23. Norton/Widow White Creek Population

Central Coastal Stratum

Dependent Population

Recovery criteria: 80% of available IP habitat must be occupied in years following spawning of brood years with high marine survival

Habitat likely available to support all life stages

6.14 mi² (0% Federal ownership)

10 IP-km (6 IP-mi) (62% High)

Dominant Land Uses are Urbanization and Agriculture

Key Limiting Stresses are 'Degraded Riparian Forest Conditions' and 'Lack of Floodplain and Channel Structure'

Key Limiting Threats are 'Channelization/Diking' and 'Roads'

Highest Priority Recovery Actions

• Increase beaver abundance • Increase conifer riparian vegetation • Remove barriers	• Increase large woody debris (LWD), boulders, or other instream structure • Construct off-channel habitats, alcoves, backwater habitat, and old stream oxbows • Reduce pesticides

23.1 History of Habitat and Land Use

The community of McKinleyville encompasses most of the Norton/Widow White basin, with nearly 100 percent of the land privately owned. Historically, much of the basin was cleared for farming, agriculture and timber harvest purposes. The majority of the channel meanders through a low-lying coastal plain, and is currently occupied by urban and rural development, and some small-scale agricultural areas. The foothills, which contain the headwaters, have a more recent history of timber harvest with second growth currently dominating the landscape.

Significant habitat changes began in Norton/Widow White Creeks around the 1920s, when Highway 101 was built and created a fish barrier low in the basin. Currently, the long culvert at this location is still a partial barrier, inhibiting movement of juvenile salmonids. Just to the east of the highway, extensive urban development has also contributed to habitat degradation and there are many road/stream crossings, channelized reaches, water diversions, and housing and urban developments all within the riparian corridor. Many of the road crossings have created partial or complete barriers to fish and much of the riparian vegetation has been depleted or altered. Additionally, asphalt and other impervious surfaces replace upland vegetation in many cases, contributing to an altered and flashier hydrograph and decreased water quality throughout the lower basin.

Natural structures such as wood were likely removed during development to facilitate unimpeded flow through culverts and narrow channels, which has contributed to the simplification of the stream habitat. Additionally, the lack of riparian vegetation decreases future recruitment of large wood structures in the channel, further simplifying habitat. The original riparian vegetation containing old growth trees has been removed in many areas and has been replaced with nonnative species that do not provide the same benefits as natives. Many reaches are simplified through landscaping and other urban and residential alterations that do not provide the shade, bank stability, and floodplain structure necessary for functional coho salmon habitat.

Development in McKinleyville is composed primarily of residential neighborhoods, small retail businesses, and a small number of light industrial facilities. The high level of impervious surfaces from these developed areas contributes to increased storm water runoff, increased point and non-point source pollution, and alterations to the hydrology. Pollutants entering the storm water conveyance facilities are expected to consist of sediments and topsoil, oils and greases (petroleum hydrocarbons), organics (mainly from pesticides), nutrients (mainly from fertilizers), heavy metals, and bacterial/viral constituents (Humboldt County 2005), and are likely also entering Norton/Widow White Creek and negatively affecting coho salmon of all life stages.

Today, there are community efforts to restore this basin, particularly along the popular Hammond Trail, which provides a positive interpretive opportunity for the public. The schools that lie along the creeks also provide potential for educational activities related to stream habitat and fish use.

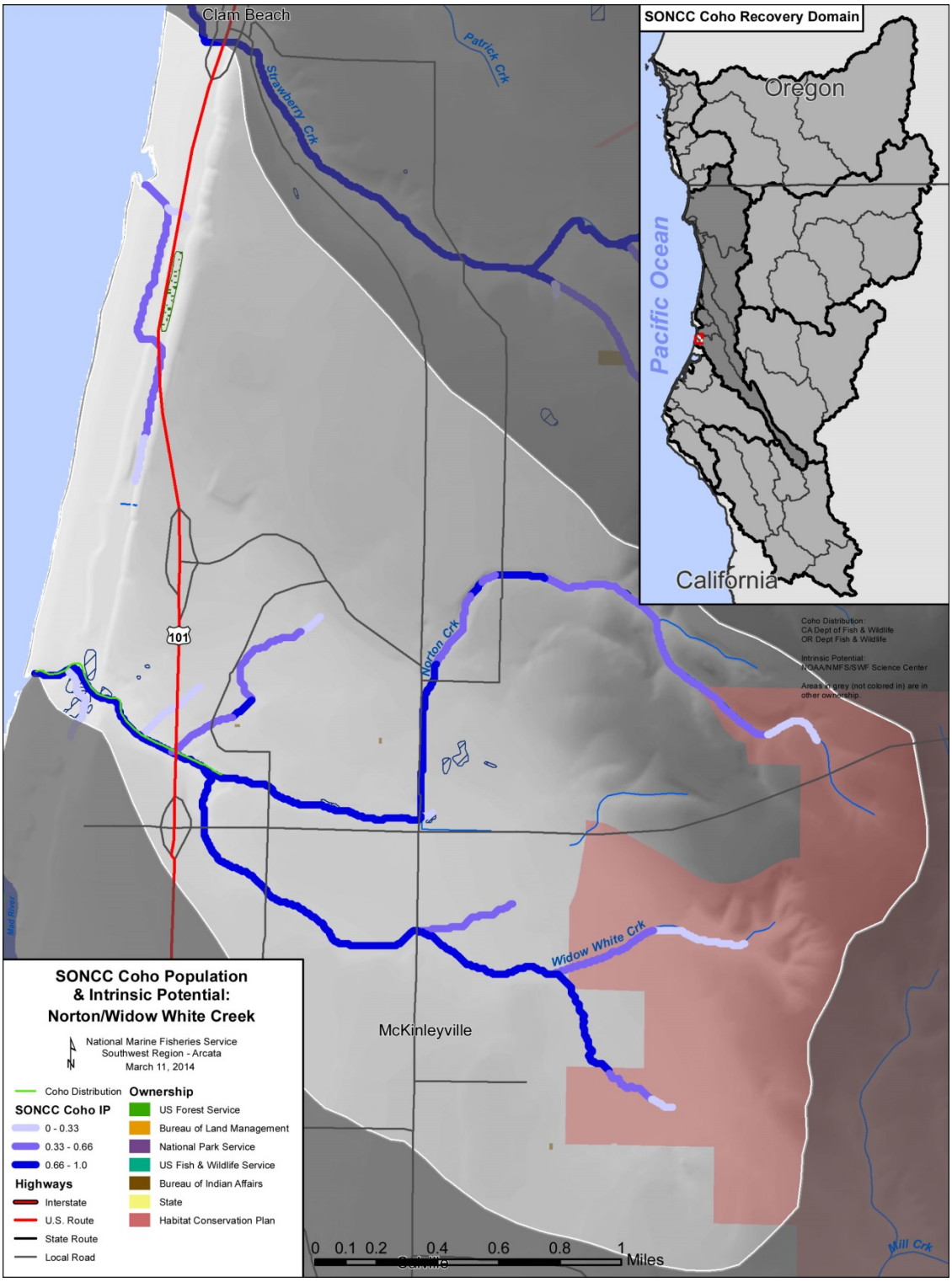

Figure 23-1. The geographic boundaries of the Norton/Widow White coho salmon population. Figure shows modeled Intrinsic Potential of habitat (Williams et al. 2006), land ownership, coho salmon distribution (CDFG 2012a), and location within the Southern-Oregon/Northern California Coast Coho Salmon ESU and the Northern Coastal diversity stratum (Williams et al. 2006). Grey areas indicate private ownership.

23.2 Historic Fish Distribution and Abundance

No data exist on run characteristics or population abundance for coho salmon in Norton Creek or the major tributary, Widow White Creek. Surveys detected presence of coho salmon brood year 2001 in Norton Creek and 2000 in Widow White Creek, but not 2001 in Widow White Creek (Garwood 2012). Additionally, two historical surveys did not detect presence of brood years 1983 in Widow White Creek (Garwood 2012). Potential coho salmon habitat is distributed throughout the 15.9 km² basin. The IP model shows 8.54 km of IP habitat, with high values (IP > 0.66) for most (5.94 km) of the basin, and lower values near the upper parts of Norton Creek and some smaller tributaries to Widow White Creek.

23.3 Status of Norton/Widow Coho Salmon

Spatial Structure and Diversity

The majority of both Norton and Widow White creeks have high IP value, indicating there is potential for good spatial distribution of coho salmon in the basin. The current distribution of coho salmon spans from the estuary upstream to just past the confluence of Norton and Widow White creeks (Figure 23-1). In the recent past, barriers limited coho salmon to the lowest reaches of the basin, but recent restoration activities have improved access allowing for the potential recolonization of the upper basin by coho salmon. Although several road/stream crossing barriers have been improved since 2001, the culvert at Highway 101 remains a partial barrier (Lang 2005) and continues to inhibit recovery in the majority of the basin.

The more restricted and fragmented the distribution of individuals within a population, and the more spatial distribution and habitat access diverge from historical conditions, the greater the extinction risk. The amount of habitat currently used by coho salmon is unknown but presumed to be very limited due to habitat degradation associated with urbanization and the presence of barriers.

Population Size and Productivity

There are no data available on the current or historic coho salmon population size or productivity in Norton/Widow White Creek; however, this population is designated as a dependent population and likely is dominated by strays from nearby stream systems. Due to extensive habitat degradation and migration barriers within the basin, population size and productivity are presumably low. Currently, Norton/Widow White Creek shares a mouth with the Mad River, which has a coho salmon population that is identified as functionally independent but is also currently severely depressed, and therefore not providing an abundance of individuals for straying into adjacent populations.

Extinction Risk

Not applicable because Norton/Widow White Creek is not an independent population.

Role in SONCC Coho Salmon ESU Viability

The Norton/Widow White Creek population is considered dependent because it does not have a high likelihood of sustaining itself over a 100-year time period in isolation and likely received sufficient immigration to alter its dynamics and extinction risk (Williams et al. 2006). Although such populations may not be fully viable on their own, they do increase connectivity by allowing dispersal among independent populations, acting as a source of colonists in some cases. Historically, the Norton/Widow White Creek population would have interacted with other Northern Coastal potentially independent populations, such as the Mad River to the south, or with other dependent populations like the Strawberry Creek to the north. Any restored habitat in Norton/Widow White Creek provides potential connectivity and increased resiliency in the SONCC coho salmon ESU.

23.4 Plans and Assessments

Green Diamond Resource Company (GDRC)

Green Diamond Aquatic Habitat Conservation Plan (ACHP)

The GDRC HCP (GDRC 2006) contains measures that will aid in conservation of aquatic species in the Norton/Widow White Creek basin. The GDRC owns 18 percent of the Norton/Widow White Creek basin. The plan has a number of provisions designed to protect coho salmon and salmon habitat on GDRC land in the Norton/Widow White Creek basin. The plan was developed in accordance with section 10(a)(1)(B) of the ESA and contains a conservation strategy to minimize and mitigate the potential adverse effects of any authorized take of aquatic species that may occur incidental to GDRC's activities. The authorized take and its probable impacts will not appreciably reduce the likelihood of survival and recovery in the wild of covered listed aquatic species. Elements of the AHCP are expected to contribute to efforts to reduce the need to list currently unlisted species in the future under the ESA by providing early conservation benefits to those species. More information about the GDRC AHCP can be found in Section 3.2.5.

23.5 Stresses

Table 23-1. Severity of stresses affecting each life stage of coho salmon in Norton/Widow White Creek. Stress rank categories, assessment methods, and data used to assess stresses are described in Appendix B.

	Stresses [2]	Egg	Fry	Juvenile[1]	Smolt	Adult	Overall Stress Rank
1	Degraded Riparian Forest Conditions[1]	-	Very High	Very High[1]	Very High	Very High	Very High
2	Lack of Floodplain and Channel Structure[1]	Low	High	High[1]	High	High	High
3	Altered Hydrologic Function	Medium	Medium	Medium	Medium	Low	Medium
4	Impaired Water Quality	Medium	Medium	Medium	Low	Low	Medium
5	Altered Sediment Supply	Low	Medium	Medium	Low	Medium	Medium
6	Barriers	-	Medium	Medium	Low	Low	Medium
7	Adverse Fishery- and Collection-Related Effects	-	-	Low	Low	Low	Low
8	Impaired Estuary/Mainstem Function	-	Low	Medium	Low	Low	Low
9	Adverse Hatchery-Related Effects	Low	Low	Low	Low	Low	Low

[1] Key limiting stresses and limited life stage.
[2] Increased Disease/Predation/Competition is not considered a stress for this population.

Key Limiting Stresses, Life Stages, and Habitat

The key limiting stresses for the Norton/Widow White Creek population are degraded riparian forest conditions and lack of floodplain and channel structure. It is likely that the juvenile life stage is most limited and that quality summer and winter rearing habitat is lacking as vital habitat for the population. Lack of riparian forests and channel structure significantly contribute to the simplification of the channel. Development within the lower basin coupled with timber harvest in the upper, have degraded the riparian forests and limited the availability for LWD recruitment. Simplification of the channel disconnects the floodplain and reduces rearing habitat for juvenile salmon in the summer and winter when fish are seeking either cover in cool, deep pools or off-channel velocity refugia.

The best refuge areas for coho salmon are located within the high IP reaches and outside of highly developed area. The upper reaches of Widow White Creek appear to be upstream of most development, and contain lower road densities and less coverage by impervious surfaces as compared to lower reaches in the watershed. This upper reach is upstream of any diversions and has potential for more complex habitat and riparian diversity. Unfortunately, there are many road crossings and highly channelized areas between the lower basin and the upper basin. The accumulation of partial barriers and low flow areas may limit access to these upper reaches.

Degraded Riparian Forest Conditions

Degraded riparian forest conditions present a very high stress across all life history stages except the egg stage. The high amount of urban/residential development in the lower part of the basin has altered the riparian and upslope landscape, and replaced native vegetation with impervious surfaces and exotic plants. Many of the legacy trees in the upper basin were harvested, resulting in little potential for large wood recruitment, increased sedimentation in spawning areas, decreased food availability, and widespread decreases in bank stability.

Lack of Floodplain and Channel Structure

Floodplain and channel structure presents a high stress across most life history stages of coho salmon. Urbanization has highly altered the floodplain of Norton/Widow White Creek. Changes in land uses affecting the floodplain and channel structure include urban/residential development, timber harvest and a shift from natural vegetation to impervious surfaces. No habitat surveys have been conducted in the Norton/Widow White Creek basin but the removal of large wood from stream channels and the removal/depletion of riparian habitat, which is the source of future large wood input, have likely reduced the structural complexity of stream channels. Fine sediment input from land use practices in the upper basin areas has likely filled pools and simplified habitat, limiting rearing and spawning habitat in accessible areas. .

Altered Hydrologic Function

Altered hydrologic function represents a medium stress across most life history stages. Hydrologic function has been altered through high amounts of impervious surfaces and several diversions. The McKinleyville Community Services District provides water from the Mad River to residents of the lower and middle portions of the basin (MCSD 2010) where the majority of the human population is located; however, there are several water diversions in the upper reaches of Widow White and Norton creeks. The diversions are relatively high in the basin, and it is unknown how much water the users are withdrawing. Additionally, many of the rural residents in the basin use wells that may contribute to a lowered water table.

Impaired Water Quality

Water quality poses a medium to low stress to coho salmon in the basin. This stress is most likely in the form of urban pollutants and surface runoff from impervious surfaces. Norton Creek runs through Humboldt Sanitation and Recycling, which is also the location of a historic auto-wrecking yard. The contribution of pollutants from this site is unknown. No water temperature data have been collected in the Norton/Widow White basin, but temperature is likely not a limiting factor for the Norton/Widow White basin because the entire basin falls within coastal influences, where cool and moist climate conditions dominate.

Altered Sediment Supply

Altered sediment supply is a medium stress to some life stages. Because of the high road density and decreased amount of riparian vegetation in the basin, sediment supply to the creeks has been altered and is likely affecting both rearing and spawning habitat. Many rural residents in the upper basin have gravel or dirt roads and driveways, which can contribute fine sediment to the

streams. Additionally, many of the residents have horses or cattle that graze adjacent to the stream and contribute to bank instability and the introduction of fine sediment into adjacent stream reaches. The combination of unpaved roads and erosion associated with livestock increases fine sediment input and contributes to the filling of pools and widening of channels. These fine sediments can also create high levels of embeddedness, decreasing the quality of spawning gravel.

Barriers

Barriers are a medium stress for the Norton/Widow White Creek coho salmon population. Although work has begun to address issues throughout the basin, barriers continue to be an issue. The California Fish Passage Assessment Database lists eight barriers in the Norton/Widow White Creek basin (CalFish 2009). Several partial or complete barriers related to culverts have recently been reconstructed to reduce impediments to fish passage (Lang 2005). Rather than replacing the culverts, jump heights have been reduced through the construction of multiple rock weirs that create a series of pools with one-foot jump heights at the culvert outlet. This method of grade control still poses passage problems for juvenile fish, reducing their ability to seek out refuge habitat. The culvert at Highway 101 is a partial barrier and is a high priority for replacement due to its location low in the basin. One natural barrier exists on Norton Creek at river mile 1.5, and appears to be related to low flows. This barrier is listed as the natural limit to anadromy in the creek (CalFish 2009). It appears restoration efforts to improve fish passage have lowered the severity of this stress. Currently, complete barriers have been removed, allowing adults access to the upper basin, while juvenile fish passage remains to be a problem.

Adverse Fishery- and Collection-Related Effects

Based on estimates of the fishing exploitation rate, as well as the status of the population relative to depensation and the status of NMFS approval for any scientific collection (Appendix B), these activities pose a low stress to juveniles, smolts, and adults.

Impaired Estuary/Mainstem Function

Dune dynamics and the migration of the Mad River mouth influence the mouth of Norton/Widow White Creek and its estuary. The Mad River mouth has migrated north over the last several decades, reaching all the way to Clam Beach and consuming the outlet of Norton/Widow White Creek. Currently, the Mad River mouth is moving south and Norton/Widow White Creek continues to flow parallel to the beach until reaching the mouth of the Mad River where it enters the sea. The continued southerly migration of the Mad River will probably isolate the mouth of Norton/Widow White Creek again in the future. There is some functional wetland habitat that is likely used by juveniles and smolts from this population as well as the Mad River coho salmon population. One potential issue may be stranding of juveniles in pools on the beach if the hydrology is such that fish can access these pools at high tide and then are stranded during low tide. These so-called “death traps” can heat up during the day and likely lead to mortality events. The lower part of the creek runs along the beach both north and south of where it meets the beach and there are numerous areas where it pools up and could result in such stranding events. Eliminating such features, which could be the result of anthropogenic

changes in the basin, would prevent this from happening. Overall, the availability of access to and from the basin and the availability of habitat make this a low stress for the population.

Adverse Hatchery-Related Effects

Hatchery-origin coho salmon may stray into Norton/Widow White Creek; however, the proportion of adults that are of hatchery origin is likely less than five percent. Therefore, adverse hatchery-related effects pose a low risk to all life stages.

23.6 Threats

Table 23-2. Severity of threats affecting each life stage of coho salmon in Norton/Widow White Creek. Threat rank categories, assessment methods, and data used to assess threats are described in Appendix B.

Threats[2]		Egg	Fry	Juvenile[1]	Smolt	Adult	Overall Threat Rank
1	Channelization/Diking[1]	Medium	Very High	Very High[1]	Very High	Very High	Very High
2	Roads[1]	Medium	Very High	Very High[1]	Very High	Very High	Very High
3	Urban/Residential/Industrial Dev.	Medium	Very High	Very High	Very High	Very High	Very High
4	Road-Stream Crossing Barriers	-	High	High	High	Medium	High
5	Timber Harvest	Medium	Medium	Medium	Medium	Low	Medium
6	Agricultural Practices	Low	Medium	Medium	Medium	Medium	Medium
7	Dams/Diversion	Low	Medium	Medium	Medium	Low	Medium
8	High Severity Fire	Low	Medium	Medium	Medium	Medium	Medium
9	Fishing and Collecting	-	-	Low	Low	Low	Low
10	Climate Change	Low	Low	Low	Low	Low	Low
11	Hatcheries	Low	Low	Low	Low	Low	Low
12	Invasive Non-Native/Alien Species	Low	Low	Low	Low	Low	Low

[1] Key limiting threats
[2] Mining/Gravel Extraction is not considered a threat to this population.

Key Limiting Threats

The two key limiting threats, those which most affect recovery of the population by influencing stresses, are channelization/diking, and roads.

Channelization/Diking

Channelization and diking are a very high threat to almost all life history stages of the Norton/Widow White Creek coho salmon population. This threat is tied to the urbanization of the basin, and contributes significantly to all stresses. The channel is restricted by the close proximity to roads and other urban structures, limiting its access to much of the floodplain. Further, habitat within the channelized area is simplified and therefore less suitable for coho salmon. One of the most acutely channelized reaches is Norton Creek along Central Avenue, where the high-IP habitat is confined to a narrow ditch for approximately 2000 feet.

Roads

Roads pose a very high threat to Norton/Widow White Creek coho salmon. Many of the roads in the more rural portions of the basin are unpaved with gravel or dirt surfaces, are not maintained, and contribute to increased sediment loading throughout the basin. Because these roads are in a rural setting and often in the form of driveways and private roads, they can be difficult to treat, as decommissioning or proper maintenance is often not an option. Additionally, the existence of these roads adjacent to the stream channel can contribute to altered hydrologic function, decreased bank stability, disconnected floodplain, and simplification of the channel.

Urban/Residential/Industrial Development

Urban and residential development in the Norton/Widow White Creek basin contributes to all of the stresses affecting this population, and poses a very high threat to almost all life history stages of coho salmon. The basin is almost entirely privately owned with a multitude of land uses including, timber harvest, residential development, light industrial and commercial services. Development has led to more paved roads, which facilitate runoff of pollutants into creeks, degrading water quality. Development has also resulted in other threats to this population, including road-stream crossing barriers and channelization.

Road-Stream Crossing Barriers

Road-stream crossing barriers constitute a low threat to the coho salmon population in Norton/Widow White Creek. There are six major road-stream crossings within the Norton/Widow White basin. Currently, none of these are known to be complete barriers to fish, however the partial barrier from the Highway 101 culvert may decrease distribution into the basin. Surveys by Humboldt State University (Lang 2005) and Ross Taylor and Associates (Taylor 2000) listed five barriers as either temporal and/or partial barriers. The Widow White Creek crossings at McKinleyville Road and Murray Road were modified to lower jump heights but still pose passage problems for juvenile salmon (Lang 2005). Road-stream crossings also occur on private roads and driveways, and the extent of fish passage problems at these stream crossings is unknown.

Timber Harvest

Extensive timber harvest likely occurred in the early history of McKinleyville's development and resulted in clearing the land for later agriculture and human settlement. Timber harvest may have contributed to early degradation of the riparian zone and lack of instream structure, which now are major stresses within the system. Today, timber harvest is considered a medium threat to the Norton/Widow White Creek population.

Today, at least 18 percent of the watershed is owned by GDRC and managed for timber harvest under an AHCP (GDRC 2006) that includes minimization and mitigation measures consisting of road and riparian management, slope stability, and harvesting restrictions. The impacts of timber harvesting, even if carried out under the AHCP, may result in the loss of pool habitat, loss of large wood and stream complexity, altered hydrology and nutrient cycling, and increased sediment loads. Adverse changes in habitat conditions will have a negative effect on all life stages of coho salmon utilizing those areas (NMFS 2007a). GDRC's recent wood additions to

streams and their assessments of erosion and sedimentation sources will help mitigate the impacts from future timber harvest in Norton/Widow White Creek.

Agricultural Practices

Agriculture may have once played a more significant role in the Norton/Widow White Creek basin, but now only presents a medium threat. Most of the basin is dominated by urban and rural development; however there are some small-scale agriculture lands further upstream at the base of the foothills. Many of these landowners have a small number of horses or cattle grazing adjacent to the stream. Grazing can contribute to multiple stresses including increased sediment supply, degraded riparian zones, and poor water quality.

Dams/Diversions

Dams and diversions present a medium threat across all life stages. There are no known dams within the Norton/Widow White Creek basin; however, there are at least three diversions. These diversions can contribute to decreased flows, limiting the habitat availability and increasing stream temperatures in the summer. However, given the location of this population on the coast in a cool, wet climate, it is unlikely that the small numbers of withdrawals are having a significant effect on the water quantity and quality in Norton/Widow White Creek.

High Severity Fire

High severity fire poses a medium threat to the coho salmon population in Norton/Widow White Creek. Due to the largely urban and pastoral setting, timber stands do not occupy much of the area and therefore fire is not an imminent threat to the population. If those timber stands that remain, primarily those in the upper basin, were to burn, the resultant sediment delivery to streams would be harmful to the coho salmon habitat found there as well as to individuals living downstream. However, the likelihood of a large catastrophic fire is small given the cool, damp climate and the lack of fuels found throughout the area.

Fishing and Collecting

Based on estimates of the fishing exploitation rate, as well as the status of the population relative to depensation and the status of NMFS approval for any scientific collection (Appendix B), these activities pose a low threat to juveniles, smolts, and adults.

Climate Change

There is moderate risk of a change in average precipitation over the next 50 years (Appendix B). Modeled regional average temperature shows a low increase over the next 50 years (Appendix B). Average temperature could increase by up to 1^{o} C in the summer and by a similar amount in the winter. The risk of sea level rise is low to moderate (Thieler and Hammer-Klose 2000), which may impact the quality and extent of wetland juvenile and smolt habitat. Adults may be negatively impacted by climate-related ocean acidification and changes in ocean conditions and prey availability (see Independent Science Advisory Board 2007, Feely et al. 2008, Portner and Knust 2007).

Hatcheries

Hatcheries pose a low threat to all life stages of coho salmon in the Norton/Widow White Creek population area. The rationale for these ratings is described under the "Adverse Hatchery-Related Effects" stress.

Invasive and Non-Native/Alien Species

Given the extent of residential development along streams in the Norton/Widow White Creek basin, it is likely that invasive plant species will spread from residential landscaping into riparian areas, particularly if there are pre-existing gaps in the riparian vegetation. Some of these species could impede restoration of riparian forests and wetlands. The extent to which this has already occurred is unknown.

23.7 Recovery Strategy

The greatest need for habitat restoration and threat reduction is in those areas currently occupied by coho salmon in the lower reaches of Widow White and Norton creeks. Unoccupied areas must also be restored to provide enough habitat for coho salmon recovery.

The Norton/Widow White Creek population is considered dependent and therefore cannot be viable on its own; however, it is necessary to restore access and habitat within the basin so that it can provide connectivity between other populations in the ESU. The recovery criterion for the population is that coho salmon must occupy 80% of available IP habitat in years following spawning of brood years with high marine survival. The coho salmon population in Norton/Widow White Creek is severely depressed, with adult salmon only recently regaining access to habitat throughout the basin. The most important factor limiting recovery of coho salmon in the Norton/Widow White Creek basin is a lack of suitable rearing habitat for juveniles. The processes that create and maintain such habitat must be restored by increasing habitat complexity within the channel, re-establishing off-channel rearing areas, restoring riparian forests, and reducing threats to instream habitat. Other necessary actions include additional fish passage improvements, particularly at Highway 101, which is a partial barrier to adults, but also several juvenile barriers at county road crossings. Urban development and associated roads and channelization are the largest threats, contributing to most stresses, but remains the most difficult to change. The effects of fishing on this population's ability to meet its viability criteria should be evaluated.

Table 23-3 on the following page lists the recovery actions for the Norton/Widow White Creek population.

Table 23-3. Recovery action implementation schedule for the Norton/Widow White Creek population. Recovery actions for monitoring and research are listed in tables at the end of Chapter 5.

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-NWWC.7.1.1	Riparian	Yes	Improve wood recruitment, bank stability, shading, and food subsidies	Improve long-range planning	Population wide	2c
SONCC-NWWC.7.1.1.1	*Review General Plan or City Ordinances to ensure coho salmon habitat needs are accounted for. Revise if necessary*					
SONCC-NWWC.7.1.1.2	*Develop watershed-specific guidance for managing riparian vegetation*					
SONCC-NWWC.7.1.2	Riparian	Yes	Improve wood recruitment, bank stability, shading, and food subsidies	Increase conifer riparian vegetation	Population wide	2c
SONCC-NWWC.7.1.2.1	*Develop an appropriate timber harvest management plan for benefits to coho salmon habitat*					
SONCC-NWWC.7.1.2.2	*Thin, or release conifers, guided by the plan*					
SONCC-NWWC.7.1.2.3	*Plant conifers, guided by the plan*					
SONCC-NWWC.2.1.7	Floodplain and Channel Structure	Yes	Increase channel complexity	Increase LWD, boulders, or other instream structure	All streams where coho salmon would benefit immediately	2c
SONCC-NWWC.2.1.7.1	*Assess habitat to determine beneficial location and amount of instream structure needed*					
SONCC-NWWC.2.1.7.2	*Place instream structures, guided by assessment results*					
SONCC-NWWC.2.1.26	Floodplain and Channel Structure	Yes	Increase channel complexity	Increase LWD, boulders, or other instream structure	Population wide	2d
SONCC-NWWC.2.1.26.1	*Assess habitat to determine beneficial location and amount of instream structure needed*					
SONCC-NWWC.2.1.26.2	*Place instream structures, guided by assessment results*					
SONCC-NWWC.2.2.8	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Construct off channel habitats, alcoves, backwater habitat, and old stream oxbows	Lower Widow White Creek and all streams where coho salmon would benefit immediately	2c
SONCC-NWWC.2.2.8.1	*Identify potential sites to create refugia habitats. Prioritize sites and determine best means to create rearing habitat*					
SONCC-NWWC.2.2.8.2	*Implement restoration projects that improve off channel habitats to create refugia habitat, as guided by assessment results*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-NWWC.2.2.27	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Construct off channel habitats, alcoves, backwater habitat, and old stream oxbows	Population wide	2d
SONCC-NWWC.2.2.27.1	*Identify potential sites to create refugia habitats. Prioritize sites and determine best means to create rearing habitat*					
SONCC-NWWC.2.2.27.2	*Implement restoration projects that improve off channel habitats to create refugia habitat, as guided by assessment results*					
SONCC-NWWC.5.1.3	Passage	No	Improve access	Remove barriers	Highway 101 culvert and all streams where coho salmon would benefit immediately	2c
SONCC-NWWC.5.1.3.1	*Evaluate and prioritize barriers for removal*					
SONCC-NWWC.5.1.3.2	*Prioritize and resolve passage issues at Highway 101*					
SONCC-NWWC.5.1.3.3	*Upgrade County culverts to accommodate fish passage at all life stages*					
SONCC-NWWC.5.1.29	Passage	No	Improve access	Remove barriers	Population wide	2d
SONCC-NWWC.5.1.29.1	*Evaluate and prioritize barriers for removal*					
SONCC-NWWC.5.1.29.2	*Prioritize and resolve passage issues, based on evaluation*					
SONCC-NWWC.5.1.29.3	*Upgrade County culverts to accommodate fish passage at all life stages*					
SONCC-NWWC.10.2.16	Water Quality	No	Reduce pollutants	Reduce pesticides	All areas where coho salmon would benefit immediately	2c
SONCC-NWWC.10.2.16.1	*Develop a pesticide management plan*					
SONCC-NWWC.10.2.16.2	*Implement pesticide management plan and technical assistance program*					
SONCC-NWWC.10.2.24	Water Quality	No	Reduce pollutants	Reduce pesticides	Population wide	2d
SONCC-NWWC.10.2.24.1	*Develop a pesticide management plan*					
SONCC-NWWC.10.2.24.2	*Implement pesticide management plan and technical assistance program*					
SONCC-NWWC.2.2.9	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Increase beaver abundance	Lower Widow White Creek and all streams where coho salmon would benefit immediately	3c
SONCC-NWWC.2.2.9.1	*Develop a beaver conservation plan that includes education and outreach, technical assistance for land owners, and methods for reintroduction and/or relocation of beaver as a last resort*					
SONCC-NWWC.2.2.9.2	*Implement education and technical assistance programs for landowners, guided by the plan*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-NWWC.2.2.28	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Increase beaver abundance	Population wide	2d
SONCC-NWWC.2.2.28.1	*Develop a beaver conservation plan that includes education and outreach, technical assistance for land owners, and methods for reintroduction and/or relocation of beaver as a last resort*					
SONCC-NWWC.2.2.28.2	*Implement education and technical assistance programs for landowners, guided by the plan*					
SONCC-NWWC.10.7.23	Water Quality	No	Restore nutrients	Add marine-derived nutrients to streams	All streams where coho salmon would benefit immediately	3c
SONCC-NWWC.10.7.23.1	*Develop a plan to supply appropriate amounts of marine-derived nutrients to streams (e.g. carcass placement, pellet dispersal)*					
SONCC-NWWC.10.7.23.2	*Supply marine-derived nutrients to streams guided by the plan*					
SONCC-NWWC.10.7.25	Water Quality	No	Restore nutrients	Add marine-derived nutrients to streams	Population wide	3d
SONCC-NWWC.10.7.25.1	*Develop a plan to supply appropriate amounts of marine-derived nutrients to streams (e.g. carcass placement, pellet dispersal)*					
SONCC-NWWC.10.7.25.2	*Supply marine-derived nutrients to streams guided by the plan*					
SONCC-NWWC.2.2.15	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Improve regulatory mechanisms	Population wide	BR
SONCC-NWWC.2.2.15.1	*Improve protective regulations for beaver and develop guidelines for relocation that are practical for restoration groups*					
SONCC-NWWC.10.2.4	Water Quality	No	Reduce pollutants	Educate stakeholders	Population wide	BR
SONCC-NWWC.10.2.4.1	*Assess and prioritize point and non-point sources of pollution*					
SONCC-NWWC.10.2.5	Water Quality	No	Reduce pollutants	Educate stakeholders	Population wide	BR
SONCC-NWWC.10.2.5.1	*Develop an educational program that teaches landowners and businesses about avoiding pollution from septic systems, backyard pesticides, fuels, and nutrients*					