
CHAPTER 9: RECOVERY CRITERIA

"Recovery is the process by which listed species and their ecosystems are restored and their future safeguarded to the point that protections under the ESA are no longer needed"

Interim Recovery Planning Guidelines July, 2006

FRAMEWORK FOR DOWNLISTING & DELISTING

The ESA requires recovery plans to incorporate (to the maximum extent practicable) objective, measurable criteria which, when met, would result in a determination in accordance with the provisions of the ESA that the species be removed from the Federal List of Endangered and Threatened Wildlife and Plants (50 CFR 17.11 and 17.12). The recovery criteria herein, or formal downlisting and delisting criteria, for the CCC coho salmon ESU include: (1) population based biological criteria that considers future commercial, recreational and tribal harvest; (2) criteria to measure watershed health and (3) criteria for the abatement and amelioration of threats. These criteria require clear evidence that the populations' status has improved in response to the reduction of threats and that they are tracking the reduction or abatement of threats (new and those identified at the time of listing). The analysis includes an assessment that threats, leading to the species decline and listing, have been reasonably controlled.

RECOVERY GOALS AND OBJECTIVES

The overarching goals of this recovery plan are to prevent the extinction of wild CCC coho salmon and ensure their long term persistence in a viable, self sustaining, and eventually harvestable status across the ESU. Before NMFS considers downlisting or delisting CCC coho salmon, substantially higher numbers of returning adults and, successful spawning and rearing conditions in freshwater environments, are needed. To that end it is critically important to preserve, enhance, and restore the species' existing habitats. Individual watersheds must have the capacity to support self-sustaining populations in the face of natural variation and conditions such as predation, droughts, floods, variable ocean conditions, wildfires, and long-term climate change. Viable populations across ensures a viable ESU. NMFS has identified three objectives for the ultimate recovery of CCC coho salmon:

Objective 1: Prevent extinction by protecting habitats in Core Areas within identified focus populations. This will be accomplished by improving current conditions, and ameliorating existing and future threats;

Objective 2: Re-establish viable populations in the 28 prioritized watersheds (at a minimum) and within four of the five Diversity Strata by protecting, enhancing, and

restoring habitats to properly functioning conditions, and by controlling and abating existing and future threats in all Core, Phase I and Phase II areas;

Objective 3: Implement standardized monitoring of coho salmon populations and their habitat across the CCC ESU. Standardization reduces uncertainty associated with habitat assessment methods and increases confidence in population estimates when evaluating effectiveness of recovery actions. Standardization will also improve accuracy when measuring progress towards downlisting and delisting criteria.

RECOVERY CRITERIA

Recovery criteria measure progress toward achieving recovery objectives. Criteria must be “SMART”: specific, measurable, achievable, realistic and time-referenced. NMFS is proposing downlisting criteria for the transition between the endangered and threatened status, as well as delisting criteria, for the ESU. The specific criteria related to the status of populations, improvements in watershed conditions and the abatement of threats across the ESU must be met prior to downlisting or delisting. In addition, an analysis of threats pursuant to the five statutory listing factors in section 4 of the ESA will be necessary. An outline of the population, watershed and threat abatement criteria is provided in Table 17 followed by Table 18 which provides a summary of all recovery criteria.

Table 21: Outline and Hierarchy of Recovery Criteria for CCC coho salmon ESU

<p><i>Downlisting and Delisting Recovery Criteria for Populations and ESU</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Population Level Criteria for Independent and Dependent Populations <input type="checkbox"/> ESU Recovery Criteria for Delisting
<p><i>Downlisting and Delisting Criteria for Watershed Health</i></p>
<p><i>Downlisting and Delisting Criteria for Threats (including an analysis of the five listing factors)</i></p> <p>Five Listing Factors</p> <ul style="list-style-type: none"> <input type="checkbox"/> Present or threatened destruction, modification, or curtailment of habitat or range <input type="checkbox"/> Overutilization for commercial, recreational, scientific, or educational purposes <input type="checkbox"/> Disease or predation <input type="checkbox"/> Inadequacy of existing regulatory mechanisms <input type="checkbox"/> Other natural and manmade factors affecting the species continued existence

Table 22: Population, Watershed Condition and Threat Criteria

	Population	ESU	Improving Watershed Condition	Abating Threats
Downlist	<ul style="list-style-type: none"> - All focus Independent Populations meet moderate extinction risk criteria of annual abundance >15 spawners/IP-km, over a 12 year period (four generations)¹⁶. - The sum of annual spawner abundance for Dependent populations in each focus Diversity Stratum is 50% of the total stratum abundance target over a 12 year period. 	<ul style="list-style-type: none"> -All focus Independent and Dependent populations meet Population, Habitat, and Threats criteria for downlisting. 	<p>For each focus Diversity Stratum (Lost Coast, Navarro – Gualala Point, Coastal, and Santa Cruz) three criteria must be achieved for focus Independent and Dependent populations: (1) Key habitat attributes rated as poor or fair shift one level higher to an improved indicator rating in 50% of Core and 50% of Phase I areas; (2) Key habitat attributes rated as poor or fair shift one level higher to an improved rating in 25% of Phase II areas; and (3) > 32 IP-km of good quality habitat (based on good ratings of key habitat attributes) exists in each focus Independent basin.</p>	<p>For each focus Diversity Stratum (Lost Coast, Navarro –Gualala Point, Coastal, and Santa Cruz) two criteria must be achieved for focus Independent and Dependent populations: (1) All Core and 75% of Phase I areas improve one level in threat rank <i>and/or</i> all Core and 75% of Phase I areas rank as Low or Medium; and (2) 25% of Phase II areas improve one level in threat rank <i>and/or</i> 25% of Phase II areas rank as Low or Medium.</p>
Delist	<ul style="list-style-type: none"> - All Independent Populations meet low extinction risk criteria (e.g. spawner density recovery targets) over a 12 year period (four generations). - All Dependent populations meet recovery abundance targets. 	<ul style="list-style-type: none"> - All focus Independent and Dependent populations meet population, Habitat and Threats criteria for delisting. 	<p>For each focus Diversity Stratum (Lost Coast, Navarro – Gualala Point, Coastal, and Santa Cruz) three criteria must be achieved for all Independent and Dependent Populations: (1) Key habitat attributes rated as poor or fair shift one level higher to an improved rating in 75% of Core and 75% of Phase I areas <i>and/or</i> 75% of Core and 75% of Phase I areas rank Good or Very Good for these conditions; and (2) Key habitat attributes rated as poor or fair shift one level higher to an improved rating in 50% of Phase II areas <i>and/or</i> 50% of Phase II areas rank as Good or Very Good; and (3) > 75% of IP-km habitat contributing to spawning targets is rated as high quality.</p>	<p>For each focus Diversity Stratum (Lost Coast, Navarro –Gualala Point, Coastal, and Santa Cruz) two criteria must be achieved for all focus populations: (1) All Core and 75% of Phase I areas improve one level in threat rank <i>and/or</i> all Core and 75% of Phase I areas rank as Low or Medium and (2) 50% of Phase II areas improve one level in threat rank <i>and/or</i> 50% of Phase II areas rank as Low or Medium.</p>

¹⁶ At >15 adult coho salmon spawners per IP-km will allow all Independent populations to meet the threshold for low extinction risk for the population characteristic Ng, or total population size per generation (Ng ≥ 2500).

Biological Viability Criteria versus Delisting Recovery Criteria

The biological viability criteria developed by Spence *et al.* (2008) (Appendix B) set the foundation for understanding the long term biological viability of CCC coho salmon populations and ESU. These viability criteria, however, are not synonymous with recovery criteria. The viability criteria define “sets of conditions or rules for viable populations that, if satisfied, would suggest that the ESU is at low risk of extinction” (Spence *et al.* 2008). These general conditions include: (1) achieving population viability across selected populations; and (2) attaining a number and configuration of viable populations across the landscape to ensure long-term viability of the ESU as a whole. The criteria, however, “...do not explicitly specify which populations must be viable for the ESU to be viable... but rather they establish a framework within which there may be several ways by which ESU viability can be achieved” (Spence *et al.* 2008). Furthermore, the biological viability criteria do not include specific numeric targets for the abundances of populations identified as “dependent”.

The viability criteria provide a theoretical foundation and practical basis for recovery planners to select populations for the inclusion into the recovery scenario, and to develop criteria for measuring population response to recovery actions. The viability criteria include metrics for population abundance, productivity, spatial structure, and diversity. Populations that are abundant at each life stage, highly productive, widely distributed, and exhibit the full variety of life history traits available are considered at low risk of extinction.

Downlisting and delisting recovery criteria includes: (1) biological viability criteria for Independent populations; (2) numeric criteria for Dependent populations; (3) criteria to track improvement of watershed conditions (e.g., health); and (4) criteria tracking the amelioration of threats including a specific analysis of threats outlined under the five listing factors. These criteria take into consideration the landscape context influencing our watersheds and salmon and the expectation that as these ecological processes are rebuilt to support ecosystem health and productivity, a surplus of salmon can develop for tribal, recreational or commercial harvests (numeric criteria not included in Spence *et al.* 2008).

Downlisting and Delisting Recovery Criteria for Populations and ESU

Downlisting and delisting recovery criteria have been developed for Independent and Dependent populations as well as targets for their associated Diversity Strata. Since the viability criteria developed by Spence *et al.* 2008 focused on Independent populations, and did not include explicit numeric targets for abundances of Dependent populations. Criteria were thus developed for Dependent Populations to: (1) maintain connectivity within and across diversity strata; (2) provide potential sources of colonizers if adjacent populations are extirpated or experience severe declines; and, (3) ensure continued genetic reservoirs in strata where Independent populations are extirpated. The 16 selected Dependent populations must exhibit occupancy patterns consistent with patterns expected under sufficient immigration arising from the Independent populations. Thus, different metrics are involved in the development and evaluation of criteria between Independent and Dependent populations.

Population Level Recovery Criteria for Independent Populations

The population viability criteria (also termed extinction risk criteria), when met, are expected to result in Independent populations with a low risk of extinction (*i.e.*, viable). These criteria are: (1) likelihood of extinction; (2) effective population size or total population size; (3) population decline; (4) catastrophic decline; (5) spawner density, and; (6) hatchery influence (Table 19). In addition, spawner abundance criteria have been assigned to each Independent population. The population criteria have been aggregated at the Diversity Strata level to ensure the criteria meets ESU viability criteria outlined in Spence *et al.* 2008 (Table 20) which includes all criteria associated with Independent populations must be met to be considered for downlisting and delisting.

Table 23: Population Extinction Risk Criteria

Population Characteristic	Extinction Risk		
	High	Moderate	Low
Extinction risk from population viability analysis (PVA)	≥ 20% within 20 yrs	≥ 5% within 100 yrs but < 20% within 20 yrs	< 5% within 100 yrs
	- or any ONE of the following -	- or any ONE of the following -	- or ALL of the following -
Effective population size per generation	$N_e \leq 50$	$50 < N_e < 500$	$N_e \geq 500$
-or-	-or-	-or-	-or-
Total population size per generation	$N_g \leq 250$	$250 < N_g < 2500$	$N_g \geq 2500$
Population decline	Precipitous decline ^a	Chronic decline or depression ^b	No decline apparent or probable
Catastrophic decline	Order of magnitude decline within one generation	Smaller but significant decline ^c	Not apparent
Spawner density	$N_a/IPkm^d \leq 1$	$1 < N_a/IPkm < MRD^e$	$N_a/IPkm \geq MRD^e$
Hatchery influence ^f	Evidence of adverse genetic, demographic, or ecological effects of hatcheries on wild population		No evidence of adverse genetic, demographic, or ecological effects of hatchery fish on wild population

^a Population has declined within the last two generations or is projected to decline within the next two generations (if current trends continue) to annual run size $N_a \leq 500$ spawners (historically small but stable populations not included) or $N_a > 500$ but declining at a rate of $\geq 10\%$ per year over the last two-to-four generations.

^b Annual run size N_a has declined to ≤ 500 spawners, but is now stable *or* run size $N_a > 500$ but continued downward trend is evident.

^c Annual run size decline in one generation $< 90\%$ but biologically significant (e.g., loss of year class).

^d $IPkm$ = the estimated aggregate intrinsic habitat potential for a population inhabiting a particular watershed (*i.e.*, total accessible km weighted by reach-level estimates of intrinsic potential; see Bjorkstedt *et al.* [2005] for greater elaboration).

^e MRD = minimum required spawner density and is dependent on species and the amount of potential habitat available. Figure 5 summarizes the relationship between spawner density and risk for each species.

^f Risk from hatchery interactions depends on multiple factors related to the level of hatchery influence, the origin of hatchery fish, and the specific hatchery practices employed.

Table 24: Delisting and Downlisting Spawner Abundance Criteria for Independent Populations

<u>Diversity Strata</u>	<u>Population</u>	<u>IP-km</u>	<u>Density Target</u>	<u>Delisting Target</u>	<u>Downlisting Target</u>
Lost Coast	Ten Mile	105	34.9	3700	1575
Lost Coast	Noyo	118	34.0	4000	1770
Lost Coast	Big	192	28.9	5500	2880
Lost Coast	Albion	59	38.1	2300	885
				Total: 15,500	7110
Navarro Pt.	Navarro	201	28.3	5700	3015
Navarro Pt.	Garcia	76	36.9	2800	1140
Navarro Pt.	Gualala	252	24.8	6200	3780
				Total: 14,700	7935
Coastal	Russian	506	20.0	10,100	7590
Coastal	Walker	76	36.9	2800	1140
Coastal	Lagunitas	70	37.3	2600	1050
				Total: 15,500	9780
Santa Cruz	Pescadero	61	38.0	2300	915
Santa Cruz	San Lorenzo	126	33.4	4200	1890
				Total: 6500	2805
ESU Total:				52,200	27,630

Downlisting targets in Table 20 are based on meeting the threshold for the low extinction risk population characteristic N_g , or total population size per generation ($N_g \geq 2500$) for the smallest independent population (Albion River 59 IP-km). At the adult spawner density of 15 fish per IP-km all independent populations exceed the per generation target of 2500 adult fish.

For delisting, Table 20 displays spawner abundances are scaled between 20 and 40 spawners per IP-km depending on watershed size; abundance criteria is the product of the density times the total number of IP-km in that watershed. Criteria are evaluated per generation (e.g. 3 years) across 4 consecutive generations (e.g., 12 years). See Spence *et al.* 2008 for detailed equations.

Population Level Recovery Criteria for Dependent Populations

Adult spawner numeric criteria were developed for each Dependent population and their associated Diversity Strata. These numeric targets were developed using best available historical

data and information associated with adult spawner densities within Dependent population watersheds. Data from 1933-1942 in Waddell Creek, Santa Cruz County (Shapovalov and Taft 1954), were used as a reference for the spawner target density target¹⁷. The average spawner population during the period between 1932 and 1954 was 312 fish (range 111-748) resulting in a spawner density target of 34 per IP-km (312/9.2 IP-km). The statements of Shapovalov and Taft likely understate the degree Waddell Creek had been affected by the removal of the redwood forest. Virtually all portions of the watershed accessible to coho salmon were extensively disturbed prior to the onset of the Shapovalov and Taft study. Early logging practices were particularly destructive and this level of disturbance likely resulted in a significant reduction in the productive capacity for coho salmon in the watershed. Nonetheless, we believe these numeric criteria represent best available information regarding average spawner populations to be expected in Dependent watersheds. The 34 spawner adults per IP-km were calculated against the current IP-km in each population to yield the recovery delisting targets in the table. Downlisting criteria for Dependent populations is to meet a 50% stratum target evaluated per generation (e.g., 3 years) across 4 consecutive generations (e.g., 12 years) with at least two populations in that stratum contributing to the 50% stratum target. Downlisting and delisting criteria are outlined in Table 21.

¹⁷ It is important to note that virtually all portions of the Waddell Creek watershed, at the time of the Shapovalov and Taft study in the 1930's, were far from pristine conditions. Shapovalov and Taft describe Waddell Creek in the following terms: *"Some changes from the primitive condition of the area have taken place as a result of human usage. The redwood forest of the watershed below Big Basin was logged off by 1870 and is now covered by a second growth. The early lumbering operations have resulted in the creation of several semi permanent log jams and temporary accumulations of logs, which have hastened erosion of stream banks, with consequent increase in silting during flood stage."*

Table 25: Delisting and Downlisting Spawner Abundance Criteria for Dependent Populations

Dependent Population	Current	Delisting Target	
	IP-km	Spawner/km	Na
Usal Creek	10.6	34	360
Cottaneva Creek	13.8	34	469
Wages Creek	10	34	340
Pudding Creek	28.9	34	983
Casper Creek	12.8	34	435
Big Salmon Creek	17	34	578
Salmon Creek	47.6	34	1618
Pine Gulch	7.4	34	252
Redwood Creek	8	34	272
San Gregorio	40.1	34	1363
Gazos Creek	8.2	34	279
Waddel Creek	9.2	34	313
Scott Creek	15	34	510
San Vicente Creek	3.1	34	105
Soquel Creek	33	34	1122
Aptos Creek	27.4	34	932
Lost Coast-Navarro Point	6 Populations	Stratum Total (Delisting)	3165
		50% Aggregate (Downlisting)	1583
Navarro Point-Gualala Point	No Populations Selected		0
Coastal	3 Populations	Stratum Total (Delisting)	2142
		50% Aggregate (Downlisting)	1071
Santa Cruz Mountains	7 Populations	Stratum Total (Delisting)	4624
		50% Aggregate (Downlisting)	2312
		ESU	
		Total (Delisting)	9931
		50% Total (Downlisting)	4966

ESU Recovery Criteria for Delisting

Four criteria were developed that, collectively, constitute a configuration in the number and distribution of viable and non-viable populations that would likely provide for ESU persistence over 100 year time frame (i.e., viable). Thus, there may be “several plausible scenarios of population viability that could satisfy ESU-level criteria” {Spence, 2008}. The goals of the ESU criteria are to reduce the risk of extinction by ensuring (1) connectivity between populations, (2) representation of ecological, morphological, and genetic diversity, and (3) redundancy in populations to minimize risks associated with catastrophic events.

In characterizing a viable ESU the TRT applied the hypothesis that populations, as they functioned in their historical context, were highly likely of persisting and that “...*increasing departure from historical characteristics logically requires a greater degree of proof that a population is indeed viable*” (Spence *et al.* 2008). Due to the likely historical roles of functionally independent or potentially independent populations these form the foundation of the ESU viability criteria. The “non-viable” or dependent population criteria were designed to ensure reservoirs of genetic diversity, contribute to connectivity, reduce risk of ESU extinction, and provide a source of colonizers to extirpated watersheds and buffer ocean conditions and disturbances to independent populations.

To ensure the ESU goals of reducing the risk of extinction are realized, the following viability criteria must be met for delisting (See Spence *et. al.* 2008 for more information):

(1) Representation Criteria;

1.a. All indentified diversity strata that include historical FIPs or PIPs within an ESU should be represented by viable population for the ESU to be considered viable.

-AND-

1. b. Within each diversity stratum, all extant phenotypic diversity (i.e., major life-history types) should be represented by viable populations.

(2) Redundancy and Connectivity;

2.a. At least fifty percent of historically independent populations (FIPs or PIPs) in each diversity stratum must be demonstrated to be at low risk of extinction according to the population viability criteria. For strata with three or fewer independent populations, at least two populations must be viable.

-AND-

2.b. Within each diversity stratum, the total aggregate abundance of independent populations selected to satisfy this criterion must meet or exceed 50% of the aggregate viable population abundance (*i.e.*, meeting density-based criteria for low risk) for all FIPs and PIPs.

(3) ESU Occupancy;

3.a. Remaining populations, including historically dependent populations or any historical FIPs or PIPs that are not expected to attain a viable status, must exhibit occupancy patterns consistent with those expected under sufficient immigration subsidy arising from the Independent populations selected to satisfy the preceding criterion.

(4) Distribution Across ESU;

-
- 4.a. The distribution of extant populations, regardless of historical status, must maintain connectivity within the diversity stratum, as well as connectivity to neighboring diversity strata.

Downlisting Recovery Criteria for Watershed Health and Threats

To consider downlisting, the following criteria (in addition to the population and ESU level criteria) must be met for each focus Diversity Stratum (Lost Coast, Navarro –Gualala Point, Coastal, and Santa Cruz) and each identified Independent and Dependent population. These criteria are based on the TNC CAP workbook analysis and the associated ranking outputs of very good/good/fair/poor habitat and landscape attributes and the very high/high/medium/low threats. The identified shifts in levels will be accomplished by conducting the CAP workbook analysis process as described in this recovery plan. Table 18 provides a summary of these criteria.

(1) Key Habitat Attributes Criteria for Improving Watershed Health:

- 1.a. Key habitat attributes rated as poor or fair shift one level to an improved indicator rating in 50% of Core and 50% of Phase I areas;

-AND-

- 1.b. Key habitat attributes rated as poor or fair shift one level higher to an improved rating in 25% of Phase II areas;

-AND-

- 1.c. > 32 IP-km of good quality habitat (based on good ratings of key habitat attributes) exists in each focus Independent basin.

(2) Threats Criteria:

2. a. All Core and 75% of Phase I areas improve one level in threat rank *and/or* all Core and 75% of Phase I areas rank as Low or Medium;

-AND-

- 2.b. 25% of Phase II areas improve one level in threat rank *and/or* 25% of Phase II areas rank as Low or Medium.

Delisting Recovery Criteria for Watershed Health and Threats

To consider delisting, the following criteria (in addition to the population and ESU level criteria) must be met for each focus Diversity Stratum (Lost Coast, Navarro –Gualala Point, Coastal, and Santa Cruz) and each identified Independent and Dependent population. These criteria are based on the TNC CAP workbook analysis and the associated ranking outputs of very good/good/fair/poor habitat and landscape attributes and the very high/high/medium/low threats. The identified shifts in levels will be accomplished by conducting the CAP workbook analysis process as described in this recovery plan. Table 18 provides a summary of these criteria.

(1) Key Habitat Attributes Criteria for Improving Watershed Health:

1.a. Key habitat attributes rated as poor or fair shift one level higher to an improved rating in 75% of Core and 75% of Phase I areas *and/or* 75% of Core and 75% of Phase I areas rank Good or Very Good for these conditions;

-AND-

1.b. Key habitat attributes rated as poor or fair shift one level higher to an improved rating in 50% of Phase II areas *and/or* 50% of Phase II areas rank as Good or Very Good;

-AND-

1.c. > 75% of IP-km habitat contributing to spawning targets is rated as high quality.

(2) Threats Criteria:

2. a. All Core and 75% of Phase I areas improve one level in threat rank *and/or* all Core and 75% of Phase I areas rank as Low or Medium;

-AND-

2.b. 50% of Phase II areas improve one level in threat rank *and/or* 50% of Phase II areas rank as Low or Medium.

-AND-

2.c. Meet all listing factor criteria.

To inform these criteria it is necessary that monitoring include a lengthy time series of adult abundance at appropriate spatial scales. Life cycle monitoring will be necessary to inform these criteria. Few datasets exist and *“there is an urgent need to initiate monitoring programs that will generate data of sufficient quality to rigorously assess progress toward population and ESU recovery. Development of a comprehensive coastal monitoring plan for salmonids has been underway for several years by the California Department of Fish and Game, with input from NMFS; however, dataset that will allow assessment of status using the criteria described herein are likely more than a decade away. Consequently, the present values of these criteria...are to inform the development of such a monitoring plan and to provide preliminary targets for recovery planners”* (Spence *et al.* 2008). Refer to Spence *et al.* (2008) for additional information.

Listing Factor Criteria

Listing factor criteria address large scale issues limiting the species recovery across the ESU. As recommended in the NMFS Interim Guidance (2007), criteria were developed to assess these broad scale factors that originally led to the listing of the species.

Listing Factor A: Present or threatened destruction, modification, or curtailment of habitat or Range

The destruction, modification and curtailment of the habitat and range of the Domain salmonids are primary driving factors that led to their declines. Factors expected to continue into the future and, if not abated or removed, will significantly affect the recovery of this species.

Objective: Ensure adequate quantities of good quality habitat are available across the range of CCC coho salmon to support viable and recovered populations over the long term.

Criterion A 1: The watershed conditions and threat abatement criteria identified in Table 20 must be achieved for downlisting and delisting.

Listing Factor B: Overutilization for commercial, recreational, scientific, or educational purposes

The impacts of freshwater and marine harvest have been reduced since listing; however the magnitude of collection, illegal harvest, and fishing interception remain unknown.

Objective: Ensure commercial, recreational or educational activities are not adversely affecting the survival and recovery of CCC coho salmon.

Downlisting criterion B 1: Collection, illegal harvest, and bycatch (fishing interception including interception from the recreational steelhead fishery) are evidenced as not adversely impacting each life stage of CCC coho salmon by more than five percent across the ESU.

Delisting criterion B 2: Collection, illegal harvest and bycatch (fishing interception including interception from the recreational steelhead fishery) are evidenced as not adversely impacting each life stage of CCC coho salmon by more than one percent across the ESU.

Recovery action: Section 10 Scientific Collection Permits will prioritize consistent methods, inform the recovery criteria, and expand to include monitoring of adults and smolts.

Recovery action: DFG Steelhead Fishing Report-Restoration Card will require anglers to report incidental coho salmon capture.

Recovery action: Conduct outreach and education for commercial and recreational anglers to reduce injury or mortality associated with incidental bycatch.

Recovery action: Coordinate enforcement to minimize illegal harvest, identify areas where illegal harvest may be a problem, and coordinate NOAA and DFG enforcement actions in those areas.

Listing Factor C: Disease or predation

The impacts of disease and predation outlined at the time of listing either continue to persist or the magnitude of the impacts are unknown.

Objective: Disease and predation should not limit CCC coho salmon survival and recovery.

Downlisting criterion C 1: Sufficient information is available to reasonably conclude that disease and predation would not compromise the recovered status of CCC coho salmon.

Delisting criterion C 2: Disease and predation do not compromise long-term persistence of CCC coho salmon.

Recovery action: Develop and implement programs informing the specific threats of freshwater versus disease and marine predation.

Recovery action: Develop and implement targeted programs that successfully remove or substantially reduce non-native predators limiting coho salmon abundance in key environments.

Recovery action: Evaluate the effects of native predators (*e.g.* marine mammals) and develop programs of control if warranted. Comply with the Marine Mammal Protection Act.

Listing Factor D: The inadequacy of existing regulatory mechanisms

Despite the Federal and non-Federal efforts, due to funding and implementation uncertainties and the voluntary nature of many programs, the existing regulatory mechanisms do not provide sufficient certainty that combined Federal and non-Federal efforts are reducing threats to all salmonids in the NCCC Domain.

Objective: Ensure Federal, State, local, and other agencies' regulatory mechanisms are adequate to ensure threats to the recovery of the CCC coho salmon do not persist or reappear.

Downlisting criterion D 1: High priority ESU and Diversity Strata strategies are underway and are implemented through appropriate regulatory processes.

Downlisting Criterion D 2: State and local management mechanisms to ensure sustainability of CCC coho populations in the future are underway.

Delisting criterion D 3: High priority ESU and Diversity Strata strategies are implemented or the relevant issues are addressed through an appropriate regulatory process.

Recovery action: Appropriate agencies should secure funding for, and engage in, full enforcement of relevant laws, codes, regulations, policies and ordinances protective of CCC coho salmon and their habitats.

Recovery action: Federal, state, local governments and other pertinent parties should cooperate to seek regulatory streamlining opportunities together to more efficiently work towards CCC coho recovery and provide regulatory assurance mechanisms for landowners and others.

Recovery action: Conduct outreach and education to other Federal agencies to encourage implementation of their ESA section 7(a)(1) responsibilities for CCC coho salmon recovery.

Recovery action: Prioritize ESA section 7 consultations which include important recovery actions, and include recovery actions in section 7 Reasonable and Prudent Alternatives and Conservation Recommendations.

Recovery action: Encourage amendment of the Army Corps 404 Clean Water Act exemptions for farming, logging, and ranching activities by terminating Section 404(f) exemptions for discharges of dredged or fill material into US waters associated with agriculture, logging, ranching and farming.

Recovery action: Encourage amendments to the FEMA mandates to include funding for upgrades beneficial to CCC coho salmon to flood damaged infrastructure.

Recovery action: Petition SWRCB to declare all CCC coho salmon watersheds fully appropriated.

Recovery action: Work with the SWRCB to bring unauthorized diversions into compliance with State law.

Delisting Criterion D 4: State and local management mechanisms are in place to ensure sustainability of CCC coho populations in the future without the protections of the ESA.

Listing factor E: Other natural and manmade factors affecting the species' continued existence

Other than the hatchery programs, all threats are expected to persist into the future with the effects of climate change predicted to negatively impact salmonid habitats, and thus their likelihood of survival and recovery.

Objective: Improve other manmade factors and lessen or offset the effects of natural factors to salmonids and their habitats.

Downlisting criterion E1: Ensure the threat of hatcheries remains low for the CCC coho salmon and all future hatchery programs. Develop an HGMP under section 10 (a) (1) and comport to the hatchery criteria identified in Spence *et al.* (2008).

Delisting criterion E2: All recovery actions for Climate Change, Droughts, and Storms and Flooding are implemented or the issues addressed sufficiently to ensure population and habitat resiliency to these perturbations.