COASTAL MULTISPECIES PLAN

Photo Courtesy: Scott Harris, CDFW, Northern California Steelhead Summer-Run Adult, Middle Fork Eel River, CA

VOLUME III

NORTHERN CALIFORNIA STEELHEAD

PUBLIC DRAFT

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LITERATURE CITATION SHOULD READ AS FOLLOWS:

National Marine Fisheries Service. 2015. Public Draft Coastal Multispecies Recovery Plan. National Marine Fisheries Service, West Coast Region, Santa Rosa, California.

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Attn: Recovery Team
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
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http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/salmon_and_steelhead.html

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INTRODUCTION TO NC STEELHEAD DPS RECOVERY

The Northern California (NC) steelhead Distinct Population Segment (DPS) historically consisted of five Diversity Strata with 41 independent populations of winter-run steelhead (19 functionally independent and 22 potentially independent) and 10 populations of summer steelhead (all functionally independent) (Spence *et al.* 2008; Spence *et al.* 2012). The delineation of the NC steelhead DPS Diversity Strata was based on environmental and ecological similarities and life history differences between winter run and summer run steelhead. Five strata were identified by Bjorkstedt *et al.* (2005): Northern Coastal, Lower Interior, North Mountain Interior, North Central Coastal, and Central Coastal. We have selected 51 winter-run populations across the five Diversity Strata and 10 summer-run populations across two Diversity strata to represent the recovery scenario for the NC steelhead DPS (Figure 1).

The biological recovery criteria for these populations are (See also Biological Recovery Criteria):

- 27 essential independent populations attaining low extinction risk criteria (*i.e.*, Garcia River, Gualala River, Navarro River, Chamise Creek, Outlet Creek, Tomki Creek, Woodman Creek, Larabee Creek, Middle Fork Eel River, North Fork Eel River, Upper Mainstem Eel River, Van Duzen River, Big River, Noyo River, Ten Mile River, Usal Creek, Wages Creek, Maple Creek/Big Lagoon, Bear River, Humboldt Bay Tributaries, Little River (Humboldt County), Mattole River, South Fork Eel River, Mad River (Upper), Mad River (Lower), and Redwood Creek (Upper) and Redwood (Lower) (Humboldt County));
- Ten supporting independent populations attaining moderate extinction risk criteria (*i.e.*, Brush Creek, Elk Creek, Bell Springs, Bucknell Creek, Dobbyn Creek, Garcia Creek, Jewett River, Albion River, Cottaneva Creek and Pudding Creek); and
- 14 dependent populations contributing to redundancy and occupancy (*i.e.*, Schooner Gulch, Soda Creek, Caspar Creek, Guthrie Creek, Oil Creek, Big Creek, Big Flat Creek, Howe Creek, Jackass Creek, Lower Mainstem Eel River, McNutt Gulch, Shipman Creek, Spanish Creek, and Telegraph Creek).

- Ten independent summer-run steelhead populations expected to meet effective population size criteria (Table 2)
- (*i.e.*, Redwood Creek, Mad River, South Fork Eel River, Mattole River, Van Duzen River, Larabee Creek, North Fork Eel River, Upper Middle Mainstem Eel River, Middle Fork Eel River, and Upper Mainstem Eel River).

All populations in the DPS will retain ESA protections and critical habitat designation regardless of their status or role in the recovery scenario.

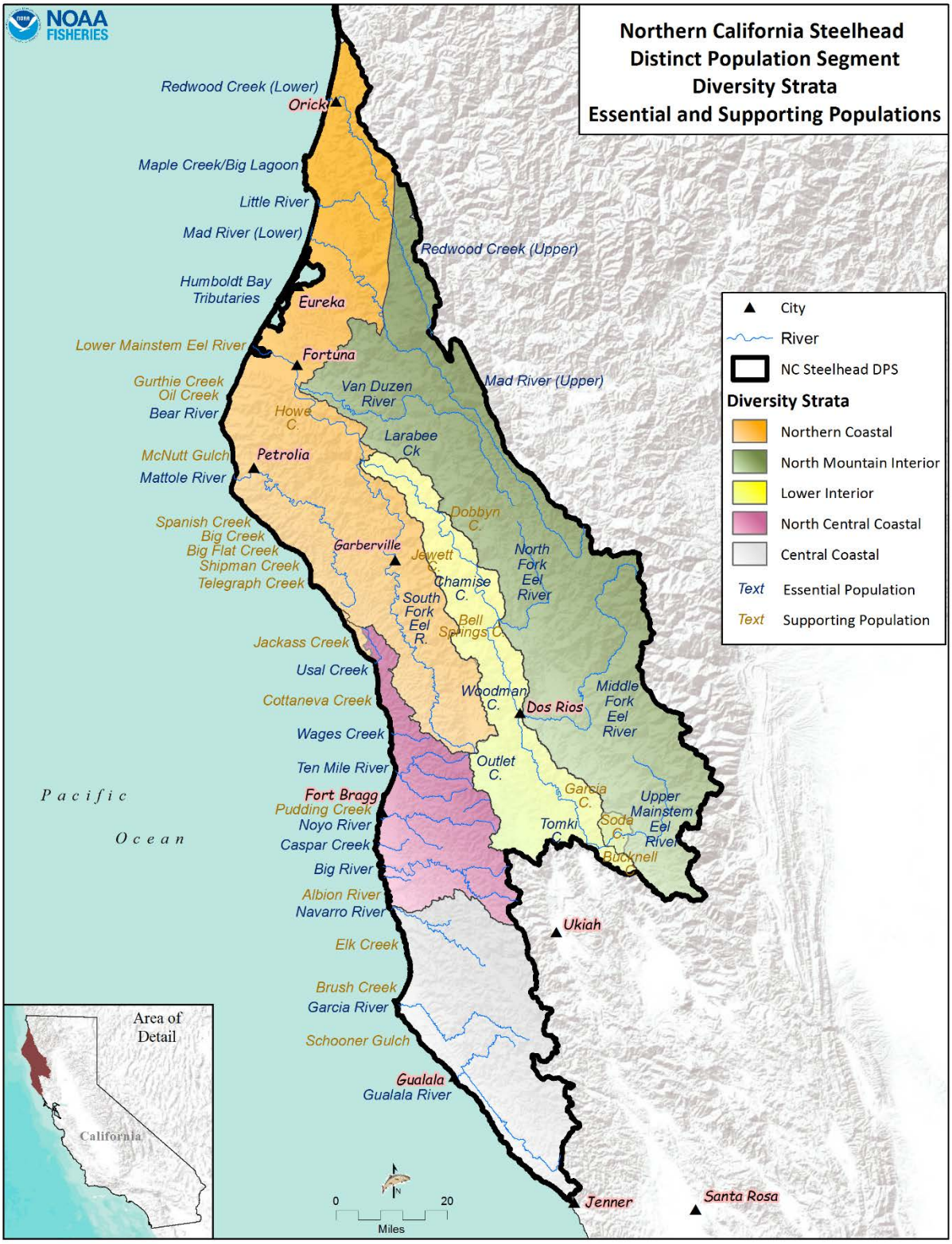

Figure 1: NC Steelhead Winter-Run Essential and Supporting Populations

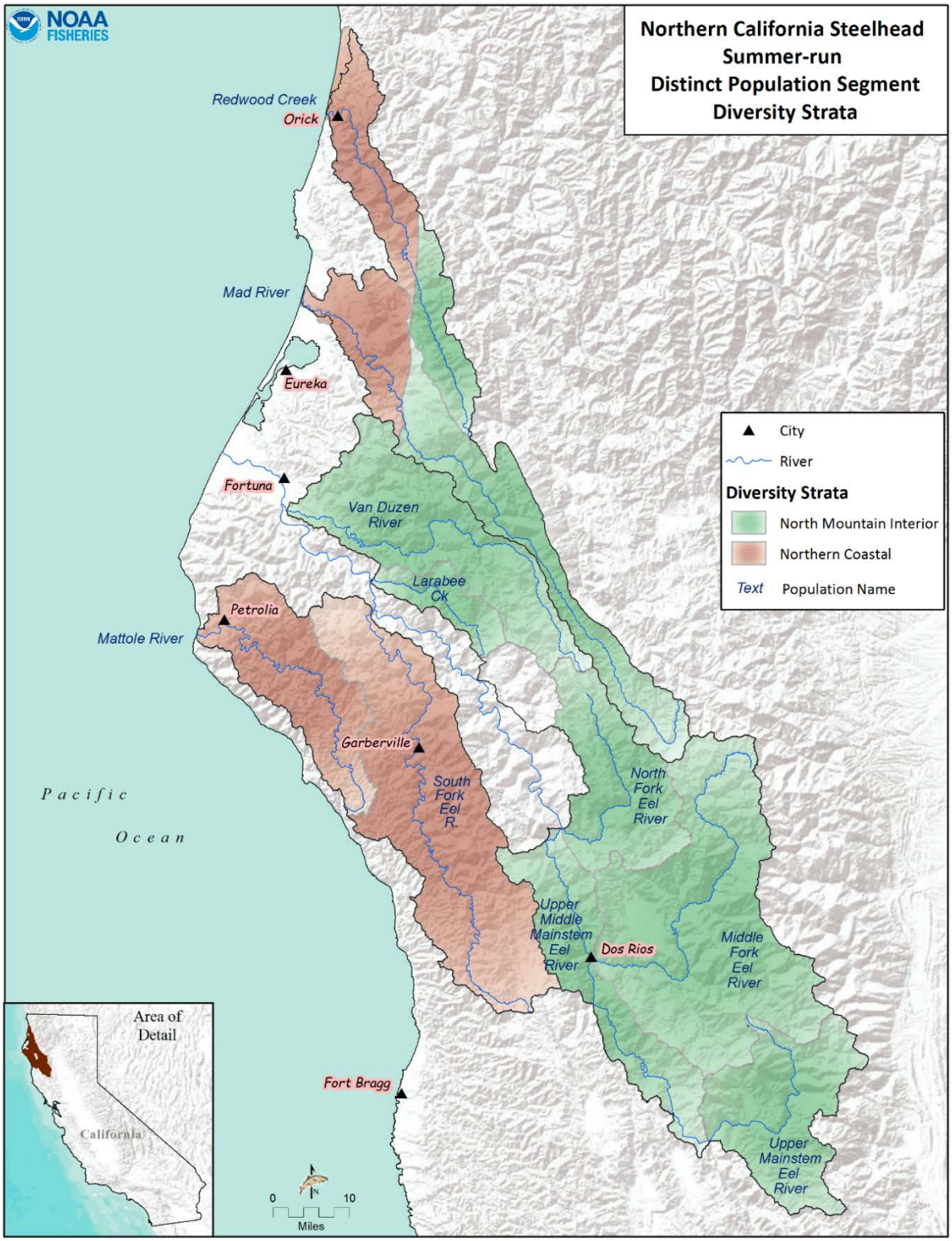

Figure 2: NC Steelhead Summer-Run Populations and Diversity Strata boundaries.

NC STEELHEAD DPS LISTING, REVIEWS & RECOVERY CRITERIA

The NC steelhead DPS was listed as a federally threatened species in 2000 (65 FR 36074). Status reviews conducted in 2005 and 2010 affirmed the threatened status of the species. This section of Volume III includes a description of the listing decision for the NC steelhead DPS, the ESA section 4(a)(1) threats identified at listing, a summary of findings from the two status reviews including the status of protective/conservation efforts, and NC steelhead recovery criteria.

NC STEELHEAD LISTING

In response to numerous petitions, and as the result of a comprehensive status review of West Coast steelhead (Busby *et al.* 1996), the NC steelhead ESU was proposed for listing as threatened under the ESA on August 9, 1996 (61 FR 56138). On August 18, 1997, the final listing determination for the NC steelhead ESU was extended for 6 months due to substantial scientific disagreement about the sufficiency and accuracy of data relevant to the determination (62 FR 43974). On March 19, 1998, NMFS determined the NC steelhead ESU did not warrant listing as a threatened species under the ESA at that time, but concluded that the ESU warranted classification as a candidate species under the ESA and noted the intent to review the determination no later than four years from the date of the Federal Register notice (63 FR 13347). Because the State of California did not implement conservation measures that NMFS considered critically important in its decision not to list the NC steelhead ESU, NMFS completed an updated status review and reconsidered the status of the ESU under the ESA. NMFS proposed the NC steelhead ESU for listing as threatened under the ESA on February 11, 2000 (65 FR 6960). On June 7, 2000, the NC steelhead ESU was listed as threatened under the ESA (65 FR 36074). On January 5, 2006, after an updated status review on a number of West Coast salmonid ESUs, NMFS reaffirmed the threatened status of NC steelhead and applied the DPS policy to the species noting that the resident and anadromous life forms of *O. mykiss* remain "markedly separated" as a consequence of physical, physiological, ecological, and behavioral factors, and may thus warrant delineation as separate DPSs (71 FR 834). The listed

DPS includes all naturally spawned anadromous *O. mykiss* (steelhead) populations in California coastal river basins from Redwood Creek southward to, but not including, the Russian River, as well as two artificial propagation programs that are no longer active: the Yager Creek hatchery and North Fork Gualala River Hatchery (Gualala River Steelhead Project) steelhead hatchery programs. The inadequacy of regulatory mechanisms, destruction and modification of habitat, and natural and man-made factors were identified as the primary causes for the decline of NC steelhead DPS (NMFS 1996).

NC STEELHEAD SECTION 4(A)(1) THREATS

Section 4(a)(1) of the ESA and the listing regulations (50 CFR part 424) set forth procedures for listing species. The Secretary of Commerce must determine through the regulatory process if a species is endangered or threatened based upon any one, or a combination of, the following ESA section 4(a)(1) factors:

> (A) the present or threatened destruction, modification, or curtailment of its habitat or range;
>
> (B) overutilization for commercial, recreational, scientific, or educational purposes;
>
> (C) disease or predation;
>
> (D) the inadequacy of existing regulatory mechanisms; and
>
> (E) other natural or manmade factors affecting its continued existence.

Through the regulatory process, the Secretary of Commerce determined the NC steelhead DPS was a threatened species based on their status and threats associated with the five section 4(a)(1) factors. NMFS concluded that habitat degradation associated with forest practices was a significant contributor to the reduction in abundance and distribution of NC steelhead (65 FR 6960). The specific threats associated with the section 4(a)(1) factors are summarized below.

Factor A: Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

Factor A At Listing:

Habitat degradation identified at the time of listing included reduced habitat complexity, riparian removal, sedimentation, altered instream flows, degradation of water quality, instream wood removal, and poor estuarine habitats. At listing both natural conditions and anthropogenic activities were identified as the source of the habitat degradation. These anthropogenic and natural conditions included: agriculture, logging, ranching, recreation, mining, forestry, habitat blockages, water diversions, artificial propagation, estuarine destructions or modification, flooding, forestry, hydropower development, instream habitat problems, lack of data, general land use activities, poaching, predation, recreational angling, urbanization, and water management.

Two habitat blockages were documented that reduced historical spawning and rearing access: Mathews Dam on the Mad River and Scott Dam on the Eel River. Matthews dam was found to block an estimated 36% of historical habitat. Scott Dam was found to block access to an estimated 99% of historical spawning and rearing habitat upstream of Soda Creek.

Factor A Since Listing:

The restoration of salmon and steelhead habitats has been a primary focus of Federal, State and local entities. The State of California Fisheries Restoration Grant Program (FRGP) alone has invested over $250 million dollars and supported approximately 3,500 salmonid restoration projects. These projects include fish passage, water conservation, improving instream habitats, watershed monitoring, education and organizational support to watershed groups. Many other entities have made investments to improve the range and habitat of steelhead. Roni *et al.*(2010) indicated the percentage of floodplain and in-channel habitat that would need to be restored to detect a 25% increase in salmon and steelhead production was 20%. There has been far more than 20% of floodplain and in-channel habitat restored due to FRGP. However, FRGP focuses

on projects associated with Southern Oregon/Northern California Coast coho salmon, Central California Coast coho salmon, Central California Coast steelhead, Southern California steelhead and South Central steelhead. While there are benefits to NC steelhead when projects overlap where NC steelhead co-occur, specific NC steelhead projects are currently not eligible for FRGP grant funding. Extensive restoration in NC steelhead populations has improved conditions; however, the activities that led to habitat degradation continue.

Although Matthews Dam on the Mad River was identified as a substantial habitat blockage at the time of listing (McEwan and Jackson 1996), the dam is now believed to block only 2 miles of historical spawning and rearing habitat. The 2 miles are believed to be of low value habitat and a portion of the river which naturally went intermittent and dry during the summer/fall months. The flows coming from Matthews Dam have improved in-river flows for summer steelhead and juvenile steelhead rearing year-round. Many of the physical effects to habitat normally associated with dams are less severe with this blockage than other dams.

All threats identified at listing continue to impair NC steelhead and their habitats. We have identified a number of threats originally discussed under Factor A that should be evaluated under a different ESA section 4(a)(1) factor. Thus, threats associated with a specific land use practice are discussed under Factor D (inadequacy of regulatory mechanisms), fishing under Factor B (overutilization), predation under Factor C (disease and predation) and flooding under Factor E (other natural or manmade factors).

Factor B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Factor B At Listing:

Threats identified for Factor B at listing included historical over-fishing, poaching, unauthorized driftnet fishing on the high seas, scientific utilization and commercial, recreational and tribal harvest. Steelhead have been an important freshwater recreational and

tribal fishery. Over-fishing in the early days of European settlement led to the depletion of many stocks of steelhead even before extensive habitat degradation. Anglers have been allowed to retain only hatchery fish. The mortality rates from incidental catch and release were unknown as was the level of illegal retention. During periods of decreased habitat availability (*i.e.,* drought or low flow conditions), recreational fisheries have had greater impact on wild steelhead. Poaching was considered a serious problem especially in the tributaries of the Middle Fork Eel River and Redwood Creek. Utilization for scientific research and education programs was identified as having little impact on NC steelhead populations (NMFS 1996) since take of this nature is via the issuances and conditioning of scientific permits. However, no comprehensive total or estimate of steelhead mortalities related to scientific sampling is kept for any watershed or steelhead stock in the state.

Factor B Since Listing:

The impacts of commercial or recreational ocean harvest are relatively unknown. The California state sport fishing regulations allow retention of hatchery steelhead; retention of wild steelhead is illegal. 2013-2014 fishing regulations increased the retention number of hatchery trout and hatchery steelhead in a number of wild steelhead streams, although on many streams where fishing is allowed there are no hatcheries and there is a very low likelihood of intercepting hatchery-origin steelhead.

Poaching and illegal retention is likely a threat in some populations. CDFW and the California Fish and Game Commission have made an effort to lessen this threat by implementing low flow fishing closures. CDFW has closed some waters to fishing in order to protect native salmon and steelhead from low water flows in California streams and rivers that have been significantly impacted by drought. CDFW has the authority under Title 14, California Code of Regulations, Section 8.00 to close select streams to fishing during specific months (depending on the area) when it determines that stream flows are below specific minimum flows or inadequate to provide fish passage for migrating steelhead trout and salmon (depending on the area). The

problem with poaching continues to plague summer steelhead due to the absence of adequate law enforcement (Moyle *et al.* 2008). Although fishing is prohibited in many areas and fines for violations are high, protection of summer steelhead populations requires special enforcement efforts (Moyle *et al.* 2008). Species identification and proper handling and release techniques, when incidental capture of NC steelhead occurs is critical to reduce the likelihood of mortality and ensure NC steelhead adults survive to reproduce. Releasing NC steelhead unharmed requires specific handling, hook removal, revival efforts and minimal air exposure time (*i.e.,* time out of the water).

Since the listing of this DPS, the take of NC steelhead for scientific research and other purposes has been closely controlled by CDFW and NMFS through the issuance and conditioning of collection permits via a Biological Opinion (NMFS 2012) and NMFS' approval of the CDFW Research Program under 50 CFR 223.203 (promulgated by NMFS under ESA section 4(d), this regulation includes an exception to take prohibitions for a state research program approved by NMFS). Tracking of authorized take began in 2004. Beginning in 2009, project applications were submitted online at the NMFS online application website Authorizations and Permits for Protected Species (APPS). APPS has allowed for improved annual tracking of lethal and non-lethal take requested, approved and reported for natural and listed hatchery-origin adults, smolts and juveniles. APPS data are analyzed annually to determine level of take for the DPS. Between 2004 and 2010, the actual reported percent mortality of NC steelhead juveniles and smolts for each year was at (or less than) 1 percent. The conclusion in the Biological Opinion (NMFS 2012) is that take associated with the CDFW Research Program is not likely to jeopardize the continued existence of NC steelhead.

Factor C: Disease or Predation

Factor C At Listing:

At Listing, avian, marine mammal, pikeminnow, freshwater predation and disease were identified as threats for Factor C. Predation was considered a threat mostly in circumstances

with introduced non-natives, low steelhead populations, habitat conditions leading to concentrations of steelhead in small areas or where avoidance habitats such as deep pools, undercut banks, or quality estuarine areas were compromised or lost. Marine predation was not well understood, but most investigators believed it to be a minor factor in steelhead declines. Pikeminnow predation in the Eel River and striped bass were considered major problems. No reliable data were available regarding the predation rates of striped bass, sea lions and harbor seals.

Diseases were attributed to hatchery-related activities, injury during passage through man-made impediments and habitat conditions leading to low water flows and high temperatures. However, very little historical information existed to quantify changes in infection levels and mortality rates attributable to disease. The listing indicated there was insufficient available information to suggest that the DPS was in danger of extinction because of disease or predation.

Factor C Since Listing:

Disease and predation were not considered major factors causing the decline of the NC steelhead DPS. Many common disease pathogens exist in wild populations, but increased individual resistance and natural ecological dynamics limit disease outbreaks and any resulting population-level impacts. Production hatcheries (i.e., those producing fish intended for angling opportunities) can have increased incidences of disease and related mortality, likely due to overcrowding and sub-optimal habitat conditions that can lower the natural immunity of individual fish. However, there are few hatcheries that exist within the NC steelhead DPS that would be a source for an outbreak of disease. No new information has emerged since listing that would suggest disease impacts have elevated in the time since, or that disease impacts are more than a minor factor in the present state of the NC steelhead DPS.

Factor D: Inadequacy of Existing Regulatory Mechanisms

Factor D At Listing:

At the time of listing, a variety of state and Federal regulatory mechanisms were in place to protect steelhead and their habitats. However, due to funding and implementation uncertainties and the voluntary nature of many programs, those regulatory mechanisms did not provide sufficient certainty that combined Federal and non-federal efforts were successfully reducing threats to NC steelhead. The following were identified as having inadequate regulatory mechanisms at the time of listing:

- California Department of Transportation (Caltrans)
- California Fish and Game Commission
    - Rearing programs
    - Steelhead policy
    - Water development and wetlands resources policy
- California Forest Practice Rules
- California Regional Water Quality Control Board
- California Department of Fish and Wildlife
    - Hatchery and Harvest Management
    - State Fishing Regulations
    - California Fish and Game Code Sections 1602/1603, 2786, 6900-6930
    - Keene-Nielsen Fisheries Restoration Act of 1985
    - Bosco-Keene Renewable Resources Investment Fund
    - Salmon and Steelhead Stock Management Policy
    - Steelhead Trout Catch Report-Restoration Card
    - Trout and Steelhead Conservation and Management Planning Act of 1979
    - Steelhead Restoration and Management Plan
    - Fishery Restoration Grant Program (FRGP)
    - California Coastal Salmonid Monitoring Program
- County Planning Efforts

- EPA/Water Quality
    - Water Quality Programs and TMDLs
    - Coastal Waters Program
    - Comprehensive Conservation and Management Plan for the San Francisco Bay-Delta Estuary
    - Wetland Protection Grants
- Five Counties MOU
- Gravel Mining Plans
- NMFS
    - ESA section 7
    - Section 10 and HCPs, including Green Diamond HCP and Pacific Lumber Company (PALCO) HCP
    - Pacific Coastal Salmon Recovery Fund
    - California Coastal Salmonid Monitoring Program
- Northcoast Regional Water Quality Control Board
- Pacific Fisheries Management Council
- Pacific Coast Ocean Salmon Fishery Management Plan and Magnuson-Stevens Act
- RCDs, Watershed Organizations and Private Companies
- US Army Corp of Engineers
    - Dredge, Fill and In-water Construction Programs
    - Section 404 of the Clean Water Act
- USDA Forest Service: Northwest Forest Plan and PACFISH

Factor D Since Listing:

For regulatory mechanisms to be deemed adequate they must be regulatory, not voluntary, enforced and found to effectively address threats to steelhead. Since listing, a number of factors outlined in the Federal Register listing NC steelhead persist, have improved or have been identified as not relevant. The primary regulatory mechanisms that protect NC steelhead are

not comprehensive and are vastly different across the landscape and land use type. For example: timber operations abide by California's Forest Practice Rules while other land uses have little to no oversight or salmonid protections rely on State regulations or county ordinances when those mechanisms are triggered.

Federal and State Land Management

Timber harvest and associated road building was noted as a limiting factor during listing. Federally, the Northwest Forest Plan (NFP) has generally accomplished the goal of slowing aquatic degradation that had been accelerating under previous forest management programs (Reeves 2006). Recent changes to the California Forest Practice Rules have improved riparian habitat protection on private timber lands, which make up the vast majority of timberland in the NC steelhead DPS. Aside from updates to the California Forest Practice Rules, few changes to state land management programs have occurred since the last status review in 2011.

Regulating and managing marijuana cultivation, while not specifically a land management issue, is nevertheless critically important in the effort to minimize environmental damage resulting from illegal marijuana grows. The issue of marijuana regulation will likely be a contentious topic in the coming few years -- a ballot initiative legalizing recreational use of marijuana is expected on the state ballot in 2016, and a legislative effort to craft a bill legalizing recreational use may gain traction in 2015. While these political efforts may dramatically change the marijuana cultivation landscape in California, the efficacy of any regulatory scheme to minimize grow-related environmental impacts would depend on specific details unknown at this time. Having environmental advocates (i.e., resource agencies or environmental NGOs) included as part of any legislative deliberations on the subject is critical toward crafting strong legalization laws that adequately and effectively minimize grow-related impacts.

Federal and State Water Management:

Groundwater regulation and management should improve in the coming decades following the 2014 passage of the Groundwater Sustainability Management Act; however, surface water throughout the state is heavily over-allocated (Grantham and Viers 2014)), and little change to the regulatory status quo concerning surface water rights and permitting is expected in the near future. As the state adapts to future climate variability combined with a period of accelerated population growth, the demands placed upon streams and rivers for surface water supplies will likely grow. Many large rivers and stream in the NC steelhead DPS are listed by the Environmental Protection Agency and State Water Quality Control Board as impaired for temperature and sediment pollution (per Section 303(d) of the Clean Water Act[1]). Many of the waterbodies listed will have Total Maximum Daily Loads identified, and an action plan for achieving that load, by 2019, which when implemented will improve salmonid habitat in affected streams.

Dredge, fill and instream construction programs

The U.S. Army Corps of Engineers, through their authority under the Clean Water Act, regulate dredge and fill within the ordinary high water mark of streams, rivers, wetlands, and other waterbodies. Likewise, CDFW performs a similar role for the state through their Streambed Alteration Agreement program (Fish and Game Code section 1602). Though both these programs analyze potential environmental impacts of the instream dredging, fill, and construction project in question, damage from upslope land grading remains largely under county oversight and is not properly analyzed or considered.

[1] Information on the 303(d) list can be found at:
http://www.swrcb.ca.gov/water_issues/programs/tmdl/integrated2010.shtml

Factor E: Other Natural and Man-made Factors Affecting the Species' Continued Existence

Factor E At Listing:

The manmade factors of artificial propagation and hatchery programs and the natural factors (*i.e.,* severe weather patterns), of drought, floods, El Nino events, climatic conditions, fires, variability in natural environmental conditions and ocean conditions were identified as threats under Factor E at the time of listing.

Artificial propagation was identified as negatively affecting wild stocks of salmonids through interactions with non-native fish, introductions of disease, genetic changes, competition for space and food resources, straying and mating with native populations, loss of local genetic adaptations, mortality associated with capture for broodstock and palliating the destruction of habitat and concealing problems facing wild stocks. The propagation programs identified were Yager Creek/Van Duzen, Van Arsdale Fish Station, Mad River, Noyo River and the North Fork Gualala hatchery.

Persistent drought conditions were found to further reduce already limited spawning, rearing and migration habitats. Drought conditions combined with agriculture and urban water use was identified as likely to result in substantial reduction or elimination of water flows in streams needed by all life stages of steelhead. Flooding was found to contribute sediment to already degraded habitats as northern California has some of the most erodible terrain in the world. Wildfires were identified as contributing to short-term sediment runoff to streams and chemical agents used to control fires have degraded water quality conditions.

Decreased ocean productivity and lower ocean survival of steelhead combined with lower freshwater survival due to degraded and altered riverine and estuarine habitats were found to be significant factors for decline.

Factor E Since Listing:

Yager Creek/Van Duzen, Van Arsdale Fish Station, Noyo and the North Fork Gualala hatchery programs have been terminated. The Mad River Hatchery continues to be operational. CDFW is currently working with NMFS in the development of a Hatchery and Genetic Management Plan for the Mad River Hatchery (steelhead produced in this hatchery are not considered part of this DPS but its operation may impact the NC steelhead DPS).

The natural factors of ocean conditions, El Nino events, terrestrial conditions, floods, droughts and fire remain as threats contributing to the threatened status of NC steelhead. Many populations have declined in abundance to levels that are well below low-risk extinction risk abundance targets, and several are, if not extirpated, likely below the high-risk depensation thresholds specified by Spence *et al.* (2008). These populations are at risk from natural stochastic processes, in addition to deterministic threats, that may make recovery of NC steelhead more difficult. As natural populations get smaller, stochastic processes may cause alterations in genetics, breeding structure, and population dynamics that may interfere with the success of recovery efforts and need to be considered when evaluating how populations respond to recovery actions. See Volume 5, Climate Change for more information on how the changing climate may affect NC steelhead.

Protective Efforts for NC Steelhead

Provided below is a list of the organizations and their protective efforts at, and since, listing.

Table 1: Protective Efforts in 2015

Organization	Protective Effort Identified at Listing	Status in 2015	Notes
Association of California Water Agencies	Conducting restoration efforts	No activities specifically for NC steelhead identified	No known benefits for NC steelhead
Bring Back the Natives: National Fish and Wildlife Foundation	Will improve the status of native aquatic species on public land	Provides funds for conservation of fish habitat; No projects for NC steelhead identified	No benefit for NC steelhead

CalTrout	Unspecified	Voluntary efforts and funding in the Eel River to protect NC steelhead	Beneficial to Eel River NC steelhead populations
Eel River Watershed Group	Unspecified	Watershed coordinators who work with landowners and managers to raise community awareness, develop action plans and implement projects for salmon and steelhead	Beneficial to Eel River NC steelhead populations
Fish Friendly Farming	Provides guidance and certification to grape growers to manage lands and use practices which decrease soil erosion and sediment delivery to streams	Currently program has properties only in the Russian and Napa River River	No benefit for NC steelhead
FishNet 4C	Multicounty effort to enhance and protect salmonid habitats	Defunded and no longer an active program	No longer benefits NC steelhead
Five Counties Roads Program	Program inventories and ranks all fish barriers	Continues to be beneficial in NC steelhead streams	Beneficial to NC steelhead
Garcia Watershed Council	Unspecified	Uncertain if council still exists	Uncertain if benefits NC steelhead
Gravel Mining Plans	Unspecified	See Factor D discussion	N/A
Humboldt Bay Watershed Advisory Council	Unspecified	Humboldt Bay Watershed Salmon and Steelhead Conservation Plan issued in 2005, improve the effectiveness of salmonid restoration and protection efforts in the Humboldt Bay watershed through implementation of the goals and objectives specified in the plan	Beneficial to Humboldt Bay NC steelhead population
Mattole Salmon Group	Unspecified	Community based non-profit organization working in the Mattole conducting monitoring, outreach and restoration.	Beneficial to Mattole NC steelhead population
Mendocino Redwood Company	Unspecified	HCP under development since 2000	No benefits to date
National Parks Service: Redwood National Park	Directs management to restore aquatic and terrestrial ecological functions	The Park conducts restoration, monitoring, and outreach for salmon and steelhead in Redwood Creek	Beneficial to Redwood Creek NC steelhead population

Watershed Groups	Unspecified	Many watershed groups are conducting outreach, securing funds, implementing restoration actions and are contributing to NC steelhead recovery in meaningful ways.	Benefits NC steelhead

Protective Efforts Since Listing: While many protective efforts are in place to restore and protect NC steelhead habitats, NMFS has not analyzed the certainty of their implementation and effectiveness to support a conclusion whether these efforts ameliorate the threats associated with the five section 4(a)(1) factors.

DPS RECOVERY GOALS, OBJECTIVES AND CRITERIA

Recovery goals, objectives and criteria provide a means by which the public can measure progress in the efforts at recovery and are used to link listing with status reviews and reclassification determinations. We developed eight categories of recovery criteria for the NC steelhead DPS: biological viability, criteria for each of the five listing factors, degree recovery actions have been implemented, and certainty conservation efforts are ameliorating threats.

The goal for this plan is to remove the NC steelhead DPS from the Federal List of Endangered and Threatened Wildlife (50 CFR 17.11; 50 CFR 223.102) due to their recovery. Our vision is to have restored freshwater and estuarine habitats that are supporting self-sustaining, well-distributed and naturally spawning salmonid populations that provide ecological, cultural, social and economic benefits to the people of California.

Recovery plan objectives are to:

1. Reduce the present or threatened destruction, modification, or curtailment of habitat or range;
2. Ameliorate utilization for commercial, recreational, scientific, or educational purposes;
3. Abate disease and predation;

4. Establish the adequacy of existing regulatory mechanisms for protecting NC steelhead now and into the future (*i.e.*, post-delisting);
5. Address other natural or manmade factors affecting the continued existence of NC steelhead; and
6. Ensure NC steelhead status is at a low risk of extinction based on abundance, growth rate, spatial structure and diversity.

BIOLOGICAL RECOVERY CRITERIA

Populations selected for recovery scenarios must achieve the following criteria based on their role in recovery. Populations selected for recovery scenarios in all the diversity strata of the DPS or ESU must meet these criteria in order for the DPS or ESU to meet biological recovery criteria.

BR1 **Low Extinction Risk Criteria:** For the essential independent populations selected to be viable, the low extinction risk criteria for effective population size, population decline, catastrophic decline, hatchery influence and density-based spawner abundances must be met according to Spence *et al*.(2008) (Table 2) (See Vol. 1 Chapter 3)

AND

BR2 **Moderate Extinction Risk Criteria:** Spawner density abundance targets have been achieved for Supporting Independent populations

AND

BR3 **Redundancy and Occupancy Criteria:** Spawner density and abundance targets for dependent populations, which are the occupancy goals for each of those populations, have been achieved (See the discussion of Spence *et al*. (2008) in Vol. Chapter 3).

AND

BR5 NC steelhead summer-run populations must meet effective population size criteria outlined by Spence *et al*. (2008) (Table 2).

*BR4 only applies to CCC steelhead (omitted from list)

The selected populations and associated recovery criteria for NC Steelhead DPS (Also see Table 3 and Table 4):

a. Selected populations in all five Diversity Strata achieving biological recovery criteria;

b. **BR-1:** 27 essential independent populations attaining low extinction risk criteria (*i.e.*, Garcia River, Gualala River, Navarro River, Chamise Creek, Outlet Creek, Tomki Creek, Woodman Creek, Larabee Creek, Middle Fork Eel River, North Fork Eel River, Upper Mainstem Eel River, Van Duzen River, Big River, Noyo River, Ten Mile River, Usal Creek, Wages Creek, Maple Creek/Big Lagoon, Bear River, Humboldt Bay Tributaries, Little River (Humboldt County), Mattole River, South Fork Eel River, Mad River (Upper), Mad River (Lower), and Redwood Creek (Upper) and Redwood (Lower) (Humboldt County));

c. **BR-2:** Eight supporting independent populations attaining moderate extinction risk criteria (*i.e.*, Brush Creek, Elk Creek, Bell Springs, Bucknell Creek, Dobbyn Creek, Albion River, Cottaneva Creek and Pudding Creek; and

d. **BR-3:** 14 dependent populations contributing to redundancy and occupancy criteria (*i.e.*, Schooner Gulch, Soda Creek, Caspar Creek, Guthrie Creek, Oil Creek, Big Creek, Big Flat Creek, Howe Creek, Jackass Creek, Lower Mainstem Eel River, McNutt Gulch, Shipman Creek, Spanish Creek, and Telegraph Creek.

e. **BR-5:** 10 independent summer-run steelhead populations expected to meet effective population size criteria () (i.e., Redwood Creek, Mad River, South Fork Eel River, Mattole River, Van Duzen River, Larabee Creek, North Fork Eel River, Upper Middle Mainstem Eel River, Middle Fork Eel River, and Upper Mainstem Eel River.)

Table 2: Criteria for assessing the level of risk of extinction for NC steelhead populations. Overall risk is determined by the highest risk score for any category. N_a is total abundance of adult spawners in a year. N_e is effective population size per generation. N_g is total number of spawners for the generation.

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 *-or-* Total population size per generation	$N_e \leq 50$ *-or-* $N_g \leq 250$	$50 < N_e < 500$ *-or-* $250 < N_g < 2500$	$N_e \geq 500$ *-or-* $N_g \geq 2500$
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] ≤ 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) <u>*or*</u> $N_a > 500$ but declining at a rate of ≥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 3: NC winter-run steelhead: Diversity Strata, Populations, Historical Status, Population's Role in Recovery, Current IP-km, and Spawner Density and Abundance Targets for Delisting. Redwood Creek and Mad River cross two diversity strata and were broken into an upper and lower to reflect this.

Diversity Strata	NC winter-run steelhead populations	Historical Population Status	Population's Role In Recovery	Current Weighted IP-km	Spawner Density	Spawner Abundance
Northern Coastal	Bear River	I	Essential	107.8	27.2	2,900
	Big Creek	D	Supporting	3.8	6-12	21-44
	Big Flat Creek	D	Supporting	5.9	6-12	33-69
	Guthrie Creek	D	Supporting	9.2	6-12	53-108
	Howe Creek	D	Supporting	13.9	6-12	81-165
	Humboldt Bay Tributaries	I	Essential	203.4	20.0	4,100
	Jackass Creek	D	Supporting	6.9	6-12	39-81
	Little River (Humboldt Co.)	I	Essential	50.0	35.3	1,800
	Lower Mainstem Eel River Tributaries	D	Supporting	166.9	6-12	999-2,001
	Mad River (Lower)*	I	Essential	145.7	22.0	3,200
	Maple Creek/Big Lagoon	I	Essential	71.7	32.3	2,300
	Mattole River	I	Essential	534.5	20.0	10,700
	McNutt Gulch	D	Supporting	11.3	6-12	66-134
	Oil Creek	D	Supporting	10.6	6-12	62-125
	Redwood Creek (Humboldt Co) (Lower)*	I	Essential	161.5	20.0	3,200
	Shipman Creek	D	Supporting	2.3	6-12	12-26
	South Fork Eel River	I	Essential	951.8	20.0	19,000
	Spanish Creek	D	Supporting	1.9	6-12	9-21
	Telegraph Creek	D	Supporting	5.3	6-12	30-62
	Northern Coastal Diversity Stratum Recovery Target					**47,200**

North Mountain Interior	Dobbyn Creek	I	Supporting	47.0	6-12	280-562
	Larabee Creek	I	Essential	86.6	30.2	2,600
	Mad River (Upper)*	I	Essential	303.8	20.0	6,100
	Middle Fork Eel River	I	Essential	472.4	20.0	9,400
	North Fork Eel River	I	Essential	317.0	20.0	6,300
	Redwood Creek (Humboldt Co) (Upper)*	I	Essential	85.7	30.3	2,600
	Upper Mainstem Eel River	I	Essential	209.2	20.0	4,200
	Van Duzen River	I	Essential	312.2	20.0	6,200
	North Mountain Interior Diversity Stratum Recovery Target					**37,400**
Lower Interior	Bell Springs Creek	I	Supporting	18.1	6-12	107-215
	Bucknell Creek	I	Supporting	9.0	6-12	52-106
	Chamise Creek	I	Essential	36.2	37.2	1,300
	Jewett Creek	I	Supporting	16.8	6-12	99-200
	Garcia Creek	D	Supporting	14.1	6-12	83-167
	Outlet Creek	I	Essential	188.8	20.0	3,800
	Soda Creek	D	Supporting	15.7	6-12	92-186
	Tomki Creek	I	Essential	89.5	29.8	2,700
	Woodman Creek	I	Essential	35.0	37.4	1,300
	Lower Interior Diversity Stratum Recovery Target					**9,100**
North-Central Coastal	Albion River	I	Supporting	48.6	6-12	290-581
	Big River	I	Essential	255	20	5,100
	Caspar Creek	D	Essential	12.9	40.4	500
	Cottaneva Creek	I	Supporting	21.9	6-12	129-261
	Noyo River	I	Essential	152.8	21.0	3,200
	Pudding Creek	I	Supporting	24.1	6-12	143-287

	Ten Mile River	I	Essential	171.0	20	3,400
	Usal Creek	I	Essential	27.5	38.4	1,100
	Wages Creek	I	Essential	17.3	39.8	700
	North-Central Coastal Diversity Stratum Recovery Target					**14,000**
Central Coastal	Brush Creek	I	Supporting	23.8	6-12	141-284
	Elk Creek	I	Supporting	21.5	6-12	127-256
	Garcia River	I	Essential	135.4	23.4	3,200
	Gualala River	I	Essential	397.1	20.0	7,900
	Navarro River	I	Essential	387.5	20.0	7,800
	Schooner Gulch	D	Supporting	7.7	6-12	44-90
	Central Coastal Diversity Stratum Recovery Target					**18,900**
	NC Steelhead DPS Recovery Target					**128,700**

Table 4: NC summer-run steelhead: Diversity Strata, Populations, Historical Population Status, and Effective Population Size (N_e). *The Redwood Creek and Mad River populations each occur in two diversity strata (Spence *et al.* 2008). In both watersheds, the location of actual spawning grounds is poorly understood and therefore each will be treated as one population until more information is obtained from monitoring.

Diversity Strata	NC summer-run steelhead populations	Historical Population Status	Effective Population Size
Northern Coastal/ North Mountain Interior	Redwood Creek*	I	$N_e \geq 500$
Northern Coastal/ North Mountain Interior	Mad River*	I	$N_e \geq 500$
Northern Coastal	South Fork Eel River	I	$N_e \geq 500$
Northern Coastal	Mattole River	I	$N_e \geq 500$
North Mountain Interior	Van Duzen River	I	$N_e \geq 500$
North Mountain Interior	Larabee Creek	I	$N_e \geq 500$
North Mountain Interior	North Fork Eel River	I	$N_e \geq 500$
North Mountain Interior	Upper Middle Mainstem	I	$N_e \geq 500$

North Mountain Interior	Middle Fork Eel River	I	$N_e \geq 500$
North Mountain Interior	Upper Mainstem Eel River	I	$N_e \geq 500$

ESA § 4(A)(1) FACTORS RECOVERY CRITERIA

The following are the recovery criteria for the section ESA 4(a)(1) listing factors. The primary metrics for assessing whether each of the listing factor criteria have been achieved will be to utilize the CAP analyses to reassess habitat attribute and threat conditions in the future, and track the implementation of identified recovery actions unless otherwise found unnecessary.

All recovery actions were assigned to a specific section 4(a)(1) listing factor in order to track progress of implementation of actions for each factor. Recovery Action Priorities are assigned to each action step in the implementation table in accordance with NMFS' Interim Recovery Planning Guidance (NMFS 2010a) and the NMFS Endangered and Threatened Species Listing and Recovery Priority Guidelines (55 FR 24296) (See Chapter 4 for more information).

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

A1 CAP/Rapid Assessment attribute ratings for:

a. **Essential Populations** found Good or better for all attributes in each Stratum.
b. **Supporting Populations** found Good or better for 50 percent[2] and the remaining rated Fair throughout the DPS/ESU.

A2 All recovery actions have been implemented under Listing Factor A, or the actions are deemed no longer necessary for recovery.

[2] The role of supporting populations within the recovery scenario is to provide for redundancy and occupancy across Diversity Stratum. Because of their role, we use lower criteria for Factor A (*i.e.*, 50 percent as Good or better and the remaining as Fair). A "Fair" CAP/rapid assessment rating means that habitat conditions, while impaired to some degree, are functioning. Therefore, at least all habitat conditions are expected to function within these populations, and at least half are expected to be in proper condition (*i.e.*, Good), which NMFS expects will be sufficient for these populations to fulfill their role within the recovery scenario.

Listing Factor B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

B1 CAP/Rapid Assessment threat ratings for Fishing and Collecting:

a. **Essential and Supporting Populations** found Medium or Low.

B2 All recovery actions have been implemented under Listing Factor B, or the actions are deemed no longer necessary for recovery.

Listing Factor C: Disease, Predation and Competition

C1 CAP/Rapid Assessment threat ratings for Disease, Predation and Competition:

a. **Essential and Supporting Populations** found Medium or Low.

C2 All recovery actions have been implemented under Listing Factor C, or the actions are deemed no longer necessary for recovery.

Listing Factor D: The Inadequacy of Existing Regulatory Mechanisms

D1 CAP/Rapid Assessment threat ratings related to Listing Factor D (see list below):

a. **Essential and Supporting Populations** found Medium or Low.

Listing Factor D Threats

- Agriculture
- Channel Modification
- Fire, Fuel Management and Fire Suppression
- Livestock Farming and Ranching
- Logging and Wood Harvesting
- Mining
- Residential and Commercial Development
- Roads and Railroads
- Water Diversions and Impoundments

D2 All recovery actions have been implemented under Listing Factor D, or the actions are deemed no longer necessary for recovery.

Listing Factor E: Other Natural and Manmade Factors Affecting the Species' Continued Decline

E1 CAP/Rapid Assessment threat ratings for Hatcheries and Aquaculture, Recreational Areas and Activities, and Severe Weather Patterns:

a. Essential and Supporting Populations found Medium or Low.

E2 All recovery actions have been implemented under Listing Factor E, or the actions are deemed no longer necessary for recovery.

CONSERVATION EFFORTS

CE1 Formalized conservation efforts applicable to the ESU or DPS have been implemented and are effective in ameliorating any remaining threats associated with the five section 4(a)(1) factors.

DPS AND DIVERSITY STRATA RESULTS

All CAP viability and threat tables were assembled for the NC steelhead DPS to evaluate patterns in the ESU across Diversity Strata and populations. Attribute and threat results are discussed first for Diversity Strata followed by results across lifestages for the DPS. A subset of CAP indicators and threat results were evaluated under a climate change scenario and are provided in Appendix B.

DIVERSITY STRATA ATTRIBUTE AND THREAT RESULTS

The delineation of the NC steelhead DPS Diversity Strata was based on environmental and ecological similarities and life history differences between winter run and summer run adult populations. Five strata were identified by Bjorkstedt *et al*. (2005): Northern Coastal, Lower Interior, North Mountain Interior, North-Central Coastal and Central Coastal.

Attribute Results

Across strata, the Lower Interior Diversity Stratum had the highest percentage of Poor or Fair attribute indicator ratings (76%), followed by the North Mountain Interior stratum (71%) (Figure 3). The North-Central Coastal Diversity Stratum received the lowest percentage of Poor or Fair indicator ratings (50%) overall and the Central Coastal stratum had the lowest percentage of Poor indicator ratings (18%). Figure 3 shows the percentage of ratings for Very Good, Good, Fair and Poor for each Stratum in the DPS.

Threat Results

The Northern Coastal Diversity Stratum received the highest percentage of Very High and High threat ratings (35%) followed by the Central Coastal Diversity Stratum (27%) (Figure 4).

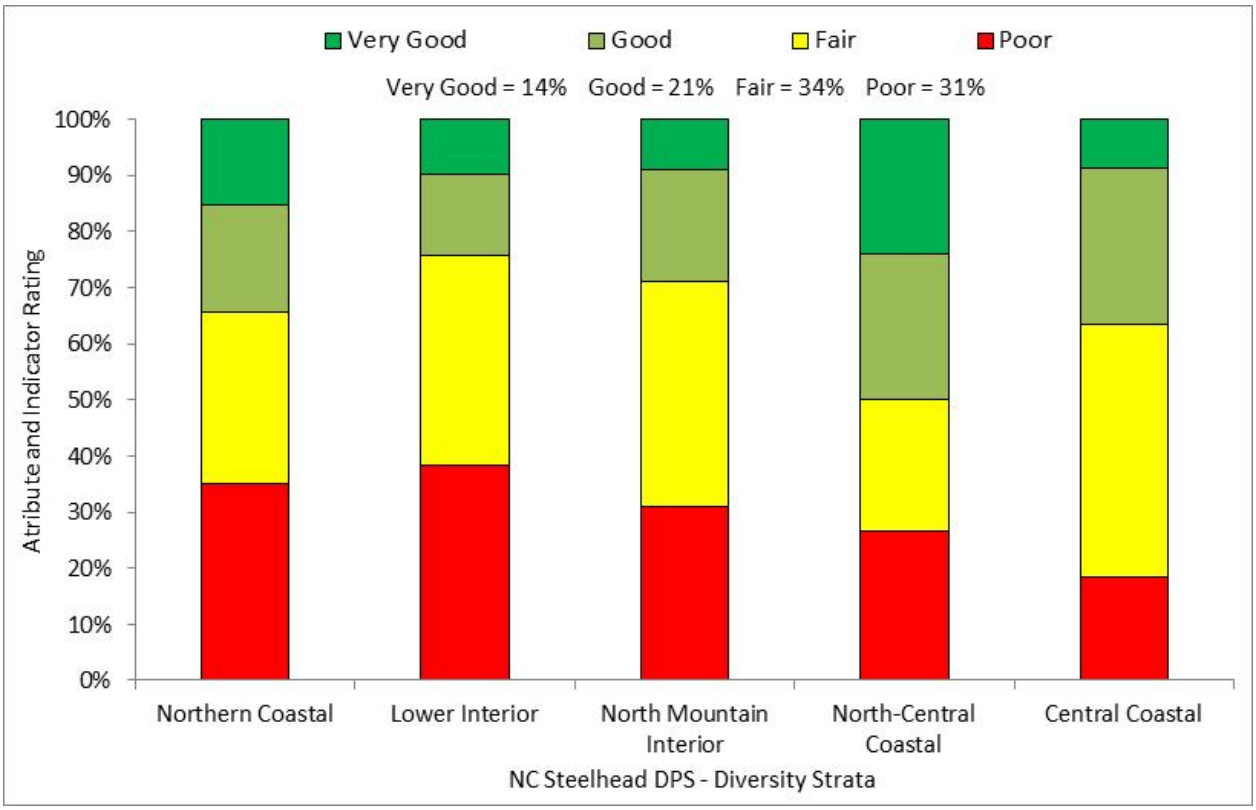

Figure 3: Attribute Indicator ratings for the NC steelhead DPS by Diversity Strata.

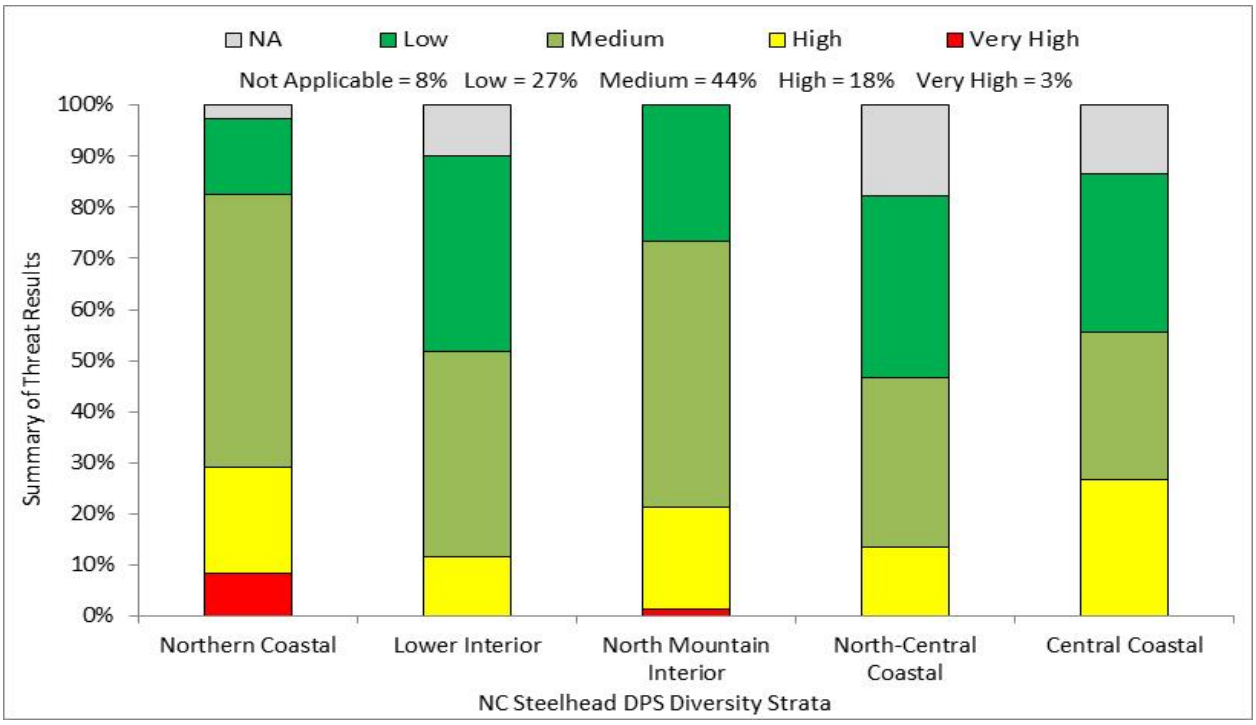

Figure 4: NC steelhead DPS Diversity Strata Threat ratings.

NORTHERN COASTAL DIVERSITY STRATUM RESULTS

The Northern Coastal Diversity Stratum is influenced by the coastal climate conditions of northern California. CAP populations in the Northern Coastal stratum include: Redwood Creek, Maple Creek/Big Lagoon, Little River, Mad River, Humboldt Bay, South Fork Eel River, Bear River, and the Mattole River. Of the five Strata in the DPS, the Northern Coastal has the most extensive urban centers (*i.e.,* Eureka and Arcata), however logging remains the most common and widespread land use.

Attribute Results

The Northern Coastal Diversity Stratum received the second highest percentage of Poor indicator ratings (35%) and a total of 65% of indicators rated as Poor or Fair (Figure 3, Figure 6 and Table 5). In general, attribute indicators of greatest concern for all life stages included estuary/lagoon (quality and extent), indicators related to in-stream habitat complexity, riparian vegetation (tree diameter), sediment transport (road density and streamside road density), and water quality (turbidity). More than 50% of attribute indicators in the Mattole River population were rated as Poor, the most of any population in the DPS. Indicators of least concern included those associated with hydrology, landscape patterns, passage/migration, and water toxicity (Table 5).

Life Stage Results

In the Northern Coastal stratum, more than 50% of indicator ratings for each life stage were rated as Poor or Fair and more than 60% for five of the six life stages (Figure 5). Winter rearing juveniles were the most impaired life stage with 74% of indicators rated as Poor or Fair followed closely by summer adults with 73%. Half of the indicators for watershed process were rated as either Poor or Fair, of which 34% were rated Poor. Across the stratum, indicators of concern for the winter adult life stage were those associated with a lack of habitat complexity, small riparian tree diameter, and high turbidity (Table 6). Impaired gravel quantity and quality necessary for successful spawning and egg incubation were the indicators identified as most

limiting for the egg life stage. For summer rearing juveniles, winter rearing juveniles, and smolts, impacted estuary/lagoon conditions (summer rearing juveniles and smolts only), and reduced in-stream habitat complexity were common impairments. For summer and winter rearing jueniles, all populations were rated Poor or Fair for riparian vegetation (tree diameter), and in all but one population (Bear River, Fair) winter rearing juveniles were rated Poor for turbidity. The four populations with summer adults in the stratum were rated Poor for viability (abundance) and habitat complexity (shelter rating), and all populations were rated Poor or Fair for mainstem water temprature, precent staging pools, and hydrology (baseflow extent) (Table 6).

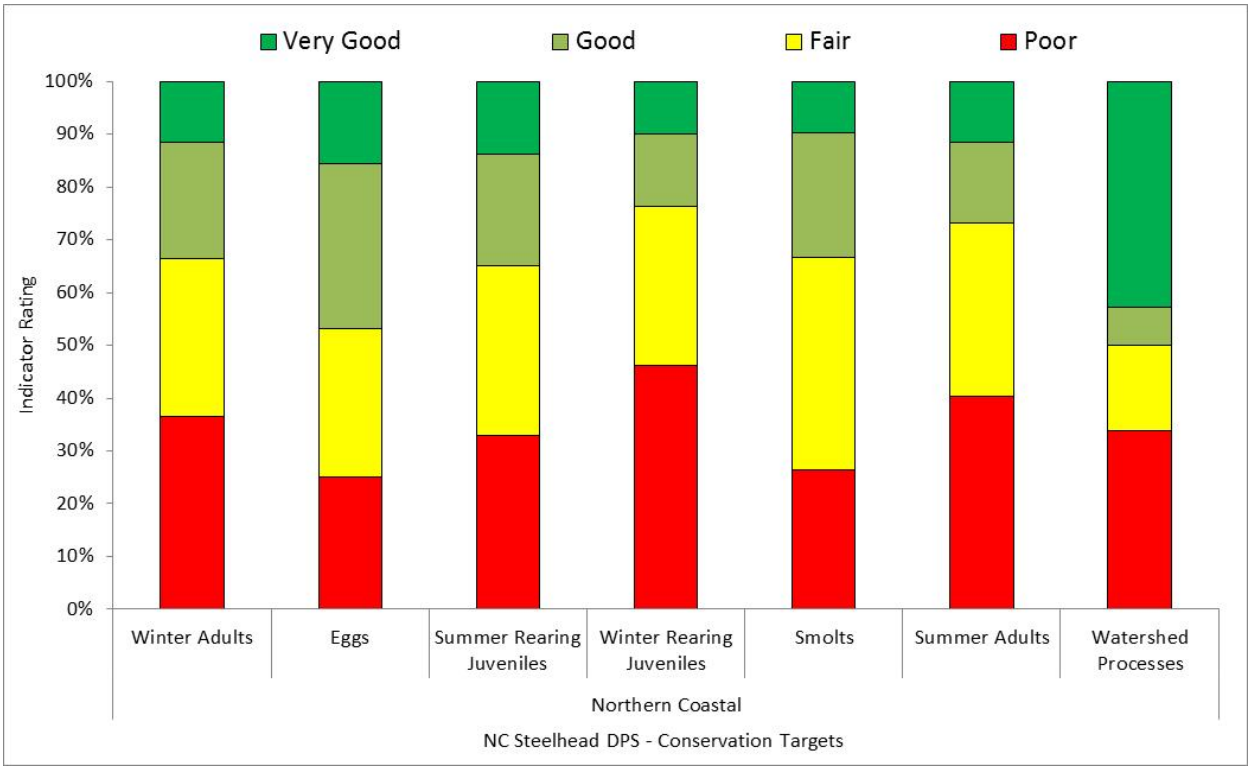

Figure 5: Attribute Indicator Ratings for the Northern Coastal Diversity Stratum Conservation Targets.

Threat Results

Within the stratum, 29% of the threats were rated Very High or High and only 15% were rated Low. Threats of greatest concern were roads and railroads, logging and wood harvesting, channel modification, and water diversions and impoundments (Figure 6 and Table 7). The Mattole River and South Fork Eel River were rated Very High and High respectively for severe weather patterns and for all other populations in the stratum this threat was rated Medium (Table 7). Although it had the most CAP viability attribute indicators rated as Poor, the Mattole River had the most threats rated Low (6 of 15) of any population in the stratum (Table 7).

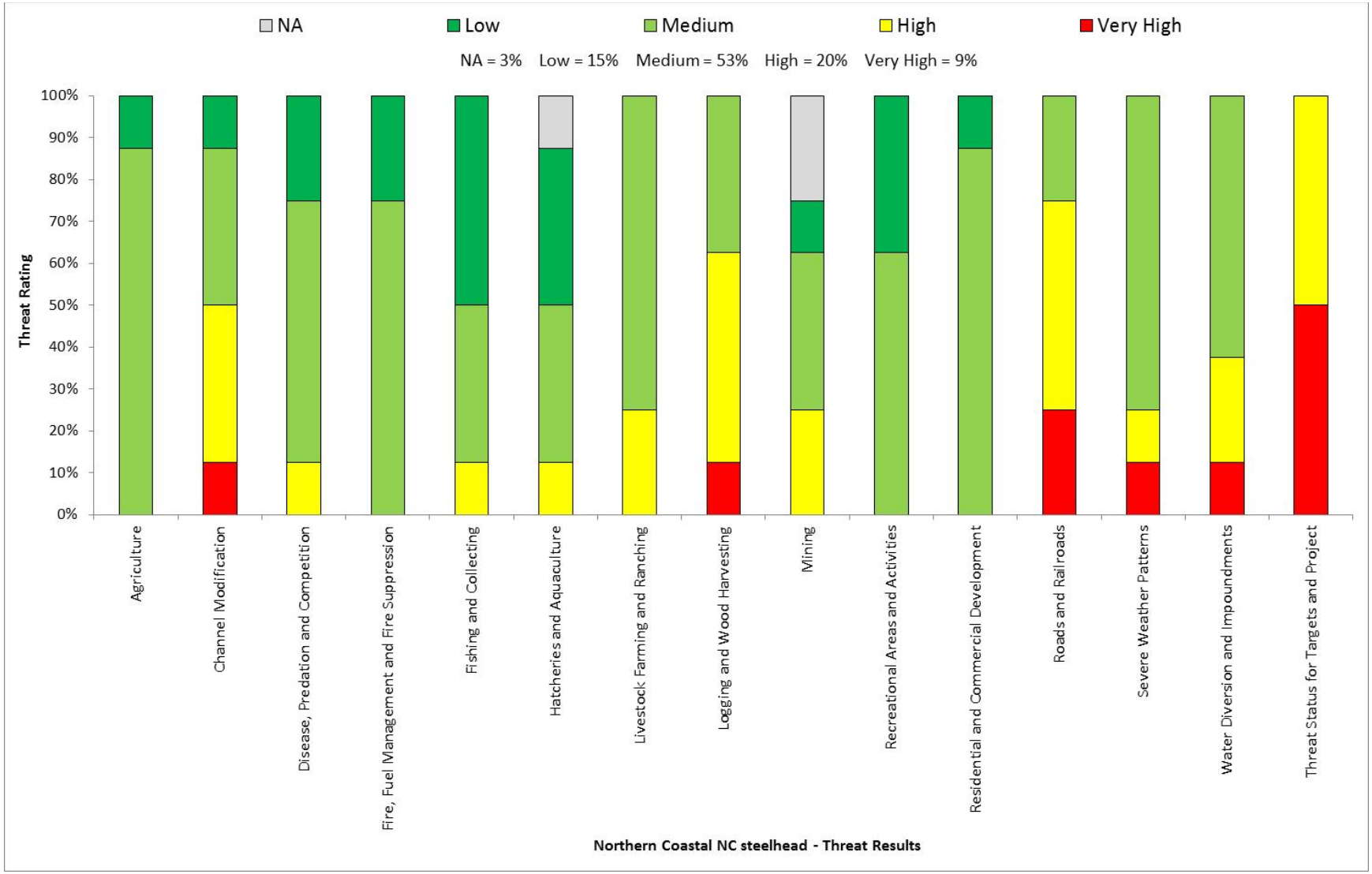

Figure 6: Threat ratings for the Northern Coastal Diversity Stratum.

LOWER INTERIOR DIVERSITY STRATUM RESULTS

The Lower Interior Diversity Stratum consists of four CAP steelhead populations: Chamise, Woodman, Outlet, and Tomki creeks, which drain the interior, mainstem valley of the Eel River Watershed.

Attribute Results

Of the five Diversity Strata, the Lower Interior had the highest percentage (76%) of Poor or Fair indicator ratings and the highest percentage (31%) of Poor ratings alone (Figure 3). Steelhead from each of the four populations in the stratum utilize the same estuary which was rated Poor. Other attribute indicators that were rated Poor or Fair consistently throughout the stratum and across life stages were habitat complexity (large wood frequency, percent primary pools, shelter rating), hydrology (baseflow conditions), riparian vegetation (tree diameter), gravel quality (embeddedness), sediment transport (streamside road density), and water quality (water temperature). Indicators that were less impaired were similar with other strata and included hydrology (impervious surfaces), landscape patterns (agriculture, timber, and urbanization), passage/migration (physical barriers), and water quality (toxicity) (Table 5).

Life Stage Results

The results from the CAP viability analysis indicate each of the target life stages across the stratum are significantly impaired with more than 70% of all attribute indicators rated as Poor or Fair for each life stage (Figure 7 and Table 6). Summer rearing juveniles were the most impacted life stage with 87% of attribute indicators rated as Poor or Fair, followed closely by eggs (82%) and winter rearing juveniles (80%) (Figure 7). Watershed processes overall had 43% of attribute indicators rated as Poor or Fair and sediment transport (streamside road density) was rated Poor throughout the stratum (Table 6). Attribute indicators of greatest concern for the winter adult life stage are habitat complexity (large wood frequency, percent staging pools, pool/riffle/flatwater ratio), riparian vegetation (tree diameter), and water quality (turbidity). For eggs, gravel quality (embeddedness) was rated Poor for all populations except Tomki Creek

(Fair). In addition to the above indicators for winter adult and egg life stages, estuary/lagoon (quality and extent), summer water temperature, and viability (density) were also rated poorly for summer rearing juveniles. Meanwhile, habitat complexity (large wood frequency, shelter), riparian tree diameter, and turbidity appear to be of most concern for the winter rearing juveniles. For smolts, estuary/lagoon, habitat complexity (shelter rating) and viability (low abundance) are most limiting.

Figure 7: Attribute Indicator Ratings for the Lower Interior Diversity Stratum Conservation Targets.

Threat Results

Despite the degraded conditions for all life stages throughout the stratum (see Figure 7), the threat ratings for the stratum were fairly positive with 78% of the threats rated as Low (38%) or Medium (Figure 8 and Table 7). None of the threats were rated Very High and those that received a High rating (12%) were roads and railroads and water diversions and impoundments; these are the greatest threat to steelhead within the stratum.

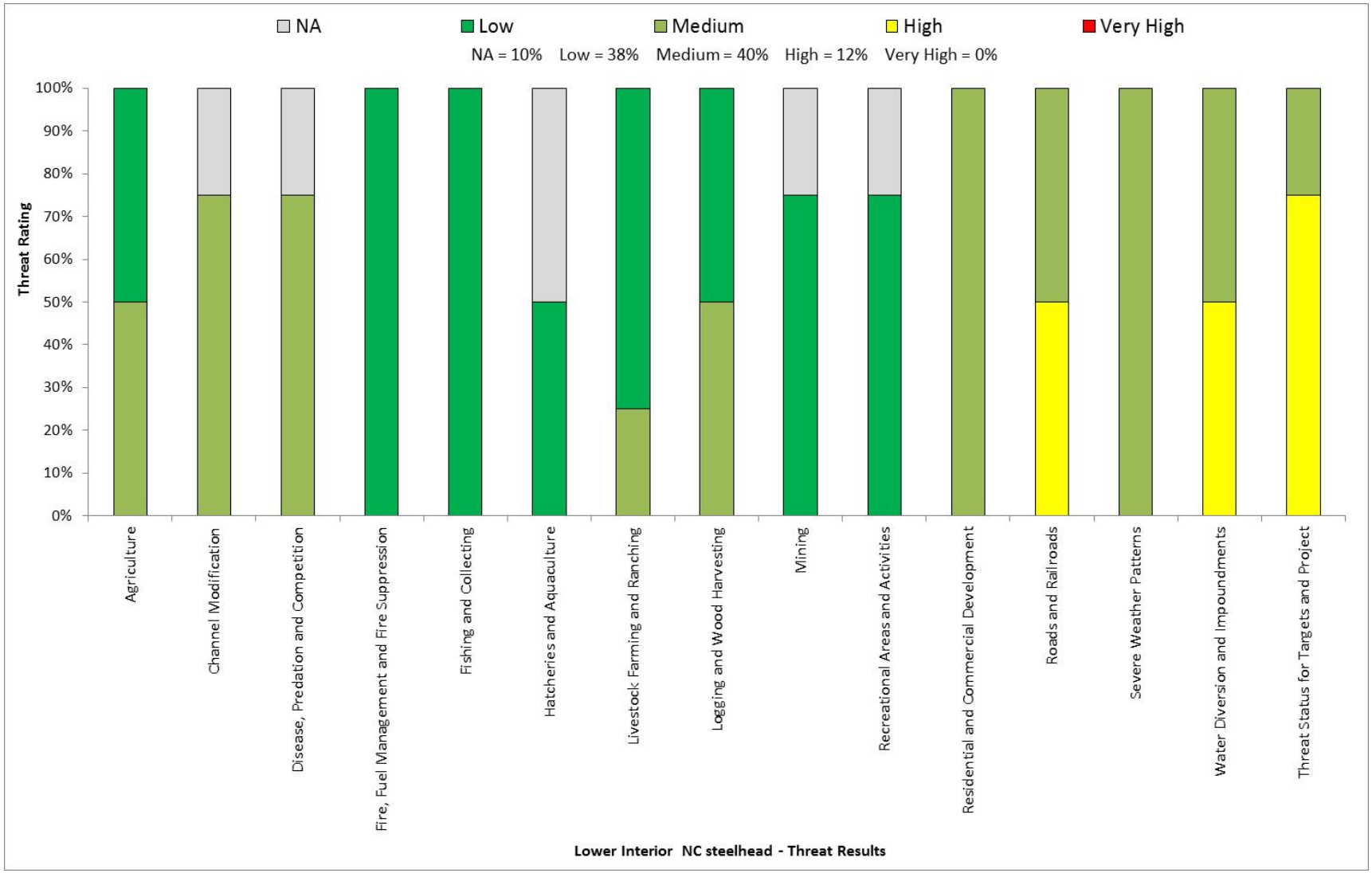

Figure 8: Threat ratings for the Lower Interior Diversity Stratum.

NORTH MOUNTAIN INTERIOR DIVERSITY STRATUM RESULTS

The North Mountain Interior Diversity Stratum includes populations or parts of populations that occupy areas influenced by likely snowmelt events in the Eel River Watershed. These include the Van Duzen River, Larabee Creek, North Fork Eel River, Middle Fork Eel River, and Upper Mainstem Eel River populations.

Attribute Results

Across strata, the North Mountain Interior had the second highest percentage (71%) of Poor or Fair indicator ratings, of which 31% were rated Poor (Figure 3). Like the other Eel River Watershed populations in the Lower Interior Diversity Stratum, the estuary was rated Poor for all applicable life stages and populations (Table 5). Other attributes with a High percentage of Poor or Fair ratings across the stratum were habitat complexity, riparian vegetation (canopy cover and tree diameter), gravel quality, streamside road density, and water temperatures for summer rearing juveniles (Table 5). Like other strata, most populations and life stages in the North Mountain Interior were rated Good or better for attribute indicators related to hydrology, landscape patterns, passage/migration, and toxicity (Table 5). The few exceptions were timber harvest (Poor) for the Van Duzen River and Larabee Creek populations, baseflow conditions for summer rearing juveniles and summer adults in the Van Duzen River and North Fork Eel River populations, and passage at mouth or confluence for smolts in the North Fork Eel River and summer rearing juveniles in the Upper Mainstem Eel River. Passage for winter adults in the Upper Mainstem Eel River was also rated Poor due to Scott Dam.

Life Stage Results

Across the North Mountain Interior Diversity Stratum, all life stages of steelhead are impaired with more than 60% of attribute indicators rated as Poor or Fair (Figure 9). Based on the percentage of indicators rated as Poor or Fair, winter rearing juveniles (82%) were the most impaired life stage, followed closely by summer rearing juveniles (80%). Summer rearing juveniles received the most Poor ratings overall (39%). As with other strata in the DPS,

streamside road density was rated Poor and is the most concerning watershed process in the North Mountain Interior populations. Individual life stage results were similar for other strata. Winter adults are most limited by habitat complexity, riparian vegetation, and to a lesser extent turbidity, and eggs are most limited by gravel embeddedness (Table 6). Estuary/lagoon, habitat complexity, riparian vegetation, sediment, and water temperature are of greatest concern for summer rearing juveniles. Winter rearing juveniles are most limited by reduced habitat complexity, riparian tree diameter, and high gravel embeddedness, and smolts are most impacted by poor estuary/lagoon and in-stream shelter conditions. For summer adults, indicators of greatest concern include percent staging pools, shelter rating, gravel quantity and quality, and high mainstem water temperatures.

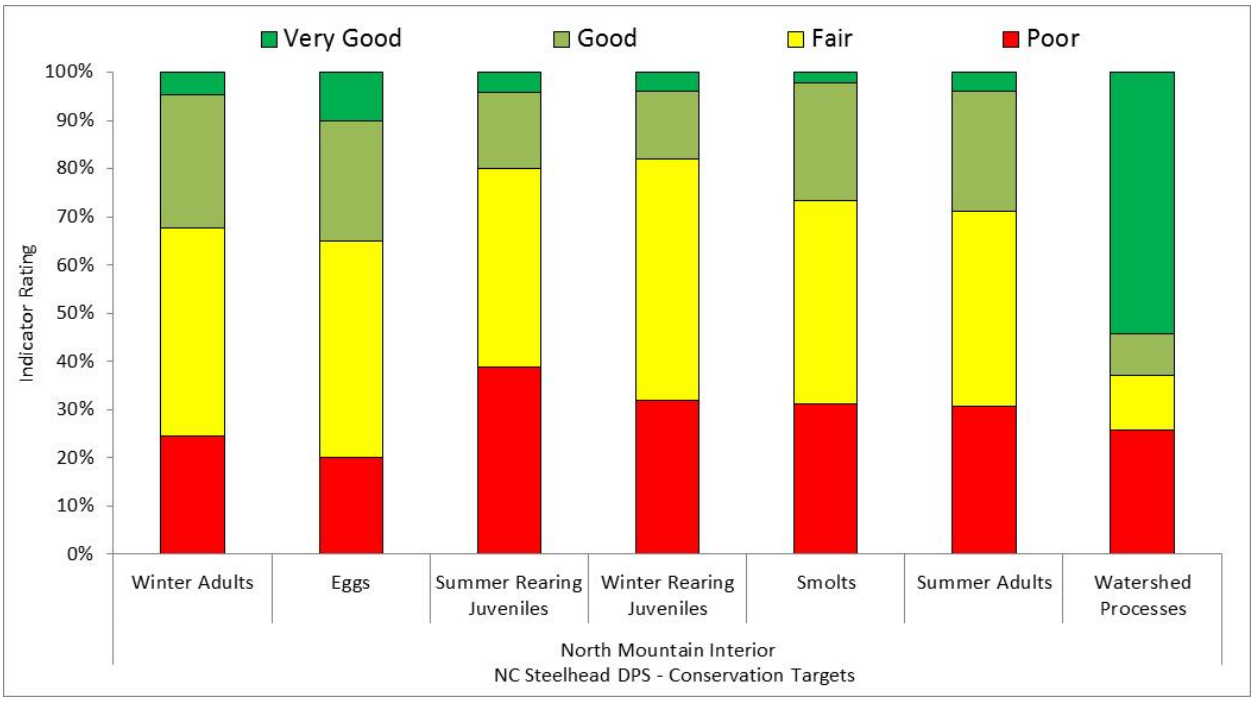

Figure 9: Attribute Indicator Ratings for the North Mountain Interior Diversity Stratum Conservation Targets.

Threat Results

Similar to the Lower Interior stratum, the North Mountain Interior had an overall Low percentage (21%) of High or Very High threats (Figure 10). The only Very High rating for the stratum was water diversion and impoundments in the Upper Mainstem Eel River population (*i.e.,* Scott Dam) (Table 7). Roads and railroads were rated a High threat for all populations in the stratum while hatcheries and aquaculture were rated Low in all populations.

Figure 10: Threat ratings for the North Mountain Interior Diversity Stratum.

NORTH-CENTRAL COASTAL DIVERSITY STRATUM RESULTS

The North-Central Coastal Diversity Stratum CAP populations occur along the Mendocino County coastline and include Usal Creek, Wages Creek, Ten Mile River, Noyo River, Caspar Creek, and Big River. This stratum is comprised almost entirely of a forested landscape, and timber harvest is the dominant land use. Small coastal and rural developments also exist.

Attribute Results

Based on the CAP viability results, the North-Central Coastal Diversity Stratum was the least impaired in the DPS (Figure 3); however 50% of indicator ratings for the stratum were reported as Poor or Fair. With the exception of Usal Creek, indicator ratings for estuary/lagoon quality and extent were better than the Eel River populations to the north and two of six of the populations were rated Good for summer rearing juveniles (Table 5). As in other strata, habitat complexity was identified as a serious impairment for steelhead viability with the exception of Caspar Creek which was rated Good or Very Good for large wood frequency and pool/riffle/flatwater ratio. Road density, including streamside roads, was rated Poor for all populations. With very few exceptions, all attribute indicators related to hydrology, landscape patterns, passage/migration, and water quality (toxicity) were rated Good or Very Good for all life stages and populations in the stratum.

Life Stage Results

In the North-Central Coastal Diversity Stratum winter rearing juveniles are the most impacted life stage with 67% of indicators rated as Poor or Fair (Figure 11). This result is consistent with the relatively poor habitat complexity (*i.e.*, poor overwintering habitat quality) reported for most of the stratum. For winter adults, large wood frequency was rated Poor or Fair in all populations except for Caspar Creek (Very Good and Good), and shelter rating was Poor or Fair for all populations in the stratum (Table 6). Most indicators were rated Fair or better for the egg life stage with the few exceptions related to gravel quantity (Usal and Wages Creeks) and quality (Ten Mile and Big Rivers) (Table 6). Like winter rearing juveniles and winter adults,

indicators of most concern for the summer rearing juvenile life stage were those associated with habitat complexity as well as sediment quality and water temperature. For smolts, all populations in the stratum were rated Poor for habitat complexity (shelter rating) except one (Wages Creek, Fair). Viability (low abundance) was also a concern for the smolt life stage throughout in the stratum. With the exception of road density throughout and timber harvest in the Ten Mile River, all other indicators for watershed processes were rated Fair or better with a majority rated as Very Good.

Figure 11: Attribute Indicator Ratings for the North-Central Coastal Diversity Stratum conservation targets.

Threat Results

As in other strata, roads and railroads represent the greatest threat to steelhead and their designated critical habitat in the North-Central Diversity Stratum (Figure 12). There were no

threats rated Very High. Severe weather patterns was rated High in two populations (Usal and Ten Mile) (Table 7).

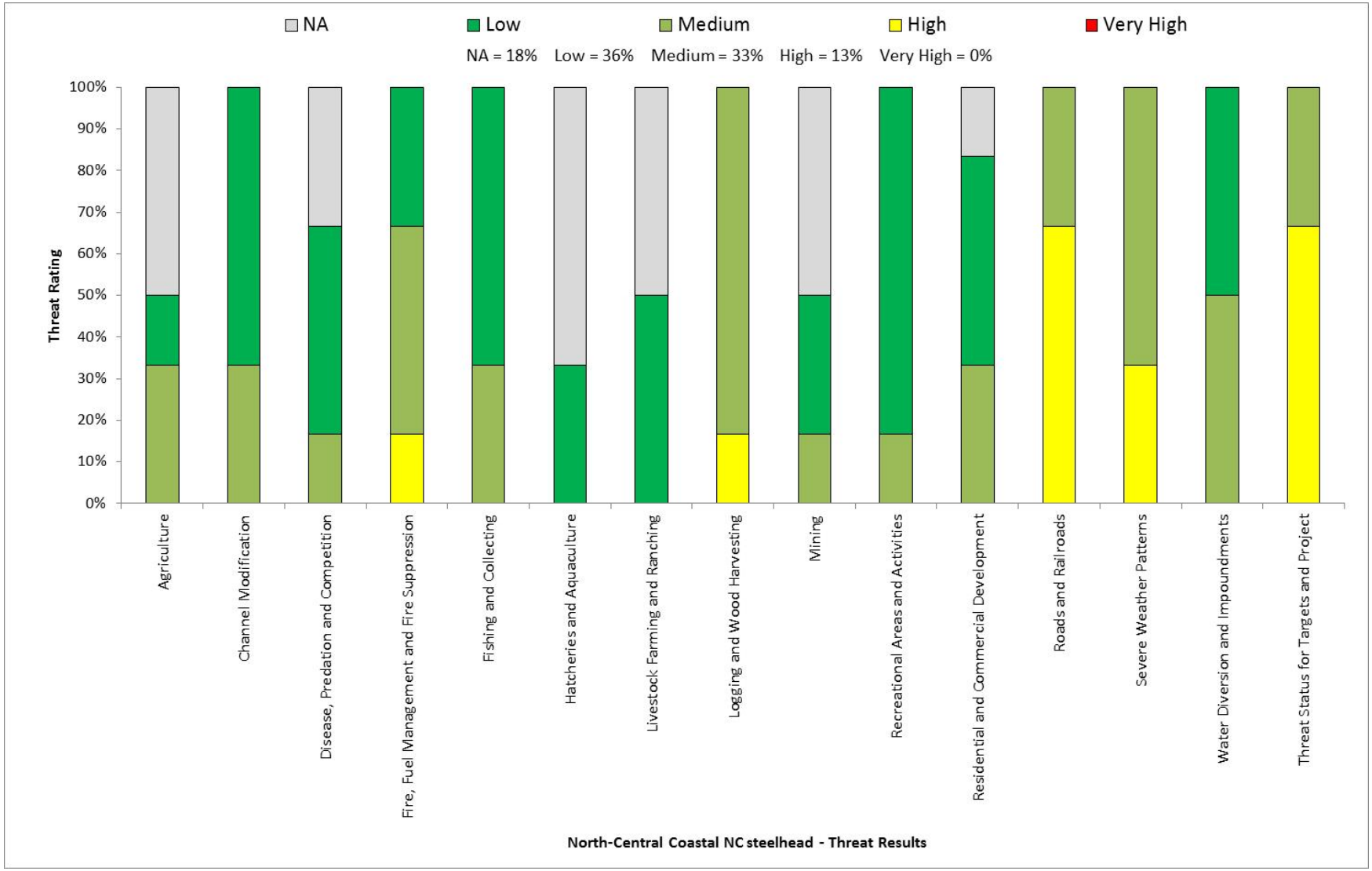

Figure 12: Threat ratings for the North-Central Coastal Diversity Stratum.

CENTRAL COASTAL DIVERSITY STRATUM RESULTS

The Central Coastal Diversity Stratum CAP populations are Navarro River, Garcia River, and the Gualala River, located in northern Sonoma and southern Mendocino counties. These populations are largely covered by a forested landscape where logging is a common land use. Agriculture and small rural developments also exist and are becoming more common.

Attribute Results

The Central Coastal Diversity Stratum had the fewest indicators rated Poor overall (18%), however 63% of indicators were rated Poor or Fair (Figure 3). Estuary conditions were rated Fair or better for all life stages and populations (Table 5). As in all other strata, most indicators of habitat complexity (shelter rating, percent primary pools, and pool/riffle/flatwater ratio) were rated Poor for most life stages and populations. Large wood frequency in the channel was generally rated Good for two of the three populations (Garcia and Gualala rivers) and Poor in the Navarro River. Like other strata, streamside road density was rated Poor or Fair for all populations and flow conditions, and viability (density) and water temperature were rated Poor or Fair for summer rearing juveniles.

Life Stage Results

Based on the combined percentage of Poor and Fair indicator ratings, smolts (78%, 7% as Poor) are the most imparied life stage in the Central Coastal Diversity Stratum; although winter rearing juveniles (27%), summer rearing juveniles (25%), and winter adults (15%) received a higher percentage of Poor ratings overall (Figure 13). The high percentage of Poor ratings for the summer rearing and winter rearing juveniles were largely due to impaired habitat complexity (Table 6). A majority of the indicator ratings for the egg life stage were rated Fair which indicates gravel quality and quantity throughout the stratum are not primary limiting factors. Winter adults and smolts are most impaired by Poor shelter, particularly in the Garcia and Gualala river populations and large wood frequency was rated Poor for winter adults in the Navarro River population.

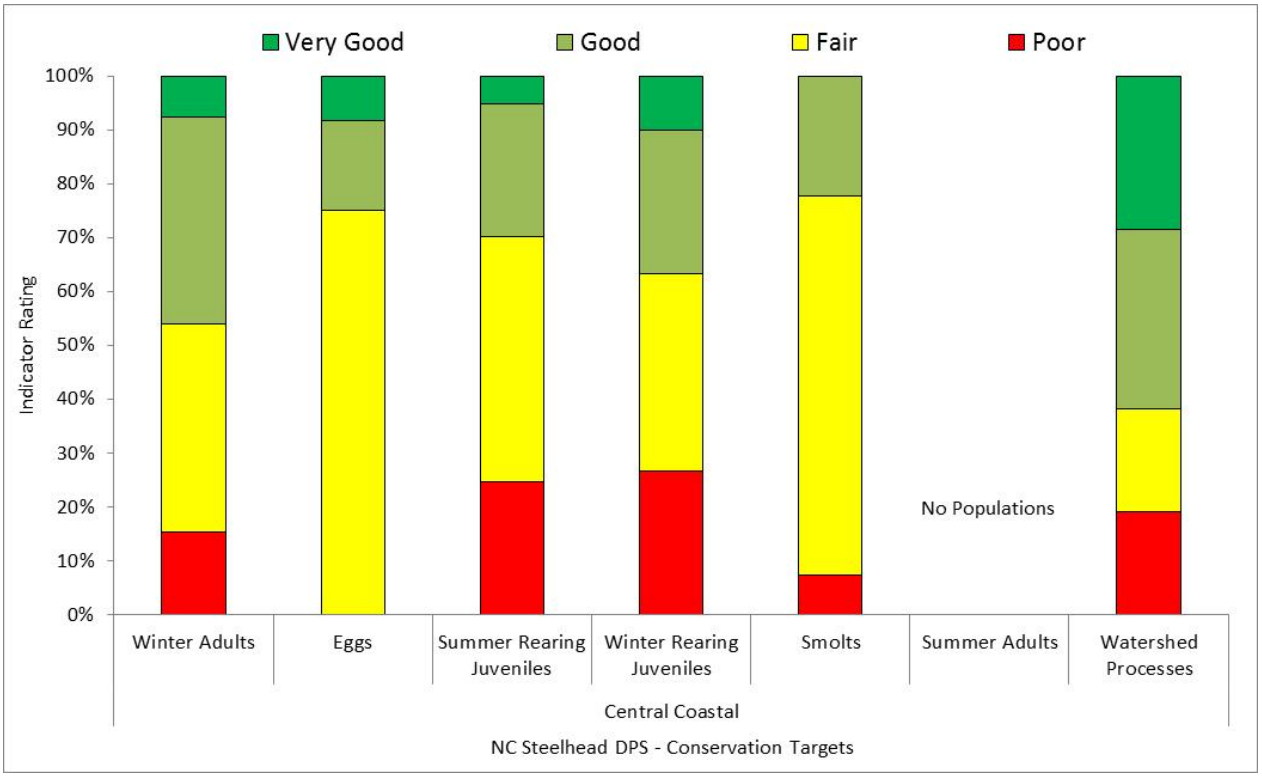

Figure 13: Attribute Indicator Ratings for the Central Coastal Diversity Stratum Conservation Targets.

Threat Results

Water diversions or impoundments for all three populations were rated High and were identified as the most significant threat to steelhead in the stratum (Figure 14 and Table 7). Roads and railroads as well as logging and wood harvesting were also rated as High threats for the Garcia and Gualala populations and Medium threats for the Navarro population.

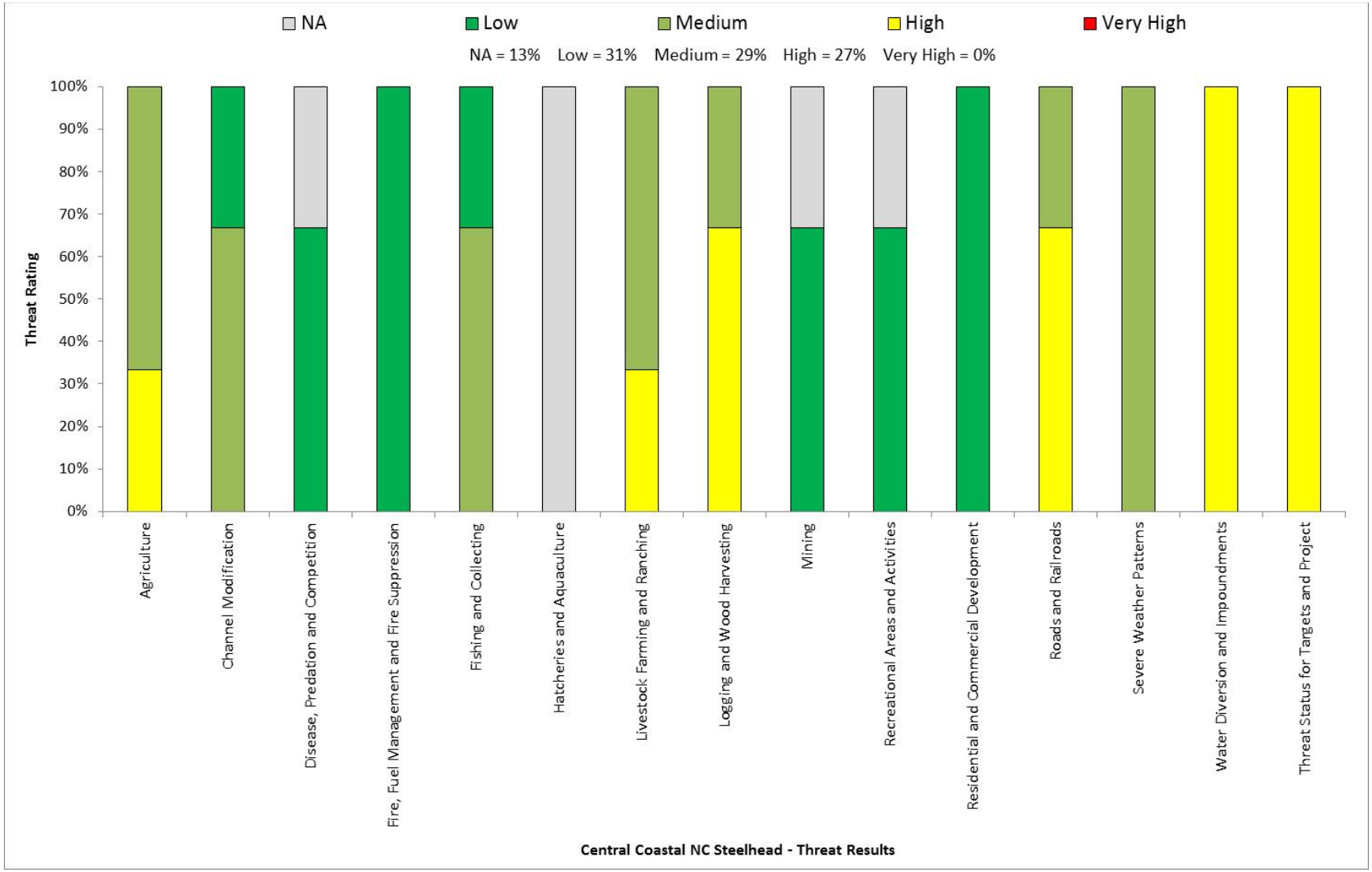

Figure 14: Threat ratings for the Central Coastal Diversity Stratum.

DPS CAP VIABILITY RESULTS

Attributes

Throughout the DPS and across life stages, attribute indicators most impacted are those associated with habitat complexity (large wood frequency, percent primary pools, pool/riffle/flatwater ratio, and shelter), riparian vegetation (tree diameter), and sediment transport (road density, streamside road density) (Table 5). The quality and extent of estuarine habitat for summer rearing juvenile and smolt life stages were rated Poor for all ten steelhead populations within the Eel River Watershed, and was rated Poor or Fair for most other populations throughout the DPS. Hydrology (flow conditions, impervious surfaces, number and magnitude of diversion, and passage flows), passage/migration (passage at mouth or confluence, physical barriers), landscape patterns (agriculture and urbanization), and water quality (toxicity) are the least impacted attribute indicators across the DPS and life stages (Table 5).

Table 5: NC steelhead DPS CAP Viability Summary by Attribute.

NC Steelhead Population Conditions By Habitat Attribute			Northern Coastal							Lower Interior				North Mountain Interior				North-Central Coastal						Central Coastal		
Target	Attribute	Indicator	Redwood	Maple Creek/Big Lagoon	Little River	Mad River	Humbold Bay	South Fork Eel River	Bear River	Mattole River	Chamise Creek	Woodman Creek	Outlet Creek	Tomki Creek	Van Duzen River	Larabee Creek	North Fork Eel River	Middle Fork Eel River	Upper Mainstem Eel River	Usal Creek	Wages Creek	Ten Mile River	Noyo River	Caspar Creek	Big River	Navarro River	Garcia River	Gualala River
Summer Rearing Juveniles	Estuary/Lagoon	Quality & Extent	P	P	F	F	F	P	F	F	P	P	P	P	P	P	P	P	P	P	F	G	F	G	F	F	G	F
Smolts	Estuary/Lagoon	Quality & Extent	P	P	F	F	F	P	F	P	P	P	P	P	P	P	P	P	P	P	F	G	F	F	F	F	F	F
Winter Adults	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	P	F	P	F	P	V	P	P	F	P	P	P	F	F	F	P	P	P	P	P	P	V	P	P	G	G
Summer Rearing Juveniles	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	P	F	P	F	P	V	P	P	F	P	P	P	F	F	F	P	P	P	P	P	P	V	P	P	G	G
Winter Rearing Juveniles	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	P	F	P	F	P	V	P	P	F	P	P	P	F	F	F	P	P	P	P	P	P	V	P	P	G	G
Winter Adults	Habitat Complexity	Large Wood Frequency (BFW 10-100 meters)	P	F	P	F	F	P	P	P	P	P	P	P	F	F	F	P	P	P	F	P	P	G	P	P	F	G
Summer Rearing Juveniles	Habitat Complexity	Large Wood Frequency (BFW 10-100 meters)	P	F	P	F	F	P	P	P	P	P	P	P	F	F	F	P	P	P	F	P	P	G	P	P	F	G
Winter Rearing Juveniles	Habitat Complexity	Large Wood Frequency (BFW 10-100 meters)	P	F	P	F	P	P	P	P	P	P	P	P	F	F	F	P	P	P	F	P	P	G	P	P	F	G
Summer Rearing Juveniles	Habitat Complexity	Percent Primary Pools	F	P	F	P	P	F	G	F	F	P	P	P	P	F	P	P	P	P	P	P	F	P	P	P	G	P
Summer Adults	Habitat Complexity	Percent Staging Pools	P	NA	NA	F	NA	F	NA	P	NA	NA	NA	NA	P	NA	P	G	F	NA	NA	NA	NA	NA	NA	NA	NA	NA
Winter Adults	Habitat Complexity	Pool/Riffle/Flatwater Ratio	P	P	P	P	F	F	P	F	F	V	F	P	F	F	P	P	F	F	F	G	F	V	P	F	G	P
Summer Rearing Juveniles	Habitat Complexity	Pool/Riffle/Flatwater Ratio	P	P	P	P	F	F	P	F	F	V	F	P	F	F	P	P	P	F	P	G	F	V	P	P	G	P
Winter Rearing Juveniles	Habitat Complexity	Pool/Riffle/Flatwater Ratio	P	P	P	P	F	F	P	F	F	V	F	P	F	F	P	P	F	F	F	G	F	V	P	P	G	P
Winter Adults	Habitat Complexity	Shelter Rating	P	P	F	P	F	P	P	P	P	P	P	P	P	F	P	P	F	P	F	P	P	P	P	F	P	P
Summer Rearing Juveniles	Habitat Complexity	Shelter Rating	P	P	F	P	F	P	P	P	P	P	P	P	P	P	P	P	F	P	F	P	P	P	P	P	P	P
Winter Rearing Juveniles	Habitat Complexity	Shelter Rating	P	P	F	P	F	P	P	P	P	P	P	P	P	F	P	P	F	P	F	P	P	P	P	P	P	P
Smolts	Habitat Complexity	Shelter Rating	P	P	F	P	F	P	P	P	P	P	P	P	P	F	P	P	P	P	F	P	P	P	P	F	P	P
Summer Adults	Habitat Complexity	Shelter Rating	P	NA	NA	P	NA	P	NA	P	NA	NA	NA	NA	P	NA	P	P	F	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Rearing Juveniles	Hydrology	Flow Conditions (Baseflow)	P	G	G	F	F	P	G	P	F	F	P	P	P	F	P	F	G	G	G	V	G	G	F	F	F	P
Summer Adults	Hydrology	Flow Conditions (Baseflow)	F	NA	NA	F	NA	F	NA	F	NA	NA	NA	NA	P	NA	P	G	G	NA	NA	NA	NA	NA	NA	NA	NA	NA
Eggs	Hydrology	Flow Conditions (Instantaneous Condition)	F	G	G	G	V	G	G	G	F	F	G	G	G	V	V	G	G	V	G	V	G	V	G	F	F	F
Summer Rearing Juveniles	Hydrology	Flow Conditions (Instantaneous Condition)	F	G	G	G	V	F	F	P	F	F	P	F	F	F	F	F	G	G	G	V	G	V	G	F	F	P
Watershed Processes	Hydrology	Impervious Surfaces	V	V	V	V	F	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	G	V	V
Summer Rearing Juveniles	Hydrology	Number, Condition and/or Magnitude of Diversions	P	V	G	F	P	F	G	P	V	G	P	F	F	G	G	F	G	V	F	F	V	V	G	F	G	G
Smolts	Hydrology	Number, Condition and/or Magnitude of Diversions	P	V	G	F	P	F	G	F	V	G	F	F	F	G	G	G	G	V	F	G	V	V	G	F	G	G
Winter Adults	Hydrology	Passage Flows	G	V	V	G	V	G	G	F	F	F	F	G	G	G	G	G	G	V	G	V	V	V	G	F	F	G
Smolts	Hydrology	Passage Flows	G	V	G	G	G	F	G	F	F	G	F	G	F	G	F	G	P	V	G	G	V	V	G	F	F	F
Summer Adults	Hydrology	Passage Flows	F	NA	NA	G	NA	F	NA	F	NA	NA	NA	NA	F	NA	G	G	G	NA	NA	NA	NA	NA	NA	NA	NA	NA
Eggs	Hydrology	Redd Scour	F	V	V	G	P	F	G	F	F	F	G	F	F	F	G	F	F	F	G	G	F	V	F	F	F	G
Watershed Processes	Landscape Patterns	Agriculture	V	V	V	V	V	V	V	V	V	V	F	V	G	V	V	V	V	V	V	V	V	V	V	F	V	V
Watershed Processes	Landscape Patterns	Timber Harvest	V	F	P	G	P	G	G	V	V	V	G	V	P	P	V	V	V	G	F	P	F	V	F	G	G	F
Watershed Processes	Landscape Patterns	Urbanization	V	V	V	V	P	V	V	V	V	V	F	F	V	V	V	V	V	V	V	V	V	V	V	G	V	V
Winter Adults	Passage/Migration	Passage at Mouth or Confluence	G	V	G	G	G	G	V	G	G	G	F	G	G	G	G	G	G	G	V	V	V	V	V	G	F	G
Summer Rearing Juveniles	Passage/Migration	Passage at Mouth or Confluence	G	V	G	G	G	P	V	P	F	G	F	F	F	G	F	F	P	G	V	V	G	V	G	F	F	F
Smolts	Passage/Migration	Passage at Mouth or Confluence	F	V	V	G	V	F	V	F	G	G	G	F	F	F	P	G	G	P	G	V	G	V	G	G	F	F
Summer Adults	Passage/Migration	Passage at Mouth or Confluence	F	NA	NA	G	NA	P	NA	F	NA	NA	NA	NA	F	NA	G	G	F	NA	NA	NA	NA	NA	NA	NA	NA	NA
Winter Adults	Passage/Migration	Physical Barriers	V	V	G	V	G	V	V	V	V	P	F	V	V	V	V	G	P	V	V	V	V	V	G	G	V	V
Summer Rearing Juveniles	Passage/Migration	Physical Barriers	V	V	G	V	G	V	V	V	V	F	P	V	G	V	V	G	F	V	V	V	V	V	G	F	V	V
Winter Rearing Juveniles	Passage/Migration	Physical Barriers	V	V	G	V	G	V	V	V	G	G	F	V	G	V	V	G	F	V	V	V	G	V	V	F	V	V
Summer Adults	Passage/Migration	Physical Barriers	V	NA	NA	V	NA	V	NA	V	NA	NA	NA	NA	V	NA	F	F	P	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Rearing Juveniles	Riparian Vegetation	Canopy Cover	F	F	G	V	V	F	P	F	P	V	F	P	P	P	P	F	F	V	V	F	V	V	P	F	F	F
Watershed Processes	Riparian Vegetation	Species Composition	F	F	F	F	G	F	P	F	F	F	F	F	V	G	F	G	F	V	V	G	G	G	F	P	F	G
Winter Adults	Riparian Vegetation	Tree Diameter (North of SF Bay)	P	F	F	F	F	P	P	F	F	P	P	P	F	P	P	P	F	F	P	P	F	G	F	P	F	F
Summer Rearing Juveniles	Riparian Vegetation	Tree Diameter (North of SF Bay)	P	F	F	F	F	P	P	F	F	P	P	P	F	P	P	P	F	F	P	P	F	G	F	P	F	F
Winter Rearing Juveniles	Riparian Vegetation	Tree Diameter (North of SF Bay)	P	F	F	F	F	P	P	F	F	P	P	P	F	P	P	P	F	F	P	P	F	G	F	P	F	F
Eggs	Sediment	Gravel Quality (Bulk)	F	P	F	V	P	P	F	P	F	F	F	F	P	G	F	P	F	P	P	F	F	F	F	F	F	G
Summer Adults	Sediment	Gravel Quality (Bulk)	F	NA	NA	V	NA	P	NA	P	NA	NA	NA	NA	P	NA	F	P	F	NA	NA	NA	NA	NA	NA	NA	NA	NA
Eggs	Sediment	Gravel Quality (Embeddedness)	G	P	P	V	F	F	G	P	P	P	P	F	P	F	F	P	F	F	G	P	F	G	P	F	V	F
Summer Adults	Sediment	Gravel Quality (Embeddedness)	G	NA	NA	V	NA	F	NA	P	NA	NA	NA	NA	P	NA	F	P	F	NA	NA	NA	NA	NA	NA	NA	NA	NA
Winter Adults	Sediment	Quantity & Distribution of Spawning Gravels	P	P	F	G	F	G	P	P	F	P	G	G	P	F	F	G	G	V	G	G	G	V	G	G	F	V
Summer Adults	Sediment	Quantity & Distribution of Spawning Gravels	P	NA	NA	G	NA	G	NA	P	NA	NA	NA	NA	P	NA	F	G	G	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Rearing Juveniles	Sediment (Food Productivity)	Gravel Quality (Embeddedness)	G	P	P	V	F	F	G	P	P	P	F	F	P	F	F	P	P	F	G	P	F	F	P	F	V	F
Winter Rearing Juveniles	Sediment (Food Productivity)	Gravel Quality (Embeddedness)	G	P	P	V	F	F	G	P	P	P	F	F	P	F	F	P	P	F	P	P	F	F	P	F	V	F
Watershed Processes	Sediment Transport	Road Density	P	P	P	P	P	P	P	F	G	G	F	G	P	P	F	V	F	P	P	P	P	P	P	P	G	G
Watershed Processes	Sediment Transport	Streamside Road Density (100 m)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	F
Smolts	Smoltification	Temperature	P	F	V	F	G	F	F	P	F	G	F	F	F	G	P	F	F	V	V	V	G	V	G	F	G	F
Winter Adults	Velocity Refuge	Floodplain Connectivity	P	F	G	G	F	F	F	P	F	G	P	G	F	G	G	F	F	G	G	F	F	F	F	G	G	F
Winter Rearing Juveniles	Velocity Refuge	Floodplain Connectivity	P	F	G	G	F	F	F	P	G	G	P	F	F	G	G	F	G	G	G	F	F	P	F	F	G	F
Summer Adults	Velocity Refuge	Floodplain Connectivity	P	NA	NA	G	NA	F	NA	P	NA	NA	NA	NA	F	NA	G	F	F	NA	NA	NA	NA	NA	NA	NA	NA	NA
Smolts	Viability	Abundance	F	G	P	F	F	G	F	P	F	P	F	P	F	F	F	F	P	F	P	F	F	P	P	F	F	F
Summer Adults	Viability	Abundance	P	NA	NA	P	NA	P	NA	P	NA	NA	NA	NA	F	NA	P	F	P	NA	NA	NA	NA	NA	NA	NA	NA	NA
Winter Adults	Viability	Density	F	G	P	F	F	F	G	P	P	F	F	P	F	F	G	F	P	F	P	F	F	F	P	F	F	F
Summer Rearing Juveniles	Viability	Density	F	G	P	F	F	G	F	P	P	P	F	P	F	F	F	F	G	F	F	F	G	F	F	F	F	P
Summer Rearing Juveniles	Viability	Spatial Structure	G	V	F	F	G	V	V	P	V	G	F	P	G	V	G	F	P	V	G	V	G	G	G	F	G	G
Summer Adults	Water Quality	Mainstem Temperature (MWMT)	P	NA	NA	F	NA	P	NA	P	NA	NA	NA	NA	F	NA	P	F	F	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Rearing Juveniles	Water Quality	Temperature (MWMT)	P	V	V	V	V	F	P	F	P	F	P	P	F	P	P	F	P	G	V	F	P	F	P	P	F	F
Winter Adults	Water Quality	Toxicity	F	G	G	G	F	F	G	G	G	F	F	G	F	G	G	F	F	V	G	G	G	G	G	F	G	F
Summer Rearing Juveniles	Water Quality	Toxicity	F	G	G	G	F	F	G	G	G	F	F	F	F	G	G	F	V	G	G	G	G	G	G	F	G	F
Winter Rearing Juveniles	Water Quality	Toxicity	F	G	G	G	F	F	G	G	G	F	F	G	F	G	G	F	F	V	G	G	G	G	G	F	G	F
Smolts	Water Quality	Toxicity	F	G	G	G	F	F	G	G	G	F	F	G	F	G	G	F	V	V	G	G	G	G	G	F	G	F
Summer Adults	Water Quality	Toxicity	F	NA	NA	G	NA	F	NA	G	NA	NA	NA	NA	F	NA	G	G	V	NA	NA	NA	NA	NA	NA	NA	NA	NA
Winter Adults	Water Quality	Turbidity	P	P	P	F	P	P	F	P	P	F	F	F	P	F	F	F	F	F	G	P	G	F	F	G	G	G
Summer Rearing Juveniles	Water Quality	Turbidity	G	P	P	G	G	G	G	F	F	F	F	F	P	G	G	G	F	G	G	G	G	G	V	G	G	G
Winter Rearing Juveniles	Water Quality	Turbidity	P	P	P	P	P	P	F	P	P	F	F	F	P	F	F	F	F	F	G	P	F	P	F	G	G	F
Smolts	Water Quality	Turbidity	P	P	P	F	G	F	F	F	F	F	F	F	P	F	F	F	F	F	G	P	F	F	F	F	G	F

Table 6: NC steelhead DPS CAP Viability Summary by Conservation Target.

NC Steelhead Population Conditions By Target Life Stage			Northern Coastal							Lower Interior				North Mountain Interior					North-Central Coastal						Central Coastal		
Target	Attribute	Indicator	Redwood	Maple Creek/Big Lagoon	Little River	Mad River	Humbold Bay	South Fork Eel River	Bear River	Mattole River	Chamise Creek	Woodman Creek	Outlet Creek	Tomki Creek	Van Duzen River	Larabee Creek	North Fork Eel River	Middle Fork Eel River	Upper Mainstem Eel River	Usal Creek	Wages Creek	Ten Mile River	Noyo River	Caspar Creek	Big River	Navarro River	Garcia River	Gualala River
Winter Adults	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	P	F	P	F	P	V	P	P	F	P	P	P	F	F	F	P	P	P	P	P	P	V	P	P	G	G
Winter Adults	Habitat Complexity	Large Wood Frequency (BFW 10-100 meters)	P	F	P	F	F	P	P	P	P	P	P	P	F	F	F	P	P	P	F	P	P	G	P	P	F	G
Winter Adults	Habitat Complexity	Pool/Riffle/Flatwater Ratio	P	P	P	P	F	F	P	F	F	V	F	P	F	F	P	P	F	F	F	G	F	V	P	F	G	P
Winter Adults	Habitat Complexity	Shelter Rating	P	P	F	P	F	P	P	P	P	P	P	P	P	F	P	P	F	P	F	P	P	P	P	F	P	P
Winter Adults	Hydrology	Passage Flows	G	V	V	G	V	G	G	F	F	F	F	G	G	G	G	G	G	V	G	V	V	V	G	F	F	G
Winter Adults	Passage/Migration	Passage at Mouth or Confluence	G	V	G	G	G	G	V	G	G	G	F	G	G	G	G	G	G	G	V	V	V	V	V	G	F	G
Winter Adults	Passage/Migration	Physical Barriers	V	V	G	V	G	V	V	V	V	P	F	V	V	V	V	G	P	V	V	V	V	V	G	G	V	V
Winter Adults	Riparian Vegetation	Tree Diameter (North of SF Bay)	P	F	F	F	F	P	P	F	F	P	P	P	F	P	P	P	F	F	P	P	F	G	F	P	F	F
Winter Adults	Sediment	Quantity & Distribution of Spawning Gravels	P	P	F	G	F	G	P	P	F	P	G	G	P	F	F	G	G	V	G	G	G	V	G	G	F	V
Winter Adults	Velocity Refuge	Floodplain Connectivity	P	F	G	G	F	F	F	P	F	G	P	G	F	G	G	F	F	G	G	F	F	F	F	G	G	F
Winter Adults	Water Quality	Toxicity	F	G	G	G	F	F	G	G	G	F	F	G	F	G	G	F	F	V	G	G	G	G	G	F	G	F
Winter Adults	Water Quality	Turbidity	P	P	P	F	P	P	F	P	P	F	F	F	P	F	F	F	F	F	G	P	G	F	F	G	G	G
Winter Adults	Viability	Density	F	G	P	F	F	F	G	P	P	F	F	P	F	F	G	F	P	F	P	F	F	F	P	F	F	F
Eggs	Hydrology	Flow Conditions (Instantaneous Condition)	F	G	G	G	V	G	G	G	F	F	G	G	G	V	V	G	G	V	G	V	G	V	G	F	F	F
Eggs	Hydrology	Redd Scour	F	V	V	G	P	F	G	F	F	F	G	F	F	F	G	F	F	F	G	G	F	V	F	F	F	G
Eggs	Sediment	Gravel Quality (Bulk)	F	P	F	V	P	P	F	P	F	F	F	F	P	G	F	P	F	P	P	F	F	F	F	F	F	G
Eggs	Sediment	Gravel Quality (Embeddedness)	G	P	P	V	F	F	G	P	P	P	P	F	P	F	F	P	F	F	G	P	F	G	P	F	V	F
Summer Rearing Juveniles	Estuary/Lagoon	Quality & Extent	P	P	F	F	F	P	F	F	P	P	P	P	P	P	P	P	P	P	F	G	F	G	F	F	G	F
Summer Rearing Juveniles	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	P	F	P	F	P	V	P	P	F	P	P	P	F	F	F	P	P	P	P	P	P	V	P	P	G	G
Summer Rearing Juveniles	Habitat Complexity	Large Wood Frequency (BFW 10-100 meters)	P	F	P	F	F	P	P	P	P	P	P	P	F	F	F	P	P	P	F	P	P	G	P	P	F	G
Summer Rearing Juveniles	Habitat Complexity	Percent Primary Pools	F	P	F	P	P	F	G	F	F	P	P	P	P	F	P	P	P	P	P	P	F	P	P	P	G	P
Summer Rearing Juveniles	Habitat Complexity	Pool/Riffle/Flatwater Ratio	P	P	P	P	F	F	P	F	F	V	F	P	F	F	P	P	P	F	P	G	F	V	P	P	G	P
Summer Rearing Juveniles	Habitat Complexity	Shelter Rating	P	P	F	P	F	P	P	P	P	P	P	P	P	P	P	P	F	P	F	P	P	P	P	P	P	P
Summer Rearing Juveniles	Hydrology	Flow Conditions (Baseflow)	P	G	G	F	F	P	G	P	F	F	P	P	P	F	P	F	G	G	G	V	G	G	F	F	F	P
Summer Rearing Juveniles	Hydrology	Flow Conditions (Instantaneous Condition)	F	G	G	G	V	F	F	P	F	F	P	F	F	F	F	F	G	G	G	V	G	V	G	F	F	P
Summer Rearing Juveniles	Hydrology	Number, Condition and/or Magnitude of Diversions	P	V	G	F	P	F	G	P	V	G	P	F	F	G	G	F	G	V	F	F	V	V	G	F	G	G
Summer Rearing Juveniles	Passage/Migration	Passage at Mouth or Confluence	G	V	G	G	G	P	V	P	F	G	F	F	F	G	F	F	P	G	V	V	G	V	G	F	F	F
Summer Rearing Juveniles	Passage/Migration	Physical Barriers	V	V	G	V	G	V	V	V	V	F	P	V	G	V	V	G	F	V	V	V	V	V	G	F	V	V
Summer Rearing Juveniles	Riparian Vegetation	Canopy Cover	F	F	G	V	V	F	P	F	P	V	F	P	P	P	P	F	F	V	V	F	V	V	P	F	F	F
Summer Rearing Juveniles	Riparian Vegetation	Tree Diameter (North of SF Bay)	P	F	F	F	F	P	P	F	F	P	P	P	F	P	P	P	F	F	P	P	F	G	F	P	F	F
Summer Rearing Juveniles	Sediment (Food Productivity)	Gravel Quality (Embeddedness)	G	P	P	V	F	F	G	P	P	P	F	F	P	F	F	P	P	F	G	P	F	F	P	F	V	F
Summer Rearing Juveniles	Water Quality	Temperature (MWMT)	P	V	V	V	V	F	P	F	P	F	P	P	F	P	P	F	P	G	V	F	P	F	P	P	F	F
Summer Rearing Juveniles	Water Quality	Toxicity	F	G	G	G	F	F	G	G	G	F	F	F	F	G	G	F	V	G	G	G	G	G	G	F	G	F
Summer Rearing Juveniles	Water Quality	Turbidity	G	P	P	G	G	G	G	F	F	F	F	F	P	G	G	G	F	G	G	G	G	G	V	G	G	G
Summer Rearing Juveniles	Viability	Density	F	G	P	F	F	G	F	P	P	P	F	P	F	F	F	F	F	G	F	F	F	G	F	F	F	P
Summer Rearing Juveniles	Viability	Spatial Structure	G	V	F	F	G	V	V	P	V	G	F	P	G	V	G	F	P	V	G	V	G	G	G	F	G	G
Winter Rearing Juveniles	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	P	F	P	F	P	V	P	P	F	P	P	P	F	F	F	P	P	P	P	P	P	V	P	P	G	G
Winter Rearing Juveniles	Habitat Complexity	Large Wood Frequency (BFW 10-100 meters)	P	F	P	F	P	P	P	P	P	P	P	P	F	F	F	P	P	P	F	P	P	G	P	P	F	G
Winter Rearing Juveniles	Habitat Complexity	Pool/Riffle/Flatwater Ratio	P	P	P	P	F	F	P	F	F	V	F	P	F	F	P	P	F	F	F	G	F	V	P	P	G	P
Winter Rearing Juveniles	Habitat Complexity	Shelter Rating	P	P	F	P	F	P	P	P	P	P	P	P	P	F	P	P	F	P	F	P	P	P	P	P	P	P
Winter Rearing Juveniles	Passage/Migration	Physical Barriers	V	V	G	V	G	V	V	V	G	G	F	V	G	V	V	G	F	V	V	V	G	V	V	F	V	V
Winter Rearing Juveniles	Riparian Vegetation	Tree Diameter (North of SF Bay)	P	F	F	F	F	P	P	F	F	P	P	P	F	P	P	P	F	F	P	P	F	G	F	P	F	F
Winter Rearing Juveniles	Sediment (Food Productivity)	Gravel Quality (Embeddedness)	G	P	P	V	F	F	G	P	P	P	F	F	P	F	F	P	P	F	P	P	F	F	P	F	V	F
Winter Rearing Juveniles	Velocity Refuge	Floodplain Connectivity	P	F	G	G	F	F	F	P	G	G	P	F	F	G	G	F	G	G	G	F	F	P	F	F	G	F
Winter Rearing Juveniles	Water Quality	Toxicity	F	G	G	G	F	F	G	G	G	F	F	G	F	G	G	F	F	V	G	G	G	G	G	F	G	F
Winter Rearing Juveniles	Water Quality	Turbidity	P	P	P	P	P	P	F	P	P	F	F	F	P	F	F	F	F	F	G	P	F	P	F	G	G	F
Smolts	Estuary/Lagoon	Quality & Extent	P	P	F	F	F	P	F	P	P	P	P	P	P	P	P	P	P	P	F	G	F	F	F	F	F	F
Smolts	Habitat Complexity	Shelter Rating	P	P	F	P	F	P	P	P	P	P	P	P	P	F	P	P	P	P	F	P	P	P	P	F	P	P
Smolts	Hydrology	Number, Condition and/or Magnitude of Diversions	P	V	G	F	P	F	G	F	V	G	F	F	F	G	G	G	G	V	F	G	V	V	G	F	G	G
Smolts	Hydrology	Passage Flows	G	V	G	G	G	F	G	F	F	G	F	G	F	G	F	G	P	V	G	G	V	V	G	F	F	F
Smolts	Passage/Migration	Passage at Mouth or Confluence	F	V	V	G	V	F	V	F	G	G	G	F	F	F	P	G	G	P	G	V	G	V	G	G	F	F
Smolts	Smoltification	Temperature	P	F	V	F	G	F	F	P	F	G	F	F	F	G	P	F	F	V	V	V	G	V	G	F	G	F
Smolts	Water Quality	Toxicity	F	G	G	G	F	F	G	G	G	F	F	G	F	G	G	F	V	V	G	G	G	G	G	F	G	F
Smolts	Water Quality	Turbidity	P	P	P	F	G	F	F	F	F	F	F	F	P	F	F	F	F	F	G	P	F	F	F	F	G	F
Smolts	Viability	Abundance	F	G	P	F	F	G	F	P	F	P	F	P	F	F	F	F	P	F	P	F	F	P	F	F	F	F
Watershed Processes	Hydrology	Impervious Surfaces	V	V	V	V	F	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	G	V	V
Watershed Processes	Landscape Patterns	Agriculture	V	V	V	V	V	V	V	V	V	V	F	V	G	V	V	V	V	V	V	V	V	V	V	F	V	V
Watershed Processes	Landscape Patterns	Timber Harvest	V	F	P	G	P	G	G	V	V	V	G	V	P	P	V	V	V	G	F	P	F	V	F	G	G	F
Watershed Processes	Landscape Patterns	Urbanization	V	V	V	V	P	V	V	V	V	V	F	F	V	V	V	V	V	V	V	V	V	V	V	G	V	V
Watershed Processes	Riparian Vegetation	Species Composition	F	F	F	F	G	F	P	F	F	F	F	F	V	G	F	G	F	V	V	G	G	G	F	P	F	G
Watershed Processes	Sediment Transport	Road Density	P	P	P	P	P	P	P	F	G	G	F	G	P	P	F	V	F	P	P	P	P	P	P	P	G	G
Watershed Processes	Sediment Transport	Streamside Road Density (100 m)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	F
Summer Adults	Habitat Complexity	Percent Staging Pools	P	NA	NA	F	NA	F	NA	P	NA	NA	NA	NA	P	NA	P	G	F	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Adults	Habitat Complexity	Shelter Rating	P	NA	NA	P	NA	P	NA	P	NA	NA	NA	NA	P	NA	P	P	F	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Adults	Hydrology	Flow Conditions (Baseflow)	F	NA	NA	F	NA	F	NA	F	NA	NA	NA	NA	P	NA	P	G	G	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Adults	Hydrology	Passage Flows	F	NA	NA	G	NA	F	NA	F	NA	NA	NA	NA	F	NA	G	G	G	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Adults	Passage/Migration	Passage at Mouth or Confluence	F	NA	NA	G	NA	P	NA	F	NA	NA	NA	NA	F	NA	G	G	F	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Adults	Passage/Migration	Physical Barriers	V	NA	NA	V	NA	V	NA	V	NA	NA	NA	NA	V	NA	F	F	P	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Adults	Sediment	Gravel Quality (Bulk)	F	NA	NA	V	NA	P	NA	P	NA	NA	NA	NA	P	NA	F	P	F	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Adults	Sediment	Gravel Quality (Embeddedness)	G	NA	NA	V	NA	F	NA	P	NA	NA	NA	NA	P	NA	F	P	F	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Adults	Sediment	Quantity & Distribution of Spawning Gravels	P	NA	NA	G	NA	G	NA	P	NA	NA	NA	NA	P	NA	F	G	G	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Adults	Velocity Refuge	Floodplain Connectivity	P	NA	NA	G	NA	F	NA	P	NA	NA	NA	NA	F	NA	G	F	F	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Adults	Water Quality	Mainstem Temperature (MWMT)	P	NA	NA	F	NA	P	NA	P	NA	NA	NA	NA	F	NA	P	F	F	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Adults	Water Quality	Toxicity	F	NA	NA	G	NA	F	NA	G	NA	NA	NA	NA	F	NA	G	G	V	NA	NA	NA	NA	NA	NA	NA	NA	NA
Summer Adults	Viability	Abundance	P	NA	NA	P	NA	P	NA	P	NA	NA	NA	NA	F	NA	P	F	P	NA	NA	NA	NA	NA	NA	NA	NA	NA

Life Stages

Based on the viability attribute results, all life stages of NC steelhead were found to be impaired (Table 6 and Figure 15). Winter rearing juveniles were the most impaired life stage across the DPS with 75% of all indicator ratings reported as Poor or Fair (40% as Poor alone), followed closely by the summer adult (72%) and summer rearing juvenile (68%) (Figure 15). Watershed processes, on a DPS level, had a combined 43% of attribute indicators reported as Poor or Fair (Figure 15), of which 31% were rated as Poor.

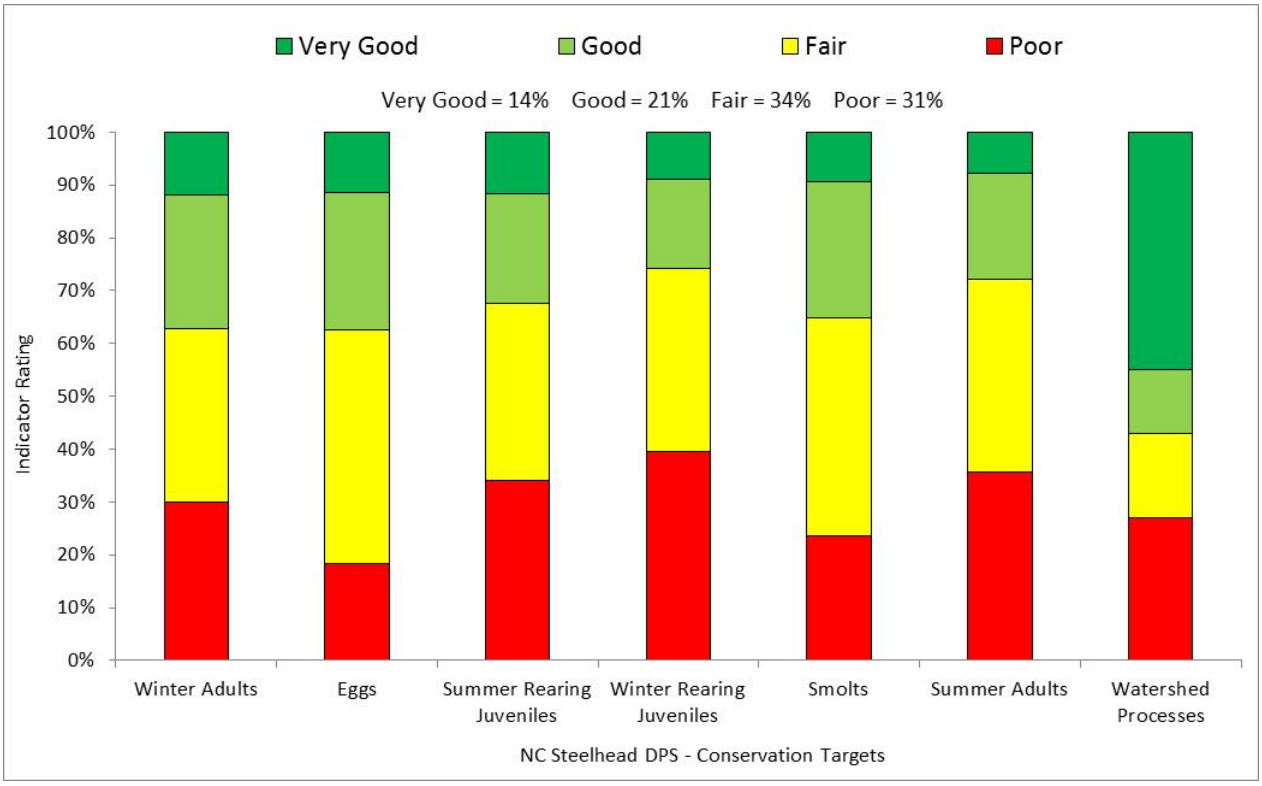

Figure 15: Attribute Indicator ratings for the NC steelhead DPS by life stage.

<u>Winter Adult Attribute Results</u>: Across the DPS, the winter adult life stage had a high percentage (> 60%) of Poor or Fair ratings; exceptions were passage flows, passage at mouth or confluence, physical barriers, the quality and distribution of spawning gravels, and toxicity (Figure 16 and Table 6). The four indicators of greatest concern, based on the percentage of Poor ratings alone were large wood frequency, pool/riffle/flatwater ratio, and shelter rating (Table 6). Shelter was rated Poor or Fair in all populations with nearly 80% of populations rated

as Poor. Population viability (*i.e.,* low abundance) was also rated as Poor or Fair for winter adults in many populations.

Eggs Attribute Results: Of the four indicators assessed for the egg life stage, the most concerning were those related to gravel quantity (bulk), followed by gravel quality (embeddedness), and the potential for redd scour (Figure 17).

Summer Rearing Juvenile Attribute Results: Attribute indicators most impaired for summer rearing juveniles were estuary/lagoon (quality and extent), habitat complexity (large wood frequency, percent primary pools, pool/riffle/flatwater ratio, and shelter rating), riparian vegetation (tree diameter), sediment (embeddedness), and water temperature (Figure 18 and Table 6). Shelter rating was rated Poor or Fair for all populations within the DPS with approximately 90% of populations rated as Poor. Indicators associated with hydrology (number and magnitude of diversions), passage/migration (passage at mouth or confluence, physical barriers), and water quality (toxicity, turbidity) were rated favorably throughout the DPS with few exceptions (Table 6). Summer rearing juvenile passage was rated Good or Very Good in approximately 90% of the populations within the DPS.

Winter Rearing Juvenile Viability Results: Winter rearing juveniles, the most impaired life stage in the DPS, are largely impacted by poor over-wintering habitat quality (*i.e.,* lack of habitat complexity) (Figure 19). As with summer rearing juveniles, shelter rating was the most impacted attribute indicator with all populations rated as Poor or Fair, of which 81% of populations were rated Poor. Riparian tree diameter was rated Poor or Fair in all but one population in the DPS (Caspar Creek, Table 6). The decline of large diameter trees within the riparian zone has, in part, contributed to the impaired quality of in-stream habitat complexity throughout the DPS. Physical barriers, floodplain connectivity, and stream toxicity indicators were largely rated as Fair or better (Figure 19).

Smolt Attribute Results: As with both winter and summer rearing juveniles, shelter rating was rated Poor (81%) or Fair (19%) for all populations (Figure 20 and Table 6). The quality and extent of estuary/lagoon habitats was also identified as a serious impairment for smolts with nearly all populations (except Ten Mile River) rated as Poor or Fair. Other impaired indicators for the smolt life stage included viability (low abundance) and water quality (turbidity).

Summer Adult Attribute Results: The summer adult life history strategy persists in eight populations within the NC steelhead DPS. These are Redwood Creek, Mad River, Mattole River, South Fork Eel River, Van Duzen River, North Fork Eel River, Middle Fork Eel River, and Upper Eel River Mainstem (Table 6). Across these populations, 72% of all attribute indicator ratings were reported as Poor or Fair (Figure 21) and attribute indicators identified as most impaired for summer adults were shelter rating, viability (low abundance), percent staging pools, and mainstem water temperature. Reduced floodplain connectivity, low passage flows at a mouth or confluence, poor upstream passage due to physical barriers, and gravel quantity and quality were also rated Poor or Fair for some populations (Table 6).

Watershed Processes: Streamside road density was rated Poor for all but one population in the DPS (Gualala River, Fair) (Figure 22). Roads in general were identified as the most significant impact to current riparian and in-stream habitat quality. Riparian species composition and timber harvest were also rated as moderately impaired with 62% and 39% of populations in the stratum rated Poor or Fair respectively. Relative to more urbanized southern DPS's, the extent of urbanization in the NC steelhead DPS is minimal with only 3 of 26 populations rated as Poor or Fair (Table 6).

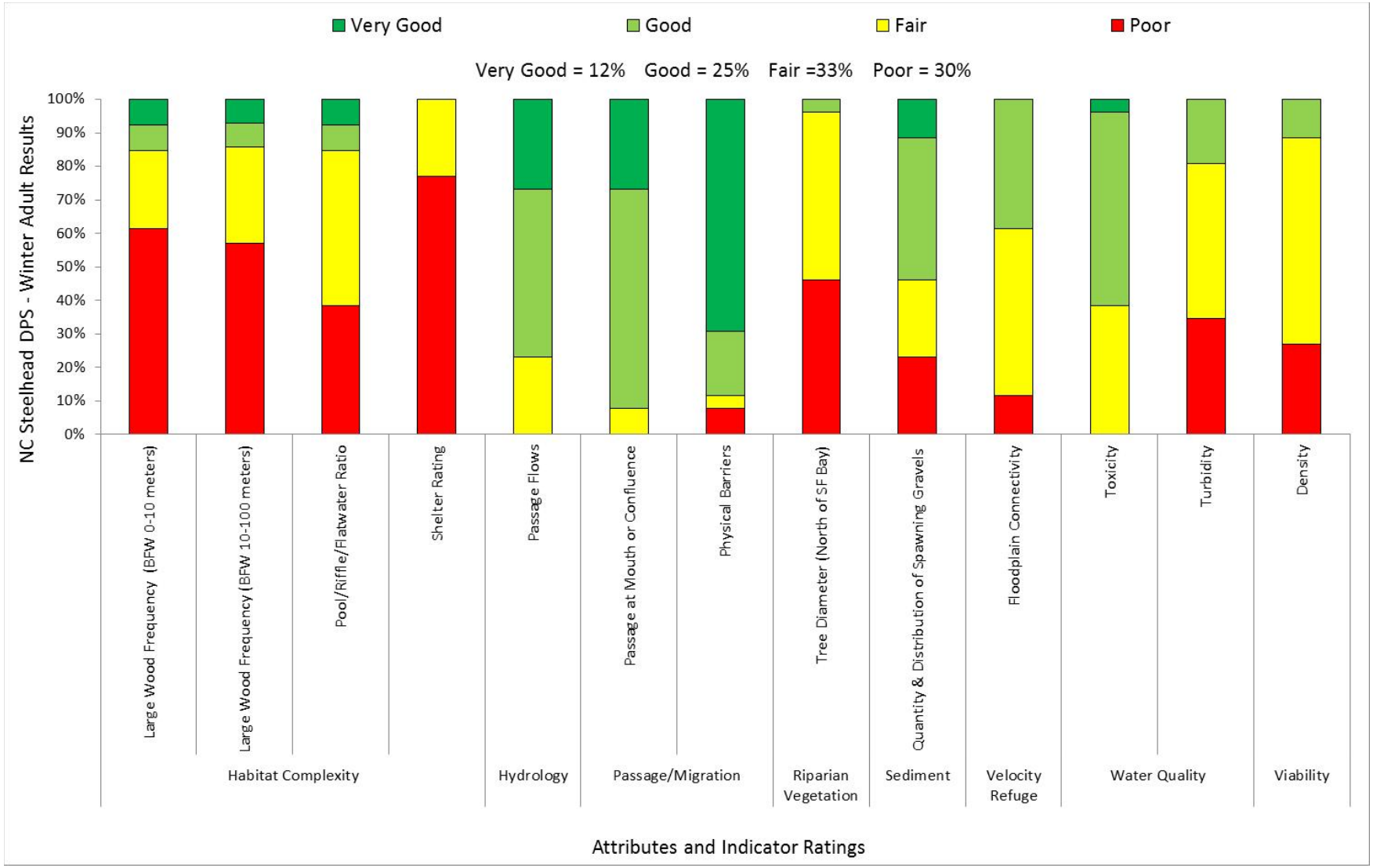

Figure 16: Attribute Indicator ratings for the Winter Adult life stage.

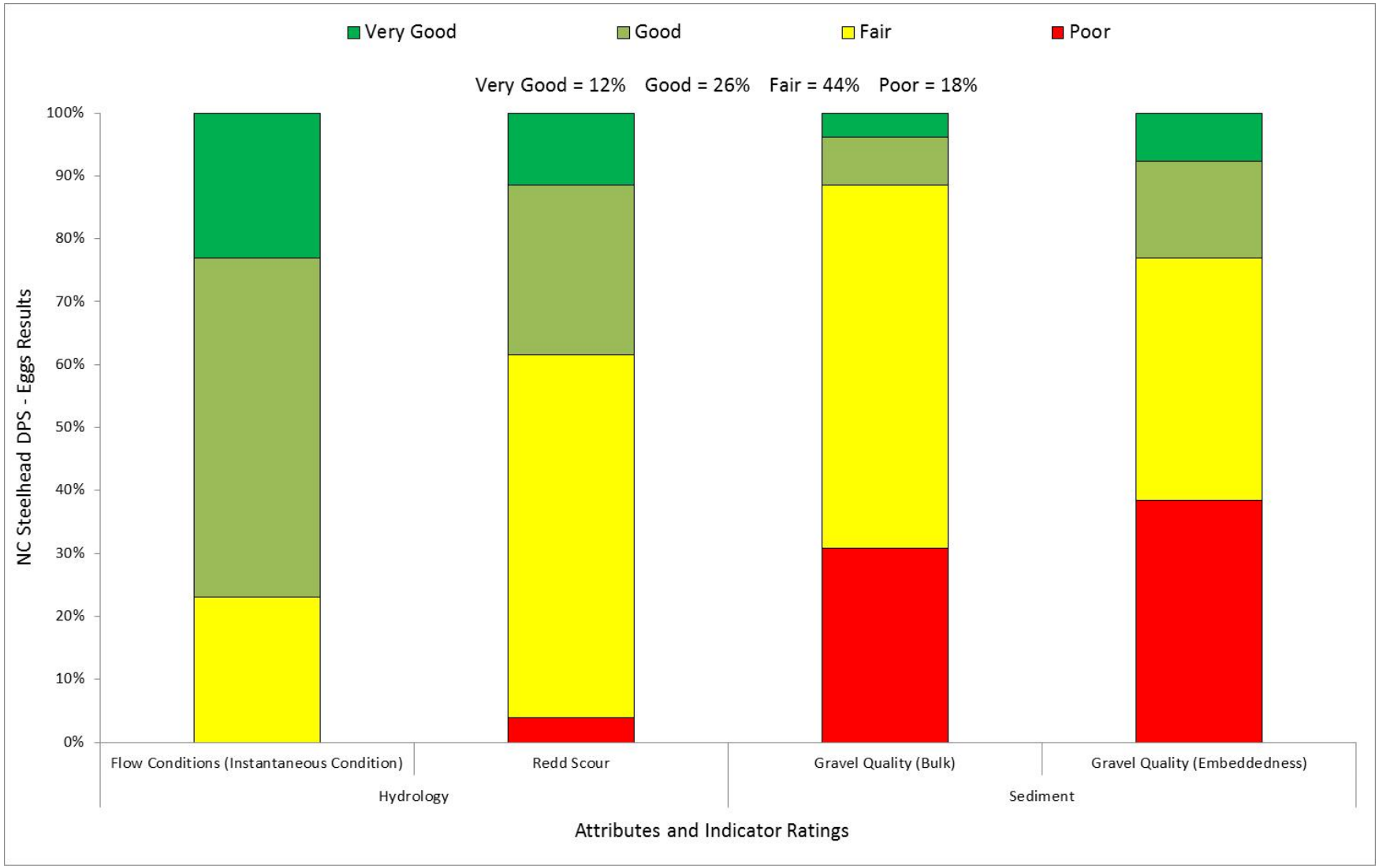

Figure 17: Attribute Indicator ratings for the Egg life stage.

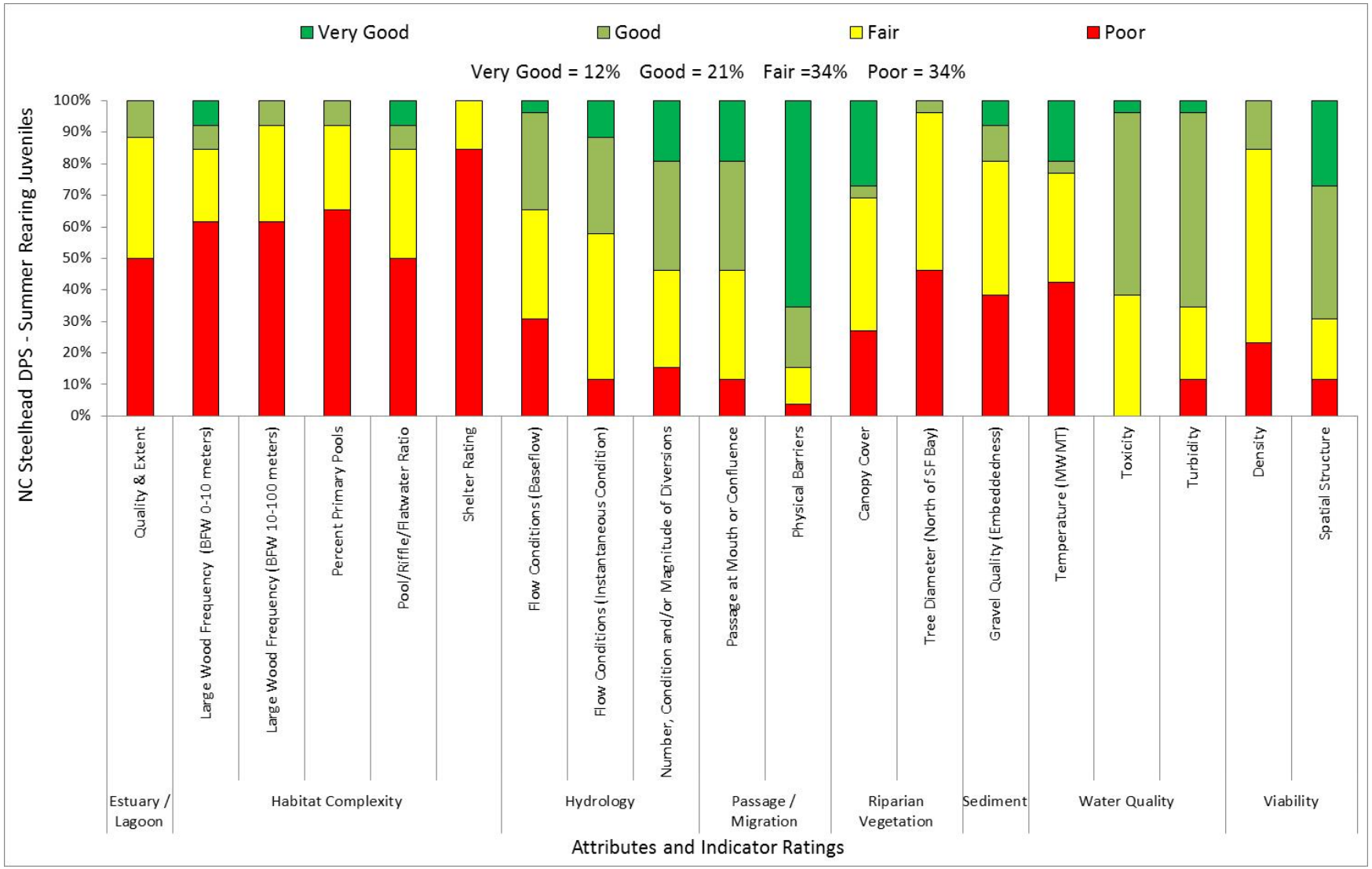

Figure 18: Attribute Indicator ratings for the Summer Rearing Juvenile life stage.

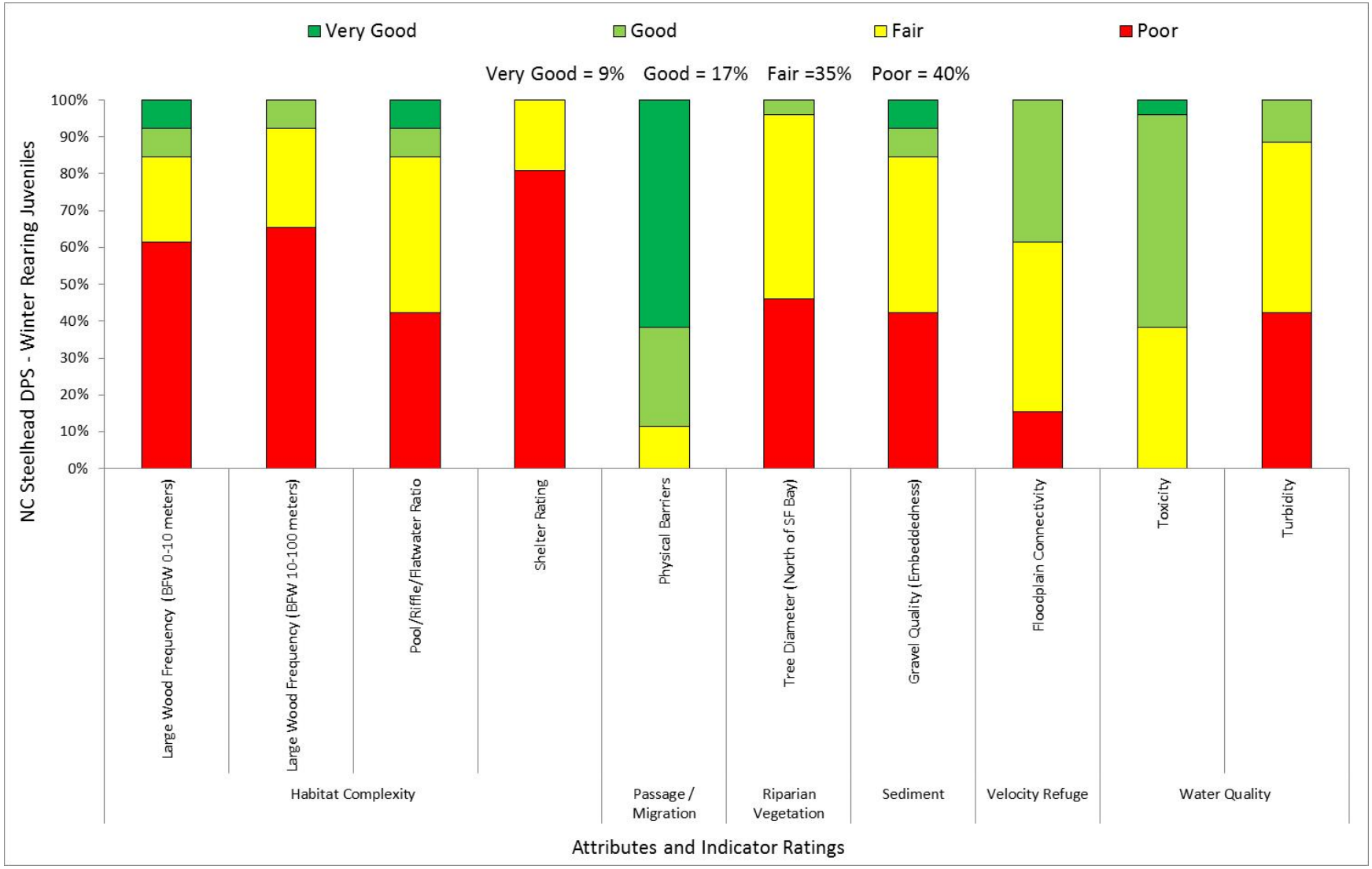

Figure 19: Attribute Indicator ratings for the Winter Rearing Juvenile life stage.

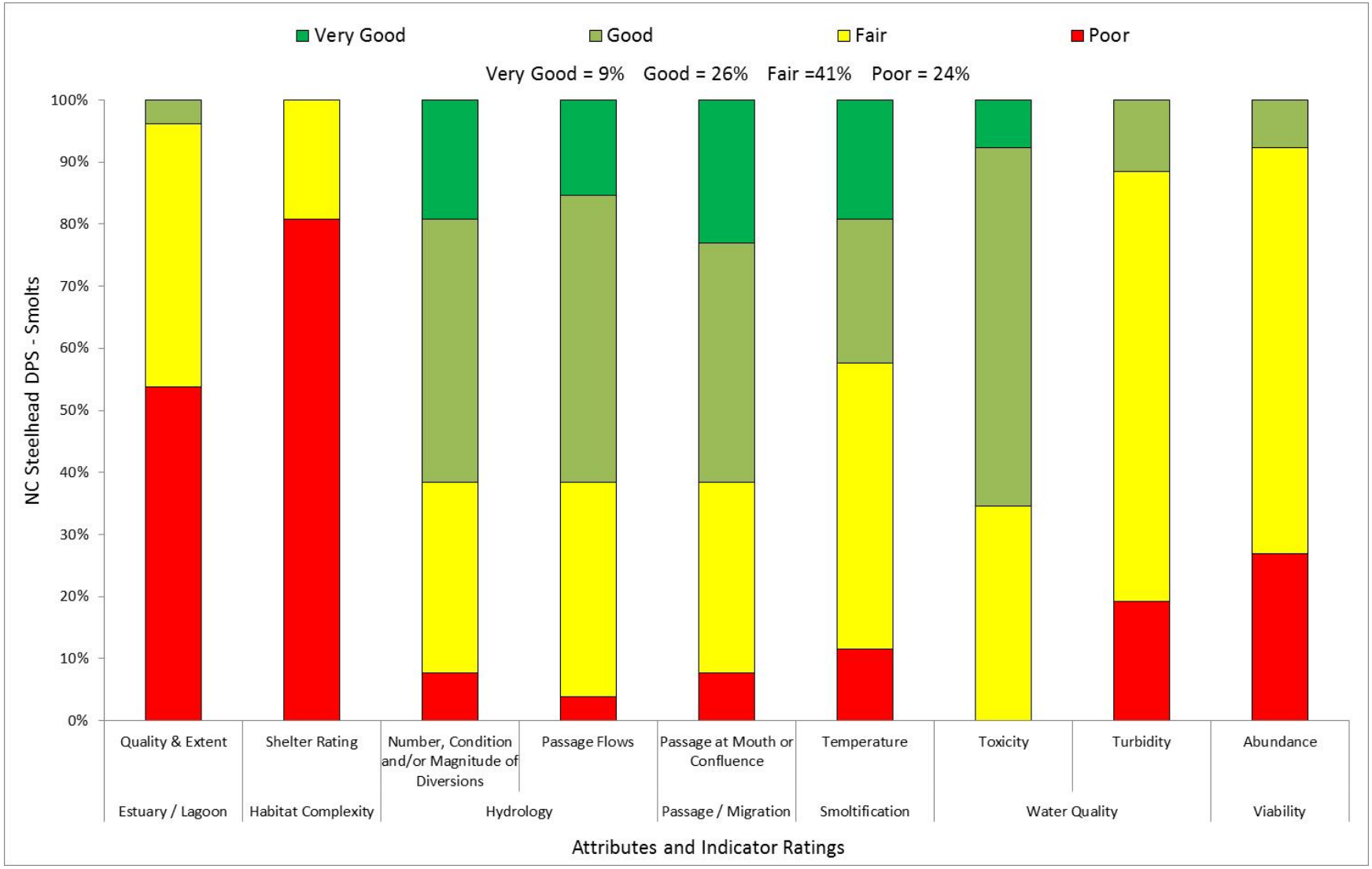

Figure 20: Attribute Indicator ratings for Smolt life stage.

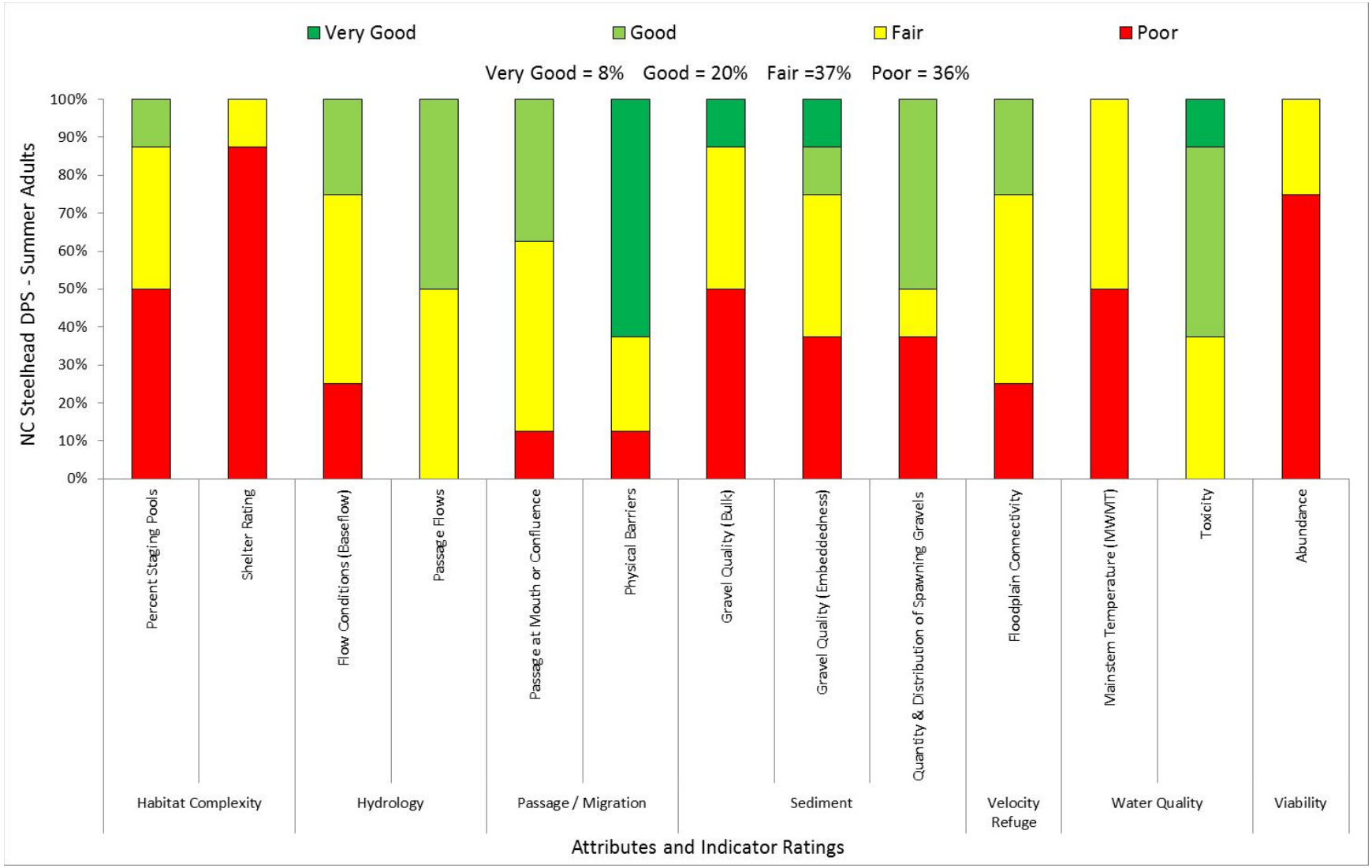

Figure 21: Attribute Indicator ratings for Summer Adult life stage.

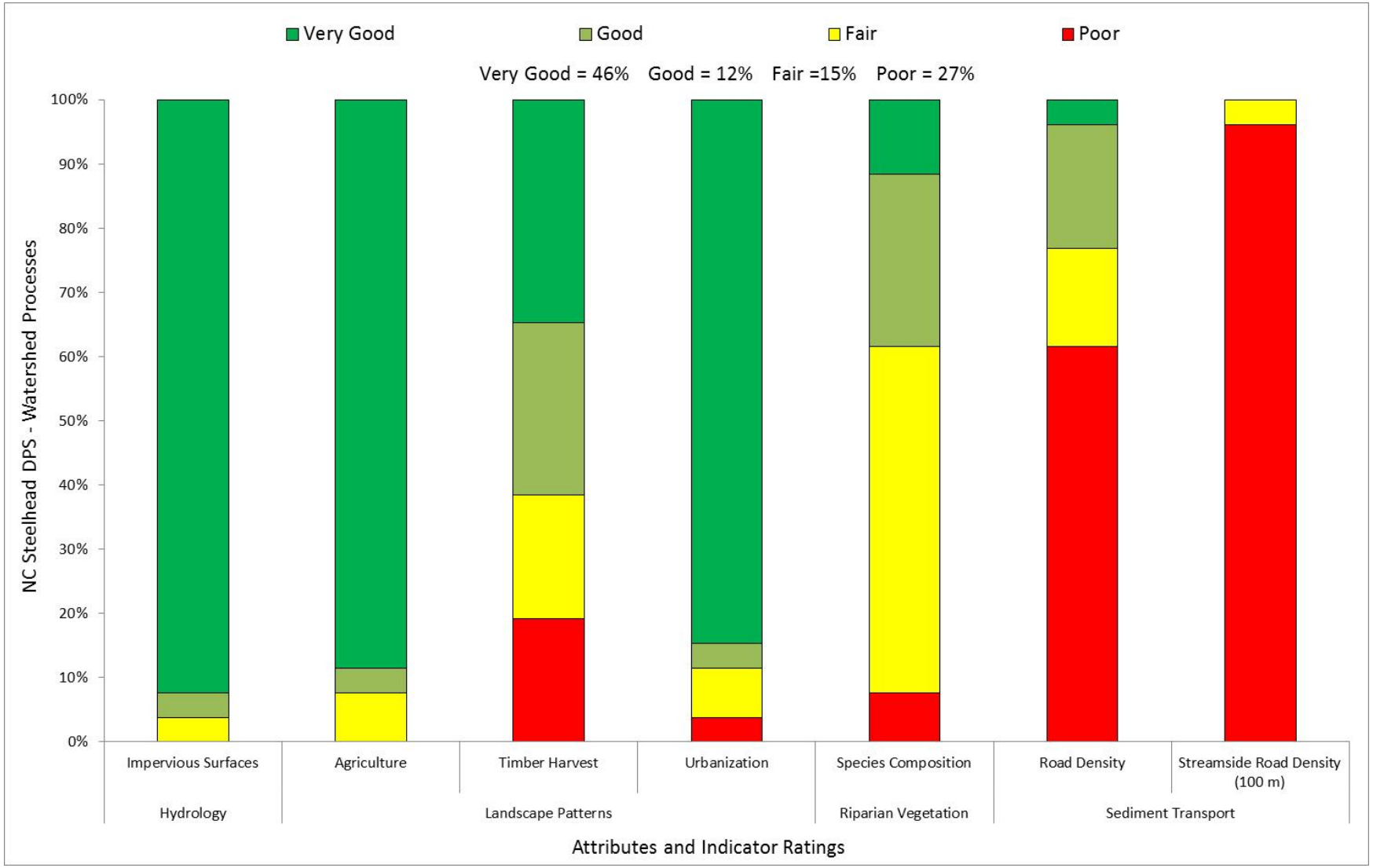

Figure 22: Attribute Indicator ratings for Watershed Processes.

DPS CAP THREAT RESULTS

Table 7 summarizes the CAP threat results across the DPS. Of the 15 identified threats, roads and railroads is the greatest threat with 73% rated Very High or High. This was followed by water diversions and impoundments (38%), logging and wood harvesting (31%), and channel modification (19%) (Table 7 and Figure 23).

Table 7: NC steelhead DPS Threat Summary Table, where L=low, M=medium, H=high, and VH=very high threat. Cells with [-] were not rated or not applicable.

Diversity Strata	Northern Coastal								Lower Interior				North Mountain Interior					North-Central Coastal						Central Coastal		
NC Steelhead Threat/Population	Redwood	Maple Creek/Big Lagoon	Little River	Mad River	Humbold Bay	South Fork Eel River	Bear River	Mattole River	Chamise Creek	Woodman Creek	Outlet Creek	Tomki Creek	Van Duzen River	Larabee Creek	North Fork Eel River	Middle Fork Eel River	Upper Mainstem Eel River	Usal Creek	Wages Creek	Ten Mile River	Noyo River	Caspar Creek	Big River	Navarro River	Garcia River	Gualala River
Agriculture	M	M	M	M	L	M	M	M	M	L	M	L	M	M	M	M	L	-	L	M	-	M	-	M	M	H
Channel Modification	VH	M	M	H	H	H	M	L	M	M	M	-	H	M	M	M	L	L	L	L	L	M	M	L	M	M
Disease, Predation and Competition	H	M	L	L	M	M	M	M	M	M	-	M	H	M	M	M	M	L	L	L	-	M	-	-	L	L
Fire, Fuel Management and Fire Suppression	M	M	L	M	M	M	M	L	L	L	L	L	M	M	M	H	M	M	M	H	L	M	L	L	L	L
Fishing and Collecting	H	M	L	L	L	M	M	L	L	L	L	L	M	M	L	M	L	L	M	L	L	M	L	L	M	M
Hatcheries and Aquaculture	M	M	-	H	L	L	M	L	L	L	-	-	L	L	L	L	L	L	-	L	-	-	-	-	-	-
Livestock Farming and Ranching	M	M	M	M	H	M	H	M	L	L	M	L	M	M	M	M	L	-	L	L	-	L	-	M	H	M
Logging and Wood Harvesting	H	VH	H	M	M	M	H	H	L	L	M	M	M	M	M	M	L	M	M	H	M	M	M	M	H	H
Mining	H	M	-	H	-	M	M	L	L	L	L	-	M	L	M	L	L	L	L	M	-	-	-	-	L	L
Recreational Areas and Activities	M	M	L	M	L	M	M	L	L	L	-	L	M	L	M	L	L	L	L	L	L	M	L	-	L	L
Residential and Commercial Development	M	M	L	M	M	M	M	M	M	M	M	M	M	L	M	L	L	L	M	L	L	M	-	L	L	L
Roads and Railroads	H	VH	H	H	H	M	VH	M	H	H	M	M	H	H	H	H	H	H	H	H	M	H	M	M	H	H
Severe Weather Patterns	M	M	M	M	M	H	M	VH	M	M	M	M	M	M	M	M	H	H	M	H	M	M	M	M	M	M
Water Diversion and Impoundments	H	M	M	M	M	H	M	VH	M	M	H	H	H	M	M	M	VH	L	M	M	L	M	L	H	H	H
Threat Status for Targets and Project	VH	VH	H	H	H	H	VH	VH	H	H	H	M	H	H	H	H	H	H	H	H	M	H	M	H	H	H

Figure 23: Threat ratings for the NC steelhead DPS

DPS LEVEL RECOVERY ACTIONS

The following recovery actions are DPS-wide recovery actions. DPS-wide recovery actions are recommendations that are designed to address widespread and often multiple threat sources across the range, such as the inadequate implementation and enforcement of local, state, and federal regulations.

Northern California Steelhead DPS Level Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
DPS-NCSW-1.1	Estuary	Objective	Address the present or threatened destruction, modification, or curtailment of the species habitat or range.										
DPS-NCSW-1.1.1	Estuary	Recovery Action	Increase quality and extent of estuarine habitat.										
DPS-NCSW-1.1.1.1	Estuary	Action Step	In estuary/lagoons when applicable, remove problematic infrastructure and fill material to promote the historical seasonal formation and timing of an estuary/lagoon barrier breach.	3	20	County, State, NMFS						TBD	Cost is dependent on the infrastructure of fill to be removed
DPS-NCSW-1.1.1.2	Estuary	Action Step	Implement patrols by citizens groups, city employees, and law enforcement to ensure seasonal sandbars are not illegally breached.	1	50	City, Citizens, County, CDFW Wardens, NMFS OLE, Non-Profits, Private Landowners,						0	Action is considered In-Kind
DPS-NCSW-1.2	Estuary	Objective	Address the inadequacy of existing regulatory mechanisms.										
DPS-NCSW-1.2.1	Estuary	Recovery Action	Increase quality and extent of estuarine habitat.										
DPS-NCSW-1.2.1.1	Estuary	Action Step	Develop and implement Estuary Inflow Protection and Enhancement Guidelines to maintain estuary function and provide information for estuary restoration.	2	20	CDFW, NMFS, SWRCB						0	Action is considered In-Kind
DPS-NCSW-1.2.1.2	Estuary	Action Step	Work with local county/city and state organizations to develop alternative methods of flood control to reduce artificial breaching frequency.	2	10	City, County, NMFS, State						0	Action is considered In-Kind
DPS-NCSW-2.1	Floodplain Connectivity	Objective	Address the present or threatened destruction, modification, or curtailment of habitat or range.										
DPS-NCSW-2.1.1	Floodplain Connectivity	Recovery Action	Rehabilitate and enhance floodplain connectivity										
DPS-NCSW-2.1.1.1	Floodplain Connectivity	Action Step	Evaluate opportunities and implement actions for planned retreat of urban development or other incompatible land uses from floodplains (similar to the City of Napa, CA) and alluvial valley streams to recreate natural floodplain processes and complex off-channel habitat and implement such opportunities where appropriate.	2	50	City, County						TBD	In-Kind for the evaluation, TBD for the implementation of the plan
DPS-NCSW-2.2	Floodplain Connectivity	Objective	Address the inadequacy of existing regulatory mechanisms										
DPS-NCSW-2.2.1	Floodplain Connectivity	Recovery Action	Rehabilitate and enhance floodplain connectivity										
DPS-NCSW-2.2.1.1	Floodplain Connectivity	Action Step	County zoning should consider the 20-year and 100-year floodprone areas and design protective ordinances and compatible land use designations in these locations.	2	50	County						0	Action is considered In-Kind
DPS-NCSW-3.1	Hydrology	Objective	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
DPS-NCSW-3.1.1	Hydrology	Recovery Action	Improve flow conditions										
DPS-NCSW-3.1.1.1	Hydrology	Action Step	Encourage water conservation and the use of native vegetation in new landscaping to reduce the need for watering and application of herbicides, pesticides, and fertilizers.	2	50	EPA, City, County, NGO, Private Landowners, State, RWQCB						0	Action is considered In-Kind
DPS-NCSW-3.1.1.2	Hydrology	Action Step	Work with rural residential communities to develop water conservation strategies protective of salmonids while allowing for domestic water use.	2	20	City, County, NGO, Private Landowners, State, SWRCB						0	Action is considered In-Kind
DPS-NCSW-3.1.1.3	Hydrology	Action Step	Work with partners to reduce stormwater run-off by removing impervious surfaces, and creating or expanding flood retention land and groundwater recharge basins.	3	20	City, County, Private Landowners, State, SWRCB						0	Action is considered In-Kind

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DPS-NCSW-3.1.1.4	Hydrology	Action Step	Work with the RWQCBs to encourage landowners to increase groundwater recharge, permeable surfaces, and percolation through swales and recharge basins in an effort to reduce the flashiness of hydrographs and increase summer baseflow.	1	20	NMFS, Private Landowners, State, RWQCB						0	Action is considered In-Kind
DPS-NCSW-3.1.1.5	Hydrology	Action Step	Work with partners to expand stream flow gaging networks in streams supporting salmonids and/or their habitat.	3	50	CDFW, City, County, NMFS, Private Landowners, State, SWRCB, USGS						TBD	Costs for implementing this action will depend on the number, location and duration of gages across the ESU and DPS. See also Monitoring Chapter.
DPS-NCSW-3.1.1.6	Hydrology	Action Step	Meter water diversions for the purposes of measuring instantaneous demand.	2	5	CDFW, City, County, NMFS, Private Landowners, State, SWRCB						0	Implementation costs should be covered under existing laws or should be the responsibility of the entity that owns the diversion.
DPS-NCSW-3.1.1.7	Hydrology	Action Step	Provide financial and technical support and develop partnerships to characterize watershed hydrology and to assess water availability and create water resource budgets.	1	10	CDFW, City, County, NMFS, State, SWRCB						TBD	Some of this would be In-Kind
DPS-NCSW-3.1.1.8	Hydrology	Action Step	Effects of consumptive water uses on both the timing and quantity of flow should be minimized. Water-management technologies promoting restoration of natural runoff patterns and water quality should be encouraged.	1	10	CDFW, City, County, NMFS, State, SWRCB						0	Patterns of water runoff, including surface and subsurface drainage, should match to the greatest extent possible the natural hydrologic pattern for the region in both quantity and quality. Action is considered In-Kind
DPS-NCSW-3.1.1.9	Hydrology	Action Step	Evaluate geological patterns in the ESU to identify areas with karst formations or similar geology. These sites may provide sources of cool water and serve as locations to buffer populations against climate change and on-going water diversions.	3	15	County, NMFS, State, USGS						TBD	
DPS-NCSW-3.2	Hydrology	Objective	Address the inadequacy of existing regulatory mechanisms										
DPS-NCSW-3.2.1	Hydrology	Recovery Action	Improve flow conditions										
DPS-NCSW-3.2.1.1	Hydrology	Action Step	Encourage local governments to condition new development to reduce or eliminate human water demand by integrating hydro-modification concerns into development planning.	2	50	City, County						0	For example: new homes should have drought-tolerant landscaping, rainwater catchment systems, and permeable surfaces; new vineyards should demonstrate that their water supply development would have no adverse impacts of fisheries resources. Action is In-Kind
DPS-NCSW-3.2.1.2	Hydrology	Action Step	SWRCB in coordination with NMFS, CDFW, and other qualified parties, should develop state-wide minimum summer baseflow requirements protective of salmonids and their habitat.	1	5	CDFW, NMFS, SWRCB						0	Enforcing the minimum baseflow requirement is necessary to ensure salmonid persistence during drought periods and water right curtailment or when watershed surface flow is over-allocated, and when prosecuting illegal diversions. Action is In-Kind
DPS-NCSW-3.2.1.3	Hydrology	Action Step	Improve coordination between the agencies, particularly with the SWRCB, to effectively identify and address illegal water diverters and out-of-compliance diverters, seasons of diversion, off-stream reservoirs, and bypass flows fully protective of listed salmonids.	1	5	City, County, CDFW, NMFS, Private Landowners, RWQCB, SWRCB						0	Action is considered In-Kind
DPS-NCSW-3.2.1.4	Hydrology	Action Step	Collaborate with and support the SWRCB and local agencies to increase oversight and responsibility for regulating groundwater extraction from aquifers hydrologically connected to surface flows.	1	5	City, County, CDFW, NMFS, Private Landowners, RWQCB, SWRCB						0	Action is considered In-Kind

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DPS-NCSW-3.2.1.5	Hydrology	Action Step	NMFS should actively participate in Groundwater Management Plan development (per California's Sustainable Groundwater Management Act) where groundwater pumping is impacting hydrologically connected streamflow.	1	5	City, County, CDFW, NMFS, SWRCB						0	Action is considered In-Kind
DPS-NCSW-3.2.1.6	Hydrology	Action Step	Encourage local governments to integrate meaningful groundwater regulation for land use planning and to increase coordination with State agencies to ensure applicants secure necessary State permits (e.g., water rights) as part of local permitting processes.	1	5	City, County, CDFW, NMFS, Private Landowners, RWQCB, SWRCB						0	Action is considered In-Kind
DPS-NCSW-3.2.1.7	Hydrology	Action Step	Extend California Water Code Section 1259.4 dealing with instream flows to protect instream beneficial uses, including native fishes, to central and northern California recovery planning areas with appropriate provisions to address regional differences, including but not limited to construction of off-stream storage as alternative to direct diversions during the dry season.	1	5	SWRCB						0	Action is considered In-Kind
DPS-NCSW-3.2.1.8	Hydrology	Action Step	Water conservation projects should be focused on shifting reliance from on-stream storage to offstream storage, resolve frost protection issues, and ensure necessary flows for all freshwater lifestages in all water years.	2	10	City, County, CDFW, NMFS, Private Landowners, RWQCB, SWRCB						TBD	
DPS-NCSW-5.1	Passage	Objective	Address the present or threatened destruction, modification, or curtailment of habitat or range.										
DPS-NCSW-5.1.1	Passage	Recovery Action	Modify or remove physical passage barriers.										
DPS-NCSW-5.1.1.1	Passage	Action Step	All new crossings and upgrades to existing crossings (bridges, culverts, fills, and other crossings) need to accommodate 100-year flood flows and associated bedload and debris.	2	50	City, County, NMFS, State						TBD	
DPS-NCSW-5.1.1.2	Passage	Action Step	Monitor and update barriers in the Passage Assessment Database (PAD) (https://nrm.dfg.ca.gov/PAD/)	3	50	City, County, NGO, RCD, State						0	The data that is collected is often part of another survey and is forwarded to CDFW. CDFW maintenance of the database is considered In-Kind
DPS-NCSW-6.2	Habitat Complexity	Objective	Address the inadequacy of existing regulatory conditions										
DPS-NCSW-6.2.1	Habitat Complexity	Recovery Action	Improve shelter										
DPS-NCSW-6.2.1.1	Habitat Complexity	Action Step	Work with Federal and State to develop an application of a programmatic permit for restoration work not funded by FRGP. The objectives of the programmatic should be to reduce costs and fast-track the implementation of high priority recovery actions.	2	5	City, County, CDFW, NGO, NMFS, NOAA RC, Private Landowners, RCD						0	Action is considered In-Kind
DPS-NCSW-6.2.1.2	Habitat Complexity	Action Step	Work with California BOF, CDFW, RWQCB and others to modify the timber harvest permitting process (including CDFW Lake and Streambed Alteration Agreement process) and provide opportunities and incentives for the implementation of LWD placement and other restoration priorities during timber harvest operations.	3	5	BOF, CDFW, NMFS, RWQCB, Timber Landowners						0	Action is considered In-Kind
DPS-NCSW-6.2.1.3	Habitat Complexity	Action Step	Work with CDFW and the California Fish and Game Commission to remove beavers from California Fish and Game Code Section 4181 that provides any owner or tenant of land or property that is being damaged or destroyed or is in danger of being damaged or destroyed by certain mammals, including beaver, may apply to the department for a permit to kill the mammals.	3	10	CDFW, California Fish and Game Commission, NMFS						0	Action is considered In-Kind

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DPS-NCSW-6.2.1.4	Habitat Complexity	Action Step	Work with CDFW and the California Fish and Game Commission to modify Title 14 of the California code of Regulations to prohibit recreational hunting/trapping of beavers within all counties within the NCCC Recovery Domain.	3	10	CDFW, California Fish and Game Commission, NMFS						0	Action is considered In-Kind
DPS-NCSW-6.2.1.5	Habitat Complexity	Action Step	Utilize non-lethal methods where feasible to manage beaver depredation issues (e.g. flooding, crop damage) such as flow devices, fencing, and beaver re-location and enhance habitat complexity.	3	10	CDFW, California Fish and Game Commission, NMFS, Private Landowners						TBD	
DPS-NCSW-6.2.1.6	Habitat Complexity	Action Step	Where non-lethal methods prove unfeasible to resolve depredation issues, relocate beaver populations to remote streams where habitat enhancement is needed and resource conflict is low.	3	10	CDFW, California Fish and Game Commission, NMFS, Private Landowners						0	Action is considered In-Kind
DPS-NCSW-6.2.1.7	Habitat Complexity	Action Step	Develop and update a Beaver Management Plan for California to benefit salmonids.	3	10	CDFW, California Fish and Game Commission, NMFS						0	Action is considered In-Kind
DPS-NCSW-7.1	Riparian	Objective	Address the inadequacy of existing regulatory conditions										
DPS-NCSW-7.1.1	Riparian	Recovery Action	Improve riparian conditions										
DPS-NCSW-7.1.1.1	Riparian	Action Step	Develop adequately sized riparian setbacks/buffers to protect salmonids habitat where they do not currently occur, and enforce requirements of local regulations where they do.	2	10	County						0	Action is considered In-Kind
DPS-NCSW-7.1.1.2	Riparian	Action Step	Counties should develop a riparian strategy to grow older larger diameter trees for improved canopy and appropriate natural recruitment to the stream. This could be achieved by creating ordinances (where currently non-existent) that limit or prevent the removal of mature trees during infrastructure upgrades or implementation of restoration projects.	3	10	County						0	Action is considered In-Kind
DPS-NCSW-8.1	Sediment	Objective	Address the present or threatened destruction, modification, or curtailment of the species habitat or range.										
DPS-NCSW-8.1.1	Sediment	Recovery Action	Improve instream gravel quality										
DPS-NCSW-8.1.1.1	Sediment	Action Step	Fund and implement sediment TMDLs within the range of listed salmonids.	2	10	EPA, RWQCB						TBD	
DPS-NCSW-8.1.1.2	Sediment	Action Step	Evaluate stream crossings for their potential to impair natural geomorphic processes. Replace or retrofit crossings to achieve more natural conditions that meet sediment transport goals.	2	10	Caltrans, County, CDFW, NMFS						TBD	
DPS-NCSW-10.1	Water Quality	Objective	Address the present or threatened destruction, modification, or curtailment of the species habitat or range.										
DPS-NCSW-10.1.1	Water Quality	Recovery Action	Reduce toxicity and pollutants.										
DPS-NCSW-10.1.1.1	Water Quality	Action Step	Work with EPA, RWQCBs and CDFW to identify and prioritize potential contaminants of concern and develop protective standards and programs for issues that directly or indirectly adversely affect the continued existence of listed salmonids.	2	5	EPA, CDFW, RWQCB						0	Action is considered In-Kind
DPS-NCSW-10.1.1.2	Water Quality	Action Step	Conduct outreach to increase awareness of the effects of pesticides and contaminants that impact the continued existence and habitat of listed salmonids.	2	5	EPA, CDFW, NGO, NMFS, RWQCB						0	Action is considered In-Kind

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DPS-NCSW-10.1.1.3	Water Quality	Action Step	Support the development and implementation of stormwater BMPs in cities, towns and rural areas.	2	5	City, County, Local, Private Landowners, State, RWQCB						0	Action is considered In-Kind
DPS-NCSW-10.1.1.4	Water Quality	Action Step	Implement performance standards in Stormwater Management Plans.	2	5	City, County, Private Landowners, State, RWQCB						0	Action is considered In-Kind
DPS-NCSW-10.1.1.5	Water Quality	Action Step	Work with pesticide users to educate and advocate for an "integrative pest management framework (IPM)" for pesticide control.	2	5	City, County, NMFS, Private Landowners, State, RWQCB						0	Best management practices within the IPM include biological control, pesticide choices, removal of pest habitat and resources, barriers, optimal fertilization and irrigation, trap plants, intercropping, and cover crops, and synthetic mulches. Action is considered In-Kind
DPS-NCSW-10.1.1.6	Water Quality	Action Step	Work with the California Department of Pesticide Regulation (CDPR) to support changes to professional pesticide application methodologies and timing to limit the potential exposure of watercourses to pesticide runoff.	3	5	City, County, NMFS, Private Landowners, State, RWQCB						0	For example: change building infrastructure applications of pyrethoids on monthly schedules throughout the entire year including the rainy season to seasons of interest. Action is considered In-Kind
DPS-NCSW-10.1.1.7	Water Quality	Action Step	Work with the academic, local, government and non-profit entities (Natural Resource Conservation District, etc.) to support funding of research and use of pesticide alternatives.	3	15	Academic, Local, Government, NGO						0	These alternatives may include technologies that reduce the amount of pesticides that need to be applied or pest management strategies that require very little pesticide use. Action is considered In-Kind
DPS-NCSW-10.1.1.8	Water Quality	Action Step	Work with EPA, RWQCBs, and local stakeholders to implement actions under section 303(d)(1)(C) and (D) of the Clean Water Act requiring States to prepare TMDLs for all water bodies targeted in this recovery plan not currently meeting State of California water quality standards.	2	25	EPA, NMFS, RWQCB, State						0	Action is considered In-Kind
DPS-NCSW-10.2	Water Quality	Objective	Address Inadequacy of existing regulatory conditions										
DPS-NCSW-10.2.1	Water Quality	Recovery Action	Reduce toxicity and pollutants.										
DPS-NCSW-10.2.1.1	Water Quality	Action Step	Work with the RWQCB to support and fast track promulgation of methods to detect impacts from pesticides and other CECs under 40 C.F.R. Part 136, followed by adoption of water quality criteria for pollutants covered by these methods.	2	10	NMFS, RWQCB, State						0	Action is considered In-Kind
DPS-NCSW-11.1	Viability	Objective	Address the present or threatened destruction, modification, or curtailment of the species habitat or range.										
DPS-NCSW-11.1.1	Viability	Recovery Action	Increase abundance, spatial structure and diversity										
DPS-NCSW-11.1.1.1	Viability	Action Step	Finalize and implement the California Coastal Salmonid Monitoring Plan.	1	50	CDFW, County, NGO, RCD, Watershed Partners, Water Agencies						TBD	Implementing the California Coastal Monitoring Plan is essential for evaluating the long-term viability of listed salmonids in California. For specific components of the Coastal Monitoring Plan see Vol.1 Chapter 6.
DPS-NCSW-11.1.1.2	Viability	Action Step	Prioritize restoration funds, notably the Pacific Coast Salmon Restoration Fund and California's Fisheries Restoration Grant Program (FRGP), to address issues in critical watersheds identified within this recovery plan.	2	50	CDFW, NMFS						0	Action is considered In-Kind
DPS-NCSW-11.1.1.3	Viability	Action Step	Work with the SWFSC to revise the "Intrinsic Potential" model in areas where the model predictions has a severe or high bias.	2	5	NMFS, SWFSC						0	Action is considered In-Kind
DPS-NCSW-11.1.1.4	Viability	Action Step	Support all educational and outreach conferences, events, workshops, etc. that advance the understanding of anadromous salmonid life history, ecology, history, biology, threats, habitat restoration, recovery, and species viability to include all those with a science, restoration, and policy focus.	2	50	Academic, CDFW, NGO, NMFS, SWFSC						TBD	

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DPS-NCSW-11.1.1.5	Viability	Action Step	Support studies, assessments, science, research, and monitoring (including associated modeling, data management, data analysis, and reporting) that will improve our understanding of species life history and genetic diversity, historical distribution, habitat relationships, status, trends, viability, and spatial structure including those for drought and climate change	2	50	Academic, CDFW, NGO, NMFS, SWFSC						TBD	
DPS-NCSW-12.1	Agriculture	Objective	Address the present of threatened destruction, modification, or curtailment of the species habitat or range.										
DPS-NCSW-12.1.1	Agriculture	Recovery Action	Prevent or minimize increased landscape disturbance.										
DPS-NCSW-12.1.1.1	Agriculture	Action Step	Continue existing cooperative conservation programs (such as Fish Friendly Farming or Fish Friendly Ranching) in order to minimize the impacts of agricultural operations on habitat quality.	2	20	NMFS, NRCS, Private Landowners, RCD, RWQCB, State						TBD	
DPS-NCSW-12.1.1.2	Agriculture	Action Step	Encourage and assist the NRCS and RCDs to increase the number of landowners participating in sediment reduction planning and implementation.	2	20	NMFS, NRCS, Private Landowners, RCD, RWQCB, State						0	Action is considered In-Kind
DPS-NCSW-12.1.1.3	Agriculture	Action Step	Develop incentive programs and incentive-based approaches for landowners who conduct operations in a manner compatible with salmonid recovery requirements.	3	20	NMFS, NRCS, Private Landowners, RCD, RWQCB, State						0	In-Kind to develop the program, TBD depending on what incentives are provided
DPS-NCSW-12.1.1.4	Agriculture	Action Step	Continue and expand the use of cover crops in agriculture fields to reduce sediment runoff.	3	10	Private Landowners						0	In-Kind, should be considered standard practice, but implementation is ultimately up to the landowner
DPS-NCSW-12.1.2	Agriculture	Recovery Action	Prevent or minimize impairment to watershed hydrology										
DPS-NCSW-12.1.2.1	Agriculture	Action Step	Support projects that build agricultural ponds as an alternative to summer riparian diversions.	2	15	NMFS, NRCS, Private Landowners, RCD, RWQCB, State, SWRCB						0	Action is considered In-Kind
DPS-NCSW-12.1.2.2	Agriculture	Action Step	If water is used for frost protection measures, encourage SWRCB to require the use of flow metering in such circumstances to ensure flows are maintained for other beneficial uses.	2	5	NMFS, Private Landowners, RWQCB, State, SWRCB						0	Action is considered In-Kind
DPS-NCSW-12.1.2.3	Agriculture	Action Step	Utilize BMP's for irrigation (cover crop, drip) and frost protection (wind machines, cold air drains, heaters, or micro-sprayers) which eliminate or minimize water use.	2	10	NMFS, NRCS, Private Landowners, RCD, RWQCB, State						TBD	
DPS-NCSW-12.1.2.4	Agriculture	Action Step	Re-design levee systems to back-flood alluvial basin recharge zones in flood tolerant agricultural areas.	3	20	Corps, County, NMFS						0	Action is considered In-Kind
DPS-NCSW-12.2	Agriculture	Objective	Address the inadequacies of existing regulatory mechanisms.										
DPS-NCSW-12.2.1	Agriculture	Recovery Action	Prevent or minimize impairment to watershed hydrology										
DPS-NCSW-12.2.1.1	Agriculture	Action Step	NMFS and CDFW should request to be included as technical experts in ongoing legislative efforts to craft marijuana cultivation regulations.	2	5	CDFW, NMFS						0	Action is considered In-Kind
DPS-NCSW-12.2.1.2	Agriculture	Action Step	Counties should condition approval of new developments (e.g. vineyards) in order to require developers to demonstrate that water is available, without adversely affecting public trust resources.	2	10	County, Private, SWRCB						0	Action is considered In-Kind
DPS-NCSW-12.2.1.3	Agriculture	Action Step	Promote the use of reclaimed waste water for agricultural, landscape and other appropriate applications.	2	10	City, County, Private, NMFS, State, RWQCB, SWRCB						0	Action is considered In-Kind

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DPS-NCSW-12.2.1.4	Agriculture	Action Step	Encourage the use of low-flow alternatives such as micro-sprinklers, and encourage alternative forms of frost protection that do not use water, such as wind machines.	2	10	City, County, Private Landowners, NMFS, State						0	Action is considered In-Kind
DPS-NCSW-12.2.1.5	Agriculture	Action Step	NMFS and CDFW should work with state/federal attorneys and the Counties District Attorney's office to coordinate prosecutorial strategies for environmental crimes arising from marijuana cultivation.	1	5	CDFW, County, NMFS, State						0	Action is considered In-Kind
DPS-NCSW-12.2.2	Agriculture	Recovery Action	Prevent or minimize impairment to watershed hydrology										
DPS-NCSW-12.2.2.1	Agriculture	Action Step	Minimize impacts from new vineyard development by enforcement of land use zoning appropriate to the site to protect floodplain and riparian processes.	2	20	County, CDFW, NMFS						0	Action is considered In-Kind
DPS-NCSW-13.1	Channel Modification	Objective	Address the present or threatened destruction, modification, or curtailment of the species habitat or range.										
DPS-NCSW-13.1.1	Channel Modification	Recovery Action	Prevent or minimize increased landscape disturbance.										
DPS-NCSW-13.1.1.1	Channel Modification	Action Step	Collaborate with local, state, and federal agencies and non-governmental organizations to acquire fee-title to parcels or conservation easements over strategically-selected stream and riparian corridors to protect salmon and steelhead migratory, spawning, and rearing habitats.	3	50	City, County, Federal, Local, NGO, State						TBD	
DPS-NCSW-13.1.1.2	Channel Modification	Action Step	Eliminate the use of gabion baskets and undersized rock within the bankfull channel. Where riprap and other bank hardening is necessary, integrate other habitat-forming features – including large woody debris and riparian plantings and other methodologies to minimize habitat alteration effects.	2	10	City, County, Private Landowner, State, Water Agencies						TBD	
DPS-NCSW-13.1.1.3	Channel Modification	Action Step	Thoroughly investigate the ultimate cause of channel instability prior to engaging in site specific channel modifications and maintenance. Focus on ensuring minimal disruption to watershed processes.	2	10	City, County, Private Landowner, State, Water Agencies						TBD	
DPS-NCSW-13.2	Channel Modification	Objective	Address the inadequacy of existing regulatory mechanisms.										
DPS-NCSW-13.2.1	Channel Modification	Recovery Action	Prevent or minimize increased landscape disturbance.										
DPS-NCSW-13.2.1.1	Channel Modification	Action Step	Encourage Counties and municipalities to adopt a policy of "managed retreat" (removal of problematic infrastructure and replacement with native vegetation or flood tolerant land uses) for areas highly susceptible to, or previously damaged from, flooding.	2	15	County, County Municipalities, NMFS						0	Action is considered In-Kind
DPS-NCSW-13.2.1.2	Channel Modification	Action Step	Encourage FEMA to set regulatory standards in its Flood Insurance Program to explicitly address the protection of natural fluvial processes essential for the maintenance of naturally functioning riverine and riparian habitats.	2	15	FEMA, NMFS						0	Action is considered In-Kind
DPS-NCSW-14.1	Disease/Predation/Competition	Objective	Address the present or threatened destruction, modification, or curtailment of the species habitat or range.										
DPS-NCSW-14.1.1	Disease/Predation/Competition	Recovery Action	Prevent or minimize reduced density, abundance, and diversity based on biological viability criteria										
DPS-NCSW-14.1.1.1	Disease/Predation/Competition	Action Step	Provide funding to investigate and remediate impacts of disease and predation to overall viability.	3	20	Academic, CDFW, NMFS, SWFSC						TBD	
DPS-NCSW-14.1.1.2	Disease/Predation/Competition	Action Step	Evaluate impacts of striped bass predation in coastal estuaries to juvenile and smolt salmonids and implement abatement strategies where appropriate.	2	10	CDFW, NMFS						TBD	See Monitoring Chapter

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Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
DPS-NCSW-14.1.1.3	Disease/Predation/Competition	Action Step	Support CDFW, and other resource agencies to control and contain invasive species in California.	2	10	CDFW, NMFS						0	Action is considered In-Kind
DPS-NCSW-14.1.1.4	Disease/Predation/Competition	Action Step	Provide support to the Invasive Species Council of California (ISCC), and the California Invasive Species Advisory Committee (CISAC) in their efforts to effectively control invasive species.	2	10	CISAC, ISCC, NMFS						0	Action is considered In-Kind
DPS-NCSW-14.1.1.5	Disease/Predation/Competition	Action Step	Work with Counties to modify existing tree ordinances (e.g., Heritage Tree Ordinance) to exclude protection of non-native trees (e.g., *Eucalyptus* sp.) and waive any associated fees for non-native tree removal, particularly when part of a restoration project or on pubic lands.	3	10	County, NMFS, CDFW						0	Action is considered In-Kind
DPS-NCSW-14.1.1.6	Disease/Predation/Competition	Action Step	Promote the practice of Clean, Drain, and Dry for watercraft and equipment used in aquatic environments. Additional information can be found at https://www.wildlife.ca.gov/Conservation/Invasives	2	5	Citizens, CDFW, NMFS						0	Action is considered In-Kind
DPS-NCSW-15.1	Fire/Fuel Management	Objective	Address the inadequacy of existing regulatory mechanisms.										
DPS-NCSW-15.1.1	Fire/Fuel Management	Recovery Action	Prevent or minimize increased landscape disturbance.										
DPS-NCSW-15.1.1.1	Fire/Fuel Management	Action Step	Review prescribed fire plans to ensure they provide adequate protection for riparian corridors.	2	10	CalFire, CDFW, Local Fire Districts, NMFS						0	Action is considered In-Kind
DPS-NCSW-15.1.1.2	Fire/Fuel Management	Action Step	Identify historical fire frequency, intensities and durations and manage fuel loads in a manner consistent with historical parameters.	2	10	CalFire, CDFW, Local Fire Districts, NMFS						0	Action is considered In-Kind
DPS-NCSW-15.1.1.3	Fire/Fuel Management	Action Step	Include CDFW and NMFS participation on rehabilitation planning teams. During rehabilitation, consider leaving felled trees in streams as LWD source. Re-contour massively modified areas. Storm-proof roads immediately after use. Dispose of suitable organic materials by dispersing them on disturbed soils on the contour. Where larger organic material is available, place in severely burned-out watercourses (assure CDFW/NMFS is a part of this design and decision). Seeding, preferably with local seed-stock, at high hazard/risk areas should be done whenever feasible.	2	10	CalFire, CDFW, Local Fire Districts, NMFS						0	Action is considered In-Kind
DPS-NCSW-15.1.1.4	Fire/Fuel Management	Action Step	Establish fire contingency plans that involve CalFire, local fire districts and regulatory agencies with expertise in fisheries issues.	2	10	CalFire, CDFW, Local Fire Districts, NMFS						0	Action is considered In-Kind
DPS-NCSW-15.1.2	Fire/Fuel Management	Recovery Action	Prevent or minimize impairment to water quality (increased turbidity, suspended sediment, and/or toxicity)										
DPS-NCSW-15.1.2.1	Fire/Fuel Management	Action Step	Disseminate recommendations from NMFS' October 9, 2007, jeopardy biological opinion on the use of fire retardants and its impacts to salmonids, to local firefighting agencies and CalFire.	2	5	CalFire, CDFW, Local Fire Districts, NMFS						0	Action is considered In-Kind
DPS-NCSW-15.1.2.2	Fire/Fuel Management	Action Step	Locate chemicals, petroleum products, latrines, camp sites, etc., out of riparian buffer and place on flat ground.	2	5	CalFire, CDFW, Local Fire Districts, NMFS						0	Action is considered In-Kind
DPS-NCSW-15.1.3	Fire/Fuel Management	Recovery Action	Prevent or minimize impairment to watershed hydrology										
DPS-NCSW-15.1.3.1	Fire/Fuel Management	Action Step	Obtain water from lakes and reservoirs not occupied by listed salmonids when possible. Require all water trucks/tenders be fitted with CDFW and NMFS approved fish screens when water is acquired at fish bearing streams. Put up a silt fence or other erosion controls around the water extraction locations. Avoid significantly lower stream flows during water drafting.	2	100	CalFire, CDFW, Local Fire Districts, NMFS						TBD	NMFS anticipates that it will take up to 5 years for this to be implemented but should continue in perpetuity

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							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
DPS-NCSW-16.1	Fishing/Collecting	Objective	Address the overutilization for commercial, recreational, scientific or educational purposes.										
DPS-NCSW-16.1.1	Fishing/Collecting	Recovery Action	Prevent or minimize reduced density, abundance, and diversity based on biological viability criteria										
DPS-NCSW-16.1.1.1	Fishing/Collecting	Action Step	Fishery managers should work with NMFS to develop Fishery Management and Evaluation Plans to prevent extinction and ensure fishery management is consistent with recovery of the species, and cover incidental take of federally listed salmonids.	1	5	CDFW, CA Fish and Game Commission, NMFS SFD, SWFSC						0	Action is considered In-Kind
DPS-NCSW-16.1.1.2	Fishing/Collecting	Action Step	Collaborate with CDFW to develop appropriate fisheries data in select indicator watersheds that will support Fishery Management and Evaluation Plans (FMEPs).	1	5	CDFW, CA Fish and Game Commission, NMFS						0	Action is considered In-Kind
DPS-NCSW-16.1.1.3	Fishing/Collecting	Action Step	Work with CDFW and Fish and Game Commission to refine freshwater sport fishing regulations to minimize unintentional and unauthorized take, and incidental mortality, of listed species by anglers during the migration period. This effort could include development of specific emergency regulations during adult migration periods between September and January, low-flow closures (much like Washington State) and angler outreach programs.	1	5	CDFW, CA Fish and Game Commission, NMFS						0	Action is considered In-Kind
DPS-NCSW-16.1.1.4	Fishing/Collecting	Action Step	Work with CDFW to develop protective regulations and seek funds for additional Game Wardens to minimize impacts from fishing during the migratory period (e.g., until sandbars open naturally) within one mile of the river mouths of watersheds with essential or supporting populations.	1	5	CDFW, CA Fish and Game Commission, NMFS						0	Action is considered In-Kind
DPS-NCSW-16.1.1.5	Fishing/Collecting	Action Step	Improve CDFW's Freshwater Sport Fishing Regulations by considering prohibiting removal of wild salmonids from the water in catch-and-release fisheries.	2	5	CDFW, CA Fish and Game Commission, NMFS						0	Action is considered In-Kind
DPS-NCSW-16.1.1.6	Fishing/Collecting	Action Step	Utilizing the "reminder postcard" in efforts to increase Steelhead Report Card (SRC) return rates has worked well and is applauded by fisheries managers. Work with CDFW to consider providing, additional incentives to return SRCs by the January 31 deadline to save time and money while gaining more angler participation, which will provide more accurate information for agency evaluation.	2	5	CDFW, CA Fish and Game Commission, NMFS						TBD	Example: Oregon DFW holds a drawing each year for anglers that return their salmon/steelhead/sturgeon/halibut harvest cards before the pre-determined date. Prizes are substantial, typically including a drift boat etc.
DPS-NCSW-16.1.1.7	Fishing/Collecting	Action Step	Work with CDFW to bring more awareness to special salmonid conservation propagation programs and improve salmonid identification outreach; especially in areas where a mixed stock fishery occurs (example: Russian River).	2	5	CDFW, CA Fish and Game Commission, NMFS						0	Action is considered In-Kind
DPS-NCSW-16.1.1.8	Fishing/Collecting	Action Step	Consider banning felt sole wading boots in California waters in efforts to minimize or eliminate the spread of aquatic diseases and invasive species (example: didymo, New Zealand mud snails, whirling disease, etc.).	2	5	CDFW, CA Fish and Game Commission, NMFS						0	Action is considered In-Kind
DPS-NCSW-16.1.1.9	Fishing/Collecting	Action Step	Consider other incentives for greater angler participation in fisheries restoration efforts.	2	10	CDFW, CA Fish and Game Commission, NMFS						TBD	For example, the Game Warden Stamp is an excellent way to gain more angler and hunter participation and support. Other stamp, sponsorships, and/or lottery fundraising programs that support recovery objectives should be discussed and developed.
DPS-NCSW-16.1.1.10	Fishing/Collecting	Action Step	Collaborate with NOAA OLE, CDFW, Tribes and stakeholders groups to enhance anti-poaching efforts in essential and supporting populations.	2	5	CDFW, Local Citizens, NOAA OLE, Tribes						0	Action is considered In-Kind
DPS-NCSW-17.1	Hatcheries	Objective	Address other natural or manmade factors affecting the species' continued existence.										

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Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
DPS-NCSW-17.1.1	Hatcheries	Recovery Action	Prevent or minimize reduced density, abundance, and diversity based on biological viability criteria										
DPS-NCSW-17.1.1.1	Hatcheries	Action Step	For all hatchery operations, develop and implement HGMPs consistent with 50 CFR 223.203(b)(5) and hatchery criteria identified in Spence et al. (2008).	1	10	CDFW, Hatchery Managers, NMFS						0	Ensure the threat of hatcheries remains low for listed salmonids for current, and all future, hatchery programs. Action is considered In-Kind
DPS-NCSW-17.1.1.2	Hatcheries	Action Step	Hatchery managers need to implement the recommendations in the California Hatchery Scientific Review Group report (California HSRG 2012), where appropriate.	2	10	CDFW, Hatchery Managers, NMFS						TBD	
DPS-NCSW-17.1.1.3	Hatcheries	Action Step	Where applicable, for severely depressed populations investigate the implementation of Conservation Hatchery programs that follow criteria outlined in Spence et al. (2008) and CDFG (2004).	2	20	CDFW, Hatchery Managers, NMFS, SWFSC						TBD	
DPS-NCSW-18.1	Livestock	Objective	Address the present or threatened destruction, modification or curtailment of the species habitat or range.										
DPS-NCSW-18.1.1	Livestock	Recovery Action	Prevent or minimize increased landscape disturbance.										
DPS-NCSW-18.1.1.1	Livestock	Action Step	Aid and encourage willing landowners to fence livestock from the stream channel and riparian zones and develop offstream alternative water sources.	2	15	NRCS, RCD, Private Landowners						TBD	
DPS-NCSW-18.1.1.2	Livestock	Action Step	Encourage Livestock and Ranch Managers to utilize Groundwork: A Handbook for Small-Scale Erosion Control in Coastal California (MRCD, 2007), and Management Tips to Enhance Land & Water Quality for Small Acreage Properties (Sotoyome RCD, 2007), and The Grazing Handbook (Sotoyome RCD, 2007).	3	15	NRCS, RCD, Private Landowners						0	Action is considered In-Kind
DPS-NCSW-18.1.1.3	Livestock	Action Step	Establish conservative residual dry matter (RDM) targets per acre to ensure areas are not overgrazed at the end of grazing season. Remove cattle from pasture before soils dry out.	3	15	NRCS, RCD, Private Landowners						0	Action is considered In-Kind
DPS-NCSW-18.1.1.4	Livestock	Action Step	Substitute continuous season-long use of pastures in favor of rotational grazing strategies to reduce runoff, improve soil conditions, minimize noxious weeds, and encourage native revegetation.	3	15	NRCS, RCD, Private Landowners						0	
DPS-NCSW-18.1.1.5	Livestock	Action Step	Work with existing cooperative conservation programs (such as Fish Friendly Farming or Fish Friendly Ranching) in order to minimize the impacts of Livestock operations on habitat quality.	3	15	NRCS, NMFS, RCD, Private Landowners						TBD	
DPS-NCSW-18.1.2	Livestock	Recovery Action	Prevent or minimize impairment to water quality (increased turbidity, suspended sediment, and/or toxicity)										
DPS-NCSW-18.1.2.1	Livestock	Action Step	Implement practices as outlined in the University of California guidelines for water quality protection (Ristow 2006).	2	10	NRCS, RCD, Private Landowners						TBD	
DPS-NCSW-18.1.2.2	Livestock	Action Step	Implement recommendations of the California Rangeland Water Quality Management Program.	2	10	NRCS, RCD, Private Landowners						TBD	
DPS-NCSW-19.1	Logging	Objective	Address the present or threatened destruction, modification, or curtailment of habitat or range.										
DPS-NCSW-19.1.1	Logging	Recovery Action	Prevent or minimize increased landscape disturbance.										
DPS-NCSW-19.1.1.1	Logging	Action Step	Encourage development of a GCP/HCP/Natural Community Conservation Plan (NCCP), conservation easements, conservation banks, or safe harbor agreements with industrial or non-industrial forestland owners.	2	50	County, Private Landowners, NMFS, State, Timber Landowners						0	Action is considered In-Kind

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Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
DPS-NCSW-19.1.1.2	Logging	Action Step	Investigate opportunities to programmatically permit the forest certification program to authorize incidental take for landowners through ESA Section 10(a)(1)(B).	3	15	NMFS, Private Landowners, Timber Landowners						0	Action is considered In-Kind
DPS-NCSW-19.1.1.3	Logging	Action Step	Consider assigning NMFS staff to conduct THP reviews of the highest priority areas using revised "Guidelines for NMFS Staff when Reviewing Timber Operations: Avoiding Take and Harm of Salmon and Steelhead" (NMFS 2004) and work to implement recommendations as a result of these reviews	3	5	NMFS						0	Action is considered In-Kind
DPS-NCSW-19.1.1.4	Logging	Action Step	The State should consider a Salmonid Watershed Database (similar to the CDFW Northern Spotted Owl database) for RPFs to acquire standardized information on populations and habitat conditions in the watersheds associated with their harvest plan.	3	15	BOF, CDFW, Timber Landowners						TBD	
DPS-NCSW-19.2	Logging	Objective	Address the inadequacy of existing regulatory mechanisms.										
DPS-NCSW-19.2.1	Logging	Recovery Action	Prevent or minimize increased landscape disturbance.										
DPS-NCSW-19.2.1.1	Logging	Action Step	Discourage Counties from rezoning forestlands or identified TPZ areas to rural residential or other land uses (e.g., vineyards).	3	50	County, NMFS						0	Action is considered In-Kind
DPS-NCSW-19.2.1.2	Logging	Action Step	Increase THP inspections by CalFire especially during winter months.	3	50	BOF, CalFire, CDFW, NMFS, Private Landowners, Timber Landowners						0	Action is considered In-Kind
DPS-NCSW-19.2.1.3	Logging	Action Step	Encourage to CalFire and BOF to explore a statewide Forestry HCP (similar to that developed in Washington State), GCP, safe harbor agreements, and seek funding opportunities to support the effort.	2	20	BOF, CalFire, CDFW, NMFS, Private Landowners, Timber Landowners						0	Action is considered In-Kind
DPS-NCSW-19.2.1.4	Logging	Action Step	Work with the BOF, CalFire, CDFW, professional organizations and landowners to modify the timber harvest permitting process to provide opportunities and incentives for LWD recruitment during timber harvest operations.	1	25	BOF, CalFire, CDFW, NMFS, Private Landowners, Timber Landowners						0	Action is considered In-Kind
DPS-NCSW-19.2.1.5	Logging	Action Step	California BOF could consider requiring (1) EIRs for all forestland conversions, (2) adopting a forestland Conversion THP, (3) elimination of the subdivision exemption, (4) raising forestland conversion permit fees, (5) developing requirements to offset loss of timberland, (6) incentivize restoration of unproductive timberlands, (7) investigate conservation banking programs and (8) coordinate with the other agencies involved for more CalFire oversight on forestland conversions.	1	10	BOF, CDFW, NMFS, Private Landowners, Timber Landowners						TBD	
DPS-NCSW-20.1	Mining	Objective	Address the present or threatened destruction, modification, or curtailment of habitat or range.										
DPS-NCSW-20.1.1	Mining	Recovery Action	Prevent or minimize increased landscape disturbance.										
DPS-NCSW-20.1.1.1	Mining	Action Step	In sites with legacy terrace gravel mining pits, remove, setback, or breach levees and re-contour mining pits to an elevation inundated by frequent winter river/stream flows; Restore the inset floodplain at elevation appropriate for modern channel and regulated winter/spring base flows.	2	20	County, EPA, Federal, NMFS, Private, State						TBD	
DPS-NCSW-20.2	Mining	Objective	Address the inadequacy of existing regulations										

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							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
DPS-NCSW-20.2.1	Mining	Recovery Action	Prevent or minimize increased landscape disturbance.										
DPS-NCSW-20.2.1.1	Mining	Action Step	NMFS National Gravel Extraction Guidance (2005, 2014) should be followed for all existing and proposed projects.	2	20	County, EPA, Federal, NMFS, Private, State						0	Action is considered In-Kind
DPS-NCSW-20.2.1.2	Mining	Action Step	Given the need for enormous amounts of water during fracking, oil companies and state/federal regulators should consult with NMFS/CDFW to ensure adequate water resources exist prior to developing the well. Avoid fracking operations that obtain water from underground aquifers hydrologically connected with surface streamflow.	2	10	County, EPA, Federal, NMFS, Private, State						0	Action is considered In-Kind
DPS-NCSW-20.2.1.3	Mining	Action Step	Evaluate the potential for fracking to impact surface water quality (and thus impact salmon and steelhead) where hydrologic connectivity between ground and surface water exists.	2	10	EPA, NMFS, RWQCB, State						0	Action is considered In-Kind
DPS-NCSW-22.1	Residential/Commercial Development	Objective	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
DPS-NCSW-22.1.1	Residential/Commercial Development	Recovery Action	Prevent or minimize impairment to water quality (increased turbidity, suspended sediment, and/or toxicity)										
DPS-NCSW-22.1.1.1	Residential/Commercial Development	Action Step	Design new developments to avoid or minimize impact to unstable slopes, wetlands, areas of high habitat value, and similarly constrained sites that occur adjacent to the habitat of listed salmonids.	3	20	City, County, County Planners, Public Works, State						0	Action is considered In-Kind
DPS-NCSW-22.1.2	Residential/Commercial Development	Recovery Action	Prevent or minimize impairment to watershed hydrology										
DPS-NCSW-22.1.2.1	Residential/Commercial Development	Action Step	Educate county and city public works departments, flood control districts, and planning departments, etc., on the critical importance of maintaining a mature and properly functioning riparian zone.	3	5	City, County, County Planners, Public Works, State						0	Action is considered In-Kind
DPS-NCSW-22.1.2.2	Residential/Commercial Development	Action Step	New development in all watersheds with essential and supporting populations should be designed to minimize storm-water runoff and changes in duration or magnitude of peak flow.	3	20	City, County, County Planners, RWQCB, State						0	Action is considered In-Kind
DPS-NCSW-22.2	Residential/Commercial Development	Objective	Address the inadequacy of existing regulatory mechanisms.										
DPS-NCSW-22.2.1	Residential/Commercial Development	Recovery Action	Prevent or minimize impairment to stream hydrology (impaired water flow).										
DPS-NCSW-22.2.1.1	Residential/Commercial Development	Action Step	As mitigation for potential adverse consequences to a watershed's hydrograph, municipalities and counties should develop and implement larger or more effective stormwater detention methods in key watersheds with ongoing channel degradation or in sub-watersheds where impervious surface area > 10 percent.	2	20	CDFW, County, Municipalities, NMFS, SRWCB						0	Action is considered In-Kind
DPS-NCSW-22.2.1.2	Residential/Commercial Development	Action Step	Develop and implement regulations for activities that intercept groundwater recharge.	2	10	CDFW, County, NMFS, SRWCB						0	Action is considered In-Kind
DPS-NCSW-22.2.1.4	Residential/Commercial Development	Action Step	Work with partners to develop legislation that will fund county planning for environmentally sound growth and water supply development and work in coordination with California Dept. of Housing, and other government associations (CDFG 2004).	2	30	County, NMFS, State						0	Action is considered In-Kind
DPS-NCSW-22.2.2	Residential/Commercial Development	Recovery Action	Prevent or minimize increased landscape disturbance.										
DPS-NCSW-22.2.2.1	Residential/Commercial Development	Action Step	Enforce existing building permit programs to minimize unpermitted construction.	3	50	City, County, County Planner						0	Action is considered In-Kind

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DPS-NCSW-22.2.2.2	Residential/Commercial Development	Action Step	Modify Federal, State, city and county regulatory and planning processes to prevent or minimize new construction of permanent infrastructure that will adversely affect watershed processes, particularly within the 100-year flood prone zones in all watersheds with essential and supporting populations.	2	15	City, County, Federal, NMFS, State						0	Action is considered In-Kind
DPS-NCSW-22.2.2.3	Residential/Commercial Development	Action Step	Identify forestlands or oak woodland areas at high risk of conversion, and develop incentives and alternatives for landowners to discourage conversion.	3	15	City, County, County Planner						TBD	Price depends on the type of incentive provided
DPS-NCSW-22.2.2.4	Residential/Commercial Development	Action Step	Encourage infill and high density developments over dispersal of low density rural residential development.	2	50	City, County, County Planner, NMFS, State						0	Action is considered In-Kind
DPS-NCSW-22.2.2.5	Residential/Commercial Development	Action Step	Develop legislation that will fund county planning for environmentally sound growth and water supply and work in coordination with California Dept. of Housing, Association of Bay Area Governments, and other government associations (CDFG 2004).	2	15	City, County, County Planner, NMFS, State						0	Action is considered In-Kind
DPS-NCSW-23.1	Roads/Railroads	Objective	Address the present or threatened destruction, modification, or curtailment of the species habitat or range.										
DPS-NCSW-23.1.1	Roads/Railroads	Recovery Action	Prevent or minimize impairment to water quality (increased turbidity, suspended sediment, and/or toxicity)										
DPS-NCSW-23.1.1.1	Roads/Railroads	Action Step	For all rural (unpaved) and seasonal dirt roads apply, at a minimum, the road standards outlined in the most recent version of the California Forest Practice Rules.	2	50	BOF, Local, RWQCB, Timber Landowner						TBD	
DPS-NCSW-23.1.1.2	Roads/Railroads	Action Step	Design new roadways to avoid or minimize effects to unstable slopes, wetland, floodplains and other areas of high habitat value.	2	50	BOF, Local, RWQCB, Timber Landowner						TBD	
DPS-NCSW-23.1.1.3	Roads/Railroads	Action Step	Conduct annual inspections of roads prior to winter. Correct conditions that are likely to deliver sediment to streams.	2	50	BOF, Local, RWQCB, Timber Landowner						0	Inspections should be standard practice in timber operations
DPS-NCSW-23.1.1.4	Roads/Railroads	Action Step	Restoration projects that upgrade or decommission high risk roads adjacent to streams supporting listed salmonids should be considered an extremely high priority for funding (e.g., PCSRF).	1	50	CDFW, NMFS, Timber Landowner						0	In-Kind to consider the projects, cost of upgrading/decomissioning roads is at the population level when recommended.
DPS-NCSW-23.1.1.5	Roads/Railroads	Action Step	Conduct outreach and continual education regarding the adverse effects of roads and the types of best management practices protective of salmonids. Education should address watershed process and the adverse effects of improper road construction and maintenance on salmonids and their habitats.	3	50	CalTrans, CDFW, NMFS, Timber Landowner						0	Action is considered In-Kind
DPS-NCSW-23.1.1.6	Roads/Railroads	Action Step	Evaluate and mitigate (where appropriate) the effects of transportation corridors and infrastructure on estuarine and stream fluvial processes. Mitigating measures may include, elevating existing approach, fill and maximizing clear spanning of upstream active channel(s), floodways, and floodplains to accommodate natural riverine and estuarine fluvial processes.	3	50	CDFW, NMFS, Timber Landowner						TBD	
DPS-NCSW-23.1.2	Roads/Railroads	Recovery Action	Prevent or minimize impairment to passage and migration.										

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DPS-NCSW-23.1.2.1	Roads/Railroads	Action Step	Use NMFS Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a) and review appropriate barrier databases when developing new or retrofitting existing road crossings.	2	50	CalTrans, CDFW, City, County, County Planner, Engineers, NMFS, State						0	Action is considered In-Kind
DPS-NCSW-23.1.2.2	Roads/Railroads	Action Step	Bridges associated with new roads or replacement bridges (including railroad bridges) should be free span or constructed with the minimum number of bents (i.e., pilings) feasible in order to minimize drift accumulation and facilitate fish passage.	2	50	CalTrans, CDFW, City, County, County Planner, Engineers, NMFS, State						0	Action is considered In-Kind
DPS-NCSW-23.1.2.3	Roads/Railroads	Action Step	For impact pile driving during construction, develop and implement sound attenuation methods that ensure sound levels are (1) below thresholds for onset of physical injury to fish (see NMFS' 2008 Interim Criteria for Injury to Fish from Pile Driving), (2) avoiding adverse behavioral effects (e.g., during adult migration, etc.), and (3) minimized by a reduction in the sound field (e.g., reduce the size of the area impacted). In situations where sound attenuation is not able to keep sound pressure at sub-injurious levels (i.e., sound levels that will not harm or injure fish), work should be conducted during seasonal work windows to avoid migrating salmonids.	2	50	CalTrans, CDFW, City, County, Engineers, NMFS, State						TBD	
DPS-NCSW-23.1.3	Roads/Railroads	Recovery Action	Prevent or minimize increased landscape disturbance.										
DPS-NCSW-23.1.3.1	Roads/Railroads	Action Step	Encourage implementation of Vegetation Management Plans for the roadside maintenance activities to discourage or eliminate unwanted vegetation and promote desirable (native) vegetation.	3	50	CalTrans, CDFW, City, County, NMFS, State						TBD	
DPS-NCSW-23.2	Roads/Railroads	Objective	Address the inadequacy of existing regulatory mechanisms.										
DPS-NCSW-23.2.1	Roads/Railroads	Recovery Action	Prevent or minimize impairment to watershed hydrology										
DPS-NCSW-23.2.1.1	Roads/Railroads	Action Step	Support and engage CalTrans, counties and others with oversight on road practices to reduce sediment delivery to streams from road networks and channelization from poorly situated roads.	2	50	CalTrans, County, NMFS, RWQCB						0	Action is considered In-Kind
DPS-NCSW-23.2.1.2	Roads/Railroads	Action Step	Encourage enforcement of existing regulations regarding grading, riparian and building violations and sediment release from county roads.	2	50	CalTrans, County, NMFS, RWQCB						0	Action is considered In-Kind
DPS-NCSW-24.1	Severe Weather Patterns	Objective	Address other natural or manmade factors affecting the species continued existence.										
DPS-NCSW-24.1.1	Severe Weather Patterns	Recovery Action	Prevent or minimize impairment to watershed hydrology										
DPS-NCSW-24.1.1.1	Severe Weather Patterns	Action Step	Actively conduct outreach to stakeholders and the public regarding anticipated effects of climate change to salmonids and increase awareness that human actions can offset these effects. The public, local, state and federal agencies should become familiar with, and implement as necessary through lifestyle and policy changes, recommendations of the Intergovernmental Panel on Climate Change (IPCC).	3	5	Federal, Local, NMFS, Public, State						0	See the website http://www.ipcc.ch to view a summary of climate change issues for North America and the suite of actions from the IPCC to be considered for ecosystem (and human health) due to climate change. Action is considered In-Kind

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Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
DPS-NCSW-24.1.1.2	Severe Weather Patterns	Action Step	Develop a climate strategy that addresses simultaneously the reduction of fossil fuels and the protection of forestlands.	3	15	Academic, NWFSC, State, SWFSC,						TBD	For example, promote biological carbon sequestration best management practices (BMPs), where feasible, that are consistent with NMFS policies and guidelines. Develop incentives to maintain and rehabilitate forestlands, manage for older forests, discourage conversions or forest changes. Forestlands store carbon and reduce greenhouse gases.
DPS-NCSW-24.1.1.3	Severe Weather Patterns	Action Step	Expand research and monitoring to improve predictions of climate change and its effects on salmon recovery.	2	15	Academic, NWFSC, State, SWFSC,						TBD	Tools such as the Regional Climate System Model, Sea Level Rise and Coastal Flooding Impacts Viewer, etc. should be used to improve ecological forecasting of the threat of climate change, human population growth, and their impacts to salmonids and their habitats.
DPS-NCSW-24.1.1.4	Severe Weather Patterns	Action Step	Minimize anthropogenic increases in water temperatures by maintaining well-shaded riparian areas. Work to encourage and incorporate climate change vulnerability assessments and climate change scenarios in consultations, permitting, and restoration projects.	2	50	CDFW, CORPS, County, NMFS, NOAA RC, State						0	Action is considered In-Kind
DPS-NCSW-24.1.1.5	Severe Weather Patterns	Action Step	Maintain headwater areas in an undisturbed state to ensure a continuous source of cool water downstream.	1	50	CDFW, CORPS, County, NMFS, NOAA RC, State						0	Action is considered In-Kind
DPS-NCSW-24.1.1.6	Severe Weather Patterns	Action Step	Maximize connectivity, and increase diversity, of instream habitats to allow a full range of opportunities for salmonids to exploit as environmental conditions shift.	2	100	CDFW, County, NMFS, State						TBD	
DPS-NCSW-24.1.1.7	Severe Weather Patterns	Action Step	Evaluate feasibility and benefits of establishing an Emergency Drought Operations Center (similar to the Emergency Drought Operations Center developed in Washington State), comprised of the SWRCB, CDFW, NMFS, and others to develop emergency rules for augmenting water supplies and mitigating the effects of drought and extreme climate listed salmonids and their habitats.	2	5	CDFW, NMFS, SWRCB						0	Action is considered In-Kind
DPS-NCSW-24.1.1.8	Severe Weather Patterns	Action Step	Institute water conservation strategies that provide for drought contingencies without relying on interception of surface flows or groundwater depletion.	1	50	CDFW, Local Government, Private Landowners, NMFS, SWRCB						TBD	
DPS-NCSW-24.1.1.9	Severe Weather Patterns	Action Step	Partner with land owners and local governments to explore the use of groundwater sources with high yield, such as Karst formations, and manage them as groundwater storage/banking, particularly during drought periods, or for adverse climate change conditions.	3	50	Local Government, Private Landowners, NMFS, SWRCB, USGS						TBD	
DPS-NCSW-24.1.2	Severe Weather Patterns	Recovery Action	Prevent or minimize impairment to estuarine quality and extent										
DPS-NCSW-24.1.2.1	Severe Weather Patterns	Action Step	Investigate the potential impact of sea level rise from climate change on the amount of salinity intrusion into fresh and brackish water habitats.	2	15	Academic, NWFSC, State, SWFSC,						TBD	
DPS-NCSW-25.1	Water Diversion/Impoundments	Objective	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
DPS-NCSW-25.1.1	Water Diversion/Impoundments	Recovery Action	Prevent or minimize impairment to watershed hydrology										
DPS-NCSW-25.1.1.1	Water Diversion/Impoundments	Action Step	Encourage cooperation among water users and coordination of their diversions where they share a common water source to minimize adverse effects of diversions on the species' habitat.	2	50	Private Landowners, NGO, NMFS, SWRCB						0	Action is considered In-Kind

Northern California Steelhead DPS Level Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
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DPS-NCSW-25.1.1.2	Water Diversion/Impoundments	Action Step	Work with partners to promote water storage as an alternative to direct diversion during periods of low stream flow.	2	50	Private Landowners, NGO, NMFS, SWRCB						0	In-Kind. See also Hydrology
DPS-NCSW-25.1.1.3	Water Diversion/Impoundments	Action Step	Support projects that provide rainwater catchment systems to rural residential as an alternative to summer riparian diversions.	3	50	Private Landowners, NGO, NMFS						0	Action is considered In-Kind
DPS-NCSW-25.1.1.4	Water Diversion/Impoundments	Action Step	Partner with water rights holders to dedicate water already claimed under existing appropriative right to be used instead for instream benefits under California Water Code Section 1707.	2	50	CDFW, Private Landowners, NMFS, SWRCB						0	Action is considered In-Kind
DPS-NCSW-25.1.1.5	Water Diversion/Impoundments	Action Step	Explore the possibility of using other easement mechanisms to dedicate water to instream uses.	2	50	CDFW, NMFS, SWRCB						0	Action is considered In-Kind
DPS-NCSW-25.1.1.6	Water Diversion/Impoundments	Action Step	Support temporary urgency change petitions by appropriative water right holders during critically dry periods if it will provide a benefit to salmonids.	2	50	CDFW, NMFS, SWRCB						0	Action is considered In-Kind
DPS-NCSW-25.1.1.7	Water Diversion/Impoundments	Action Step	Promote passive diversion devices designed to allow diversion of water only when minimum streamflow requirements are met or exceeded (CDFG 2004).	3	50	CDFW, NMFS, Private Landowners, SWRCB						0	Action is considered In-Kind
DPS-NCSW-25.1.1.8	Water Diversion/Impoundments	Action Step	Support improvement of major dam/reservoir operations. Evaluate water release schedules and work with partners to modify as needed to improve conditions for salmonids downstream.	1	50	CDFW, NMFS, Public Works, Water Agencies, SWRCB						0	Action is considered In-Kind
DPS-NCSW-25.1.1.9	Water Diversion/Impoundments	Action Step	Support technical solutions to improved short-term precipitation forecasting where such information will facilitate more efficient management of reservoir storage.	3	50	NMFS, NOAA NWS						0	Action is considered In-Kind
DPS-NCSW-25.2	Water Diversion/Impoundments	Objective	Address the inadequacy of existing regulatory mechanisms										
DPS-NCSW-25.2.1	Water Diversion/Impoundments	Recovery Action	Prevent or minimize impairment to watershed hydrology										
DPS-NCSW-25.2.1.1	Water Diversion/Impoundments	Action Step	Encourage the SWRCB to exercise greater regulatory authority over summer water diversions. Water rights held under a claim of pre-1914 rights, riparian rights or older appropriative rights could be regulated to protect instream uses.	2	50	CDFW, NMFS, SWRCB						0	Action is considered In-Kind
DPS-NCSW-25.2.1.2	Water Diversion/Impoundments	Action Step	Work with the SWRCB and explore the feasibility of upgrading bypass flow conditions for water rights developed prior to the establishment of AB 2121.	2	10	NMFS, Private Landowners, Public Works, Water Agencies, SWRCB						0	Action is considered In-Kind
DPS-NCSW-25.2.1.3	Water Diversion/Impoundments	Action Step	Support State agencies in implementing groundwater legislation (AB 1739, SB 1168, and SB 1319) where it may result in improved surface water conditions via groundwater/surface water interaction.	1	10	County, NMFS, Private Landowners, Public Works, Water Agencies, SWRCB						0	Action is considered In-Kind
DPS-NCSW-25.2.1.4	Water Diversion/Impoundments	Action Step	Improve coordination between the agencies, particularly the SWRCB and county District Attorneys, to effectively identify and address illegal water diverters and out-of-compliance diverters, seasons of diversion, off-stream reservoirs, and bypass flows to protect listed salmonids.	1	5	County, NMFS, Private Landowners, Public Works, Water Agencies, SWRCB						0	Action is considered In-Kind
DPS-NCSW-25.2.1.5	Water Diversion/Impoundments	Action Step	Evaluate the recovery benefits of declaring some watersheds as fully appropriated and petition the SWRCB to formally declare it if appropriate.	2	10	NMFS, SWRCB						0	Action is considered In-Kind

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DPS-NCSW-25.2.1.6	Water Diversion/Impoundments	Action Step	Provide technical assistance to the SWRCB in its implementation of the frost protection regulation.	2	10	Agriculture Owners, County, NMFS, Private Landowners, SWRCB						0	Action is considered In-Kind
DPS-NCSW-25.2.1.7	Water Diversion/Impoundments	Action Step	Encourage the SWRCB to conduct interagency consultation with CDFW, and seek technical assistance from NMFS on the issuance of water rights permits.	2	10	CDFW, NMFS, SWRCB						0	Action is considered In-Kind
DPS-NCSW-25.2.1.8	Water Diversion/Impoundments	Action Step	Counties should consider forbearance agreements that eliminate withdrawals during low-flow conditions.	2	5	CDFW, County, NMFS, Private Landowners, SWRCB						0	Action is considered In-Kind
DPS-NCSW-25.2.1.9	Hydrology	Action Step	Coordinate with CDFW and the SWRCB to ensure the effective implementation of California Fish and Game Code Sections 5935-5937 regarding the provision of fishways and fish flows associated with dams and diversions.	2	5	CDFW, NMFS, SWRCB						0	Action is considered In-Kind
DPS-NCSW-25.2.1.10	Water Diversion/Impoundments	Action Step	Encourage development of a GCP/HCP/Natural Community Conservation Plan (NCCP), conservation banks, or safe harbor agreements for new water diversions in watersheds with essential and supporting populations.	3	5	CDFW, NMFS						0	Action is considered In-Kind
DPS-NCSW-25.2.2	Water Diversion/Impoundments	Recovery Action	Prevent or minimize reduced density, abundance, and diversity based on biological viability criteria										
DPS-NCSW-25.2.2.1	Water Diversion/Impoundments	Action Step	Adequately screen water diversions to prevent juvenile salmonid mortalities.	1	50	CDFW, County, NMFS, Private Landowners						TBD	

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