NOAA FISHERIES

COASTAL MULTISPECIES PLAN

APPENDIX G: INTRINSIC POTENTIAL CHANGES

2016

Photo: High quality salmonid habitat in Bean Creek, Santa Cruz. *Courtesy: Joyce Ambrosius, NMFS*

INTRINSIC POTENTIAL

The number of kilometers (km) of habitat with Intrinsic Potential (IP) was updated from values provided by Bjorkstedt *et al.* (2005) and Spence *et al.* (2012). The revisions were conducted for three reasons: (1) to account for natural barriers not detected during model development (*e.g.*, waterfalls, excessive steep gradients); (2) to eliminate incorrect hydrologic pathways created during IP development (*e.g.*, non-existent flow paths in low gradient areas); and (3) to identify where current conditions are unsuitable and/or irretrievable as determined by the NCCO recovery team. Some of the revisions were in response to comments and information provided to NMFS by Co-managers and Statement of Understanding (SOU) partners. NMFS developed a Statement of Understanding (SOU) with local public agencies (Agency or Agencies) within the CCC steelhead DPS. All parties agreed that a collaborative dialog on CCC steelhead recovery planning would be mutually beneficial.

In 2011 and 2014, drafts of the Coastal Multispecies Recovery Plan were provided to Co-Managers and SOU partners for review and comment. From the 2011 review, NMFS received several comments regarding the extent of IP for steelhead and the density-based adult abundance targets. In response to these comments, the SWFSC revised the model used to derive the IP for steelhead (NC and CCC DPSs), which resulted in changes to the amount of IP-km for steelhead. This process was described by Spence *et al.* (2012) and is found in appendix C.

NATURAL BARRIERS AND INCORRECT HYDROLOGY

Following the 2012 revision of steelhead IP by the SWFSC, staff at the NMFS NCCO reviewed each population for the occurrence of IP-km that extended beyond the natural limits of anadromy. This exercise was done in GIS and utilized only the natural, total barriers within the California Department of Fish and Wildlife's (CDFW) Passage Assessment Database (PAD). In most cases, IP reaches upstream of natural barriers were removed from the historic IP. In addition, the original IP network included incorrect (or unnatural) hydrologic pathways (*i.e.*, stream or river paths that

did not exist historically or currently). Such reaches were especially apparent in low gradient valley floor and tidal sections of the watersheds (particularly for streams at the San Francisco Bay confluence). The incorrect pathways were removed from the historic IP. Removal of these reaches often results in broken segments within the IP-km shown in the individual maps.

In May 2014, a second draft of the plan was distributed to the Co-managers and SOU partners for review and comment. While addressing comments, additional occurrences where IP-km extended upstream of natural total barriers were found. A second review of each population was conducted and IP-km found upstream of natural total barriers were removed from historic IP. When available, other sources of information (*e.g.,* documentation of anadromy, fish passage assessments, CDFW habitat typing reports, and photographs) were also reviewed prior to making final determinations.

Both Bjorkstedt *et al.* (2005) and Spence *et al.* (2012) indicate the IP networks do not account for the productive estuarine habitats when estimating steelhead productivity within populations. In coastal streams, the IP-kms through estuarine habitats (including bar-built lagoons) had substantially fewer incorrect pathways than populations that drained through the tidal portions of San Francisco Bay, and were therefore left intact. However, for San Francisco Bay populations, the IP contained extensive incorrect, unnatural pathways that did not reflect historic or current conditions, or in some cases did not reach the Bay at all. Stream networks generated by digital elevation models (as the IP model) often result in inaccuracies within flat areas such as tidal flats and mudflats. For consistency, all estuarine reaches within the San Francisco Bay area were removed from the current IP to the upstream extent of tidal influence.

INTRINSIC POTENTIAL AND SEVERE BIAS

From the 2014 Co-manager and SOU partner review, NMFS received additional comments regarding the extent of IP below natural barriers and population spawner abundance targets. While the revisions to IP made by the SWFSC in 2012 reduced the extent of IP considerably,

reviewers of the plan identified extensive areas of IP-km that were not likely to have provided suitable habitat conditions for steelhead spawning or rearing both historically and currently. As with the 2011 draft, a vast majority of these comments pertained to populations tributary to San Francisco Bay and those identified as having a severe IP bias by Bjorkstedt *et al.* (2005) and in Spence *et al.* (2008).

Data on the historic and current presence of steelhead, stream flow duration, and the suitability of habitat conditions for steelhead in these populations are limited to primarily anecdotal accounts and limited, more recent juvenile sampling. Due to the lack of empirical data, NMFS staff invited regional experts from our Co-managers and SOU partners to review and provide comments on the extent of IP in the severely biased, essential independent populations of the two San Francisco Bay Diversity Strata. Using data or their best professional judgement, the experts were asked to identify reaches that were likely to have supported steelhead historically, and those that had a reasonable likelihood of functioning as spawning and/or rearing habitat into the future; this would include reaches currently impaired but that could be enhanced through reasonable restoration efforts. The focus of these meetings was to discern existing and, where possible, historic hydrology (precipitation, surface flow duration, water temperature), gradient, substrate, and vegetation communities as well as the distribution (presence/absence) and relative abundance of steelhead.

The comments provided by the regional experts were reviewed by NMFS and, where consensus was met, stream reaches unlikely to support spawning or rearing (*e.g.,* highly ephemeral reaches, or highly modified and irretrievable reaches) retained the classification of IP per the original model output, but are not included in the development of the density-based spawner abundance targets. In addition, reaches currently inundated by large reservoirs were omitted since these reaches are no longer suitable spawning habitat and because most reservoirs represent poor rearing habitat (*i.e.,* poor water quality conditions, abundant predators, and poor access to downstream reaches).[1] All remaining historic IP reaches were used to generate the density-based

[1] Exceptions to this were Calaveras and San Antonio reservoirs which, although incapable of providing spawning habitat, the reservoirs have been documented to support rainbow trout that exhibit an adfluvial life history.

abundance criteria.

For the severely biased populations (and the Petaluma River), two maps were generated showing both the historic (modeled) IP extant (Figure 1), and the current recovery scenario (Figure 2) used to calculate the density-based spawner abundance targets. For these populations, both maps are included in the profiles. For all other populations, only maps of the historic IP extent (i.e., the recovery scenario) are included. Stream reaches not considered in the recovery scenario for the severely biased populations that connect other segments of IP are delineated as connectivity reaches due to their importance as migratory habitat for steelhead (Figure 2).

ASSESSMENT OF DAMS

In general, IP-km upstream of large impassable dams were removed from consideration in most populations. However, for populations within the two San Francisco Bay diversity strata, the currently accessible IP-km would not yield the density-based spawner abundance targets required to meet the minimum biological viability criteria in Spence *et al.* (2008) and Spence *et al.* (2012). Beginning in 2011, NMFS conducted an assessment of existing dams in these two Diversity Strata to identify populations where passage above dams for adult steelhead would be necessary to meet the biological viability criteria. For populations outside of the San Francisco Bay Diversity Strata, a few select dams were identified as candidates to investigate feasibility for fish passage in the future. NMFS considered the following: (1) the quantity and quality of IP-km existing above the dams; (2) the role of the population within the Diversity Stratum (*i.e.,* independent or dependent populations and proximity to other nearby watersheds); and (3) the feasibility of passage relative to the extent and quality of IP-km upstream. All dams where fish passage is either required to meet the biological viability criteria (San Francisco Bay populations), or where future feasibility studies may be warranted are identified in Tables 1, 2, and 3 (see column "With Passage Above Dams").

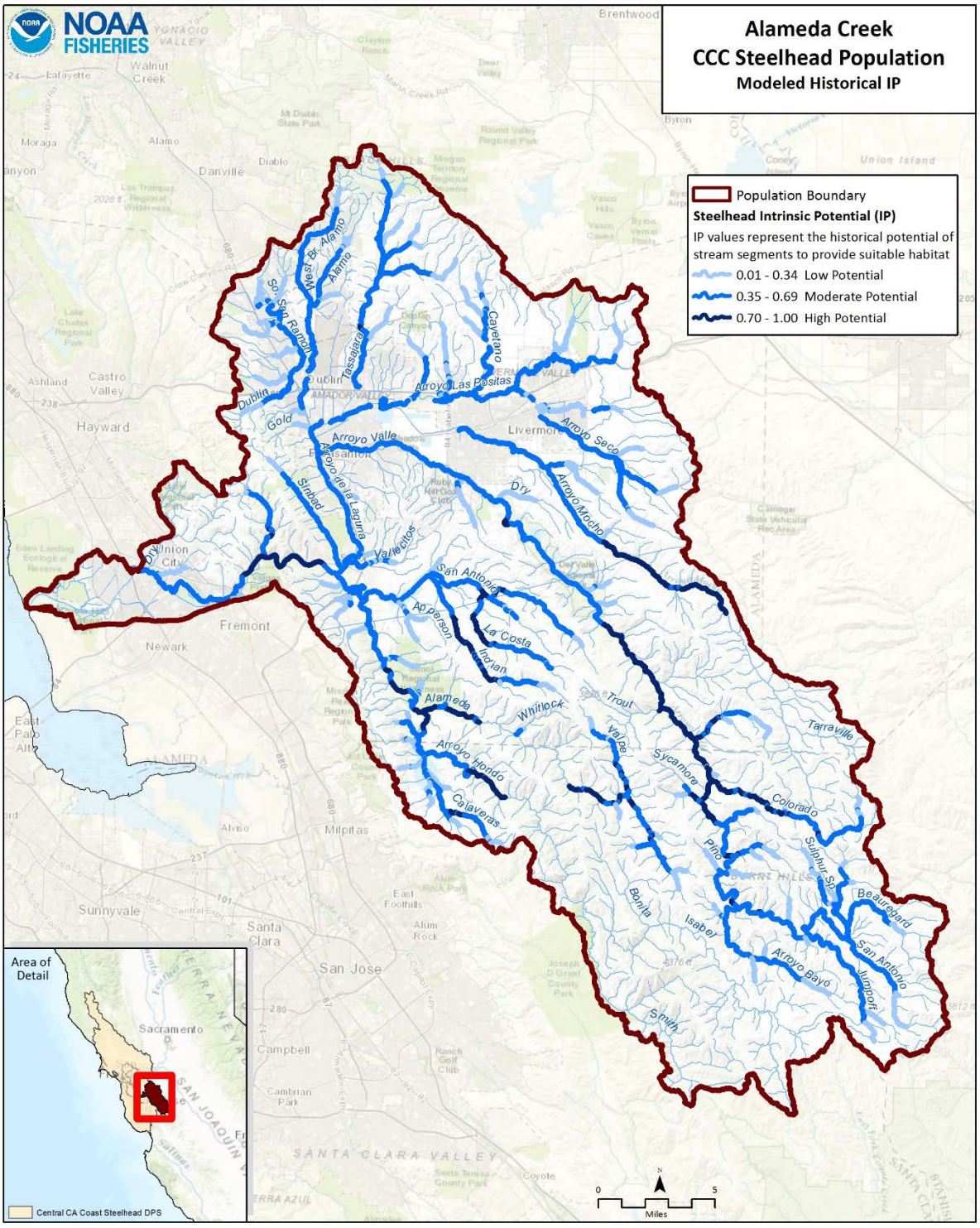

Figure 1. Map of modeled historic IP in the Alameda Creek watershed.

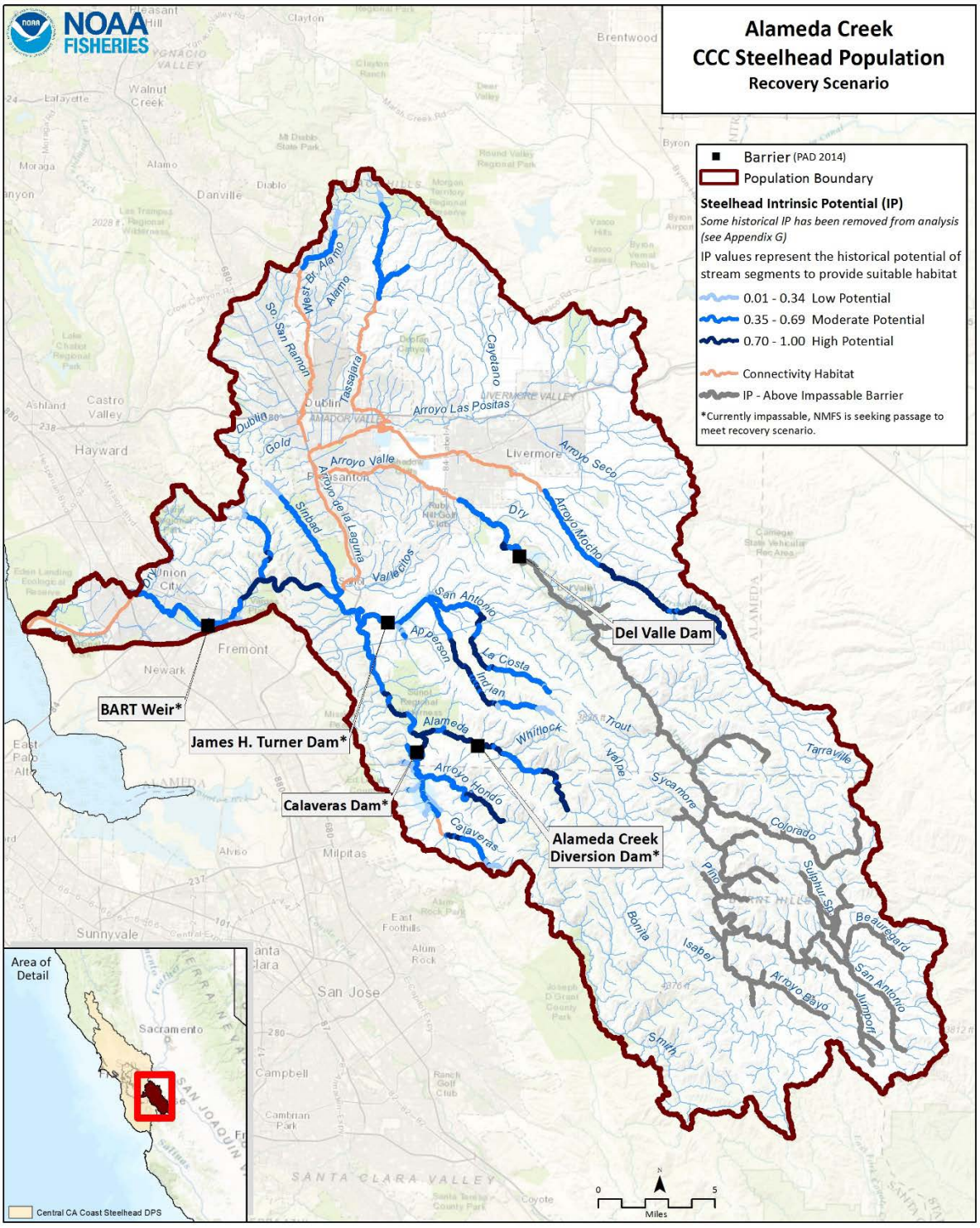

Figure 2. Map of the recovery scenario IP with connectivity reaches for the Alameda Creek watershed.

INTRINISIC POTENTIAL TABLES

Tables 1, 2 and 3 (starting on the next page) provide the historic IP-km (as identified by Spence *et al.*, 2012), subsequent revisions to the IP-km, including brief rationale for the changes. Population-specific details are provided in the individual profiles for each ESU/DPS. Table 3 includes the subset of IP-km for the severely biased essential populations of the two San Francisco Bay Diversity Strata that will be used to generate the density-based abundance targets.

LITERATURE CITED

Bjorkstedt, E. P., B. C. Spence, J. C. Garza, D. G. Hankin, D. Fuller, W. E. Jones, J. J. Smith, and R. Macedo. 2005. An analysis of historical population structure for evolutionarily significant units of Chinook salmon, coho salmon, and steelhead in the north-central California coast recovery domain. U.S. Department of Commerce. NOAA Technical Memorandum. NMFS-SWFSC-382.

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Spence, B. C., E. P. Bjorkstedt, S. Paddock, and L. Nanus. 2012. Updates to biological viability criteria for threatened steelhead populations in the North-Central California Coast Recovery Domain. National Marine Fisheries Service, Southwest Fisheries Science Center, Fisheries Ecology Division, Santa Cruz, CA.

Table 1: Population-specific changes to Intrinsic Potential per kilometer (IP-km) and areas above dams included in the CC Chinook Salmon ESU. Numbers in bold font were used to calculate spawner abundance target.

Population	Historical IP-km (Spence et al. (2008))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	Revisions to CC Chinook salmon IP-km		
					Total (IP-km)	IP-km either removed or added	Reason
North Coastal Diversity Stratum							
Redwood Creek	116.1		**116.1**				
Little River	18.6		**17.4**		18.6	-1.2	Above a natural barrier
					17.4		Final IP-km
Mad River	94.4		**94.4**				
Humboldt Bay Tributaries	77.8	76.6	**76.6**		77.8	-1.2	Above a natural barrier
					76.6		Final IP-km
Lower Eel River – Lower Mainstem/South Fork Eel River	370.8	368.4	**368.4**		370.8	-2.3	Above a natural barrier
					368.4		Final IP-km
Bear River	39.4		**39.4**				
Mattole River	177.5		**177.5**				
North Mountain Interior Diversity Stratum							
Upper Eel River	556	528.5	468.7	**528.5**	556	-27.5	Above a natural barrier
					528.5	-59.8	Currently the accessible IP-km to Chinook salmon
					468.7	59.8	NMFS is seeking to investigate the potential of removing Scott Dam
					528.5		Final IP-km
Lower Eel River: Van Duzen River/Larabee Creek	144		**144**				
North-Central Coastal Diversity Stratum							
Ten Mile River	67.2		**67.2**				
Noyo River	62.2		**62.2**				
Big River	104.3		**104.3**				
Albion River	17.6		**17.6**				

Population	Historical IP-km (Spence et al. (2008))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	Revisions to CC Chinook salmon IP-km		
					Total (IP-km)	IP-km either removed or added	Reason
Central Coastal Diversity Stratum							
Navarro River	131.5		**131.5**				
Garcia River	56.2		**56.2**				
Gualala River	175.6		**175.6**				
Russian River	584.6	583.8	**465.2**		584.6	-0.8	Natural barrier
					583.8	-54.3	Warm Springs Dam
						-32.6	Coyote Valley Dam
						-1.1	Matanzas Creek Dam
						-22	Not viable habitat
						-8.6	Incorrect hydrologic modeling
					465.2		Final IP-km

Table 2: Population-specific changes to Intrinsic Potential per kilometer (IP-km) and areas above dams included in the NC steelhead DPS. Numbers in bold font were used to calculate spawner abundance target.

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	Revision to NC steelhead IP-km		
					Total (IP-km)	IP-km either removed or added	Reason
Northern Coastal Diversity Stratum							
Redwood Creek (Lower)	183.3	161.1	**161.1**		183.3 **161.1**	-22.2	Above natural barriers Final IP-km
Maple Creek / Big Lagoon	71.7		**71.7**				
Little River	63	50	**50**		63 **50**	-13	Above natural barriers Final IP-km
Mad River (Lower)	148.8	146.3	**146.3**		148.8 **146.3**	-2.6	Above natural barriers Final IP-km
Humboldt Bay Tributaries	212.1	203.4	**203.4**		212.1 **203.4**	-8.7	Above natural barriers Final IP-km
Lower Mainstem Eel River Tributaries	166.4		**166.4**				
Howe Creek	13.9		**13.9**				
South Fork Eel River	1016.7		**951.5**		1016.7 **951.5**	-65.2	Above natural barriers Final IP-km
Guthrie Creek	9.2		**9.2**				
Oil Creek	10.6		**10.6**				
Bear River	107.8		**107.8**				
McNutt Gulch	11.3		**11.3**				
Mattole River	541.4	534.4	**534.4**		541.4 **534.4**	-7	Above natural barriers Final IP-km
Spanish Creek	1.9		**1.9**				
Big Creek	3.8		**3.8**				
Big Flat Creek	5.9		**5.9**				
Shipman Creek	2.3		**2.3**				
Telegraph Creek	5.3		**5.3**				

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	Revision to NC steelhead IP-km		
					Total (IP-km)	IP-km either removed or added	Reason
Jackass Creek	7.6	6.9	**6.9**		7.6	-0.7	Above natural barriers
					6.9		Final IP-km
Lower Interior Diversity Stratum							
Jewett Creek	16.8		**16.8**				
Chamise Creek	36.2		**36.2**				
Bell Springs Creek	18.1		**18.1**				
Woodman Creek	35		**35**				
Outlet Creek	192.2	192.1	**176**		192.2	-0.1	Above natural barrier
					192.1	-7.3	Morris Dam
						-6.8	Brooktrails Dam
						-0.9	Lake Ada Rosa Dam
						-0.5	Chinquapin Dam
						-0.6	Incorrect hydrologic modeling
							Although currently inaccessible to steelhead – NMFS is seeking for the investigation of passage and habitat above Morris Dam. Currently the IP-km is not included in the final IP-km but passage would open up 6.5 IP-km (area under the reservior not considered habitat (0.8 IP-km)).
							Although currently inaccessible to steelhead – NMFS is seeking for the investigation of passage and habitat above Brooktrails Dam. Currently the IP-km is not included in the final IP-km but passage would open up 6.2 IP-km (area under the reservior not considered habitat (0.6 IP-km)).
					176		Final IP-km
Garcia Creek	14.1		**14.1**				

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	Revision to NC steelhead IP-km		
					Total (IP-km)	IP-km either removed or added	Reason
Tomki Creek	90.8	89.5	**89.5**		90.8	-1.3	Above natural barrier
					89.5		Final IP-km
Bucknell Creek	19.1	9	**9**		19.1	-10.1	Above natural barrier
					9		Final IP-km
Soda Creek	15.7		**15.7**				
North Mountain Interior Diversity Stratum							
Redwood Creek (Upper)	87.7	86.2	**86.2**		87.7	-1.5	Above natural barrier
					86.2		Final IP-km
Mad River (Upper)	305	301.4	138.2	**289.6**	305	-3.6	Above natural barrier
					301.4	-163.2	R. w. Matthews Dam
					138.2	163.2	Although it currently is inaccessible to steelhead - NMFS is seeking for Passage above R. w. Matthews Dam
					301.4	-11.8	Area under reservoir not considered habitat
					289.6		Final IP-km
Van Duzen River	317.4	312.2	**312.2**		317.4	-5.2	Above natural barrier
					312.2		Final IP-km
Larabee Creek	88.4	86.4	**86.4**		88.4	-2	Above natural barrier
					86.4		Final IP-km
Dobbyn Creek	49.1	47	**47**		49.1	-2.1	Above natural barrier
					47		Final IP-km
North Fork Eel River	318.2	315.7	**315.7**		318.2	-2.5	Above natural barrier
					315.7		Final IP-km
Middle Fork Eel River	503.5	474.2	**472.4**		503.5	-29.2	Above natural barrier
						-1.8	Williams Valley Dam
					472.4		Final IP-km

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	Revision to NC steelhead IP-km		
					Total (IP-km)	IP-km either removed or added	Reason
Upper Mainstem Eel River	333.5	317.5	1.5	**317.5**	333.5	-16	Above natural barrier
					317.5	-316.1	Scott Dam
					1.5	316.1	Although currently inaccessible to steelhead – NMFS is seeking to investigate the removal of Scott Dam
					317.5		Final IP-km
North Central Coastal Diversity Stratum							
Usal Creek	32.2	27.5	**27.5**		32.2	-1.4	Not viable habitat
						-3.3	Natural limit to anadromy
					27.5		Final IP-km
Cottaneva Creek	23.2	21.9	**21.9**		23.2	-1.3	Above natural barriers
					21.9		Final IP-km
Wages Creek	17.7	17.4	**17.4**		17.7	-0.3	Above natural barriers
					17.4		Final IP-km
Ten Mile River	181.3	171.1	**171.1**		181.3	-10.2	Not viable habitat
					171.1		Final IP-km
Pudding Creek	23.9		**23.9**				
Noyo River	157.6	153.7	**152.8**		157.6	-3.8	Above natural barriers
					153.7	-0.9	McGuire Dam
					152.8		
Caspar Creek	12.9		**12.9**				
Big River	256.1	255	**255**		256.1	-3.5	Above natural barriers
					252.6		Final IP-km
Albion River	48.6		**48.6**				

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	Revision to NC steelhead IP-km		
					Total (IP-km)	IP-km either removed or added	Reason
Central Coastal Diversity Stratum							
Navarro River	402.7	388.6	**387.6**		402.7	-14.1	Above natural barriers
					388.6	-1	Not viable habitat
					387.6		Final IP-km
Elk Creek	21.5		**34.5**		21.5	13	Natural barrier determined to be passable
					34.5		Final IP-km
Brush Creek	23.8		**21.4**		23.8	-2.4	Incorrect hydrologic modeling
					21.4		
Garcia River	137.2	135.4	**135.4**		137.2	-1.8	Above natural barriers
					135.4		Final IP-km
Schooner Gulch	7.7		**7.7**				
Gualala River	401	397.1	**396.7**		401	-3.9	Above natural barriers
					397.1	-0.4	Richardson Dam
					396.7		Final IP-km

Table 3: Population-specific changes to Intrinsic Potential per kilometer (IP-km) and areas above dams included in the recovery plan for the CCC Steelhead DPS. Numbers in bold font were used to calculate spawner abundance target. NMFS met with its Statement of Understanding (SOU) Partners and Co-Managers and revised in select populations (see narrative). Any revisions to IP from this process are in the notes section below and designated as SOU Partnership.

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	SOU Partnership Revision	Revision to CCC steelhead IP-km		
						Total (IP-km)	IP-km either removed or added	Reason
Northern Coastal Diversity Stratum								
Willow Creek	8		**8**					
Sheephouse Creek	3.8		**3.8**					
Freezeout Creek	1.3		**1.3**					
Austin Creek	95.4	95.1	**95.1**			95.4	-0.3	Above natural barrier
						95.1		Final IP-km
Dutch Bill Creek	13.3		**13.2**					
Green Valley Creek	37.1		**24.9**			37.1	-12.2	Not viable habitat
						24.9		
Hulbert Creek	10.2		**10.2**					
Porter Creek	10.3		**10.3**					
Salmon Creek	44.6	42.1	**33.6**			44.6	-8.5	Above natural barrier
						42.1	-2.5	Above barrier
						33.6		Final IP-km
Estero Americano	35.4		**35.4**					
Walker Creek	77.1	73.4	**54.2**			77.1	-3.7	Above natural barrier
						73.4	-19.2	Soulajule Dam
								Although currently inaccessible to steelhead – NMFS is seeking for the investigation of passage and habitat above Soulajule Dam. Currently the IP-km is not included in the final IP-km but passage would open up 18.1 IP-km (area under the reservior not considered habitat (1.1 IP-km)).
						54.2		Final IP-km

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	SOU Partnership Revision	Revision to CCC steelhead IP-km		
						Total (IP-km)	IP-km either removed or added	Reason
Lagunitas Creek	110.1	109.9	**53.3**			110.1	-0.2	Above natural barrier
						109.9	-11.2	Peters Dam
							-4.6	Alpine Dam
							-1.1	Bon Tempe Dam
							-1.3	Lagunitas Dam
							-0.2	Hagmaier Dam North
							-37.9	Nicasio Dam
							-0.4	Incorrect hydrologic modeling
								Although currently inaccessible to steelhead – NMFS is seeking for the investigation of passage and habitat above Nicasio Dam. Currently the IP-km is not included in the final IP-km but passage would open up 31.4 IP-km (area under the reservior not considered habitat (6.5 IP-km)).
						53.3		Final IP-km
Drakes Bay Tributaries	NA					SWFSC did not develop IP for this population		
Pine Gulch	9.7		**9.7**					
Redwood Creek	6.7		**6.7**					
Interior Diversity Stratum								
Mark West Creek	286.8	281.4	**164.2**			286.8	-5.4	Above natural barrier
						281.4	-1.7	Piner Creek Dam
							-12.1	Mantanzas Creek Dam
							-1.3	Alpine Creek Dam
							-0.2	Unnamed Dam
							-101.7	Not viable habitat
						164.2		Final IP-km

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	SOU Partnership Revision	Revision to CCC steelhead IP-km		
						Total (IP-km)	IP-km either removed or added	Reason
Dry Creek	282.9		**116.7**			282.9	-165.7	Warm Springs Dam
							-0.6	Merlo Dam
						116.7		Final IP-km
Maacama Creek	77.1		**76.2**			77.1	-0.9	Mallacomes Dam
						76.2		Final IP-km
Sausal Creek	12	11.1	**11.1**			12	-0.9	Above natural barrier
						11.1		Final IP-km
Miller Creek	7.8	6.5	**3.1**			7.8	-1.3	Above natural barrier
							-3.4	Incorrect hydrologic modeling
						3.1		Final IP-km
Gill Creek	8.3		**7.2**			8.3	-0.2	Not viable habitat
						8.1	-0.9	Incorrect hydrologic modeling
						7.2		Final IP-km
Crocker Creek	4.7	4.5	**4.5**			4.7	-0.2	Above natural barrier
						4.5		Final IP-km
Upper Russian River	679	629.2	**423.9**			679	-49.8	Above natural barrier
						629.2	-119.8	Coyote Valley Dam
							-85.6	Not viable habitat
						423.9		Final IP-km
Coastal San Francisco Bay Diversity Stratum								
Arroyo Corte Madera del Presidio	7		**6.9**			7	-0.05	Cascade dam
							-0.05	Tidal
						6.9		Final IP-km

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	SOU Partnership Revision	Revision to CCC steelhead IP-km		
						Total (IP-km)	IP-km either removed or added	Reason
Corte Madera Creek	26.4	25.6	21.5	22.8	**19.8**	26.4	-0.8	Above natural barrier
						25.6	-2.3	Not viable habitat
							-1.8	Phoenix Lake Dam
						21.5	1.8	Although currently not inaccessible to steelhead - NMFS is seeking for passage above Phoenix Lake Dam
							-0.5	Area under reservoir not considered habitat
						22.8	-3	Tidal
						19.8		Final IP-km
Miller Creek	11.2		**9.1**			11.2	-2.1	Tidal
						9.1		Final IP-km
Novato Creek	48.9		24.4	33.1	**28.3**	48.9	-14.7	Not viable habitat
							-9.8	Stafford Dam
						24.4	9.8	Although currently inaccessible to steelhead - NMFS is seeking for passage above Stafford Dam
							-1.2	Area under reservoir not considered habitat
						33.1	-1.5	Not viable habitat (SOU partnership)
							-6.6	Tidal
							3.4	Viable Habitat (SOU partnership)
						28.3		Final IP-km

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	SOU Partnership Revision	Revision to CCC steelhead IP-km		
						Total (IP-km)	IP-km either removed or added	Reason
Guadalupe River	113.1	111.1	43.4	58.4	**51.9**	113.1	-2	Incorrect hydrologic modeling
						111.1	-40	Not viable habitat
							-2.2	Calero Dam
							-12.1	Almaden Dam
							-5.1	Guadalupe Dam
							-8.3	Camden Drop Structure
						43.4	12.1	Although currently inaccessible to steelhead - NMFS is seeking for Passage above Almaden Dam
							-1.2	Area under Almaden Reservoir not considered habitat
							5.1	Although currently inaccessible to steelhead - NMFS is seeking for Passage above Guadalupe Dam
							-1	Area under Guadalupe Reservoir not considered habitat
						58.4	-6.7	Tidal
							-0.7	Not viable habitat (SOU partnership)
							0.9	Viable habitat (SOU partnership)
						51.9		Final IP-km
Stevens Creek	31.4	27.3	10.5	26	**22.9**	31.4	-4.1	Incorrect hydrologic modeling
						27.3	-16.7	Stevens Creek Dam
						10.5	16.7	Although currently inaccessible to steelhead - NMFS is seeking for Passage above Stevens Creek Dam
							-1.2	Area under the reservoir not considered habitat
							-0.3	Tidal
						25.7	-3.1	Not viable habitat (SOU partnership)
						22.6		Final IP-km

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	SOU Partnership Revision	Revision to CCC steelhead IP-km		
						Total (IP-km)	IP-km either removed or added	Reason
San Francisquito Creek	43.3	40.2	22.5	36.5	**35.5**	43.3	-1.4	Above natural barrier
							-1.7	Incorrect hydrologic modeling
						40.2	-14.5	Searsville Dam
							-3.1	Bear Gulch Barrier
						22.5	14.5	Although currently inaccessible to steelhead - NMFS is seeking for Passage above Searsville Dam
							-0.5	Area under the reservoir not considered habitat
						36.5	-1	Not viable habitat (SOU partnership)
						35.5		Final IP-km
San Mateo Creek	33.3		**6.3**			33.3	-25.7	Lower Crystal Springs Dam
							1.3	Incorrect hydrologic modeling
						6.3		Final IP-km
Interior San Francisco Bay Diversity Stratum								
Petaluma River	148.5	142	**64.3**			148.5	-5.7	Incorrect hydrologic modeling
							-0.8	Above natural barrier
						142	-0.8	Dams
							-54.5	Not viable habitat
							-22.4	Tidal
						64.3		Final IP-km
Sonoma Creek	198.1	185.8	**129**			198.1	-6.2	Natural barrier
							-6.1	Incorrect hydrologic modeling
						185.8	-47.7	Not viable habitat
							-9.1	Tidal
						129		Final IP-km

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	SOU Partnership Revision	Revision to CCC steelhead IP-km		
						Total (IP-km)	IP-km either removed or added	Reason
Napa River	426.2	402.2	230.7	284.1	**233.9**	426.2	-2	Natural barrier
							-22	Incorrect hydrologic modeling
						402.2	-110	Not viable habitat
							-1.2	Bell Canyon Dam
							-2	Kimball Creek Dam
							-2.7	York Dam
							-55.6	Conn Creek Dam
						230.7	2.7	Although currently inaccessible to steelhead – NMFS is seeking for passage above York Dam
							55.6	Although currently inaccessible to steelhead – NMFS is seeking for passage above Conn Dam
							-4.8	Area under Lake Henessey not considered habitat
						284.1	-14.4	Not viable habitat (SOU Partnership)
							-7.6	Incorrect hydrologic modeling
							-14.8	Natural barrier
							-13.5	Tidal
						233.9		Final IP-km
Green Valley / Suisun Creek	99.3		82.4		**64.3**	99.3	-15.7	Lake Curry Dam
							-1.2	Wooden Valley Dam
						82.4	-26.2	Tidal
							8.1	Viable habitat (SOU partnership)
						64.3		Final IP-km
Pinole Creek	NA					SWFSC did not develop IP for this population		

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	SOU Partnership Revision	Revision to CCC steelhead IP-km		
						Total (IP-km)	IP-km either removed or added	Reason
San Pablo Creek	29.1	28.5	**8.5**			29.1	-0.6	Natural barrier
						28.5	-18.5	San Pablo Reservoir
							-0.5	Tidal
							-1	Incorrect hydrologic modeling
						8.5		Final IP-km
Wildcat Creek	NA					SWFSC did not develop IP for this population		
Codornices Creek	NA					SWFSC did not develop IP for this population		
San Leandro Creek	44		**5.5**			44	-8.5	Chabot Dam
							-23.6	New Upper San Leandro Dam
							-5.6	Not viable habitat
							-0.8	Tidal
						5.5		Final IP-km
San Lorenzo Creek	40.8		**18.6**			40.8	-10.6	Don Castro Dam
							-5.8	Cull Creek Dam
							-3	Not viable habitat
							-2.8	Tidal
						18.6		

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	SOU Partnership Revision	Revision to CCC steelhead IP-km		
						Total (IP-km)	IP-km either removed or added	Reason
Alameda Creek	432	370.9	133.2	199.7	**108.7**	432	-61.1	Natural barrier
						370.9	-85.8	Del Valle Dam
							-28.2	James H. Turner Dam
							-16.4	Calaveras Dam
							-85.4	Not viable habitat
							-21.9	Alameda Creek Diversion Dam
						133.2	28.2	Although currently inaccessible to steelhead – NMFS is seeking for Passage above Turner Dam
							16.4	Although currently inaccessible to steelhead – NMFS is seeking for Passage above Calaveras Dam
							21.9	Alameda Creek Diversion Dam
						199.7	-91	Not viable habitat (SOU partnership)
						108.7		Final IP-km
Coyote Creek	286.6	276.5	30.7	167.5	**109.3**	286.6	-10.1	Incorrectly modeled as historical habitat
						276.5	-100.1	Not viable habitat
							-53.7	Leroy Anderson Dam
							-92	Coyote Dam
						30.7	53.7	Although currently inaccessible to steelhead – NMFS is seeking for Passage above Anderson Dam
							-5.9	Area under Anderson Lake not considered habitat
							92	Although currently inaccessible to steelhead – NMFS is seeking for Passage above Coyote Dam
							-3	Area under Coyote Lake not considered habitat
						167.5	-46.5	Not viable habitat (SOU partnership)
							-11.7	Tidal
						109.3		Final IP-km

Population	Historical IP-km (Spence et al. (2012))	Revised Historical IP-km	Current IP-km	Future Current IP-km with Passage Above Selected Dams	SOU Partnership Revision	Revision to CCC steelhead IP-km		
						Total (IP-km)	IP-km either removed or added	Reason
Santa Cruz Mountains Diversity Stratum								
San Pedro Creek	NA					SWFSC did not develop IP for this population		
Pilarcitos Creek	28.9	28.5	**28.5**			28.9	-0.4	Natural barrier
						28.5		Final IP-km
Tunitas Creek	10.8	10.7	**10.7**			10.8	-0.1	Natural barrier
						10.7		Final IP-km
San Gregorio Creek	55.2	46.6	**46.6**			55.2	-8.6	Natural barrier
						46.6		Final IP-km
Pescadero Creek	66.4	66.1	**66.1**			66.4	-0.3	Natural barrier
						66.1		Final IP-km
Gazos Creek	13.2	12.5	**12.5**			13.2	-0.7	Natural barrier
						12.5		Final IP-km
Waddell Creek	13.7	10.6	**10.6**			13.7	-3.1	Natural barrier
						10.6		Final IP-km
Scott Creek	18.9	16.4	**16.4**			18.9	-2.5	Natural barrier
						16.4		Final IP-km
San Vicente Creek	6.2		**5.7**			6.2	-0.5	Mining tunnel and diversion dam
						5.7		Final IP-km
Laguna Creek	13.1	4.5	**4.5**			13.1	-8.6	Natural barrier
						4.5		Final IP-km
San Lorenzo River	161.5	154.6	**146.2**			161.5	-6.9	Natural barriers
						154.6	-8.4	Newell Dam
						146.2		Final IP-km
Soquel Creek	54.2	52.1	**52.1**			54.2	-2.1	Natural barrier
						52.1		Final IP-km
Aptos Creek	29.7	25	**25**			29.7	-1.8	Natural barrier
							-2.9	Outside watershed boundaries
						25		Final IP-km