Endangered Species Act - Section 7 Consultation Biological Opinion, Unlisted Species Analysis, Section 10(a)(2)(B) Findings

And

Magnuson-Stevens Fisheries Conservation and Management Act Essential Fish Habitat Consultation

For issuance of an Incidental Take Permit to the City of Kent for their Clark Springs Water Supply System Habitat Conservation Plan, Rock Creek, King County, Washington (Sixth Field Hydrologic Unit Code 171100120106 Rock Creek)

Lead Action Agency:	National Marine Fisheries Service
Consultation Conducted By:	National Marine Fisheries Service Northwest Region
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Issued by:	William W. Stelle, Jr. Regional Administrator
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LIST OF ABBREVIATIONS AND ACRONYMS

BMPs	Best Management Practices
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH	Critical Habitat
City	City of Kent, Washington
DQA	Data Quality Act
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
Findings	National Marine Fisheries Service Statement of Findings
FR	Federal Register
HCM	Habitat Conservation Measure
HCP	Habitat Conservation Plan
ITP	Incidental Take Permit
LWM	Large Woody Material
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
Opinion	Biological Opinion
PCE	Primary Constituent Element
PFMC	Pacific Fishery Management Council
ppm	parts per million
RM	River Mile
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VSP	Viable Salmonid Population
WDFW	Washington Department of Fish and Wildlife
WUA	Weighted Usable Area

1.0 INTRODUCTION

The City of Kent (City) has prepared a Habitat Conservation Plan (HCP) supporting its application for an Incidental Take Permit (ITP or Permit) under section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531, et. seq.). In addition, the underlying activities are likely to adversely affect Essential Fish Habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Therefore, NMFS has completed consultations under both the ESA and MSA, and this document contains the results of both consultations. In addition, this document reports NMFS' Statement of Findings (Findings) on each of the ITP issuance criteria stated in ESA section 10(a)(2)(B).

The consultations and Findings are based on NMFS' review of the draft and revised HCP and draft Environmental Impact Statement (EIS). The geographic HCP coverage area includes the geographic range of threatened Puget Sound (PS) Chinook salmon (*Oncorhynchus tshawytscha*) and threatened PS steelhead (*O. mykiss*). The covered area also contains Critical Habitat (CH) for PS Chinook salmon. Species not currently listed under the ESA, but which the City has requested inclusion in the ITP include chum salmon (*O. keta*), coho salmon (*O. kisutch*), and sockeye salmon (*O. nerka*).

1.1 Background

The City seeks ITPs from the National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service (USFWS) (together, the Services) covering possible incidental take of listed aquatic species. The USFWS consultation is completed under separate cover. The HCP contains provisions for presently unlisted aquatic species should they become listed in the future. The ITPs would cover the City for the next 50 years during operation and maintenance of its Clark Springs water supply system (Clark Springs System), located on Rock Creek, a tributary to the Cedar River. The Clark Springs System serves as the City's largest and primary water source. Issuing an ITP is a Federal action that triggers responsibility to comply with ESA section 7(a)(2).

1.2 Consultation History

The City submitted a formal application to NMFS and (USFWS) for ITPs on April 23, 2010 (FR 75, pages 21344 to 21345). The NMFS announced a 45-day public scoping period in the Federal Register on June 19, 2006 (71 FR 35286). The NMFS held a public scoping meeting on June 27, 2006, at the City of Kent City Hall to introduce the proposed HCP and the National Environmental Policy Act of 1969, as amended (NEPA) (42 U.S.C. sections 4321-4355) review process. The Services received comments during publication. The Services also conducted internal scoping activities to address key components of alternative descriptions, to develop the level of detail for impact and cumulative impact analyses, and to prepare the Draft EIS framework and schedule. The Draft EIS was prepared in consideration of issues raised during the public and internal scoping process. A draft EIS and draft HCP were published on April 23, 2010.

The Services and the City prepared a final EIS, Response to Comments, and a final HCP. These documents will be made available to the public for a 30-day period. After the close of the publication processes, the Services began their respective consultations under ESA section

7(a)(2). Although NMFS conducts intra-agency consultation on the issuance of an ITP, the consultation process included continuing cooperation between the Services and the City. A complete administrative record of the HCP development is on file in the Services' Lacey, Washington offices. NMFS initiated its ESA section 7 intra-agency consultation in October 2010, following a review of the public comments received on the draft documents.

1.3 Description of the Proposed Action

The NMFS proposes to issue an ITP to the City covering incidental take of the two species listed above. Covered activities would include actions involved in the operation and maintenance of facilities at the City's Clark Springs System. The HCP also includes the implementation of conservation measures to minimize and mitigate the effects of take and thereby support conservation of covered species. Issuing the ITP would extend coverage of certain presently unlisted species that are address in the HCP, should they become listed during the ITP term. The ITP would be in effect for 50 years.

The elements of the HCP described in detail in the HCP (City of Kent 2010) and EIS (USFWS and NMFS 2010). Those descriptions are incorporated here by reference and therefore only summarized in this document. The City would implement the HCP which minimizes and mitigates the effects of any anticipated incidental take of the covered species. The City would receive incidental take coverage for the ESA listed species immediately upon issuance of the ITP. For the unlisted species, the ITP coverage would become effective only upon future listing.

The City will continue to withdraw water from the aquifer in the Rock Creek watershed. The water withdrawal system, located adjacent to Rock Creek at river mile (RM) 1.94, includes an infiltration gallery (i.e., buried pipes that collect groundwater), surface water diversion, and wells. The City withdraws an average of 6.2 cfs (cubic feet per second) from the aquifer.

Other proposed ITP covered activities include:

- Operations, maintenance, and improvements to the water supply facilities located in the Clark Springs Watershed such as the buildings, wells, access roads, fences and security infrastructure, infiltration gallery, and water transmission main, except for portions within the ordinary high water boundaries of Rock Creek. The City will install and use all appropriate and applicable best management practices (BMPs) such as erosion and sedimentation control devices as appropriate.

- Vegetation management as needed by the City to maintain its facilities. This includes, but is not limited to, maintaining open areas, service roads, and clearing/trimming fence lines and power line/telephone line areas associated with the facilities. The City will not use chemical applications to manage vegetation. Vegetation management may also include relocation of LWM to protect the integrity of the water supply and infrastructure.

- Operation and maintenance of the Parshall Flume and USGS gauging station (No. 12118400). This includes cleaning the flume to remove algae, minor repairs, and repositioning of coarse substrate (primarily boulders and cobbles) or woody material upstream or downstream of the flume, if needed to maintain its structural integrity and accuracy to measure instream flows.

- Wildlife management within the Clark Springs Watershed for the purpose of protecting and enhancing the quality of the water supply (e.g. beaver trapping and beaver dam removal).

- Electrical, control, and telemetry operations, maintenance, improvements and replacement of equipment, conduit, cabling and related infrastructure to meet the needs of the water supply facilities within the Clark Springs Watershed. Portions of this infrastructure are buried at the facility. The City will use current erosion and sediment control BMPs as needed during implementation of this covered activity.

- The delivery and storage of chemicals, the chemical treatment processes and the operation, maintenance, replacement and improvement of equipment, conduit, piping and sampling infrastructure required to monitor and treat the City’s water supply. The site contains multiple spill kits, capable of containing both dry and liquid releases.

- The maintenance and replacement of storm water conveyance, control, and distribution facilities within the 320 acre Kent property boundaries at the Clark Springs facility.

- Installation of monitoring wells along the eastern boundary of the Clark Springs property to monitor groundwater quality. Wells and access roads will be located at least 50 feet from the ordinary high water mark and outside wetland boundaries.

- Habitat Conservation Measures (HCMs) including: (1) Rock Creek flow augmentation (includes augmentation system relocation and maintenance); (2) passage improvements at the mouth of Rock Creek; (3) off-channel habitat enhancement; (4) culvert replacement for improved fish passage at the Summit-Landsburg Road crossing; (5) large woody material (LWM) supplementation in Rock Creek; (6) a city-wide water conservation program; and (7) establishment of a riparian acquisition, easement, and enhancement fund in the Rock Creek Basin.

- Monitoring and evaluation measures to include: 1) flow monitoring in Rock Creek to document compliance with the flow augmentation HCM, 2) precipitation monitoring to allow refinements in determining water year types, 3) spawning surveys to document effectiveness of the passage improvements at the mouth of Rock Creek and track salmon escapement trends, 4) monitor the low flow weirs at the mouth of Rock Creek to document functionality, and 5) document if fish use the newly connected off-channel habitat.

1.4 Action Area

The action area is defined at 50 CFR 402 to mean "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area includes: (1) the 320 acres of land owned by the City and collectively called the Clark Springs Facility; (2) Rock Creek, Sixth Field Hydrologic Unit Code (HUC) 171100120106, from the upstream end of the City's Clark Springs Watershed property, downstream to the mouth of the creek (latitude 47°22'54" N and longitude 122°1'00" W); and (3) areas along Rock Creek where mitigation, monitoring, and restoration activities described in Chapter 4 of the proposed HCP would occur. The action area provides potential spawning, rearing, and migration habitat for PS steelhead and perhaps PS Chinook salmon. The action area is also EFH for Chinook and coho salmon.

2.0 ENDANGERED SPECIES ACT: SECTION 7 BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

Section 7(a)(2) of the ESA requires Federal agencies to consult with NMFS to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. The Biological Opinion (Opinion) that follows records the results of the interagency consultation for this proposed action. An incidental take statement is provided after the Opinion that specifies the impact of any taking of threatened or endangered species that was incidental to the action.

2.1 Introduction to the Biological Opinion

To complete the jeopardy analysis presented in this Opinion, NMFS reviewed the status of each listed species of Pacific salmon and steelhead[1] considered in this consultation (and the status of certain unlisted species that would be covered by the unlisted species provisions of the HCP), the effects of the environmental baseline in the action area, the effects of the action, and cumulative effects (50 CFR 402.14(g)). From this analysis, NMFS determined whether the effects of the action were likely, in view of existing risks, to appreciably reduce the likelihood of both the survival and recovery of the affected listed species.

For the critical habitat adverse modification analysis, NMFS considered the status of the entire designated area of the critical habitat considered in this consultation, the environmental baseline in the action area, the likely effects of the action on the function and conservation role of the affected critical habitat, and cumulative effects. The NMFS used this assessment to determine whether, with implementation of the proposed action, critical habitat would remain functional, or

[1] An "evolutionarily significant unit" (ESU) of Pacific salmon (Waples 1991) and a "distinct population segment" (DPS) (Policy Regarding the Recognition of District Vertebrate Population; 61 FR 4721, Feb 7, 1996) are both "species" as defined in Section 3 of the ESA.

retain the current ability for the primary constituent elements (PCEs) to become functionally established, to serve the intended conservation role for the species.[2]

2.2 Rangewide Status of the Species and Critical Habitat

To determine whether the proposed action will or will not jeopardize the continued existence of each affected species; NMFS considers the species' present prospects for long-term survival and the risks bearing on those prospects. Where the information is available, NMFS uses criteria that describe a 'Viable Salmonid Population' (VSP) (McElhany et al. 2000). Attributes associated with a VSP include levels of abundance, productivity, spatial structure, and genetic diversity that maintain the species' capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment. These attributes are influenced by survival, behavior, and experiences throughout the entire life cycle, characteristics that are influenced by habitat and other environmental conditions.

While climate change has the potential to restrict the distribution or productivity of salmonids in some Puget Sound watersheds, water temperatures and amounts in Rock Creek would not be influenced by altered snowpacks and this general issue is not material to covered species in this HCP. More than 60 years of hydrologic information for the upper Cedar River watershed analyzed by the City of Seattle, in addition to review of relevant models of potential climate change, supports the City's conclusion that about the same amount of total precipitation can be expected to the Cedar River watershed, with less snow and more rain. Because the Rock Creek sub-basin is entirely within the rain-dominated elevation zone, there is no expected change in patterns of rainfall that drive the local hydrology over the next 50 years.

<u>Puget Sound Chinook Salmon</u>

The PS Chinook salmon ESU includes all naturally spawned populations of Chinook salmon from rivers and streams flowing into Puget Sound including the Straits of Juan De Fuca from the Elwha River, eastward, including rivers and streams flowing into Hood Canal, South Sound, North Sound and the Strait of Georgia in Washington (March 24, 1999, 64 FR 14208). Based on available information from 2002, the PS Chinook salmon ESU was defined as 22 purported populations (Ruckelshaus et al. 2006). Recent analyses of the history of Chinook salmon in several watersheds have revealed a more complex picture. Streams with extant stocks of spawning Chinook salmon in north Lake Washington and Mid-Hood Canal were likely founded with hatchery strays and those streams likely did not have self-sustaining Chinook salmon before hatcheries. This refined understanding of the ESU's population structure does not appreciably change the following summary of the ESU condition.

Eight of 26 existing artificial propagation programs are directed at conserving PS Chinook salmon. The remaining programs considered to be part of the ESU are operated primarily for fisheries harvest augmentation purposes (some of which also function as research programs) using transplanted within-ESU-origin Chinook salmon as brood stock. The NMFS determined

[2] Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (November 7, 2005) (Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act).

that these artificially propagated stocks are no more divergent relative to the local natural population(s) than what would be expected between closely related natural populations within the ESU (NMFS 2005).

Although some of the PS Chinook salmon populations have shown substantial progress in recent years, none of the 22 populations are presently close to meeting the minimum value of the viable planning range for abundance and productivity, all are considered to be at high risk, and the condition of all of the populations needs to improve (NMFS 2006).

Abundance. Overall abundance of Chinook salmon in this ESU has declined substantially from historical levels of approximately 690,000 spawners in the early 1900s. The long- and short-term escapement trends for natural Chinook salmon runs in North Puget Sound were predominately negative through the mid-1990s. Escapement trends are now predominantly positive (1990-2007). In South Puget Sound and Hood Canal, escapement trends have been predominantly stable. However, the contribution of hatchery fish to natural escapements in many of the populations, particularly in the latter regions, may be substantial, potentially masking trends in natural-origin production (NMFS 2010). Since listing, the geometric mean (1999–2009) of natural spawners in populations of Puget Sound Chinook salmon ranges from 150 (Mid-Hood Canal population) to just over 10,000 fish (Upper Skagit River population). Just over half of the 22 populations contain natural spawners numbering over 1,000 fish (median recent natural escapement = 1,254 fish); however, only two of those are thought to have a consistently low fraction of hatchery fish. Twenty-one of the 22 Puget Sound Chinook populations exhibit stable or increasing trends in abundance (NMFS 2010). Based on the geometric mean number of natural spawners from 1999 to 2007, the PS Chinook salmon ESU consisted of 42,424 fish (NMFS 2008).

Productivity. Eleven populations exhibit a stable or increasing growth rate in return (i.e., recruits/spawners) and 19 populations exhibit a stable or increasing growth rate in escapement (i.e., spawners/spawners). Growth rates in return show substantial declining trends for the South Fork Nooksack, South Fork Stillaguamish, Puyallup, Nisqually, and Skokomish populations. The White River population shows a significant increasing trend in growth rates for both return and escapement. Growth rates for both return and escapement are declining for the South Fork Stillaguamish, Sammamish, and Puyallup populations (NMFS 2010).

Spatial Structure. The spatial structure of a population refers both to the spatial distributions of individuals in the population and the processes that generate that distribution. A population's spatial structure depends fundamentally on habitat quality and spatial configuration, and the dynamics and dispersal characteristics of individuals in the population (McElhany et al. 2000). Over the ESU, populations in the 14 natal watersheds are a mix of natural-origin and out-of-watershed origins unchanged since about the middle of the last century.

Diversity. Good et al. (2005), based on 2002 data, found that Puget Sound ESU diversity had not changed since the last status assessment in about 1995. Some of the PS Chinook salmon stocks now believed extirpated were early-run (spring) populations (Ruckelshaus et al. 2006). The loss of spring Chinook salmon stocks in Puget Sound represents an important loss of part of the evolutionary legacy of the historical ESU (Good et al. 2005).

Factors Affecting Puget Sound Chinook Salmon Status. Early logging practices removed old-growth riparian forests, reducing stream shade, protective cover and food resources. Dams, culverts and other barriers have eliminated access to important spawning and rearing habitat. Dikes, fill, and structures in riparian zones, flood plains and estuaries have also eliminated habitat, or impaired watershed processes that create habitat. Urbanization has caused additional habitat degradation. Streams in heavily urbanized areas have lost much of their complexity and riparian vegetation, for example due to channelization and streambank armoring. Water infiltration is reduced due to an increase in impervious surface area, resulting in flashier hydrographs, and delivery of pollutants (e.g. heavy metals, petroleum products) to the streams and estuaries. Wastewater treatment plants contribute additional metals and contaminants such as ammonia, chloride, aluminum, boron, iron, manganese, oil and grease, PCBs and other toxic substances. Estuaries and other intertidal habitats have been highly degraded or lost completely due to fill, dredging, diking, and shoreline armoring.

Puget Sound Steelhead

The PS steelhead DPS includes all naturally spawned anadromous *O. mykiss* populations, from streams in the river basins of the Strait of Juan de Fuca, Puget Sound, and Hood Canal, Washington, bounded to the west by the Elwha River (inclusive) and to the north by the Nooksack River and Dakota Creek (inclusive). The DPS also includes the Green River natural and Hamma Hamma winter-run steelhead hatchery stocks (72 FR 26722; May 11, 2007). Independent populations of PS steelhead have not been determined. The NMFS compiled the following summary based on information from the most recent PS steelhead status review (Hard et al. 2007), unless otherwise noted.

Abundance. The risk of declining steelhead abundance to viability of the Puget Sound steelhead DPS is high. Based on incomplete commercial harvest records from 1889 to 1920, the peak PS steelhead harvest was estimated at 163,796 fish in 1895. Using a harvest rate range of 30-50 percent, the estimated peak run size during this period ranged from 327,592 and 545,987 fish. By the early 1920's the commercial harvest was generally less than 10,000 fish. Beginning in 1932, the commercial catch of steelhead was prohibited (Crawford 1979). Total steelhead run size (catch and escapement) for Puget Sound in the early 1980s was calculated from estimates in Light (1987) to be approximately 100,000 winter-run and 20,000 summer-run fish, including an unknown proportion of hatchery fish. In the 1990s, the total run size for major stocks in this DPS was greater than 45,000, with the total natural escapement about 22,000. Busby et al. (1996) estimated 5-year average natural escapements for streams with adequate data range from less than 100 to 7,200, with corresponding total run sizes of 550–19,800.

The PS steelhead DPS is composed primarily of winter-run populations but also includes summer-run life-history types. No abundance estimates exist for most summer-run populations, but all appear to be small, most averaging less than 200 spawners annually. Winter-run steelhead in the Skagit and Snohomish rivers support the two largest populations in the DPS. These streams average approximately 5,000 (Skagit) and 3,000 (Snohomish) total adult spawners annually. The geometric means of most populations have declined in the last five years; recent means for many populations are 50-80 percent of the corresponding long-term means. Exceptions to this trend include winter run populations in the Samish River (northern Puget Sound) and the Hamma Hamma River (Hood Canal), both of which appear to be growing rapidly. Trends over the most recent decade were also strongly negative for several populations, especially in southern Puget Sound (Green, Lake Washington, Nisqually, and Puyallup winter run), Hood Canal (Skokomish winter run), and along the Strait of Juan de Fuca (Dungeness winter run).

When evaluating trends in abundance, total run size to the river (catch and escapement) was also measured as this trend better reflects changes in productivity. Run sizes of naturally produced steelhead generally show less consistent temporal trends than escapement of naturally produced steelhead because of management for numerical escapement goals for steelhead in the DPS. Nevertheless, marked declines in natural run size are evident in all areas of the DPS, a pattern that reflects widespread reduced productivity of natural steelhead. Declines over the entire series are observed in northern Puget Sound (Stillaguamish winter run), southern Puget Sound (Cedar, Lake Washington, and Puyallup winter run), Hood Canal (Skokomish winter run), and along the Strait of Juan de Fuca (McDonald winter run).

Productivity. Declining steelhead productivity poses high risk to DPS viability. Estimates of lambda were less than one for nearly all populations in the DPS, indicating declining population growth. When analyses were restricted to those populations for which natural production data could be used to compute population growth rates, the Snohomish and Puyallup winter-run populations show evidence of significantly declining growth rates. Thus, there is evidence for declining population growth in large winter-run populations in the major production areas of northern and southern Puget Sound.

Spatial Structure. Spatial structure of steelhead in the DPS poses moderate risk to its viability. The DPS is likely to be at elevated risk due to reduced complexity of spatial structure of its steelhead populations and, consequently, diminishing connectivity among them. Declines in natural abundance for most populations, coupled with large numbers of anthropogenic barriers such as impassable culverts reduce opportunities for movement and migration between steelhead aggregations in different watersheds. The reduction in escapement of natural steelhead to the centrally located Lake Washington watershed in recent years is also of concern, especially due to weakening trends in abundance for neighboring populations.

Diversity. Current steelhead diversity in the DPS poses moderate risk to DPS viability. Populations of summer run steelhead occur throughout the Puget Sound DPS but are concentrated in northern Puget Sound area, are generally small, and are characterized as isolated populations adapted to streams with distinct attributes. Genetic distances between wild steelhead collections taken approximately twenty years apart and the Washington Department of Fish and Wildlife (WDFW) Chambers Creek winter run hatchery strain generally indicate that steelhead have not become increasingly homogenized towards the hatchery strain, at least in northern Puget Sound and the Washington Pacific Coastal Rivers (Phelps et al. 1997). An exception includes populations from the Strait of Juan de Fuca. Hatchery fish are not part of the PS steelhead DPS.

High harvest rates before the mid-1990s may have removed a substantial proportion of wild summer run and early-returning wild winter run fish from many of these systems. Present day high harvest rates for marked hatchery origin fish are likely to result in continued mortality of early returning naturally spawning steelhead through poaching and hook-and-release mortalities.

Factors Affecting Puget Sound Steelhead Status. Although information on genetic and ecological interactions between natural and hatchery origin steelhead within specific Puget Sound populations is largely unavailable, studies conducted elsewhere (e.g., Kalama River, lower Columbia River, Forks Creek, and Willapa River) indicate hatchery impacts can be substantial. The effects of hatcheries are important even when mean individual performance of hatchery origin fish is poor, because of the large numbers of returning hatchery origin adults that significantly outnumber natural origin adults. Similarly, despite the divergence in run and spawn times between hatchery origin and natural origin winter run steelhead, the potential for interbreeding effects is still considerable given the large number of returning hatchery fish and the small number of natural origin fish. At present, the major threat from hatcheries to PS steelhead comes from past and present hatchery practices involving hatchery stocks that were either founded outside the DPS or have undergone extensive hatchery domestication.

Habitat use by steelhead has been most affected by reductions in habitat quality and by fragmentation. Dams in several Puget Sound basins have eliminated access to steelhead habitat. Dams also affect habitat quality through changes in river hydrology, temperature profile, downstream gravel recruitment, and the movement of LWM. Urbanization has resulted in large areas of impervious surface (e.g. buildings, roads, parking lots). Wetland and riparian habitat loss has changed the hydrology of many urban streams, with increases in flood frequency and peak flow during storm events and decreases in groundwater-driven summer flows. River braiding and sinuosity have been reduced through the construction of dikes, hardening of banks with riprap, and channelization. River constriction by dikes, especially during high flow events, increases likelihood of gravel scour and dislocation of rearing juveniles. The continued destruction of steelhead habitat is considered the principal factor limiting the viability of PS steelhead into the foreseeable future (71 FR 15673; March 29, 2006).

Puget Sound/Strait of Georgia Coho Salmon

Currently this ESU is not listed as threatened or endangered under the ESA, but is considered a species of concern (69 FR 19975). Upon reevaluation, NMFS may reconsider and propose to list the Puget Sound/Strait of Georgia population as threatened or endangered in the future (60 FR 38011). Continued loss of habitat, high harvest rates, and a recent decline in average spawner size are considered substantial threats to remaining native coho salmon populations in this ESU. Therefore, although not presently listed under the ESA, this ESU is subject to the same factors affecting the status of both Puget Sound Chinook salmon, and steelhead.

Puget Sound/Strait of Georgia Fall-run Chum Salmon

The Lake Washington Watershed is in the Puget Sound/Strait of Georgia fall chum salmon ESU. Commercial harvest of chum salmon has been increasing since the early 1970s throughout the ESU. This increased harvest, coupled with generally increasing trends in spawning escapement, provides evidence that chum salmon are abundant and have been increasing in abundance in recent years within the ESU (Johnson et al. 1997). The NMFS concluded that this ESU is not presently at risk of extinction, and is not likely to become endangered in the near future (63 FR 11778). Risk factors include estuarine or nearshore marine habitat loss, oceanic and climatic changes, and decreased genetic integrity due to hatchery influences (Johnson et al. 1997). Although not presently listed under the ESA, this ESU is subject to the same factors affecting the status of both Puget Sound Chinook salmon, and steelhead.

Sockeye Salmon

Investigators are uncertain whether anadromous sockeye salmon were present historically in the Lake Washington/Lake Sammamish Basin. Presently, the largest population of sockeye salmon in the conterminous U.S. spawns along Lake Washington shores and in the Cedar River, the main tributary of Lake Washington. Cedar River sockeye salmon are believed to be derived from a stock perpetuated at the U.S. Bureau of Fisheries Birdsview Hatchery on Grandy Creek in the Skagit River Basin. Over the years between 1914 and 1945, the parent stock for this hatchery program was overwhelmingly Baker Lake sockeye salmon (Gustafson et al. 1997). Because NMFS considers the Cedar River population non-native, it is not currently included in a recognized ESU. The NMFS also determined that the Baker River ESU is not threatened or endangered at this time (64 FR 14528). Changing climate patterns and ocean conditions, decreased genetic integrity due to hatchery influences, disease prevalence, predation, and changes in life history characteristics such as spawning age or size are all potential risk factors for sockeye salmon (Gustafson et al. 1997). Therefore, although not presently listed under the ESA, this ESU is subject to the same factors affecting the status of both Puget Sound Chinook salmon, and steelhead.

Status of Critical Habitat

The NMFS reviews the status of designated critical habitat (CH) affected by the proposed action by examining the condition and trends of Primary Constituent Elements (PCEs) throughout the action area. The PCEs are sites with physical and biological features essential to the conservation of the listed species. These features include sites essential to support one or more life stages of the listed fish (sites for spawning, rearing, migration and foraging). The NMFS has designated CH for PS Chinook salmon, but not PS Steelhead.

Critical habitat designated for PS Chinook salmon includes the major Puget Sound Basin tributaries, including the Cedar River and lower Rock Creek.

The PCEs of PS Chinook salmon critical habitat are:

> PCE 1 - Freshwater spawning sites with water quantity and quality conditions and substrate that support spawning, incubation, and larval development;
>
> PCE 2 - Freshwater rearing sites with (1) water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility, (2) water quality and forage that support juvenile development, and (3) natural cover such as shade, submerged and overhanging large wood, logjams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks;

PCE 3 - Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks that support juvenile and adult mobility and survival;

PCE 4 - Estuarine areas free of obstruction and excessive predation with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation;

PCE 5 - Nearshore marine areas free of obstruction and excessive predation with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and

PCE 6 - Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

As part of the critical habitat designation process for the ESU, a NMFS Critical Habitat Analytical Review Team (CHART)[3] assessed the conservation value of habitat within freshwater, estuarine, and nearshore areas at the fifth field hydrologic unit code (HUC), generally corresponding to the watershed scale[4]. Of the 61 HUCs evaluated within the ESU, twelve received a low rating, nine received a medium rating, and 40 rated a "high" conservation value. In addition, all nineteen marine water areas (encompassing 2,376 miles) also received a rating of high conservation value. Rankings were based on a variety of factors and do not necessarily indicate that PCEs are in optimal or good condition (NOAA Fisheries 2005).

The PCEs of CH throughout the Puget Sound basin have been degraded by numerous activities, including hydropower development (disrupting water quantity), loss of mature riparian forests (degrading natural cover), increased sediment inputs (impairing water quality), removal of LWM (eliminating rearing areas), intense urbanization (altering water quality and quantity), agriculture (eliminating riparian vegetation and impairing water quality), alteration of floodplain and stream

[3] The CHARTs were organized by geographic domains roughly corresponding to recovery planning domains within the ESU. The CHARTs were led by NOAA Fisheries biologists, but included experts from other Federal and state agencies and Tribes, The CHARTs explored a variety of data sources and used their best professional judgment to (1) verify the presence of PCEs within each occupied area, (2) verify the existence of activities that may affect the PCEs, and (3) rate the conservation value of watersheds, riverine corridors, and estuarine and nearshore marine areas and determine if any unoccupied areas may be essential to conservation (NOAA Fisheries 2005).

[4] In the Advance Notice of Proposed Rulemaking (68 FR 55926, September 29, 2003) we describe the conservation value of a site as depending on "(1) the importance of the populations associated with a site to the ESU conservation, and (2) the contribution of that site to the conservation of the population either through demonstrated or potential productivity of the area (emphasis added)." "The consideration involves population characteristics and is relevant because some populations have a higher conservation value to the ESU than others. Thus a HUC5 that received a medium score might nevertheless be rated high if it supports a unique or significant population within the ESU." (NOAA Fisheries 2005).

morphology (e. g. channel modification, dikes and levees, resulting in reduced rearing habitat), wetland draining and conversion, dredging, armoring of shorelines (reducing forage and rearing), marina and port development (impairing migration and forage), road and railroad construction and maintenance, timber harvest (degrading water quality), and mining. Changes in habitat quantity, availability, diversity, stream flow, temperature, sediment load, and channel instability are common limiting factors throughout the geographic designation of CH.

The degradation of multiple PCEs throughout CH of PS Chinook salmon indicates that the conservation potential of the CH is not being reached, even in areas where the conservation value of habitat is ranked high.

2.3 Environmental Baseline

The environmental baseline includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02). The NMFS identifies the habitat conditions in the action area, and the effect of these conditions on the listed species that use the action area.

Extensive discussions of the environmental conditions in the Rock Creek basin are given in the final EIS (USFWS and NMFS 2010), and in the HCP (City of Kent 2010). The following environmental baseline material is summarized from those sources.

<u>Environmental Conditions in the Action Area</u>

The Rock Creek basin is approximately 15.7 square miles, with perennial flow beginning just upstream (east) of the Clark Springs watershed property near RM 2.8. The Rock Creek basin is low elevation within the foothills of the Cascade Mountains. Land use within the Rock Creek basin is 45 to 72 percent forested, which is an important factor contributing to its high watershed quality. The watershed also includes grass, pasture, and wetlands. Only about 3 percent of the land cover was considered impervious surface in 1999. The lower 2.6 miles of Rock Creek includes the City's Clark Springs Property and the Rock Creek Natural Area, owned by King County.

Groundwater and surface runoff from mostly rain are the major sources of water to Rock Creek. Much of the upper portion of the watershed lies on glacial outwash soils, with high infiltration into the groundwater. The rainfall pattern and topography interact to determine a runoff pattern that results in wet winters and dry summers. The seasonality of rainfall combined with the time required to recharge the groundwater aquifer following the dry season results in Rock Creek having most of its discharge in the winter and spring months.

Rock Creek flows are highest from late November through March, decline gradually through the spring and summer, and are lowest from mid-September to early November. Prior to 1966, a period when withdrawals at Clark Springs were 0.0 to 0.5 cfs the mean annual seven-day low flow was 4.7 cfs (median 4.5 cfs), and ranged from 1.5 to 6.7 cfs. The mean annual seven-day low flow was 1.6 cfs from 2001 through 2009. A Parshall flume, located just downstream of the Clark Springs facilities and just upstream of Kent-Kangley Road, allows the City to monitor Rock Creek flows. This is also the location of United States Geological Survey (USGS) stream gauging station number 12118400. This will be the compliance point for flow measurements pertaining to this HCP.

While Rock Creek is tributary to Cedar River, and is accessible to fishes from the Cedar River, available fish habitats in Rock Creek are about an order of magnitude less than in the Cedar River. For example, late summer flows for spawning salmonids in Rock Creek are roughly 3 to 7 cfs, while Cedar River flows are 80 to 330 cfs. Much more fish use information is available for the Cedar River than Rock Creek so timing of various life stages in Rock Creek is presumed from Cedar River information.

The City has been withdrawing water from the Clark Springs watershed since 1957. The City is permitted to withdraw up to 12 cfs within the requirements of its existing water rights authorized by Washington State. However, the City typically withdraws between 4.9 and 7.6 cfs, with an average of 6.2 cfs (data from 1986 to 1997). The City's water rights are also expressed as annual acre-feet; the City can withdraw a maximum of 4,950 acre-feet per year (equivalent to 6.8 cfs) under its infiltration gallery and surface water rights. On an annual basis, the City normally withdraws close to the 4,950 acre-feet per year limit of these two water rights with gravity flow, i.e., without pumping from wells.

When the wells are not used, which is most of the year, no minimum flow applies. When the City uses the well pumps, their water rights require a minimum instream flow of 15 cfs between November 1 to April 30 and a minimum instream flow of 2 cfs between July 1 and October 31. Between May 1 and June 30, minimum instream flows would decline arithmetically between 15 cfs and 2 cfs when the well pumps are in use. The maximum withdrawal capacity in the transmission main under gravity flow is 8.2 cfs. During the baseline period, this capacity has usually been reduced to between 4.9 to 6.2 cfs because of seasonal reduction in groundwater head at Clark Springs from declines in the water table as the summer progresses.

To meet instream flows during well use and provide augmented flows for salmonid spawning, in 1997, the City installed a streamflow augmentation system. Depending on the aquifer levels, this can supply up to approximately 2.0 cfs of water to be discharged into Rock Creek during low flow periods when HCP-covered salmonid species are spawning, i.e., about September to December. The augmentation system operates by pumping water from the downstream end of the infiltration gallery, from which it is discharged to Rock Creek after aeration. The water available for discharge is subject to hydrologic conditions affecting the infiltration gallery. In addition to meeting instream flow requirements, this system has been operated periodically on a voluntary basis, especially when streamflows have fallen below 3 cfs during October, November, and December salmonid spawning periods. Augmentation reduces the instantaneous amount of water available for the water supply by the amount pumped.

Several other entities withdraw groundwater from the Rock Creek basin including the Covington Water District's Ravensdale well (approximately 0.08 cfs in 2001), and privately operated water supply systems (total capacity of 9.4 cfs, but information on actual water usage is lacking). Other water rights that are all or partly within the Rock Creek basin total 1,230 acre-feet per year (equivalent to 1.7 cfs). A large but unknown number of wells also provide water to individual landowners that are exempt from water rights.

The potential for water withdrawals to affect streamflow in Rock Creek depends on the time of year, amount of withdrawals, and the overall flow of groundwater through the aquifer. It also depends on the spatial variability of the creek bed elevation and the elevation of the aquifer's water table, both upstream and downstream of Clark Springs. The relationship between groundwater levels, surface flow in Rock Creek, and the Clark Springs System operations is complex and is discussed in detail in the EIS and HCP Appendices C, D, and G.

In the Summer of 2004, maximum daily water temperatures in Rock Creek were less than 62° F. The highest 7-day average daily maximum temperature was 59º F (July 27) near the confluence with the Cedar River. Water temperatures tended to increase moving downstream and are influenced by groundwater; the maximum temperature recorded at Kent-Kangley road was 55.2° F, while the maximum temperature recorded in Rock Creek near the confluence was 60.8° F. Dissolved oxygen data are limited for Rock Creek, but measurements taken on a weekly basis from February 4 through August 2, 2005 indicated that levels are at or close to saturation values and healthy for fish.

Turbidity was measured approximately monthly between June 1997 and December 2001 from Rock Creek within the Clark Springs watershed. The highest turbidity level documented was very low, indicating naturally clear water. Monthly pH measurements taken from June 1997 to August 2002 within the Clark Springs watershed were in the acceptable range that supports fish (Spence et al. 1996).

The Landsburg Mine, a coalmine that operated from 1959 to 1975, is located within the Rock Creek basin just upstream of the Clark Springs watershed. The collapsed trench of the mine was used to illegally dispose of 4,500 55-gallon drums and approximately 200,000 gallons of oily sludge from 1969-1978. Wastes disposed of in the trench included, but were not limited to paint, solvents, heavy metals, oily water and sludges. The mine is the highest potential contaminant source of ground water in the Clark Springs System. Monitoring at the Clark Springs facility for metals and toxics from 1997 through 2002, documented no exceedances of the maximum contaminant levels for drinking water.

Species Status in the Action Area

Chinook, coho, and sockeye salmon, and steelhead have been documented in Rock Creek. Chinook salmon potentially using Rock Creek are part of the Cedar River population. The population of PS Chinook salmon present in the Cedar River has a summer/fall ocean type life history pattern (WDF et al. 1994). Adult Chinook salmon typically enter the Cedar River in September, and most fish have been observed spawning in October and November, with a peak during early- to mid-October (USFWS and NMFS 2010 p.3-35). Cedar River drainage redd counts ranged from 53 to 853 from 1999 through 2009 (Burton et al. 2010). The majority of Cedar River Chinook salmon use mainstem habitats for spawning with a small proportion using tributaries (Burton et al. 2010). Chinook salmon fry in the Cedar River typically begin emergence from the gravel as soon as late January, and have generally completed emigration by early June.

The Cedar River tributaries, including Rock Creek, are believed to have played a relatively small role in the spatial distribution and overall abundance of the Cedar River Chinook salmon population (Shared Strategy 2007). The extent of historic use of Rock Creek by Chinook salmon is uncertain, but likely was minimal because this stream is much smaller than streams typically used by spawning Chinook salmon (Ruckelshaus et al. 2006). No redds were found during Chinook salmon redd surveys in Rock Creek from 2000-2009 (Burton et al. 2010). Six adult Chinook salmon (including live fish and carcasses) were observed in the lower reaches of Rock Creek from 2001 through 2004 (USFWS and NMFS 2010, p. 3-38).

In the Lake Washington system, only one steelhead stock has been identified, which is a winter-run stock. Winter steelhead return to the Lake Washington drainage from mid-December to mid-May and spawn generally from early March to mid-June. Stream-rearing occurs for 2 to 3 years before smoltification and emigration to the ocean.

The Cedar River may be the only stream that is contributing natural steelhead production to the Lake Washington basin. The WDFW considers the Cedar River steelhead population as critically depressed because of very low abundance of returning adult fish. In addition to the hydrological alterations associated with rerouting the Cedar River into Lake Washington in the early 1900s, there are a number of factors that potentially influence Cedar River steelhead survival. These factors include: sea lion predation at the Hiram Chittenden Locks; stream habitat degradation from land and water management practices; predation by native and non-native species in the basin; injury to smolts while emigrating through the Ballard Locks; excessive recreational harvest and poaching; and droughts, floods, and unfavorable ocean conditions (City of Seattle 2000). Burton (2010) stated that possible shifts from anadromous to freshwater life history patterns could be another potential factor.

The relative influence of these factors is difficult to measure (Burton 2010). The City of Seattle (2000) concluded that one of the major factors that contributed to the decline of steelhead in the Cedar River was predation from sea lions at the Ballard Locks. The precipitous decline experienced during the 1990s coincided with the arrival of sea lions at the locks in the 1980s which preyed on adult steelhead migrating through the locks.

Although habitat in the Cedar River below Landsburg Dam has been modified by channel confinement, increased impervious surfaces, commercial and agricultural development and a lack of riparian forest cover and large woody debris, it is still considered to provide some of the best steelhead habitat remaining in the basin (City of Seattle 2000). Through the Cedar River HCP, the City of Seattle has implemented several conservation measures that will improve stream habitat conditions for steelhead (City of Seattle 2000). One measure has been to provide fish passage to 17 miles of habitat (including tributaries) upstream of the Landsburg Dam that was inaccessible from 1901 to 2003. Expected flows under the Cedar River HCP regime provide more weighted usable area (WUA; an index of the amount of suitable habitat) for steelhead spawning and rearing than would occur under natural conditions without the presence of water storage and diversion facilities (City of Seattle 2000). In addition, water quality is excellent in the Cedar River, and the City of Seattle is committed to protecting and improving water quality in the basin (City of Seattle 2000). Therefore, habitat quantity and quality do not seem to be limiting factors to the Cedar River steelhead population.

Steelhead were historically present in Rock Creek, but the current level of use is uncertain because so few adult fish are in the Cedar River watershed. No spring spawning surveys have been conducted in Rock Creek. Steelhead habitat is very limited in Rock Creek. The City of Kent (2010) estimates there is about 7,000 square feet of spawning habitat in April, but only 715 square feet of rearing habitat in October. In comparison, the mainstem Cedar River has 21.8 miles of habitat downstream of the Landsburg Diversion Dam, and about 12 miles above Landsburg Dam. The anadromous fish zone in the Cedar River is considered to provide some of the best salmonid habitat remaining in the Lake Washington basin (City of Seattle 2000).

Rock Creek coho salmon are identified by the WDFW as part of the Lake Washington-Cedar River stock, which is included in the Puget Sound/Strait of Georgia ESU. Although the status of Cedar River coho salmon was determined to be healthy in 1992 (WDF et al. 1994), as a result of recent downward population trends it is now classified as depressed (WDFW 2002). An average of 488 live coho salmon were counted during WDFW spawning surveys in Rock Creek from 1981 through 1990, while an average of 110 live fish were counted from 1991 through 2000. Currently this ESU is not listed as threatened or endangered under the ESA, but is considered a species of concern.

Adult coho salmon immigrate in the Cedar River from early September through late January. Coho salmon are present in Rock Creek throughout the year. Adult coho salmon may enter Rock Creek in late October, but more generally, the spawning immigration begins in mid- to late November. Spawning generally occurs in Rock Creek from late October to early March, with peak spawning from the second week in December through mid-January. Juvenile coho salmon may rear in Rock Creek for about a year, migrating as smolts during the spring.

Chum salmon that are likely strays from stocks or hatcheries outside the Lake Washington basin have occasionally been observed in the Cedar River drainage; however, native stocks in the Cedar River, if any existed, were believed extirpated in 1917 by the diversion of the river into Lake Washington. One adult chum salmon was recently observed in Rock Creek, but the extent of any spawning is unknown.

Adult fall-run chum salmon typically return to fresh water in October and November and spawn in the lower reaches of coastal rivers from mid-November through December. Preferred spawning areas are in groundwater-fed streams or at the head of riffles. In general, chum salmon are reported to spawn in shallower, low-velocity streams and side channels more frequently than other salmon species.

The sockeye salmon that spawn in Rock Creek are part of the Cedar River sockeye salmon stock, a component of Lake Washington sockeye salmon stocks. Lake Washington hosts the largest naturally-spawning sockeye salmon stock south of British Columbia. While there were likely historically resident-sockeye, i.e., kokanee, in Lake Sammamish and Walsh Lake, tributary to the Cedar River above Rock Creek, there are no certain records of anadromous sockeye salmon in the Cedar or Lake Washington before the current sockeye salmon stock was introduced into Lake Washington from Baker Lake (Skagit basin) in 1935. Because anadromous sockeye salmon in the Cedar River are considered non-native and not part of any ESU, they are not likely to be considered for ESA listing (Gustafson et al. 1997).

A few sockeye salmon may begin to enter Rock Creek during the last week of September, but more typically the immigration begins in early October with peak spawning occurring from mid-October to mid-November. Sockeye salmon spawning has been observed up through Reach 12, but the majority occurs in Reaches 1 through 4. Fry emergence begins in late January and continues through May. Sockeye salmon fry begin their downstream movement to Lake Washington shortly after emergence, with no sockeye rearing in Rock Creek. Sockeye salmon spawning escapement estimates for Rock Creek for a set of reaches consistently surveyed between the 2001-2002 and 2004-2005 spawning seasons ranged from 502 to 3,346 sockeye salmon.

<u>Critical Habitat in the Action Area</u>

The action area contains designated critical habitat for PS Chinook salmon. The critical habitat PCEs present in the action area include freshwater spawning, freshwater rearing, and freshwater migration. The attributes of those PCEs are listed in Table 1. The CHART determined that the HUC has 34.8 miles of spawning and rearing PCE's, 1 mile of rearing and migration PCE's, and 1.6 miles of the freshwater migration PCE. The CHART gave the Cedar River HUC a high conservation value rating (NOAA Fisheries 2005). High conservation value watersheds are deemed to have a high likelihood of promoting ESU conservation, while low-value watersheds are expected to contribute relatively less to conservation. Based on Chinook salmon potential use information provided by WDFW, the NMFS designated approximately 1.3 miles of Rock Creek as critical habitat for PS Chinook salmon. Actual use of Rock Creek by Chinook salmon is likely very limited because the small channel size and little flow are inconsistent with well-documented Chinook salmon use of the Cedar River and other natal rivers in Puget Sound. For example, spawning flows in the Cedar and other rivers are more than about 100 cfs, while natural flows in Rock Creek during September and October are always much less than 10 cfs. Therefore, the relative value of critical habitat in Rock Creek is low compared to critical habitat in the Cedar River and other tributaries.

Table 1. Primary constituent elements of critical habitat designated for Puget Sound Chinook salmon and corresponding species life history.

Primary Constituent Elements		Species Life History Stage
Site Type	**Site Attribute**	
Freshwater spawning	Substrate Water quality Water quantity	Adult spawning Embryo incubation Alevin development
Freshwater rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	Fry emergence Fry/parr growth and development
Freshwater migration	Free of artificial obstructions Natural cover Water quality Water quantity	Adult sexual maturation Adult upstream migration, holding Fry/parr seaward migration

The freshwater spawning and rearing PCEs are present in the action area, but the small size of Rock Creek and its geomorphology greatly limit the amount of potentially suitable Chinook salmon habitat (City of Kent 2010). Rearing Chinook salmon have not been observed in August 2002 electro-fishing surveys of Rock Creek. Apparently, no surveys for rearing Chinook salmon have been done in April to June when juvenile Chinook salmon could be present. The current baseline water withdrawal conditions (with no flow augmentation) have reduced flows in Rock Creek slightly. Habitat surveys and subsequent modeling have documented a lack of depth and pool habitat suitable for Chinook salmon migration and spawning. For example, the median WUA for Chinook salmon spawning in Rock Creek in October is 2,977 square feet, approximately 15 percent of the optimal WUA available if the City withdrew no water (based on the Douglas Curve model in Figure 8, Appendix F of City of Kent 2010, p. F-23). For November, the median WUA is 1,756 square feet, about 7 percent of the optimal WUA. Therefore, water quantity affects the function of the spawning PCE in Rock Creek.

The present function of the migration PCE is also slightly impaired. Perched culverts at the Summit-Landsburg Road crossing are potential barriers to upstream migration at low flows. Also, the shallow channel conditions at the mouth of in Rock Creek in late summer and fall may limit immigration into Rock Creek from the Cedar River. Adult sockeye salmon that immigrate at the same time as Chinook in the Cedar River are able to move into Rock Creek, while the larger-sized Chinook salmon may not be able to immigrate as easily through the shallow channel at the mouth. Therefore, water quantity is possibly a limiting factor to the migration PCE in Rock Creek. However, habitat modeling suggests that Chinook salmon adult holding habitat, mean depth, and migration conditions would be sub-optimal even under natural flow conditions (i.e. no water withdrawals by the City). The results of habitat modeling described in the HCP for Chinook salmon in Rock Creek are consistent with (1) very few observations of adult Chinook salmon in Rock Creek; and (2) the absence of Chinook salmon from many similarly-sized tributaries to other rivers that support independent populations of Chinook salmon in Puget Sound.

Water quality, including contaminant levels, temperature, and turbidity are all functioning well in support of the spawning, rearing, and migration PCEs in Rock Creek. Large woody material (LWM) is important to river channel processes, including those that create and maintain salmonid habitat (Montgomery et al. 1995; Abbe and Montgomery 1996; Spence et al. 1996; Beechie and Sibley 1997). Instream large wood amounts are generally good in the perennial portion of Rock Creek, providing cover for salmonids. Forested riparian zones bordering much of the perennial reach of Rock Creek help maintain LWM recruitment, and are a source of insect fallout and allochthonous input, important in providing forage for juvenile salmonids.

2.4 Effects of the Action

Effects of the action are the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Effects of the action that degrade PCEs that are already identified as limiting factors, or that impair VSP parameters, may increase the likelihood that the proposed action will result in jeopardy to that listed species or in destruction or adverse modification of a designated critical habitat.

Effects on Listed Fish

The City's groundwater withdrawals reduce instream flows, which reduces the amount of habitat available on which certain salmonids rely to express their life histories in the action area. Operations under the HCP involve continued water withdrawal to serve the municipal water supply. To address the risk of continued effects of operations on salmonid habitat, the HCP requires the City implement HCMs which, while addressing the adverse effects of water supply operations, could also adversely affect habitat quality and quantity, albeit temporarily.

Specifically, the HCMs will likely require in-channel work that will temporarily isolate portions of the channel, alter water quantity and quality, disturb benthic areas, and change channel morphology. Each of these environmental changes has the potential to affect anadromous salmonids in Rock Creek, even while the intent of each project will be to minimize and mitigate the effects of take to the maximum extent practicable over the term of the ITP. The HCP will require passage improvement work at the mouth of Rock Creek, connecting off-channel habitat to Rock Creek, replacing the culverts at Summit-Landsburg Road, moving the augmentation outfall, relocating LWM, and beaver dam removal, each of which will benefit salmonids and their habitat over time.

The analysis that follows is based on the assumption that dewatering and fish rescue will be conducted following a protocol that will minimize effects on fish, such as the "Protocol I - Dewatering within High Likelihood Listed Fish Areas" in Appendix A of the U. S. Army Corps of Engineers Fish Passage and Habitat Enhancement Restoration Programmatic Consultation (NMFS and USFWS 2008). Finally, the analysis is based on the assumption that these activities will occur during the approved prescribed in-water work window from August 1 to August 31 in Rock Creek.

Instream Flows

The City withdraws groundwater year-round. These withdrawals, at a minimum, result in a reduction in the level of surface flows in Rock Creek during some portions of the year (City of Kent 2010, p. F-1). The City modeled the effects of these reduced flows on habitat availability, using WUA as an index to compare the amount of suitable habitat at different flows. Table 2 shows the optimal amount of WUA (i.e. if there were no water withdrawals by the City), and also the WUA under the current water withdrawal program. During October through December, there are measurable decreases in the WUA for several salmonid species and life stages, compared to optimal WUA. Decreases in spawning and rearing habitat from reduced instream flows can be so great as to result in decreased productivity and abundance of ESA listed salmonids.

To minimize these potential effects, the City is proposing to augment low flows in Rock Creek during October, November and December with flow augmentation based on the seasonal water year type (Table 3). This flow augmentation will increase spawning habitat WUA for Chinook and sockeye salmon in October and November and for coho salmon in November (Table 2). During October, flow augmentation will also slightly increase rearing habitat WUA for coho salmon and steelhead (Table 2). Therefore, flow augmentation will beneficially address the adverse effects of groundwater withdrawal continuing under the HCP. This flow augmentation also addresses the Puget Sound Chinook salmon recovery plan, which lists protection of flows during the low flow season as a strategy for Rock Creek (Shared Strategy 2007).

Table 2. Estimated median weighted usable area (WUA) for various salmonid species and life stages in Rock Creek under baseline and flow augmentation conditions (sq. ft. = square feet). Compiled from data in Chapter 4 and Appendix F of City of Kent (2010).

Species	Life stage	Month	Estimated optimal WUA (sq. ft.)	Median baseline WUA (sq. ft.)	Median WUA with flow augmentation (sq. ft.)	Increase in WUA with flow augmentation (sq. ft.)
Chinook	Spawning	October	20,100	2,977	9,139	6,162
		November	22,000	1,756	9,139	7,383
Coho	Spawning	November	7,600	1,549	1,868	319
		December	23,500	17,917	17,917	0
	Rearing	October	10,500	9,250	9,719	469
Chum	Spawning	October	16,000	5,718	9,985	4,267
		November	16,500	4,985	9,985	5,000
		December	52,000	41,657	41,657	0
Sockeye	Spawning	October	26,000	4,042	12,012	7,970
		November	28,000	2,561	12,012	9,451
		December	56,000	52,333	52,333	0
Steelhead	Rearing	October	2,600	715	1,328	613

Table 3. Rock Creek flow targets in cubic feet per second (cfs) and the maximum augmentation flows to be provided by the City of Kent to meet those targets as determined by seasonal water year type (City of Kent 2010, p. 4-4).

Seasonal Water Year Type[1]	Maximum Augmentation (cfs)	Rock Creek Flow Target (cfs)[2]
Wet	2.5	3.5
Normal	2.0	3.0
Dry	1.75	2.75
Drought	1.50	2.50

[1] See Appendix H of the HCP for a description of the rationale, and process used for categorizing seasonal water year types.
[2] Minimum stream flow target to be measured at USGS gage 12118400 on the Clark Springs Property, with augmentation occurring during the months of October through December only. The augmentation flow rate shall be measured at the flow meter on the augmentation pipe from the City's clear well.

Work Site Dewatering, Fish Capture, and Handling

Because coho salmon and steelhead juveniles could be present in Rock Creek year round, they could be exposed to effects of HCMs that include channel dewatering, worksite isolation, and fish capture. Although these measures are typically included in many actions to reduce the extent of listed animals exposed to in-water work, the processes themselves are likely to adversely affect some individual fish of the exposed cohorts. During channel dewatering (and possibly worksite isolation), some juvenile fish are reasonably certain to become stranded in the dewatered channel (e.g. hidden under rocks) and not found. These stranded fish are likely to die because they will lack access to flowing water for several days during in-water construction. Some of the rescued fish may be injured or killed by stress responses to capture and handling. Capturing and handling fish can cause them short-term stress, increasing plasma levels of cortisol and glucose (Frisch and Anderson 2000; Hemre and Krogdahl 1996). Even short-term, low intensity handling may cause reduced predatory avoidance for up to 24 hours (Olla et al. 1995).

Suspended Sediment

Conducting in-channel work during the in-water work window will avoid exposing juvenile and adult Chinook, chum, and sockeye salmon, and adult coho salmon and steelhead to suspended sediments (SS). Juvenile steelhead and coho salmon could be present in the action area during the proposed work window, and therefore could be exposed to elevated suspended sediment concentrations. Even if the channel is dewatered or the worksite isolated for activities requiring in-channel excavation, there will still likely be one or more pulses of suspended sediment in the creek after the sites are re-watered, or when stream levels rise.

Several parameters may be considered when evaluating the effects of increased SS on salmonids including the level of increase in SS, along with the duration, timing, and frequency of that increase (Bash et al. 2001). Increased SS concentrations can cause lethal, sublethal, and behavioral effects in juvenile and adult salmonids (Newcombe and Jensen 1996). Behavioral effects can include an abandonment of cover or avoidance of the higher SS concentration areas. Sub-lethal effects may include reductions in feeding rates, and physiological stress, and lethal effects examples include reduced growth rates leading to increased susceptibility to predation and severe habitat degradation, such as sedimentation that reduces egg to fry survival (Newcombe and Jensen 1996). Newcombe and Jensen (1996) scored qualitative response data (i.e. suspended sediment effects on fish) along a semi-quantitative ranking scale, which they called the scale of severity of ill effects (SEV) (Table 4). They further categorized the rankings into four major classes of effect including nil effect, behavioral effects, sub-lethal effects, and lethal effects. Newcombe and Jensen (1996) also used a meta-analysis to develop models to relate SEV on fishes (including salmonids) to duration of exposure and concentration of suspended sediment.

For this analysis, NMFS first determined which SEV equates to an adverse effect that would “harm” individual exposed fish. NMFS’s general endangered and threatened species regulations define “harm” as an act causing significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering” (50 CFR 222.102). To determine whether increased SS would harm salmonids under HCP activities, NMFS assessed the meaning of “substantial increase” in sediment input meant for this analysis.

Table 4. Scale of severity of ill effects (SEV) associated with suspended sediment. Modified from Newcombe and Jensen (1996).

SEV	Description of effect
	Nil effect
0	
	Behavioral effects
1	Alarm reaction
2	Abandonment of cover
3	Avoidance response
	Sublethal effects
4	Short-term (less than 2 hours) reduction in feeding rates and feeding success
5	Minor physiological stress (e.g. increase in rate of coughing, increased respiration rate)
6	Moderate physiological stress
7	Moderate habitat degradation; impaired homing
8	Indicators of major physiological stress: (e.g. long-term reduction in feeding rate, long-term reduction in feeding success, poor condition)
9	Reduced growth rate, delayed hatching: reduced fish density
	Lethal effects
10	0-20 percent mortality: increased predation; moderate to severe habitat degradation
11	20–40 percent mortality
12	40-60 percent mortality
13	60-80 percent mortality
14	80-100 percent mortality

All lethal effects (SEV of nine to 14) clearly constitute take in the form of harm. Behavioral effects (level one to three) are on the opposite end of the scale. They neither injure nor kill fish. Harm does occur somewhere in the range of the sublethal effects (SEV of four to nine). Newcombe and MacDonald (1991) define sublethal effects as "effects that injure the tissues or physiology of the organism, but are not severe enough to cause death". A severity level of four equates to a short-term (less than 2 hours) reduction in feeding rate. The authors explain that "they reflect less a change in fish behavior than reduced availability of food and reduced visual hunting range." This level of response would not constitute an adverse effect. Reducing feeding rate for less than two hours does not injure a juvenile by significantly impairing feeding or rearing. The same can be argued for a SEV of five, minor physiological stress associated with an increase in the rate of coughing, and increased respiration. An SEV of six, moderate physiological stress, can include a large increase in the coughing rate and an increase in blood glucose levels (Servizi and Martens 1992). Thus, for this analysis NMFS determined that increased sedimentation that results in a response of SEV six or higher will equate to an adverse effect. A SEV of six for juvenile salmonids equates to an increase in SS concentration of about 1,097 milligrams per liter (i.e., parts per million or ppm) for 1 to 3 hours exposure time (Figure 3 of Newcombe and Jensen 1996). A SEV of ten (where lethal effects begin) would equate to a SS concentration of 59,874 ppm for 1 to 3 hours exposure time. Although NMFS views the combination of SS concentration and exposure time to create a continuum of potential adverse effects on juvenile salmonids, the threshold values in Figure 3 of Newcombe and Jensen (1996) are adequate to support inferences for this analysis.

No quantitative data are available regarding potential SS concentration increases for in-water work in Rock Creek. Therefore, NMFS relied on other Pacific Northwest studies to make inferences as to whether SS concentration increases might be high enough to cause adverse effects on anadromous salmonids, and to determine the downstream extent of those effects. The Western Washington Fish and Wildlife Office of the USFWS has compiled monitoring data from 24 projects in Washington, Idaho, and Montana that recorded changes in suspended sediment concentrations or turbidity resulting from various in-stream projects (e.g. culvert replacements, bridge construction, pipeline crossings) (J. Muck, USFWS, personal communication). Three of those projects recorded SS concentrations greater than 1,097 ppm, with the highest concentration reported of 15,587 ppm. None of the projects recorded SS concentrations greater than 1,097 ppm more than 100 feet (30 meters) downstream of the work sites. Reid and Anderson (undated report) reviewed SS concentrations related to open-cut pipeline water crossing projects that included seven projects in the Pacific Northwest. Four of these projects recorded SS concentrations greater than 1,097 ppm, with the highest concentration reported of 10,660 ppm. They did not report how far downstream of the pipeline crossings the samples were taken. Foltz et al. (2008) reported SS concentrations exceeding 1,097 ppm when measured 20 meters downstream of six culvert removal sites in Idaho. Maximum concentrations measured at these sites ranged from 1,400 to 28,400 ppm. Suspended sediment concentration was measured 100 meters downstream of three of the sites and was typically one order of magnitude less than concentrations measured 20 meters downstream of the sites (Foltz et al. 2008). By an average of 810 meters downstream of the sites, concentrations did not exceed those measured upstream of the sites, though smaller tributaries may have diluted the SS concentrations by this point (Foltz et al. 2008).

Based on studies that have documented SS concentrations exceeding 1,097 ppm during similar in-stream work in the Pacific Northwest, it is reasonable that in-channel work in Rock Creek will also produce SS concentrations exceeding 1,097 ppm, once the worksites are re-watered. Other studies also indicated substantial decreases in SS concentrations by 100 meters downstream of the work site (Foltz et al. 2008; J. Muck, USFWS, personal communication). Thus, NMFS believes the project will likely cause adverse effects on juvenile coho salmon and steelhead within 100 yards of the excavation sites.

Sediment that settles to the stream bottom could also affect anadromous salmonid habitat. Because in-channel activities would occur prior to the fall spawning season, no existing redds will be exposed to sediment deposits. But sediment deposits could make the downstream reach less suitable for anadromous salmonid spawning after August. Because there is very low potential that Chinook salmon spawn in Rock Creek, and there is likely no spawning most years, this effect would be discountable for that species. The sediment deposits could slightly decrease sockeye salmon spawning habitat quality, but NMFS believes this potential effect on reproductive success would not be measurable compared to the baseline, and thus would be insignificant. With increasing fall and winter flows, much of this sediment will likely redistribute over a larger area downstream and into the Cedar River, resulting in no measurable effect on coho spawning habitat.

Benthic Habitat Disturbance

When sections of channel are dewatered, benthic invertebrates will be killed, reducing foraging opportunities for juvenile salmonids. Aquatic invertebrates may start re-colonizing dewatered areas within 1 to 7 days of re-watering (Miller and Golladay 1996; Paltridge et al. 1997; Fowler 2004). The in-channel work in Rock Creek will also cause an increase in suspended sediments, which will settle onto the substrate downstream of the worksites. Any modification of the streambed by deposited sediment could affect the benthic invertebrate community (Waters 1995). In Rock Creek, much of this deposited sediment will likely be re-suspended during high fall and winter flows, and will be redistributed over a broad area downstream, where additional effects would be difficult to measure. There will be a temporary loss of benthic invertebrate habitat due to channel dewatering and sediment deposition downstream of the in-channel work areas. Because these impacts will be one-time, short-term events, there may be a slight reduction in aquatic insect densities, and thus salmonid forage, but not enough to have a measurable impact on juvenile salmonid growth or survival.

Stream Morphology Changes

Replacing the culverts and connecting off-channel habitat to the main channel will involve excavation in Rock Creek. If the streambed is not refilled and contoured correctly, the stream profile could change, possibly modifying substrate composition. Even if material is replaced to match the original grade of the stream bed, scour of unconsolidated material will change the hydraulic conditions at the excavation sites, which could influence channel dynamics upstream (head-cutting) and downstream (channel incision). These changes could lower the function of the area to support salmon and steelhead use. However, because Rock Creek is a relatively low-energy stream, major changes in streambed morphology are unlikely.

Beneficial Habitat Conservation Measures

Although construction activities associated with the HCP's conservation program will cause some short-term adverse effects, the HCMs will provide for long-term beneficial effects for anadromous salmonids in Rock Creek in a manner that minimizes and mitigates the extent of take (see the ESA section 10 Statement of Findings, following the opinion in this document). Reconfiguring the channel at the mouth of Rock Creek is included to improve spawner access, especially in September and October. Connecting off-channel habitat is included to support juvenile rearing, especially for coho salmon. Replacing the perched culverts at the Summit-Landsburg Road crossing will improve the migration conditions for both adult and juvenile anadromous salmonids, making spawning and rearing habitat more accessible. Large woody material supplementation will increase cover habitat and provide for forage production (e.g. aquatic insects). The water conservation and riparian acquisition programs will help conserve Rock Creek water quantity and quality and will protect watershed function, another strategy called for in the Puget Sound Chinook salmon recovery plan (Shared Strategy 2007). Taken together, these measures minimize take caused by both the habitat project construction activities, and the operation and maintenance of the water supply system as a whole.

Relating Local Environmental Effects to Population Viability

Puget Sound Chinook Salmon. Current water withdrawal operations maintain flows below those required for optimal WUA of spawning and rearing habitat in Rock Creek. However, the small size of Rock Creek makes it unlikely that it was ever a major source of Chinook salmon production in the Cedar River drainage. Therefore, the number of Chinook salmon that could use Rock Creek for spawning and rearing would be, at most, a small fraction of the Cedar River population, and adverse effects due to water withdrawals would have no measurable effect on the VSP parameters. In the long-term, the HCP HCMs will improve habitat quantity and quality in Rock Creek, including an increase in WUA. This will help maintain or slightly improve conditions for the Cedar River Chinook salmon population, such that the proposed action will have no adverse, or perhaps a slightly beneficial influence on Cedar River Chinook salmon population viability.

Puget Sound Steelhead. Flows are currently maintained below those required for optimal steelhead rearing habitat WUA in October. Even under optimum WUA conditions, the amount of rearing habitat in Rock Creek is small compared to the 21.8 miles of habitat downstream of the Landsburg Diversion Dam in the Cedar River, where habitat quality and quantity are not limiting factors on the Cedar River steelhead stock. Therefore, this affect would not influence the VSP parameters for the Cedar River stock. There is also the potential for adverse effects on individual steelhead juveniles due to in-channel activities associated with implementing the HCMs. Effects on a few individuals in Rock Creek would be such a small percentage of the Cedar River stock potential productivity, that it would have no measurable effect on VSP parameters. In the long-term, the HCMs will improve habitat quantity and quality in Rock Creek, including an increase in steelhead rearing habitat WUA. This will help maintain or slightly improve conditions for the Cedar River steelhead stock such that the proposed action will have no adverse, or perhaps a slightly beneficial influence on Puget Sound steelhead population viability.

***Puget Sound/Strait of Georgia Coho Salmon*.** Current water withdrawal operations maintain flows below those required for optimal WUA for coho salmon spawning habitat in Rock Creek. However, implementing the HCMs will improve coho salmon habitat quantity and quality in Rock Creek, including WUA. Thus, this HCP will maintain productive habitat conditions for coho salmon reproduction, numbers, and distribution in Rock Creek for the next 50 years, so will have no negative effect on Puget Sound/Strait of Georgia coho salmon VSP parameters.

Puget Sound/Strait of Georgia Fall-run Chum Salmon. Current water withdrawal operations maintain flows below those required for optimal WUA for chum salmon spawning habitat in Rock Creek. However, implementing the HCMs will improve chum salmon habitat quantity and quality in Rock Creek, including WUA. Thus, this HCP will maintain productive habitat conditions for chum salmon reproduction, numbers, and distribution in Rock Creek for the next 50 years, so will have no negative effect on Puget Sound/Strait of Georgia fall-run chum salmon VSP parameters.

Sockeye Salmon. Current water withdrawal operations maintain flows below those required for optimal WUA for sockeye salmon spawning habitat in Rock Creek. However, implementing the HCMs will improve sockeye salmon habitat quantity and quality in Rock Creek, including WUA. Thus, this HCP will maintain productive habitat conditions for sockeye salmon reproduction, numbers, and distribution in Rock Creek for the next 50 years, so will have no negative effect on sockeye salmon VSP parameters.

<u>Effects on Critical Habitat</u>

There is the possibility of slight effects on the spawning habitat PCE, if augmented flows are interrupted, as discussed above. However, during most if not all years, the flow augmentation would improve spawning habitat PCE by increasing WUA relative to conditions in the absence of the HCP. For example, the median WUA for October will increase from 2,977 square feet to 9,139 square feet, while in November it will increase from 1,756 square feet to 9,139 square feet (City of Kent 2010, p. F-6). The potential passage improvement project at the mouth of Rock Creek, and culvert replacement at the Summit-Landsburg Road will improve the migration PCE relative to the current baseline condition. Connecting some off-channel wetland habitat with Rock Creek and adding LWM may also improve potential rearing habitat for juvenile Chinook salmon. Finally, the riparian acquisition, easement, and enhancement fund will help preserve existing habitat in Rock Creek. In sum, there are likely no adverse effects on critical habitat from the proposed ITP.

2.4 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). In 2000, the City of Seattle implemented a 50-year HCP for the Cedar River (City of Seattle 2000). Conservation measures include LWD placement, removal of culvert migration barriers, providing fish passage to 17 miles of habitat upstream of the Landsburg Diversion Dam that hasn't been accessible since the early 1900s, funding for projects at the Ballard Locks designed to increase survival of emigrating smolts, and maintaining beneficial flows and suitable water quality that will help ensure the continuous provision of high quality fish habitat throughout the Cedar River between Lower Cedar Falls and Lake Washington (City of Seattle 2000). The NMFS determined that this HCP would maintain, enhance, or protect habitat in the Cedar River, allowing anadromous salmonids to fulfill their life history requirements (NMFS 2000). The NMFS concluded that implementation of the Cedar River HCP (and the associated Instream Flow and Landsburg Mitigation Agreements) would likely contribute to the conservation of PS Chinook, coho, and sockeye salmon and PS steelhead (NMFS 2000). Thus, conditions resulting from the Cedar River HCP will also benefit those anadromous salmonids that use Rock Creek.

2.5 Conclusion

After reviewing the status of the PS Chinook ESU and PS steelhead DPS, the environmental baseline for the action area, the effects of the action, and cumulative effects, NMFS concludes that the action is not likely to jeopardize the continued existence of either the ESU or DPS. While water withdrawals reduce available habitat and construction activities will have short-term negative effects, there will be no measurable negative effects on VSP parameters, and the long-term effects of the HCMs will tend to improve habitat conditions for both PS Chinook salmon and PS steelhead. The proposed HCP also addresses strategies from the Puget Sound Chinook salmon recovery plan that will help conserve and recover Puget Sound Chinook salmon.

The Chinook salmon spawning, rearing, and migration PCEs will all improve with implementation of the HCMs. The proposed action will not negatively influence the conservation role of the designated critical habitat considered in this consultation. Therefore, the action will not destroy or adversely modify PS Chinook salmon critical habitat.

HCP-covered anadromous fish species that are not now ESA-listed, i.e., Puget Sound coho salmon, chum salmon, and Cedar River sockeye salmon, were also assessed for potential serious adverse effects and none were found. The reproduction, numbers, or distribution of these covered fish species would not be seriously affected by implementing the proposed HCP. Therefore, the combined effects on covered species is unlikely to be of a magnitude, extent, duration, or frequency that would reach a level that would reduce appreciably the likelihood for survival and recovery for any of the subject ESUs. Therefore, the proposed action will not jeopardize the continued existence of these covered species.

2.6 Incidental Take Statement

Section 9(a) (1) of the ESA prohibits the taking of endangered species without a specific permit or exemption. Protective regulations adopted pursuant to section 4(d) extend the prohibition to threatened species. Among other things, an action that harms a listed species or harms by altering habitat in a way that significantly impairs its essential behavioral patterns is a taking (50 CFR 222.102). Incidental take refers to takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(o) (2) exempts any taking that meets the terms and conditions of a written incidental take statement from the taking prohibition.

The proposed action, issuing an ITP, does not cause incidental take; it authorizes the incidental take occurring during other activities conducted according to the provisions of the HCP. The ITP itself does not permit the underlying activities that cause incidental take so much as provide an authorization that lifts the prohibition against take in ESA section 9 (and extended to threatened species through ESA section 4(d)).

The incidental take that is the subject of the proposed permit and addressed in the HCP occurs mostly in the form of harm, where habitat modification, despite minimization and mitigation in the HCP, will impair normal behavior patterns of listed salmonids to an extent that actually injures or kills them. The activities that cause the habitat modification and the extent of anticipated habitat modification are summarized below.

Anticipated Amount or Extent of Take

The proposed action is the issuance of an ITP authorizing the incidental take of covered listed species. The anticipated take is reasonably certain to occur as the result of some extent of co-occurrence of the covered animals and the effects of the underlying activities described in the HCP. Although not all instances of exposure will result in take, the modification of habitat by the underlying activities will likely result in some level of changed, even impaired normal behavioral patterns for those animals, leading to their injury or even death ("harm" 50 CFR 222.102).

The ability to quantify the amount of take in numbers of fish depends on whether NMFS has sufficient information to determine the number of fish that will be exposed, the manner in which each exposed fish will respond, and whether those responses will fall into one of the categories of take. For take in the form of harm, this assessment can be difficult if not impossible to accomplish because of the likely fluctuation in densities of fish during the 50-year extent of the HCP. While this uncertainty makes it impossible to quantify take in terms of numbers of fish, the extent of habitat change to which present and future generations of fish will be exposed is readily discernable and presents a reliable measure of the extent of take that can be monitored and tracked. Therefore, when the specific number of individuals "harmed" cannot be predicted, NMFS quantifies the extent of take based on the extent of habitat modified (51 FR 19926 at 19954; June 3, 1986).

Using the amount of habitat modified to describe the extent of take is based on the general relationship between habitat function and the extent to which normal behaviors can be expressed. In this case, WUA will serve as a reliable measure of the extent of take. The expected take attributable to the difference between the optimal WUA and the median baseline WUA for the Chinook salmon and steelhead life stages by month, as given in Table 2, will be the extent of incidental take anticipated and exempted in this incidental take statement.

The expected extent of take is also the threshold for reinitiating consultation. In the event that any of these differences in WUA are exceeded during the life of the HCP, the amount of take would increase beyond that examined in this consultation, and thus the reinitiation provisions of this Opinion apply.

If other covered, unlisted species described in this document become listed and protective regulations are promulgated during the period of this HCP, the above-described extent of take will serve as the limit of anticipated take for those species also.

Reasonable and Prudent Measure

The applicant will minimize the extent of incidental take from activities covered by the proposed ITP.

Terms and Conditions

All conservation measures described in the final HCP (City of Kent 2010) together with the section 10(a)(1)(B) permit to be issued based on proposed implementation of the HCP, are hereby incorporated by reference as terms and conditions within this Incidental Take Statement. Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and section 7(o)(2) of the ESA to apply. If the permittee fails to adhere to these terms and conditions, the protective coverage of the section 10(a)(1)(B) permit and section 7(o)(2) may lapse. The amount or extent of incidental take anticipated under the proposed HCP, associated reporting requirements, and provisions for disposition of dead or injured animals are as described in the HCP and its accompanying section 10(a)(1)(B) permit.

2.7 Reinitiation of Consultation

Reinitiation of formal consultation is required and shall be requested by the Federal agency or by NMFS where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If the amount or extent of taking specified in the incidental take statement is exceeded; (b) if new information reveals effects of the action that may affect listed species or designated critical habitat in a manner or to an extent not previously considered; (c) if the identified action is subsequently modified in a manner that has an effect on the listed species or designated critical habitat that was not considered in the biological opinion; or (d) if a new species is listed or critical habitat is designated that may be affected by the identified action (50 CFR 402.16).

To reinitiate consultation, contact the Washington State Habitat Office of NMFS, and refer to the NMFS Number assigned to this consultation.

3.0 ENDANGERED SPECIES ACT: SECTION 10(a)(2)(B) STATEMENT OF FINDINGS

3.1 Section 10(a)(2)(B) Issuance Considerations

In determining whether to issue a permit, the Assistant Administrator will consider the following:

(i) *The status of the affected species or stocks*. The NMFS evaluated the status of all species to be included in the HCP. The status of covered listed and unlisted species is described in the status section of the Opinion, above. The baseline conditions of the action area covered by the HCP were also considered, and the evaluation can be found in the environmental baseline section of the Opinion.

(ii) *The potential severity of direct, indirect, and cumulative impacts on the species or stocks and habitat as a result of the proposed activity.* The Opinion includes NMFS' analysis of effects on species that are covered by the HCP, as well as an analysis of effects on the designated CH of species currently listed under the ESA. The effects analysis evaluated the direct and indirect effects of activities covered by the HCP (see Opinion, Effects of the Action section). The NMFS also evaluated the cumulative effects from other non-Federal activities that are reasonably likely to occur in the action area.

(iii) *The availability of effective monitoring techniques*. The City has committed to five monitoring and evaluation measures under the HCP. These include: 1) flow monitoring in Rock Creek to document compliance with the flow augmentation HCM, 2) precipitation monitoring to allow refinements in determining water year types, 3) spawning surveys to document effectiveness of the passage improvements at the mouth of Rock Creek and track salmon escapement trends, 4) monitor the low flow weirs at the mouth of Rock Creek to document functionality, and 5) document if fish use the newly connected off-channel habitat.

The City will ensure that streamflow in Rock Creek downstream of the Clark Springs System is measured on a real-time basis for the duration of the ITP. The City will fund the continued operation of USGS gage 12118400 “Rock Creek at Highway 516 near Ravensdale,” or a suitable alternate, as a real-time station. As part of a report describing flow patterns presented to the Services annually and reviewed at 5-year meetings, the City will provide summary plots of daily mean streamflow for each month during the period the City may provide flow augmentation (October, November and December). The report will also include tables summarizing daily mean, minimum, and maximum augmentation and stream flow, the two-month antecedent accumulated precipitation, the water year classification (wet, normal, dry, drought), and the maximum augmentation level and minimum instream flow target from the HCM-1 mitigation schedule.

For the first ten years of the HCP, the source for precipitation data will be the gage at Landsburg. After that and after the City has evaluated the additional data available from the USGS precipitation gage at the Clark Springs watershed, the City may propose to change the location for the collection of precipitation information to be the Clark Springs watershed. The City may also propose changes to methodology of determining wet/normal/dry/drought antecedent precipitation periods based on additional aquifer level and/or precipitation data. As an alternative, the City may elect to work cooperatively with Seattle Public Utilities in the monitoring of precipitation at the Landsburg site. In either case, the City has committed to support the continued monitoring of precipitation data for use in refining the seasonal water year classifications that will be used as part of HCM-1.

The City will conduct weekly spawning surveys for Chinook salmon, sockeye salmon, coho salmon, and adfluvial cutthroat trout within selected index reaches of Rock Creek every fourth year. Monitoring will begin October 1 and extend through the end of February. Index reaches for Chinook and sockeye salmon would include Reach 1 through Reach 7 from September 21 to December 31. Index reaches for coho salmon would include Reaches 8, 9, 10, and 11 from November 15 to February 28. The City is committing up to $15,000 every year that surveys are completed.

The City has committed up to $2,000 per year to conduct post-construction monitoring of the passage improvement weirs at the mouth of Rock Creek. Monitoring will include annual inspection to assess stability and condition of improvement structures prior to the fall spawning season. If substantial changes to the weirs are noted within the first 5-years of construction, the design may be adjusted to reduce periodic maintenance costs.

The City will conduct snorkel surveys to count juvenile Chinook salmon, sockeye salmon, coho salmon, steelhead trout, and cutthroat trout in the off-channel wetland areas enhanced under HCM-3 and HCM-4. Monitoring will occur during the spring of the first three years following the completion of the two projects. The City is committing up to $1,000 every year the City completes a survey.

(iv) *The use of the best available technology for minimizing or mitigating impacts.* The City will fund the USGS gage on Rock Creek as a real-time station, will record augmentation flow levels on a unit interval of 15-minutes from October 1 through December 31, and will monitor precipitation in real time. This technology will allow the City to be as efficient as possible in meeting target augmentation flows for Rock Creek. The system of stream and augmentation flow monitoring data collection and data posting will be updated consistent with future advances in data transfer technology, as agreed upon by Federal, state and local resource agencies.

(v) *The views of the public, scientists, and other interested parties knowledgeable of the species or stocks or other matters related to the application*. On June 19, 2006, the Services formally announced the Notice of Intent to conduct public scoping and to prepare an EIS related to the HCP (71 FR 35286). The announcement gave the date and address of the public scoping meeting, and provided a 45-day public comment period for written comments. The Notice of Availability (NOA) for the draft EIS was published in the Federal Register on April 23, 2010 (Vol. 75, No. 78). The Draft EIS public comment period closed July 6, 2010. During the comment period, comment letters were received from the U. S. Environmental Protection Agency, Friends of Rock Creek Valley, King County (Washington), the Muckleshoot Indian Tribe, Washington State Department of Ecology, Center for Environmental Law and Policy, and WDFW. Comments on the Draft EIS and the Clark Springs HCP were responded to in the Final EIS and are included in Appendix B of the final EIS (USFWS and NMFS 2010).

3.2 Section 10(a)(2)(B) Findings on the Permit Issuance Criteria

Having considered the above, NMFS must make certain findings under section 10(a)(2)(b) of the ESA, with regard to the adequacy of the HCP meeting the statutory and regulatory requirements for an ITP under section 10(a)(1)(B) of the ESA and 50 CFR section 222.307. To issue the permit, NMFS must find that:

(i) *The taking will be incidental.* The NMFS concluded in its Opinion that take in the form of harm is likely to occur incidentally to the water withdrawal operations and HCMs covered by the HCP. Harm is the significant modification of habitat that impairs the listed species' behavior patterns (breeding, feeding, and sheltering) in such a way as to cause injury or death. Water withdrawal operations will affect fish habitat, as described in the effects analysis above, but are not intended to kill, injure, or harm fish. Thus, NMFS finds that any take that occurs is incidental to the activities authorized under the HCP.

(ii) *The applicant will, to the maximum extent practicable, monitor, minimize, and mitigate the impacts of such taking*. The NMFS finds that the City, to whom the Permit coverage extends, will monitor, minimize and mitigate the impacts of take of the covered species to the maximum extent practicable. Under the provisions of the HCP, the impacts of take will be minimized, mitigated, and monitored in accordance with the requirements of the Permit through the following measures:

(1) Minimizing the loss in WUA by augmenting flows in Rock Creek during October, November, and December.

(2) Increasing access to habitat by improving upstream passage conditions at the mouth of Rock Creek.

(3) Increasing rearing habitat by connecting off-channel waters to Rock Creek and adding LWM to the stream.

(4) Improving fish migration conditions by replacing the culverts at the Summit-Landsburg Road crossing.

(5) Minimizing water withdrawals by implementing a water conservation program for the City of Kent.

(6) Establishing a riparian acquisition, easement, and enhancement fund in the Rock Creek Basin to help preserve water quality and quantity.

In consideration of all the above facts, NMFS finds that: (1) the mitigation is commensurate with the impacts; (2) the HCP is consistent with the long-term survival and recovery of Covered Species (also see (iii) below); and (3) the HCP monitors, minimizes and mitigates the effects of take to the maximum extent practicable. These findings are based on the fact that benefits to the species will be demonstrable, especially compared to existing conditions or those conditions expected to occur absent the HCP.

(iii) *The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild*. The NMFS, using the best scientific and commercial data available, has evaluated the anticipated extent of take that will be incidental to the practices covered by the HCP, throughout the term of the HCP (summarized in Incidental Take Statement, above), and has concluded that the incidental takings likely to occur will not appreciably reduce the likelihood of survival and recovery. This conclusion can be found in the conclusion section of the Opinion. The section 7(a)(2) “no jeopardy” standard is identical to the section 10(a)(2)(B) “no jeopardy” standard.

(iv) *The applicant has amended the conservation plan to include any measures (not originally proposed by the applicant) that the Assistant Administrator determines are necessary or appropriate.* The NMFS identified no additional conservation measures. During development of the HCP, the Services and the City collaborated extensively on developing conservation measures that would minimize take to the maximum extent practical. The HCP and ITP incorporate all elements determined by NMFS to be necessary for approval of the HCP and issuance of the permit.

(v) *There are adequate assurances that the conservation plan will be funded and implemented, including any measures required by the Assistant Administrator*. The NMFS finds that the City will ensure funding adequate to implement the HCP. The following mechanisms were considered that demonstrate the City has the ability and commitment to fully implement the HCP and the Permit:

Page 7-3 of the HCP states that “The City of Kent will fund its commitments made in the HCP as summarized in Tables 7-1 and 7-2. Funding will be from sources at the City’s discretion, including but not limited to, revenues from the sale of water and land, and from outside sources such as grants or contributions. The City will strive to achieve an efficient and effective use of the specified funds to accomplish the goals, objectives and elements of the HCP” (City of Kent 2010).

4.0 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

The consultation requirement of section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions, or proposed actions that will adversely affect EFH. Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that may be taken by the action agency to conserve EFH.

The Pacific Fishery Management Council (PFMC) designated EFH for groundfish (PFMC 2005), coastal pelagic species (PFMC 1998), and Chinook salmon, coho salmon, and Puget Sound pink salmon (PFMC 1999). The proposed action and action area for this consultation are described in the Introduction to this document. The action area includes areas designated as EFH for various life-history stages of Chinook and coho salmon (PFMC 1999).

The City's water withdrawal operations may adversely affect EFH designated for Chinook and coho salmon. The NMFS determined that the action will adversely affect Chinook and coho salmon EFH due to a reduction in WUA relative to the estimated optimum amount of WUA for the months of October through December. This effect will influence the ability of Rock Creek downstream of the Clark Springs facility to support spawning and juvenile growth and mobility. However, based on consideration of EFH during the development of the HCP, the conservation measures included in the HCP as part of the proposed activities are adequate to avoid, minimize, or otherwise offset the potential adverse effects, described above, from these activities to designated EFH for Chinook and coho salmon. The City intends to implement these conservation measures to minimize potential adverse effects to the maximum extent practicable. Consequently, NMFS has no additional conservation recommendations to make at this time.

The NMFS must reinitiate EFH consultation if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR 600.920(l)(1)).

5.0 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

Section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-554) (Data Quality Act) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the Opinion addresses these Data Quality Act (DQA) components, documents compliance with the DQA, and certifies that this Opinion has undergone pre-dissemination review.

Utility: Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. These users include the National Marine Fisheries Service and the City of Kent, King County, Washington.

Individual copies were provided to the above-listed entities. This consultation will be posted on the NMFS Northwest Region website (http://www.nwr.noaa.gov). The format and naming adheres to conventional standards for style.

Integrity: This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

Objectivity:

Information Product Category: Natural Resource Plan.

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01, et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.920(j).

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the Literature Cited section. The analyses in this Opinion/EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with Northwest Region ESA quality control and assurance processes.

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