species, at the time it is listed..., on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and
>
> (ii) specific areas outside the geographical area occupied by the species at the time it is listed… upon a determination by the Secretary that such areas are essential for the conservation of the species."

A.1.4 SUMMARY OF SIGNIFICANT PUBLIC COMMENTS ON THE RULE AND ASSESSMENT OF ISSUES RAISED

NMFS received no public comment on the Proposed Critical Habitat Designation pertaining to the Economic Analysis; therefore, no substantive changes were made to the economic analysis.

A.1.5 DESCRIPTION AND ESTIMATE OF THE NUMBER OF SMALL ENTITIES TO WHICH THE RULE APPLIES

Three types of small entities are defined in the RFA:

- **Small Business -** Section 601(3) of the RFA defines a small business as having the same meaning as small business concern under section 3 of the Small Business Act. This includes any firm that is independently owned and operated and is not dominant in its field of operation. The U.S. Small Business Administration (SBA) has developed size standards to carry out the purposes of the Small Business Act, and those size standards can be found in 13 CFR 121.201. The size standards are matched to North American Industry Classification System (NAICS) industries. The SBA definition of a small business applies to a firm's parent company and all affiliates as a single entity.
- **Small Governmental Jurisdiction -** Section 601(5) defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with a population of less than 50,000. Special

[56] 75 FR 13012.

districts may include those servicing irrigation, ports, parks and recreation, sanitation, drainage, soil and water conservation, road assessment, etc. When counties have populations greater than 50,000, those municipalities of fewer than 50,000 can be identified using population reports. Other types of small government entities are not as easily identified under this standard, as they are not typically classified by population.

- **Small Organization -** Section 601(4) defines a small organization as any not-for-profit enterprise that is independently owned and operated and not dominant in its field. Small organizations may include private hospitals, educational institutions, irrigation districts, public utilities, agricultural co-ops, etc.

The courts have held that the RFA/SBREFA requires Federal agencies to perform a regulatory flexibility analysis of forecast impacts to small entities that are directly regulated. In the case of *Mid-Tex Electric Cooperative, Inc., v. Federal Energy Regulatory Commission (FERC),* FERC proposed regulations affecting the manner in which generating utilities incorporated construction work in progress in their rates. The generating utilities that expected to be regulated were large businesses; however, their customers -- transmitting utilities such as electric cooperatives -- included numerous small entities. In this case, the court agreed that FERC simply authorized large electric generators to pass these costs through to their transmitting and retail utility customers, and FERC could therefore certify that small entities were not directly impacted within the definition of the RFA.[57]

Similarly, *American Trucking Associations, Inc. v. Environmental Protection Agency* (EPA) addressed a rulemaking in which EPA established a primary national ambient air quality standard for ozone and particulate matter.[58] The basis of EPA's RFA/SBREFA certification was that this standard did not directly regulate small entities; instead, small entities were indirectly regulated through the implementation of state plans that incorporated the standards. The court found that, while EPA imposed regulation on states, it did not have authority under this rule to impose regulations directly on small entities and therefore small entities were not directly impacted within the definition of the RFA.

The Small Business Administration (SBA) in its guidance on how to comply with the RFA recognizes that consideration of indirectly affected small entities is not required by the RFA, but encourages agencies to perform a regulatory flexibility analysis even when the impacts of its regulation are indirect.[59] "If an agency can accomplish its statutory mission in a more cost-effective manner, the Office of Advocacy [of the SBA] believes that it is good public policy to do so. The only way an agency can determine this is if it does not certify regulations that it knows will have a significant impact on small entities

[57] 773 F. 2d 327 (D.C. Cir. 1985).

[58] 175 F. 3d 1027, 1044 (D.C. Cir. 1999).

[59] Small Business Administration, Office of Advocacy. May 2003. A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act, pg. 20.

even if the small entities are regulated by a delegation of authority from the Federal agency to some other governing body."[60]

The regulatory mechanism through which critical habitat protections are enforced is section 7 of the Act, which directly regulates only those activities carried out, funded, or permitted by a Federal agency. By definition, Federal agencies are not considered small entities, although the activities they may fund or permit may be proposed or carried out by small entities. Given the SBA guidance described above, this analysis considers the extent to which this designation could potentially affect small entities, regardless of whether these entities would be directly regulated by the NMFS through the critical habitat rule or by a delegation of impact from the directly regulated entity.

This FRFA focuses on small entities that may bear the incremental impacts of this rulemaking quantified in Chapter 2 of this economic analysis. Critical habitat may affect small entities as a result of changes in the project design, operation, or management of activities taking place within the study area as discussed in Chapter 2. Exhibit A-2 describes potentially affected small businesses by NAICS code, highlighting the relevant small business thresholds. Although businesses affected indirectly are considered, this analysis considers only those entities for which impact would not be measurably diluted.

Small entities also may participate in section 7 consultation as a third party (the primary consulting parties being the NMFS and the Federal action agency). It is therefore possible that the small entities may spend additional time considering critical habitat during section 7 consultation for the eulachon. These incremental administrative impacts to third parties are discussed in Section 3 of this analysis.

As described above and detailed in Section 3 of this report, incremental impacts associated with this rulemaking are expected to consist largely of administrative costs associated with section 7 consultations. Section 3 quantifies the administrative costs of section 7 consultation. In total, annualized incremental impacts are estimated at $512,000, some portion of which may be borne by small entities. These potential impacts are described in greater detail below.

- **Project Modifications.** Because of the high level of baseline protection in designated areas incremental impacts on conservation efforts for activities occurring in critical habitat areas are considered to be unlikely for most areas. In addition, scientific uncertainty regarding eulachon's biological needs over and above those baseline protections may limit NOAA's ability to recommend modifications, at least in the foreseeable future.
- **Administrative Costs.** Based on the number of past consultations, this analysis forecasts the number of additional consultations that may take place as a result of critical habitat (see Section 3). Based on this forecast, annual incremental

[60] Ibid., pg. 21.

consultation costs that may be borne by third parties are forecast at $512,000 in total (discounted at seven percent).[61]

Ideally, this analysis would directly identify the number of small entities that are located within the watersheds designated in the rule. However, it is not possible to directly determine the number of firms in each industry sector within the critical habitat units because business activity data are maintained at the county level. Therefore, this analysis first identifies small entities in counties that overlap with watersheds designated as critical habitat, then estimates the number of small entities within the study area using the following method:

- In order to estimate the number of businesses located within the study area for the rule, this analysis assumes that business locations are distributed geographically in the same pattern that population is distributed. That is, more densely populated areas will contain proportionally more businesses than less populated areas.
- The number of people residing within the relevant watersheds was estimated by summing up the population of all census blocks that are contained within the relevant HUCs.[62, 63]
- The ratio of the population within the study area to the total population of the county is used to estimate the proportion of total and small business entities that may be affected by the rule. Thus, this analysis uses population distribution as a proxy for the distribution of small entities in a county.

Exhibits A-3 and A-4 present the number of potentially affected small businesses by county and by critical habitat unit. Exhibit A-5 presents the percentage of small businesses estimated to fall within each critical habitat unit.

A.1.6 DESCRIPTION OF REPORTING AND RECORDKEEPING EFFORTS

The rule does not directly mandate "reporting" or "record keeping" within the meaning of the Paperwork Reduction Act (PRA).

A.1.7 A DESCRIPTION OF STEPS TAKEN TO MINIMIZE SIGNIFICANT ADVERSE ECONOMIC IMPACT ON SMALL ENTITIES

In accordance with the requirements of the RFA (as amended by SBREFA, 1996) this analysis considers various alternatives to the critical habitat designation for the eulachon.

[61] Note, this total is not shown in Chapter 5 because it reflects only the administrative costs to third parties, rather than the full cost of the consultation, including NMFS and Federal agency time. In addition, it excludes annualized impacts associated with non-native species because costs associated this mitigation are expected to be borne by Federal agencies.

[62] 2000 Census of Population and Housing.

[63] In case of partial containment of a census block, the ratio of the contained and total area of the block was used to estimate the block population residing within the hydrologic unit. The population that resides within each county included in the study area is generated by summing up the population estimates across all critical habitat units with which the county intersects.

The alternative of not designating critical habitat for the eulachon was considered and rejected because such an approach does not meet the legal requirements of the ESA.

NMFS considered the alternative of designating all specific areas (e.g., no areas excluded); however, NMFS rejected this alternative because for three areas (Quinault, Klamath and Elwha Rivers), the benefits of excluding Indians lands for these areas outweighed the benefits of including them in the designation. NMFS also considered a third alternative of designating all specific areas, but excluding the Quinault, Klamath and Elwha Rivers. This alternative reduces the number of small businesses potentially affected from 607 to approximately 591, and the total potential annualized economic impact to small businesses would be reduced from $510,000 to approximately $485,300.

EXHIBIT A-2. MAJOR RELEVANT ACTIVITIES AND A DESCRIPTION OF THE INDUSTRY SECTORS ENGAGED IN THOSE ACTIVITIES

MAJOR RELEVANT ACTIVITY	DESCRIPTION OF INCLUDED INDUSTRY SECTORS	NAICS CODE	SBA SIZE STANDARD
Dams and Water Supply	**Electric Power Generation, Transmission and Distribution** This industry group comprises establishments primarily engaged in generating, transmitting, and/or distributing electric power. Establishments in this industry group may perform one or more of the following activities: (1) operate generation facilities that produce electric energy; (2) operate transmission systems that convey the electricity from the generation facility to the distribution system; and (3) operate distribution systems that convey electric power received from the generation facility or the transmission system to the final consumer.	221111 221112 221113 221119 221121 221122	4 million megawatts for the preceding year[1]
	Water Supply and Irrigation Systems This industry comprises establishments primarily engaged in operating water treatment plants and/or operating water supply systems. The water supply system may include pumping stations, aqueducts, and/or distribution mains. The water may be used for drinking, irrigation, or other uses.	221310	$7.0 million average annual receipts
Agriculture	**Crop Production (Oilseed and Grain Farming, Vegetable and Melon Farming, Fruit and Tree Nut Farming)** This industry group comprises establishments primarily engaged in 1) growing oilseed and/or grain crops and/or producing oilseed and grain seeds; 2) growing root and tuber crops (except sugar beets and peanuts) or edible plants and/or producing root and tuber or edible plant seeds; or 3) growing fruit and/or tree nut crops.	1111 1112 1113	$750,000 average annual receipts
	Beef Cattle Ranching and Farming This U.S. industry comprises establishments primarily engaged in raising cattle (including cattle for dairy herd replacements).	112111	
	Food Manufacturing Industries in this sector transform livestock and agricultural products into products for intermediate or final consumption. The industry groups are distinguished by the raw materials (generally of animal or vegetable origin) processed into food products.	311	500 employees
Transportation	**Highway, Street and Bridge Construction** This industry comprises establishments primarily engaged in the construction of highways (including elevated), streets, roads, airport runways, public sidewalks, or bridges. The work performed may include new work, reconstruction, rehabilitation, and repairs.	237310	$33.5 million average annual receipts

MAJOR RELEVANT ACTIVITY	DESCRIPTION OF INCLUDED INDUSTRY SECTORS	NAICS CODE	SBA SIZE STANDARD
Forest Management	**Logging** This industry comprises establishments primarily engaged in one or more of the following: (1) cutting timber; (2) cutting and transporting timber; and (3) producing wood chips in the field.	113310	500 employees
	Timber Tract Operations This industry comprises establishments primarily engaged in the operation of timber tracts for the purpose of selling standing timber.	113110	$7.0 million average annual receipts
	Support Activities for Forestry This industry comprises establishments primarily engaged in performing particular support activities related to timber production, wood technology, forestry economics and marketing, and forest protection. These establishments may provide support activities for forestry, such as estimating timber, forest firefighting, forest pest control, and consulting on wood attributes and reforestation.	115310	
Mining	**Mining (except Oil and Gas)** Industries in the Mining (except Oil and Gas) subsector primarily engage in mining, mine site development, and beneficiating (i.e., preparing) metallic minerals and nonmetallic minerals, including coal. The term "mining" is used in the broad sense to include ore extraction, quarrying, and beneficiating (e.g., crushing, screening, washing, sizing, concentrating, and flotation), customarily done at the mine site.	212	500 employees
	Construction Sand and Gravel Mining This industry comprises establishments primarily engaged in one or more of the following: (1) operating commercial grade (i.e., construction) sand and gravel pits; (2) dredging for commercial grade sand and gravel; and (3) washing, screening, or otherwise preparing commercial grade sand and gravel.	212321	
In-Water Construction and Restoration	**Oil and Gas Pipeline and Related Structures Construction** This industry comprises establishments primarily engaged in the construction of oil and gas lines, mains, refineries, and storage tanks.	237120	$33.5 million average annual receipts
	Other Heavy and Civil Engineering Construction This industry comprises establishments primarily engaged in heavy and engineering construction projects (excluding highway, street, bridge, and distribution line construction).	237990	
	Marinas This industry comprises establishments engaged in operating docking and/or storage facilities for pleasure	713930	$7.0 million average annual

MAJOR RELEVANT ACTIVITY	DESCRIPTION OF INCLUDED INDUSTRY SECTORS	NAICS CODE	SBA SIZE STANDARD
	craft owners, with or without one or more related activities, such as retailing fuel and marine supplies; and repairing, maintaining, or renting pleasure boats.		receipts
Water Quality	**Sewage Treatment Facilities** This industry comprises establishments primarily engaged in operating sewer systems or sewage treatment facilities that collect, treat, and dispose of waste.	221320	$7.0 million average annual receipts
Other Activities	**Power and Communication Line and Related Structures Construction** This industry comprises establishments primarily engaged in the construction of power lines and towers, power plants, and radio, television, and telecommunications transmitting/receiving towers.	237130	$33.5 million average annual receipts
	Water and Sewer Line and Related Structures Construction This industry comprises establishments primarily engaged in the construction of water and sewer lines, mains, pumping stations, treatment plants and storage tanks.	237110	

EXHIBIT A-3. ESTIMATED NUMBER OF REGULATED ENTITIES BY UNIT AND COUNTY

HUC	STATE	COUNTY	TOTAL COUNTY POPULATION	POPULATION WITHIN STUDY AREA	% COUNTY POPULATION WITHIN STUDY AREA	ALL REGULATED ENTITIES IN COUNTY	REGULATED SMALL ENTITIES IN COUNTY	ALL REGULATED ENTITIES IN STUDY AREA	REGULATED SMALL ENTITIES IN STUDY AREA
1708000107	Oregon	Hood River	21,648	0	0%	371	341	6	6
1708000107	Oregon	Multnomah	680,473	832	0%	758	679	8	8
1708000107	Washington	Clark	380,739	7,670	2%	518	489	15	14
1708000107	Washington	Skamania	10,173	1,451	14%	35	34	9	9
1708000108	Oregon	Clackamas	356,374	629	0%	326	314	8	8
1708000108	Oregon	Multnomah	680,473	49,051	7%	758	679	60	53
1708000108	Washington	Clark	380,739	9	0%	518	489	8	8
1708000205	Washington	Clark	380,739	20,231	5%	518	489	31	30
1708000205	Washington	Skamania	10,173	3	0%	35	34	6	6
1708000206	Washington	Clark	380,739	7,241	2%	518	489	14	14
1708000206	Washington	Cowlitz	94,935	3,886	4%	241	228	14	14
1708000206	Washington	Skamania	10,173	2	0%	35	34	6	6
1708000301	Washington	Cowlitz	94,935	11,241	12%	241	228	31	30
1708000301	Washington	Skamania	10,173	0	0%	35	34	6	6
1708000305	Washington	Cowlitz	94,935	89	0%	241	228	8	8
1708000305	Washington	Lewis	69,718	21	0%	93	93	7	7
1708000305	Washington	Wahkiakum	3,872	1,535	40%	25	25	12	12
1708000307	Oregon	Clatsop	35,764	7	0%	108	99	7	7
1708000307	Oregon	Columbia	46,160	2,428	5%	180	180	13	13
1708000307	Washington	Cowlitz	94,935	1,044	1%	241	228	9	8
1708000307	Washington	Wahkiakum	3,872	1,008	26%	25	25	9	9
1708000503	Washington	Cowlitz	94,935	296	0%	241	228	8	8
1708000503	Washington	Lewis	69,718	7,869	11%	93	93	14	14
1708000507	Washington	Cowlitz	94,935	7,118	7%	241	228	22	20

HUC	STATE	COUNTY	TOTAL COUNTY POPULATION	POPULATION WITHIN STUDY AREA	% COUNTY POPULATION WITHIN STUDY AREA	ALL REGULATED ENTITIES IN COUNTY	REGULATED SMALL ENTITIES IN COUNTY	ALL REGULATED ENTITIES IN STUDY AREA	REGULATED SMALL ENTITIES IN STUDY AREA
1708000507	Washington	Lewis	69,718	5,807	8%	93	93	11	11
1708000508	Washington	Cowlitz	94,935	27,932	29%	241	228	76	72
1708000603	Washington	Lewis	69,718	10	0%	93	93	7	7
1708000603	Washington	Pacific	21,207	331	2%	93	93	7	7
1708000603	Washington	Wahkiakum	3,872	403	10%	25	25	5	5
1708000605	Oregon	Clatsop	35,764	299	1%	108	99	7	7
1708000605	Washington	Pacific	21,207	14	0%	93	93	7	7
1708000605	Washington	Wahkiakum	3,872	6	0%	25	25	4	4
1709001205	Oregon	Columbia	46,160	93	0%	180	180	7	7
1709001205	Oregon	Multnomah	680,473	4,719	1%	758	679	11	11
1709001205	Washington	Clark	380,739	3,582	1%	518	489	10	10
1709001205	Washington	Cowlitz	94,935	4	0%	241	228	8	8
1710010205	Washington	Grays Harbor	67,167	692	1%	257	245	9	9
1710010205	Washington	Jefferson	27,132	0	0%	93	93	7	7
1710020507	Oregon	Lane	331,867	1,412	0%	949	915	11	11
1710020507	Oregon	Lincoln	44,813	53	0%	949	915	8	8
1710030304	Oregon	Douglas	101,950	369	0%	180	180	7	7
1710030308	Oregon	Douglas	101,950	4,236	4%	180	180	12	12
1711002005	Washington	Clallam	66,762	1,576	2%	218	211	9	9
1711002005	Washington	Jefferson	27,132	183	1%	93	93	7	7
1801010201	California	Humboldt	128,801	1,162	1%	326	314	10	10
1801010204	California	Humboldt	128,801	13,763	11%	326	314	39	38
1801020911	California	Del Norte	27,859	704	3%	42	38	7	7
1801020911	California	Humboldt	128,801	54	0%	326	314	8	8
		Total						**625**	**607**

EXHIBIT A-4. ESTIMATED NUMBER OF REGULATED ENTITIES THAT ARE SMALL (BY UNIT AND ACTIVITY TYPE)

HUC	DAMS AND WATER SUPPLY	AGRICULTURE AND GRAZING	IN-WATER CONSTRUCTION & RESTORATION	WATER QUALITY	FOREST MANAGEMENT	TRANSPORTATION	MINING	OTHER	TOTAL
1708000107	4	11	4	3	5	5	2	3	37
1708000108	7	34	5	3	7	6	3	4	69
1708000205	2	17	3	1	4	5	1	3	36
1708000206	3	11	3	2	6	4	2	3	34
1708000301	2	10	3	1	12	4	1	3	36
1708000305	3	6	2	1	8	2	3	2	27
1708000307	4	10	3	1	9	3	4	3	37
1708000503	2	6	3	1	4	2	2	2	22
1708000507	2	10	2	1	9	3	2	2	31
1708000508	3	23	4	1	27	7	3	4	72
1708000603	3	3	2	0	4	2	3	2	19
1708000605	3	3	2	0	3	2	3	2	18
1709001205	4	9	4	3	4	4	4	4	36
1710010205	2	3	2	1	2	2	2	2	16
1710020507	2	4	2	2	3	2	2	2	19
1710030304	1	1	1	0	1	1	1	1	7
1710030308	1	4	1	0	3	1	1	1	12
1711002005	2	3	2	0	3	2	2	2	16
1801010201	1	2	1	1	2	1	1	1	10
1801010204	4	13	2	1	13	3	1	1	38
1801020911	2	2	2	2	2	2	1	2	15
Total	**57**	**185**	**53**	**25**	**131**	**63**	**44**	**49**	**607**

EXHIBIT A-5. PROPORTION OF REGULATED ENTITIES THAT ARE CLASSIFIED AS SMALL (BY UNIT AND ACTIVITY TYPE)

HUC	DAMS AND WATER SUPPLY	AGRICULTURE AND GRAZING	IN-WATER CONSTRUCTION & RESTORATION	WATER QUALITY	FOREST MANAGEMENT	TRANSPORTATION	MINING	OTHER	TOTAL
1708000107	100%	92%	100%	100%	100%	100%	100%	100%	97%
1708000108	100%	89%	83%	100%	100%	100%	75%	80%	91%
1708000205	100%	94%	100%	100%	100%	100%	100%	100%	97%
1708000206	100%	100%	100%	100%	100%	100%	100%	100%	100%
1708000301	100%	91%	100%	100%	100%	100%	100%	100%	97%
1708000305	100%	100%	100%	100%	100%	100%	100%	100%	100%
1708000307	100%	100%	100%	100%	90%	100%	100%	100%	97%
1708000503	100%	100%	100%	100%	100%	100%	100%	100%	100%
1708000507	100%	91%	100%	100%	100%	100%	100%	67%	94%
1708000508	100%	92%	100%	100%	96%	100%	100%	80%	95%
1708000603	100%	100%	100%	0%	100%	100%	100%	100%	100%
1708000605	100%	100%	100%	0%	100%	100%	100%	100%	100%
1709001205	100%	100%	100%	100%	100%	100%	100%	100%	100%
1710010205	100%	100%	100%	100%	100%	100%	100%	100%	100%
1710020507	100%	100%	100%	100%	100%	100%	100%	100%	100%
1710030304	100%	100%	100%	0%	100%	100%	100%	100%	100%
1710030308	100%	100%	100%	0%	100%	100%	100%	100%	100%
1711002005	100%	100%	100%	0%	100%	100%	100%	100%	100%
1801010201	100%	100%	100%	100%	100%	100%	100%	100%	100%
1801010204	100%	93%	100%	100%	100%	100%	100%	100%	97%
1801020911	100%	100%	100%	100%	100%	100%	100%	100%	100%

A.2 POTENTIAL IMPACTS TO THE ENERGY INDUSTRY

Pursuant to Executive Order No. 13211, "Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use," issued May 18, 2001, Federal agencies must prepare and submit a "Statement of Energy Effects" for all "significant energy actions." The purpose of this requirement is to ensure that all Federal agencies "appropriately weigh and consider the effects of the Federal Government's regulations on the supply, distribution, and use of energy."[64]

The Office of Management and Budget provides guidance for implementing this Executive Order, outlining nine outcomes that may constitute "a significant adverse effect" when compared with the regulatory action under consideration:

- Reductions in crude oil supply in excess of 10,000 barrels per day (bbls);
- Reductions in fuel production in excess of 4,000 barrels per day;
- Reductions in coal production in excess of 5 million tons per year;
- Reductions in natural gas production in excess of 25 million Mcf per year;
- Reductions in electricity production in excess of 1 billion kilowatts-hours per year or in excess of 500 megawatts of installed capacity;
- Increases in energy use required by the regulatory action that exceed the thresholds above;
- Increases in the cost of energy production in excess of one percent;
- Increases in the cost of energy distribution in excess of one percent; or
- Other similarly adverse outcomes.[65]

As discussed in Chapter 3, dams and water diversions are considered to be moderate threats to the eulachon in the Columbia River Basin. To benefit salmon and steelhead species, Tacoma Power currently follows a flow regime for the Mayfield Dam on the Cowlitz River. There is some potential that plans for sediment management at and below that dam, which include the possibility of releasing large volumes of flow to flush sediments, could affect spawning habitat for the eulachon. Changing the flow release schedule has the potential to result in economic impacts for Tacoma Power in the form of, for example, decreased revenues due to a decrease in energy production during peak demand. However, due to uncertainty regarding the recommended changes to the volume and timing of any potential releases, this analysis is unable to quantify impacts at this time.

[64] Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance For Implementing E.O. 13211, M-01-27, Office of Management and Budget, July 13, 2001, http://www.whitehouse.gov/omb/memoranda/m01-27.html.

[65] Ibid.

Gross generation at Mayfield Dam ranged from 680 to 731 million kilowatts hours on an annual basis between 2008 and 2009.[66] This level of production represents the total amount of energy production that could possibly be incrementally affected by critical habitat designation, and is below the 1 billion kilowatts-hours threshold identified in the Executive Order. Therefore, it appears unlikely that the energy industry will experience "a significant adverse effect" as a result of the critical habitat designation for the eulachon.

[66] Tacoma Power Utilities, Tacoma Power 2009 Financial Report, City of Tacoma, Washington, Department of Public Utilities.

APPENDIX B | LAWS AND REGULATIONS THAT MAY PROVIDE BASELINE PROTECTION FOR THE EULACHON

CLEAN WATER ACT (33 U.S.C. 1251 ET SEQ. 1987)

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States. It gives the Environmental Protection Agency (EPA) the authority to implement pollution control programs such as setting wastewater standards for industry. The CWA also continued requirements to set water quality standards for all contaminants in surface waters.

Pursuant to Section 404 of the CWA, it is unlawful for any person to dredge, dispose off dredge material, or discharge a pollutant from a point source into navigable waters, unless a permit is obtained from the U.S. Army Corps of Engineers (USACE). As part of pollution prevention activities, the USACE may limit activities in waterways through the Section 404 permitting process, independent of eulachon concerns. These reductions in pollution may benefit eulachon critical habitat.

Pursuant to Section 402 of the CWA and under the National Pollutant Discharge Elimination System (NPDES) program, EPA sets pollutant-specific limits on the point source discharges for major industries and provides permits to individual point sources that apply to these limits. Under the water quality standards program, EPA, in collaboration with States, establishes water quality criteria to regulate ambient concentrations of pollutants in surface waters.

Under section 401 of the CWA, all applicants for a Federal license or permit to conduct activity that may result in discharge to navigable waters are required to submit a State certification to the licensing or permitting agency. For example, the 1995 Bay-Delta Water Quality Control Plan and Water Right Decision 1641 incorporates objectives such as providing water for fish and wildlife, including anadromous fish. Costs associated with this and other existing water control plans are considered baseline protection in this analysis.

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT REAUTHORIZATION ACT 2006

This law signed by the President in January, 2007, amends the older Magnuson-Stevens Fishery Conservation and Management Act (as amended through 1996) that included provision for the description of essential fish habitat in fishery management plans and consideration of actions to ensure the conservation and enhancement of habitat. The newer Magnuson-Stevens Reauthorization Act mandates the use of annual catch limits and accountability measures to end overfishing, provides for widespread market-based fishery management through limited access programs, and calls for increased

international cooperation. This act may provide protection to eulachon by imposition of stringent measures to prevent fishing of eulachon, and improve conditions by encouraging market based conservation strategies.

NATIONAL FOREST MANAGEMENT ACT (16 USC §§ 1600-1614 1976)

This Act requires assessment of forest lands, development of a management program based on multiple-use, sustained-yield principles, and implementation of a resource management plan for each unit of the National Forest System. The Act may provide protection to eulachon within National Forests, primarily through its authorization of the Northwest Forest Plan (NWFP) and PACFISH. NWFP and PACFISH provide numerous protections for anadromous fish species related to Federal lands management activities (The NWFP and PACFISH are discussed in more detail below).

NORTHWEST FOREST PLAN (1994)

The Northwest Forest Plan is a Federal interagency cooperative program that is intended to provide a coordinated management direction for the lands administered by the U.S. Forest Service (USFS) and Bureau of Land Management (BLM). The Northwest Forest Plan defines Standards and Guidelines (S&Gs) for forest use throughout the 24 million acres of Federal lands in its planning area (the range of the Northern spotted owl, Western Oregon, Western Washington, and Northwestern California). Specifically, the NWFP provides S&Gs for management of timber, roads, grazing, recreation, minerals, fire/fuels management, fish and wildlife management, general land management, riparian area management, watershed and habitat restoration, and research activities on USFS and BLM lands. To accomplish its goals, the NWFP defines seven land allocation categories, including “matrix lands,” areas where the majority of timber is to be taken, and Riparian Reserves and Key Watersheds, where distances from rivers are set within which many activities are restricted. The Aquatic Conservation Strategy (ACS) component of the plan specifically provides for fishery habitat, protection, and restoration. One of the most important substantive protective measures implemented through the Plan are riparian reserves. These are buffered strips of land that, depending on stream class and type of watershed, range from 300 feet on perennial streams to 50 feet on ephemeral streams.

PACFISH (INTERIM STRATEGIES FOR MANAGING ANADROMOUS FISH-PRODUCING WATERSHEDS) (1995)

The USFS and the BLM are developing an ecosystem-based, aquatic habitat and riparian-area management strategy (commonly referred to as "PACFISH") that addresses Federally-managed, anadromous fish watersheds in eastern Oregon, Washington, Idaho, and portions of California (areas outside the Northwest Forest Plan). The strategy is being developed in response to significant declines in naturally-reproducing salmonid stocks, including steelhead, and widespread degradation of anadromous fish habitat east of the Cascade mountain range. Like the Northwest Forest Plan, PACFISH is an attempt to provide a consistent approach for maintaining and restoring aquatic and riparian habitat conditions which, in turn, are expected to promote the sustained natural production of anadromous fish. Presently, an interim strategy has been instituted to halt degradation to

fish habitat and to ensure that future opportunities for habitat restoration are not foregone while comprehensive studies are completed for longer-term management strategies. Like the NWFP, PACFISH provides guidelines for timber, roads, grazing, recreation, minerals, fire/fuels management, lands, riparian area, watershed and habitat restoration, and fisheries and wildlife restoration. Standards and guidelines under PACFISH are nearly identical to those in the NWFP.

FEDERAL POWER ACT (16 U.S.C. § 800 1920, AS AMENDED)

The Federal Power Act (FPA) was promulgated to establish the Federal Energy Regulatory Commission (FERC) to oversee non-Federal hydropower generation. The FERC is an independent Federal agency governing approximately 2,500 licenses for non-Federal hydropower facilities, has responsibility for national energy regulatory issues.

This Act may provide protection to eulachon habitat from hydropower activities. Section 10(j) of the Federal Power Act (FPA) was promulgated to ensure that FERC considers both power and non-power resources during the licensing process. More specifically, section 18 of the FPA states that FERC shall require the construction, operation, and maintenance by a licensee at its own expense of a fishway if prescribed by the Secretaries of Interior (delegated to the Fish and Wildlife Service) and Commerce (NOAA).

FISH AND WILDLIFE COORDINATION ACT (16 U.S.C.§§ 661-666 1934, AS AMENDED)

This law provides that, whenever the waters or channels of a body of water are modified by a department or agency of the U.S. government, the department or agency must first consult with the U.S. Fish and Wildlife Service and with the head of the agency exercising administration over the wildlife resources of the State where modification will occur with a view to the conservation of wildlife resources.

The purpose of this Act is to ensure that fish and wildlife resources are equally considered with other resources during the planning of water resources development projects by authorizing FWS to provide assistance to Federal and State agencies in protecting game species and studying the effects of pollution on wildlife. This Act may offer protection to eulachon habitat by requiring consultation concerning the species with FWS for all instream activities with a Federal nexus.

RIVERS AND HARBORS ACT (33 USC §§ 401 ET SEQ. 1938)

The Rivers and Harbors Act (RHA) places Federal improvements of rivers, harbors and other waterways under the jurisdiction of the Department of the Army, USACE and requires that all improvements include due regard for wildlife conservation.

This Act may provide protection to the eulachon critical habitat related to in-stream construction activities. Under sections 9 and 10 of the RHA, the USACE is authorized to regulate the construction of any structure or work within navigable waterways. This includes, for example, bridges and docks.

NATIONAL ENVIRONMENTAL POLICY ACT (42 USC §§ 4321-4345 1969)

The National Environmental Policy Act (NEPA) requires that all Federal agencies conduct a detailed environmental impact statement (EIS) in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment.

The NEPA process may provide protection to the eulachon critical habitat for activities that have Federal involvement, if alternatives are considered and selected that are less harmful to eulachon critical habitat than other alternatives.

WILDERNESS ACT (16 USC §§ 1131-1136 1964)

The Wilderness Act established the National Wilderness Preservation System. With a few exceptions, no commercial enterprise or permanent road is allowed within a wilderness area. Temporary roads, motor vehicles, motorized equipment, landing of aircraft, structures and installations are only allowed for administration of the area. Measures may be taken to control fire, insects and disease. Prospecting for mineral or other resources, if carried on in a manner compatible with the preservation of wilderness, is allowed.

The Wilderness Act may offer protections to West Coast salmon and steelhead by limiting land disturbing activities in Wilderness Areas in National Forests. Human activity in wilderness areas is likely to be greatly reduced when compared to non-wilderness areas, which is likely to benefit eulachon and its habitat.

THE SIKES ACT IMPROVEMENTS ACT (16 USC §670 1997)

The Sikes Act Improvement Act (SAIA) requires military installations to prepare and implement an Integrated Natural Resources Management Plan (INRMP). The purpose of the INRMP is to provide for:

- The conservation and rehabilitation of natural resources on military installations;
- The sustainable multipurpose use of the resources, which shall include hunting, fishing, trapping, and nonconsumptive uses; and
- Subject to safety requirements and military security, public access to military installations to facilitate the use of the resources.

INRMPs developed in accordance with SAIA may provide protection to eulachon critical habitat on military lands.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) (CALIFORNIA NATURAL RESOURCES CODE §15065(A))

CEQA is a California State statute that requires State and local agencies (known as “lead agencies”) to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. Projects carried out by Federal agencies are not subject to CEQA provisions. CEQA instructs the lead agency (typically a county or city community development or planning department in the case of land development projects) to examine impacts from a broad perspective, taking into account the value of

species' habitats that may be impacted by the project in an Environmental Impact Report (EIR). The lead agency must determine which, if any, project impacts are potentially significant and, for any such impacts identified, whether feasible mitigation measures or feasible alternatives will reduce the impacts to a level less than significant. It is within the power of a lead agency to decide that negative impacts are acceptable in light of economic, social, or other benefits generated by the project.

FOR THE SAKE OF THE SALMON

This 1994 regional initiative by Federal, state, local, and tribal governments, and private and public organizations is intended to provide overall coordination and direction in protecting and restoring salmon throughout the Pacific Northwest. It is a proactive framework designed to identify solutions to salmon protection problems that are often beyond the scope of a single authority. It focuses on a four-part strategy which includes the following components:

- Identify and seek to modify public and private policies that contribute to the decline of the salmon and determine the means by which essential activities can be made less harmful to ecosystems;
- Take immediate steps to protect remaining healthy habitat;
- Improve the efficiency and cost effectiveness of government activities that protect and restore the health and productivity of salmon habitat; and,
- Encourage a conservation and stewardship ethic toward our natural environment in government, public, and private decision making.

MITCHELL ACT

The NMFS administers the Mitchell Act passed by Congress in 1938 (and amended in 1946) for the purpose of providing for the conservation of the fisheries resources of the Columbia River. The Columbia River Fisheries Development Program (CRFDP) was established to coordinate activities authorized under the Mitchell Act. As such, the CRFDP is a cooperative effort between NMFS, the FWS, and the fisheries agencies of Oregon, Washington, and Idaho. In addition to funding the operation and maintenance of artificial propagation facilities, the CRFDP funds activities relating to stream improvements, such as fishway development, irrigation diversion screening, and stream clearing. Under the CRFDP, over 850 screens have been constructed to prevent fish mortality at irrigation diversions. The majority of these are in the Salmon River basin in Idaho and on eastern Oregon Columbia River tributaries. The CRFDP currently provides the majority of funding for multi-agency, cooperative, accelerated programs of screen construction, rehabilitation, and replacement. The program's goal was to have all irrigation diversions which impact anadromous salmonids in the Columbia River basin screened by 2002.

THE KLAMATH ACT

On October 27, 1986, Congress passed the Klamath Act (PL 99-552), authorizing a 20-year-long Federal-State cooperative Klamath River Basin Conservation Area Restoration Program for rebuilding of river's fish resources. The Act created a 14-member Klamath River Basin Fisheries Task Force and directed the U.S. Secretary of Interior to cooperate with the Task Force in creating and implementing the Klamath River Basin Conservation Area Fishery Restoration Program. In 1991, the Task Force developed a Long Range Plan for the Klamath River Basin Conservation Area Restoration Program. The Plan is intended to give initial guidance to the Task Force in its long-range direction in accomplishing the restoration of Klamath basin anadromous fisheries which include: restore, by the year 2006, the biological productivity of the Klamath River basin in order to provide for viable commercial and recreational ocean fisheries and in-river tribal trusts and recreational fisheries; support for the Klamath Fishery Management Council in development of harvest regulation recommendations that would provide for viable fisheries and escapements; recommendations to Congress, state legislatures, and local governments on the actions each should take to protect the fish and their habitats in the basin; inform the public about the value of anadromous fish to the Klamath River region and gain their support for the Restoration Program; and promote cooperative relationships between lawful users of the basin's land and water resources and those who are primarily concerned with the implementation of the Restoration Plan and Program. The Task Force members are appointed by (and represent) the Governors of California and Oregon; the U.S. Secretaries of Interior, Commerce, and Agriculture; the California counties of Del Norte, Humboldt, Siskiyou and Trinity; Hoopa Valley, Karuk and Yurok tribal fishers and anglers and commercial fishers. The Act also created an 11-member Klamath Fishery Management Council to "establish a comprehensive long-term plan and policy... for the management of the in-river and ocean harvesting that affects or may affect Klamath and Trinity River basin anadromous salmon populations." The Council is composed of essentially the same interests as the Task Force, except that the four county representatives hold seats only on the Task Force.

SALMON, STEELHEAD TROUT, AND ANADROMOUS FISHERIES PROGRAM ACT (SENATE BILL 2261)

In 1988, the California State legislature passed the Salmon, Steelhead Trout, and Anadromous Fisheries Restoration Act (Chapter 1545/88/Senate Bill 2261), which established the long-term goal of doubling anadromous fish populations from their 1988 abundance levels by the end of the century. This Act precipitated several plans for restoring Central Valley anadromous fisheries populations and their habitat: the Central Valley Salmon and Steelhead Restoration and Enhancement Plan, and Restoring Central Valley Streams. In general, these planning documents have outlined efforts to restore chinook salmon populations. Restoration activities currently being implemented as a result of these plans and California Senate Bill 1086 (described below) include: a pilot pumping project to improve fish passage at Red Bluff Diversion Dam, installing water temperature control devices at Shasta dam and Whiskeytown reservoir, correcting fish

passage problems on several Sacramento River tributaries, and acquiring riparian woodland areas along Butte Creek and the Sacramento River.

As part of the Salmon, Steelhead Trout, and Anadromous Fisheries Program, the Steelhead Management and Restoration Project was also established in 1991. The CDFG has produced a draft plan which outlines management activities for the restoration and maintenance of California's steelhead populations. In the Central Valley, the CDFG's focus for steelhead restoration is on recovering wild populations and restoring hatchery-maintained runs. As an example, the draft plan outlines measures for the Sacramento River including correcting fish passage and screening problems, pollution from agricultural drainage and heavy metal pollution from the Iron Mountain Mine Superfund Site. Within the Sacramento River system, the plan recommends improved flows in the lower reaches by exchanging groundwater for surface flows. A monitoring program has also recently been established to assess adult steelhead numbers in Mill and Deer creeks. In addition, the CDFG plan recommends temperature and flow regimes for the Yuba River; adequate minimum flows, flow fluctuation standards, and water temperatures in the American River as well as storage levels in Folsom Reservoir. The CDFG has developed several other fishery management plans for Central Valley streams including: the Lower Yuba River fishery management plan, the Lower Mokelumne River Fisheries Management Plan, and the Steelhead Restoration Plan for the American River.

KEENE-NIELSEN FISHERIES RESTORATION ACT OF 1985

This Act states that California intends to make reasonable efforts to prevent further declines in fish and wildlife, restore fish and wildlife to historic levels where possible, and enhance fish and wildlife resources where possible. Just over $15 million were initially authorized in approved legislation, however, only $11.3 million were actually appropriated between 1985 and 1987. The Act was reworded through 1990 legislation to closely tie expenditures from this account to projects called for under the Salmon, Steelhead Trout, and Anadromous Fisheries Program Act of 1988. However, the legislation provided no funding to the Keene-Nielsen account, nor have the budgets of subsequent governors.

CAL TRANS ENVIRONMENTAL ENHANCEMENT AND MITIGATION PROGRAM

This program was established by the enactment of the Transportation Blueprint Legislation of 1989. This legislation provided for the annual allocation of $10 million that will be distributed through the California Resources Agency to FY 2000-2001. The program provides grants to local, state and Federal agencies and nonprofit entities to mitigate the environmental impact of modified or new public transportation facilities. Eligible projects for funding include the acquisition, restoration or enhancement of resource lands to mitigate the loss of, or the detriment to, resource lands lying within or near the right-of-way acquired for proposed transportation improvements. Resource lands include natural areas, wetlands, forests, woodlands, meadows, streams, or other areas containing fish or wildlife habitat.

CALIFORNIA WILD AND SCENIC RIVERS ACT

This Act declares that water is generally not available for appropriation by diversion from or storage in a designated Wild and Scenic River, unless approved by an initiative of the voters or a two-thirds vote of the California Legislature. Recently, Mill and Deer creeks (Sacramento River tributaries) have been proposed for inclusion in the State and National Wild and Scenic River Acts.

COLUMBIA RIVER FISH MANAGEMENT PLAN

In keeping with an existing court order, the states of Oregon and Washington must work with tribal and Federal authorities to rebuild weak runs and achieve fair sharing of the available salmon harvest between Native American and non-Native American fisheries. Major points of the plan include the commitment to rebuild upriver spring and summer chinook salmon runs to levels that would restore fisheries, management of harvests to insure that wild salmon runs continue to rebuild, and management of inriver and ocean fisheries to ensure fair sharing between Native American and non-Native American. The plan also provides for a flexible and dynamic management approach, as well as for the creation of a basin-wide Production Advisory Committee to coordinate joint development of subbasin plans that will address habitat protection, fish propagation, and harvest.

NORTHWEST POWER PLANNING COUNCIL - STRATEGY FOR SALMON

The Northwest Power Planning Council was established by Congress to develop a plan to protect and enhance the Columbia basin's fish and wildlife and a regional power plan that provides a reliable, low-cost electricity supply. The goal of the plan is to double salmon production in the Columbia River basin and to accomplish this with no appreciable risk to the biological diversity of fish populations. The plan calls for improved passage and screening at Columbia and Snake River dams, predator reductions in the Columbia and Snake Rivers, downstream barging of juvenile salmonids past Columbia River dams, improvement of harvest and hatchery practices to protect wild salmonids, and protection and restoration of fish habitat within the Columbia River basin. The plan also calls for the evaluation of adverse economic effects of salmon recovery and identification of sources of funds to mitigate the adverse effects.

OTHER STATUTES AND REGULATIONS THAT APPLY TO LAND USE ACTIVITIES

While the following statutes and regulations may apply to lands and waters that fall within eulachon habitat areas, they are unlikely to provide significant baseline protections and are not considered in the analysis.

- *Fish and Wildlife Conservation Act (16 USC §§ 2901-2911 1980, as amended)* – The FWCA encourages States to develop, revise and implement, in consultation with Federal, State, local and regional agencies, a plan for the conservation of fish and wildlife, particularly species indigenous to the State.
- *Fisheries Restoration and Irrigation Mitigation Act (16 USC § 777 2000)* - The FRIMA directs the Secretary of Interior, in consultation with the heads of other appropriate agencies, to develop and implement projects to mitigate impacts to

fisheries resulting from the construction and operation of water diversions by local government entities (including soil and water conservation districts) in the Pacific Ocean drainage area.

- *Water Resources Development Act (33 USC §§ 2201-2330 1986, as amended)* - WRDA authorizes the construction or study of USACE projects and outlines environmental assessment and mitigation requirements.
- *Anadromous Fish Conservation Act (16 USC §§ 757 et seq. 1965)* - The AFCA authorizes the Secretary of the Interior to enter into agreements with States and other non-Federal interests to conserve, develop and enhance the anadromous fish resources of the U.S.
- *Wild and Scenic Rivers Act (16 USC §§ 1271-1287 2001)* - WSRA authorizes the creation of the National Wilderness Preservation System and prohibits extractive activities on specific lands.
- *North American Wetland Conservation Act (16 USC § 4401 et seq. 1989)* - NAWCA encourages partnerships among public agencies and other interests to protect, enhance, restore and manage an appropriate distribution and diversity of wetland ecosystems and other habitats for migratory birds and other fish and wildlife.
- *Federal Land Policy and Management Act (43 USC §§ 1701-1782 1976)* – This Act requires the Bureau of Land Management to employ a land planning process that is based on multiple use and sustained yield principles.
- *Executive Order 11988 and 11990 (1977)* – These Executive Orders require, to the extent possible, prevention of long and short term adverse impacts associated with the occupancy and modification of floodplains and prevention of direct or indirect support of floodplain development wherever there is a practicable alternative.
- *Coastal Zone Management Act (16 USC §§ 1451 et seq. 1972)* - CZMA establishes an extensive Federal grant program to encourage coastal States to develop and implement coastal zone management programs to provide for protection of natural resources, including wetlands, flood plains, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat.
- *Action Plan for the Restoration of the South Fork Trinity River Watershed and its Fisheries.* This action plan was completed for the BOR and Trinity River Task Force in 1994. The plan describes the factors presently limiting anadromous fish restoration, reviews past research and monitoring activities, and lists actions necessary to restore the South Fork Trinity River basin and its anadromous fishes.
- *Trout and Steelhead Conservation and Management Planning Act of 1979*. This Act declares that it is a policy of the State of California to establish and maintain wild trout and steelhead stocks in suitable waters of the state and establishes

angling regulations designed to maintain wild trout and steelhead through natural production.

- *California Endangered Species Act (California Fish and Game Code §§ 2050, et seq.)* - The CESA parallels the main provisions of the Federal Endangered Species Act and is administered by the California Department of Fish and Game (DFG). CESA prohibits the "taking" (the California Fish and Game Code defines "take" as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill") of listed species except as otherwise provided in State law. The CESA also applies the take prohibitions to species petitioned for listing ("candidate species").
- *Z'berg-Nejedly Forest Practice Act of 1973 (Cal. Pub. Res. Code §§ 4511 - 4628)* - Also referred to as the California Forest Practice Act, this act regulates all timber harvesting in California on all non-federal land. CDF oversees enforcement of California's forest practice regulations. Under the Forest Practice Act, Timber Harvesting Plans (THPs) are submitted to CDF for commercial timber harvesting on all non-federal timberlands. The Act requires that all private forest land be replanted within five years and that a certain number of dead trees be left in harvest areas for birds and animals that need them.

APPENDIX C | SUPPLEMENTAL ADMINISTRATIVE COST INFORMATION

This appendix provides additional detail regarding the calculation of administrative costs by watershed and by activity. Specifically, it presents the estimated administrative costs by watershed and activity by consultation type (formal, informal, technical assistance). It also presents the total administrative costs by watershed and activity. Consultations classified as “implementation” and “conference” opinions are assumed to be formal for the purposes of this analysis.

EXHIBIT C-1. ANNUAL NUMBER OF FORECAST FORMAL SECTION 7 CONSULTATIONS BY WATERSHED AND ACTIVITY

HUC	AGRICULTURE	FOREST MGMT	IN STREAM WORK	MINING	TRANSPORTATION	RESTORATION	WATER QUALITY	WATER SUPPLY	DAMS	OTHER	TOTAL
1708000107	0.0	0.0	0.4	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.8
1708000108	0.1	0.0	0.3	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.5
1708000205	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.3	0.6
1708000206	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1708000301	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.3
1708000305	0.0	0.0	0.4	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.5
1708000307	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
1708000503	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1708000507	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
1708000508	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.3
1708000603	0.0	0.0	0.1	0.0	0.2	0.4	0.0	0.0	0.0	0.1	0.7
1708000605	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
1709001205	0.0	0.0	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.8
1710010205	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
1710020507	0.0	0.0	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.4
1710030304	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
1710030308	0.0	0.0	0.3	0.0	0.2	0.3	0.1	0.0	0.0	0.0	0.8
1711002005	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
1801010201	0.0	0.4	0.3	0.0	0.5	0.5	0.1	0.0	0.6	0.1	2.4
1801010204	0.0	0.0	1.0	1.2	0.2	0.0	0.0	0.2	0.0	0.2	2.8
1801020911	0.0	0.3	0.5	0.1	0.5	0.0	0.2	0.0	0.0	0.1	1.7
Total	**0.1**	**0.9**	**5.0**	**1.7**	**2.3**	**1.6**	**0.5**	**0.2**	**0.7**	**0.8**	**13.7**

EXHIBIT C-2. ANNUAL NUMBER OF FORECAST INFORMAL SECTION 7 CONSULTATIONS BY WATERSHED AND ACTIVITY

HUC	AGRICULTURE	FOREST MGMT	IN STREAM WORK	MINING	TRANSPORTATION	RESTORATION	WATER QUALITY	WATER SUPPLY	DAMS	OTHER	TOTAL
1708000107	0.05	0.05	0.50	0.00	0.25	0.00	0.05	0.00	0.00	0.00	0.90
1708000108	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
1708000205	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.10	0.00	0.10	0.80
1708000206	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
1708000301	0.10	0.00	0.30	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.50
1708000305	0.00	0.00	0.65	0.00	0.00	0.15	0.10	0.00	0.00	0.00	0.90
1708000307	0.00	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60
1708000503	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1708000507	0.00	0.00	0.30	0.00	0.40	0.00	0.10	0.00	0.00	0.00	0.80
1708000508	0.05	0.00	0.60	0.00	0.20	0.10	0.05	0.00	0.00	0.00	1.00
1708000603	0.10	0.00	0.60	0.00	0.40	0.30	0.00	0.00	0.00	0.00	1.40
1708000605	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
1709001205	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90
1710010205	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1710020507	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1710030304	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
1710030308	0.05	0.10	0.05	0.00	0.00	0.05	0.05	0.00	0.00	0.00	0.30
1711002005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1801010201	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1801010204	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1801020911	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.45**	**0.35**	**4.80**	**0.00**	**1.85**	**0.60**	**0.45**	**0.10**	**0.00**	**0.10**	**8.70**

EXHIBIT C-3. ANNUAL NUMBER OF FORECAST TECHNICAL ASSISTANCE SECTION 7 CONSULTATIONS BY WATERSHED AND ACTIVITY

HUC	AGRICULTURE	FOREST MGMT	IN STREAM WORK	MINING	TRANSPORTATION	RESTORATION	WATER QUALITY	WATER SUPPLY	DAMS	OTHER	TOTAL
1708000107	0.00	0.00	0.10	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.30
1708000108	0.00	0.03	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.10
1708000205	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10
1708000206	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1708000301	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1708000305	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1708000307	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1708000503	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1708000507	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1708000508	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
1708000603	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
1708000605	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1709001205	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
1710010205	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1710020507	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.20
1710030304	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1710030308	0.00	0.10	0.10	0.00	0.00	0.05	0.05	0.00	0.00	0.00	0.30
1711002005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1801010201	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1801010204	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1801020911	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.00**	**0.13**	**0.70**	**0.00**	**0.30**	**0.18**	**0.08**	**0.00**	**0.00**	**0.10**	**1.50**

EXHIBIT C-4. ANNUAL NUMBER OF FORECAST PROGRAMMATIC SECTION 7 CONSULTATIONS BY WATERSHED AND ACTIVITY

HUC	AGRICULTURE	FOREST MGMT	IN STREAM WORK	MINING	TRANSPORTATION	RESTORATION	WATER QUALITY	WATER SUPPLY	DAMS	OTHER	TOTAL
1708000107	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1708000108	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1708000205	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1708000206	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1708000301	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1708000305	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1708000307	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1708000503	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1708000507	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1708000508	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1708000603	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1708000605	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1709001205	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1710010205	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1710020507	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1710030304	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1710030308	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1711002005	0.08	0.30	0.16	0.01	0.14	0.13	0.01	0.01	0.00	0.01	0.84
1801010201	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1801010204	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1801020911	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**1.50**	**5.32**	**2.82**	**0.10**	**2.48**	**2.41**	**0.13**	**0.23**	**0.00**	**0.11**	**15.10**

EXHIBIT C-5. ESTIMATED ANNUALIZED ADMINISTRATIVE COSTS BY WATERSHED AND ACTIVITY (7 PERCENT DISCOUNT RATE)

HUC	AGRICULTURE	FOREST MGMT	IN STREAM WORK	MINING	TRANSPOR-TATION	RESTORATION	WATER QUALITY	WATER SUPPLY	DAMS	OTHER	TOTAL
1708000107	$1,170	$3,930	$2,910	$2,900	$5,680	$1,490	$91	$9,910	$0	$9	$28,100
1708000108	$1,800	$4,130	$1,390	$578	$2,450	$937	$222	$9,910	$0	$9	$21,400
1708000205	$1,080	$3,840	$1,050	$4,640	$7,290	$697	$12	$10,600	$0	$1,270	$30,500
1708000206	$1,260	$3,840	$816	$578	$1,980	$697	$12	$9,910	$0	$9	$19,100
1708000301	$1,260	$3,840	$1,780	$578	$1,980	$926	$171	$9,910	$0	$9	$20,400
1708000305	$1,080	$3,840	$2,710	$578	$1,980	$1,290	$171	$9,910	$0	$9	$21,600
1708000307	$1,080	$3,840	$2,280	$578	$2,290	$697	$117	$10,400	$0	$9	$21,300
1708000503	$1,080	$3,840	$816	$578	$1,980	$697	$12	$9,910	$0	$9	$18,900
1708000507	$1,320	$3,840	$1,620	$578	$5,210	$697	$171	$9,910	$0	$9	$23,400
1708000508	$1,170	$3,840	$2,650	$578	$4,370	$864	$91	$9,910	$0	$9	$23,500
1708000603	$1,260	$3,840	$2,430	$578	$6,300	$2,000	$12	$9,910	$0	$325	$26,600
1708000605	$1,080	$3,840	$1,610	$578	$1,980	$697	$12	$9,910	$0	$9	$19,700
1709001205	$1,080	$3,840	$4,820	$9,860	$1,980	$697	$12	$9,910	$0	$9	$32,200
1710010205	$1,080	$9,660	$816	$578	$1,980	$697	$12	$9,910	$0	$9	$24,700
1710020507	$1,080	$3,840	$1,010	$578	$4,950	$697	$117	$9,910	$0	$9	$22,200
1710030304	$1,080	$4,020	$1,210	$578	$1,980	$697	$12	$9,910	$0	$9	$19,500
1710030308	$1,170	$4,370	$1,930	$578	$3,690	$1,620	$328	$9,910	$0	$9	$23,600
1711002005	$1,080	$3,840	$816	$578	$1,980	$697	$12	$9,910	$1,480	$9	$20,400
1801010201	$0	$2,530	$687	$0	$4,660	$1,150	$316	$0	$8,150	$316	$17,800
1801010204	$0	$0	$2,290	$55,700	$1,860	$0	$0	$3,040	$0	$631	$63,500
1801020911	$0	$2,170	$1,150	$4,640	$4,660	$0	$631	$0	$0	$316	$13,600
Total	**$21,200**	**$80,700**	**$36,800**	**$86,400**	**$71,200**	**$17,900**	**$2,530**	**$183,000**	**$9,630**	**$3,010**	**$512,000**