

Central CA Coast Coho Salmon ~ ESU Level

ACTIONS FOR RESTORING HABITATS

1. Restoration- Estuary

1.1. **Objective:** Address the present of threatened destruction, modification or curtailment of habitat or range

1.1.1. **Recovery Action:** Increase quality and extent of estuarine habitat

1.1.1.1. **Action Step:** Work with landowners/stakeholders to remove dikes and levees limiting the current extent of estuary systems.

1.1.1.2. **Action Step:** Work with landowners/stakeholders to preserve or restore primary processes in support of a properly functioning estuary/lagoon ecosystem.

1.1.1.3. **Action Step:** Prevent development of surface water diversions that, independently or cumulatively, will reduce inflow or impair estuarine water quality conditions during spring/summer/fall months.

1.1.1.4. **Action Step:** Prevent future alterations (e.g., jetties, tide gates, roads, bridge abutments, dredging, artificial breaching, etc.) to river mouth, inner estuary or lagoon dynamics that change estuary opening patterns.

1.1.1.5. **Action Step:** For restoration/rehabilitation estuary projects, identify physical (hydrology, water quality, substrate, tidal circulation, freshwater input, inundation period, habitat complexity, etc.) and functional (productivity/growth, staging, migration, refuge, etc.) attributes needed for coho salmon.

1.1.1.6. **Action Step:** Promote the historical seasonal formation and timing of estuary/lagoon barrier beach through removal of problematic infrastructure and fill materials.

1.1.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

1.2. **Objective:** Address the inadequacy of existing regulatory mechanisms

1.2.1. **Recovery Action:** Increase quality and extent of estuarine habitat

1.2.1.1. **Action Step:** Develop and implement Estuary Inflow Protection and Enhancement Guidelines to maintain estuary function and provide information for estuary restoration.

1.2.1.2. **Action Step:** Work with local county/city and state organizations to develop alternative methods of flood control to reduce artificial breaching frequency.

1.2.1.3. **Action Step:** Implement patrols by citizens groups, city employees, and law enforcement to ensure seasonal sandbars are not illegally breached.

1.2.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

2. Restoration- Floodplain Connectivity

2.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range

2.1.1. **Recovery Action:** Improve floodplain connectivity with the main channel

2.1.1.1. **Action Step:** Undeveloped and active floodplains should be protected from channelization, development, forest conversion, and other disturbances.

2.1.1.2. **Action Step:** Protect and promote restoration or enhancement projects in critical over-wintering habitats (e.g., floodplains, alcoves, backchannels, off channel areas, estuaries and lagoons).

2.1.1.3. **Action Step:** Evaluate opportunities and implement restoration actions to re-establish main channel function (e.g., meandering, substrate deposition, seasonal patterns of overbank flows) and its connection with historical floodplains and off-channel habitats.

2.1.1.4. **Action Step:** Evaluate opportunities for planned retreat of urban development or other incompatible land uses from floodplains (similar to the City of Napa, Napa County, CA) and alluvial valley streams to recreate natural floodplain processes and complex off-channel habitat.

2.1.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

2.2. **Objective:** Address the inadequacy of existing regulatory mechanisms

2.2.1. **Recovery Action:** Improve floodplain connectivity with the main channel

2.2.1.1. **Action Step:** Prevent impacts from new development through enforcing land use zoning appropriate to the site to protect floodplain and riparian processes.

2.2.1.2. **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.

2.2.1.3. **Action Step:** Undeveloped and active floodplains should be protected from channelization, development, forest conversion, and other disturbances by

conservation easements, county zoning, grading ordinances and other mechanisms.

2.2.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

3. Restoration- Habitat Complexity

3.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range

3.1.1. **Recovery Action:** Improve habitat complexity

3.1.1.1. **Action Step:** Conduct outreach to potential applicants of FRGP to develop projects addressing high-priority areas and issues identified in the recovery plan for all four diversity strata.

3.1.1.2. **Action Step:** Restoration actions should focus on increasing freshwater survival probability of coho salmon in Core areas in the next four years (e.g., input wood structures) and improving nearby expansion habitats (e.g. Phase I), followed by habitat improvements to Phase II areas thereafter.

3.1.1.3. **Action Step:** Identify historical CCC coho salmon habitats lacking in channel complexity, and promote restoration projects designed to create or restore complex habitat features that provide for localized pool scour, velocity refuge, and cover. Prioritize Core areas first, followed by Phase I and Phase II areas.

3.1.1.4. **Action Step:** In stream reaches where large wood is lacking, encourage landowners to implement wood and riparian restoration as part of their ongoing operations.

3.1.1.5. **Action Step:** Maintain current LWD, boulders, and other structure-providing features to maintain current stream complexity, pool frequency, and depth (CDFG 2004).

3.1.1.6. **Action Step:** Habitat restoration and enhancement activities should emphasize rehabilitation of ecological processes and functions, not artificial creation of habitat. Placement of permanent or semi-permanent habitat structures in streams should be discouraged unless it can be clearly demonstrated no other reasonable alternative is available. Existing artificial structures that impede the trajectory of watershed recovery towards properly functioning conditions should be removed or remediated.

3.1.1.7. **Action Step:** Utilize non-lethal methods to manage beaver depredation issues (e.g. flooding, crop damage) within the range of CCC salmonids such as flow devices, fencing, and beaver re-location and enhance habitat complexity.

- 3.1.1.8. **Action Step:** Where non-lethal methods prove unfeasible to resolve depredation issues, relocate beaver populations to remote CCC coho streams where habitat enhancement is needed and resource conflict is low.
- 3.1.1.9. **Action Step:** Restoration projects that introduce woody debris into any of the 28 focus, or 11 supplemental, populations should be considered an extremely high priority.
- 3.1.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions
- 3.2. **Objective:** Address the inadequacy of existing regulatory mechanisms
 - 3.2.1. **Recovery Action:** Improve watershed conditions
 - 3.2.1.1. **Action Step:** The continuation of FRGP and PCSRF contributions is a very high priority.
 - 3.2.1.2. **Action Step:** Immediately initiate with Federal and State agencies creation 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.
 - 3.2.1.3. **Action Step:** Work with California BOF, CDFG, RWQCB and others to modify the timber harvest permitting process (including CDFG 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.
 - 3.2.1.4. **Action Step:** Develop and update a Beaver Management Plan for California to benefit salmonids.
 - 3.2.1.5. **Action Step:** Work with CDFG and the CDFG Commission to reclassify beavers from a “non-native nuisance” animal within the CDFG code and literature to a “native non-nuisance” animal.
 - 3.2.1.6. **Action Step:** Work with CDFG and the CDFG 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.
 - 3.2.1.7. **Action Step:** Work with CDFG and the CDFG Commission to remove beavers from CDFG's list of depredated animals, and/or authorize only non-lethal management and relocation methods within the NCCC Recovery Domain.
 - 3.2.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

4. Restoration- Hydrology

4.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range

4.1.1. **Recovery Action:** Improve flow conditions throughout the watershed

4.1.1.1. **Action Step:** Expand number of stream flow gauging stations for priority watersheds within the CCC coho salmon ESU and improve the network of those gauges by coordinating monitoring activities with the SWRCB, landowners, and other partnerships with ongoing monitoring programs. Work with other entities to develop a long-term source of funding that provides for monitoring, equipment, personnel, databases, analyses to develop bypass flows, public interface, and other necessities for stream flow information.

4.1.1.2. **Action Step:** 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. 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.

4.1.1.3. **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.

4.1.1.4. **Action Step:** Water conservation projects should be instituted that shift reliance from on-stream storage to offstream storage, resolve frost protection issues, and ensure necessary flows for all freshwater lifestages in all water years.

4.1.1.5. **Action Step:** Prioritize projects to support and expand existing efforts to increase off-stream storage capacity (e.g., ponds) as a method to offset summer diversions.

4.1.1.6. **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.

4.1.1.7. **Action Step:** Work with the agricultural community to develop water conservation strategies protective of all freshwater life stages.

4.1.1.8. **Action Step:** Develop incentives for instream water right dedications. Support financing and expedited permitting for water users willing to shift the timing

and manner of diversion from less protective practices (e.g., direct diversion during low-flow periods) to more protective practices (e.g., properly conditioned diversions to off-stream storage during the rainy season, etc.).

4.1.1.9. **Action Step:** Work with rural residential communities to develop water conservation strategies protective of salmonids while allowing for domestic water use.

4.1.1.10. **Action Step:** Work to ensure that road drainages are disconnected from the stream network to dampen the effects of discharge peaks during intense rain events.

4.1.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

4.2. **Objective:** Address the inadequacy of existing regulatory mechanisms

4.2.1. **Recovery Action:** Improve flow conditions throughout the watershed

4.2.1.1. **Action Step:** Participate in water use planning with local, county, and State agencies with direct control and responsibilities over non-Federal practices.

4.2.1.2. **Action Step:** Encourage local governments to condition new development to reduce or eliminate human water demand (e.g., 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).

4.2.1.3. **Action Step:** Protect spring and large groundwater seeps from development and water removal; subterranean water sources will be increasingly important when surface flows are altered by climate change.

4.2.1.4. **Action Step:** Collaborate and support the SWRCB and local agencies to increase oversight and responsibility for regulating groundwater extraction from aquifers hydrologically connected to surface flows.

4.2.1.5. **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.

4.2.1.6. **Action Step:** Improve coordination between the agencies, particularly 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 CCC coho salmon.

4.2.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

5. Restoration- Landscape Patterns

5.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range

5.1.1. **Recovery Action:** Reduce adverse impact to landscape patterns

5.1.1.1. **Action Step:** Aggressively promote implementation of restoration projects that can serve immediate or near-term benefits to the freshwater survival of current CCC coho salmon populations. Develop a programmatic and seek efficiencies and pathways to reduce burdens on project applicants proposing such projects.

5.1.1.2. **Action Step:** Restoration actions should be considered in context to overall recovery priorities for the watershed and be coordinated across a watershed and coho salmon life stages.

5.1.1.3. **Action Step:** Promote programs that purchase land or develop conservation easements encouraging the protection, re-establishment and/or enhancement of natural riparian communities.

5.1.1.4. **Action Step:** The continuation of groups such as FishNet4C and the 5 Counties Salmon Protection Conservation Program that educate, coordinate and facilitate priority restoration by the counties are a high priority.

5.1.1.5. **Action Step:** Residential landowners should utilize the Stewardship Guide for the Russian River (Sotoyome Resource Conservation District, 2011), and 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 Resource Conservation District, 2007).

5.1.1.6. **Action Step:** Where local watershed restoration coalitions and coordinators exist, NMFS will work to coordinate coho recovery efforts. Where such groups do not exist, NMFS will work with CDFG to facilitate the creation of watershed restoration coalitions.

5.1.1.7. **Action Step:** Establish recovery plan implementation groups across each Recovery Unit (e.g., diversity strata) and secure funding (e.g., Pacific Coast Salmon Restoration Fund) for four designated representatives to act as liaisons and coordinators for each implementation group. Liaisons should work with grassroots watershed groups to implement recovery efforts.

5.1.1.8. **Action Step:** Conduct extensive outreach to improve education and awareness for agencies, professional organizations, landowners, and the public regarding the importance for adopting measures to minimize the likelihood of harm from their actions to listed coho salmon.

- 5.1.1.9. **Action Step:** Coordinate with NRCS, RCDs, and watershed groups to provide information to legal cannabis producers regarding water conservation, beneficial rural road maintenance practices and proper use and disposal of toxic materials.
- 5.1.1.10. **Action Step:** Conduct an outreach campaign to educate the public on the status of CCC coho salmon and associated laws, policies, ordinances, etc. related to water and uses.
- 5.1.2. **Recovery Action:** Prevent impairment to watershed hydrology
 - 5.1.2.1. **Action Step:** Residential landowners should utilize BMP's from Basins Of Relations: A Citizen's Guide to Protecting and Restoring Our Watersheds (OAEC, 2007), and Slow it. Spread it. Sink it! (Santa Cruz Resource Conservations District, 2009) to conserve water resources.
- 5.1.3. **Recovery Action:** Increase density, abundance, spatial structure and diversity
 - 5.1.3.1. **Action Step:** All work adjacent to, or within, waterways occupied by coho salmon should be conducted during the summer low flow period (June 15th - October 15th).
 - 5.1.3.2. **Action Step:** Prioritize ESA section 7 consultations including important recovery actions, and include recovery actions in section 7 Reasonable and Prudent Alternatives and Conservation Recommendations.
- 5.1.4. **Recovery Action:** NMFS staff will facilitate discussions with the outlined entities on those items found inadequate for Listing Factor A as outlined in the Federal Register Notice Chapter in Volume I
- 5.1.5. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions
- 5.2. **Objective:** Address the inadequacy of existing regulatory mechanisms
 - 5.2.1. **Recovery Action:** Reduce adverse impacts to landscape patterns
 - 5.2.1.1. **Action Step:** Provide information to the appropriate regulatory bodies regarding the current status of CCC coho salmon, priority watershed processes needing consideration, and recommendations that provide no take or incidental take assurances. Encourage increased regulatory oversight for actions impairing salmonid habitat or result in direct harm to coho salmon.
 - 5.2.1.2. **Action Step:** Use Mitigation and Conservation Banking as a means for public participation in CCC coho salmon recovery and remove barriers to development and implementation. Banks offer large scale and long-term restoration opportunities and monitoring tailored to site specific needs. Over

85% of the CCC coho salmon range is privately owned and without public/private partnerships recovery will not be possible.

- 5.2.1.3. **Action Step:** Work with Federal and State agencies to streamline and prioritize permitting for a core set of conservation actions contributing to the recovery of salmonids and their habitats. Coordinate on development of comprehensive programmatic permits for such actions, particularly streamlined permitting for non-FRGP funded restoration projects.
- 5.2.1.4. **Action Step:** Encourage appropriate agencies to minimize use of exemptions and engage in full enforcement of relevant laws, codes, regulations and ordinances protective of CCC coho salmon and their habitats.
- 5.2.1.5. **Action Step:** Evaluate possible funding assistance or waivers where counties are deemed economically disadvantaged and restoration work is a high priority (Priority 1) as outlined in the recovery plan.
- 5.2.1.6. **Action Step:** Discourage home building or other incompatible land use in areas identified as timber production zones (TPZ).
- 5.2.1.7. **Action Step:** Participate in land and water use planning with local, county, and State agencies that have direct control and responsibilities over non-Federal practices.
- 5.2.1.8. **Action Step:** Work with law enforcement agencies to abate illegal cannabis operations. Stream reaches with high quality salmonid habitat that may be affected by cannabis operations should be prioritized for abatement actions.
- 5.2.1.9. **Action Step:** Fully implement the Programmatic Section 7 consultation for restoration projects administered by the NOAA Restoration Center that permits placement of instream woody debris and other work.
- 5.2.1.10. **Action Step:** Consider developing No-Take guidance to assist NMFS staff and stakeholders in avoiding and minimizing potential take or harm to CCC coho salmon or their habitats when evaluating or planning land use practices (e.g., livestock grazing, agriculture, road construction and maintenance, channel modification, etc.).
- 5.2.1.11. **Action Step:** Create a forum that coordinates agencies with enforcement capabilities (e.g., CalFire, SWRB, RWQCB, counties).
- 5.2.1.12. **Action Step:** Encourage counties to better integrate water and land use planning efforts, and ensure their permitting staff and applicants are informed about required water and endangered species permits (and encourage applicants to consult with SWRCB and/or CDFG about water rights and

Streambed Alteration Agreement requirements prior to issuance of local permits).

- 5.2.2. **Recovery Action:** NMFS staff will facilitate discussions with the outlined entities on those items found inadequate for Listing Factor D as outlined in the Federal Register Notice Chapter in Volume I
- 5.2.3. **Recovery Action:** NMFS will initiate actions outlined in the Implementation Chapter of Volume I
- 5.2.4. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

6. Restoration- Passage

- 6.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range
 - 6.1.1. **Recovery Action:** Improve passage conditions across the ESU
 - 6.1.1.1. **Action Step:** Creating safe passage to and from the ocean for all life freshwater life stages of CCC coho salmon is a high priority.
 - 6.1.1.2. **Action Step:** Identify and address high priority road related barriers and restore passage per NMFS' Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a).
 - 6.1.1.3. **Action Step:** All new crossings and upgrades to existing crossings (bridge, culverts, fills, and other crossings) must accommodate 100-year flood flows and associated bedload and debris.
 - 6.1.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions
- 6.2. **Objective:** Address the inadequacy of existing regulatory mechanisms
 - 6.2.1. **Recovery Action:** Prevent impairment to passage
 - 6.2.1.1. **Action Step:** Monitor and maintain the Coastal Conservancy database of barriers to fish passage (CDFG 2004).
 - 6.2.1.2. **Action Step:** Adopt NMFS Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a) and review appropriate barrier databases when developing new or retrofitting existing road crossings.
 - 6.2.1.3. **Action Step:** Consider statutory changes to prevent certain projects through the LSAA agreement process.
 - 6.2.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

7. Restoration- Pool Habitat

7.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of the species habitat or range

7.1.1. **Recovery Action:** Implement ESU and population level recovery actions for Habitat Complexity

8. Restoration- Riparian

8.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range

8.1.1. **Recovery Action:** Improve riparian condition

8.1.1.1. **Action Step:** Promote growth of larger diameter trees and adequately sized buffers across the range of CCC coho salmon.

8.1.1.2. **Action Step:** Protect and manage existing riparian areas for site potential composition and structure such that trees are allowed to mature, provide canopy, die and recruit to streams naturally.

8.1.1.3. **Action Step:** A comprehensive evaluation and monitoring program should be implemented to determine areas where poor canopy conditions are producing water temperatures limiting salmonid survival.

8.1.1.4. **Action Step:** Forestry, agricultural, and grazing practices should allow riparian zones to maintain a full range of natural vegetative characteristics, i.e., characteristics occurring in watersheds with natural disturbance regimes. Riparian zones should ideally be wide enough to fulfill all functions necessary for maintaining aquatic productivity.

8.1.1.5. **Action Step:** Upstream cool water sources should be protected from riparian disturbance to buffer stream temperatures over the long term.

8.1.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

8.2. **Objective:** Address the inadequacy of existing regulatory mechanisms

8.2.1. **Recovery Action:** Improve riparian condition

8.2.1.1. **Action Step:** Develop adequately sized riparian setbacks/buffers where they do not currently occur, and enforce requirements of local regulations where they do.

8.2.1.2. **Action Step:** Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (CDFG 2004). Work cooperatively with land trusts, etc.

- 8.2.1.3. **Action Step:** Counties should develop a riparian strategy to grow older larger diameter trees for improved canopy and appropriate natural recruitment to the stream.
- 8.2.1.4. **Action Step:** Enforce requirements of local regulations and riparian/setbacks.
- 8.2.1.5. **Action Step:** Discourage encroachment into riparian zones from road widening projects, residential and commercial development, or other infrastructure expansion.

8.2.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

9. Restoration- Sediment

9.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range

9.1.1. **Recovery Action:** Improve instream gravel quality

9.1.1.1. **Action Step:** Sediment from all land uses should be reduced to magnitudes appropriate to the geologic setting of the watershed.

9.1.1.2. **Action Step:** Restoration work should consider re-establishment of natural instream sediment processes (e.g., sorting and distribution) through wood placement, bank protections, tree plantings, etc.

9.1.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

9.2. **Objective:** Address the inadequacy of existing regulatory mechanisms

9.2.1. **Recovery Action:** Improve instream gravel quality

9.2.1.1. **Action Step:** Fund and implement sediment TMDL recommendations within the CCC ESU.

9.2.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

9.3. **Objective:** See also recommendations under Threat - Roads/Railroads

10. Restoration- Viability

10.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range

10.1.1. **Recovery Action:** Increase density, abundance, spatial structure and diversity

10.1.1.1. **Action Step:** To prevent extinction of CCC coho salmon, all mechanisms and opportunities to improve survival probability of the 28 focus populations should be considered and implemented (e.g., intervention, broodstock

development, outplanting opportunities, research on coho salmon response to restoration, etc.).

10.1.1.2. **Action Step:** Conduct outreach to key entities and prioritize restoration funds, that increase viability and probability of freshwater survival in Core areas, or areas meeting the definition of Core (e.g. occupied) first. High profile projects that increase public awareness should be strongly encouraged.

10.1.1.3. **Action Step:** Conduct watershed and ESU level monitoring and develop a centralized database and analysis process that can provide information on population and habitat trends overtime.

10.1.1.4. **Action Step:** Evaluate and conduct nutrient enrichment projects to improve freshwater growth and increase smolt escapement utilizing available carcasses from hatcheries and other methods.

10.1.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

10.2. **Objective:** Address the overutilization for commercial, recreational, scientific or educational purposes

10.2.1. **Recovery Action:** NMFS staff will facilitate discussions with the outlined entities on those items found inadequate for Listing Factor B as outlined in the Federal Register Notice Chapter in Volume I

10.2.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

10.3. **Objective:** Address the inadequacy of existing regulatory mechanisms

10.3.1. **Recovery Action:** Increase density, abundance, spatial structure and diversity

10.3.1.1. **Action Step:** Coordinate with the U.S. Department of Justice and the District Attorney's environmental prosecutors in all counties across the ESU to outline the dire status of CCC coho salmon and discuss coordination on potential enforcement actions (NOAA's Office of Law Enforcement can refer cases to District Attorneys on behalf of CDFG for 1600 and 5650 violations).

10.3.1.2. **Action Step:** Initiate a comprehensive effort to educate CDFG Wardens and NOAA OLE Special Agents on; (1) the status of CCC coho salmon, (2) important habitat requirements, (3) key issues limiting their survival, and (4) potential vulnerability to various human-caused activities (particularly water diversion related impacts). Education efforts should be initiated immediately and consist of a series of yearly one-day workshops, at a minimum, for the next three years for all enforcement staff. One module of the workshop would consist of a primer on water law.

- 10.3.1.3. **Action Step:** Collaborate with CDFG and others to finalize and implement the Statewide Coastal Monitoring Plan. The plan is essential to informing recovery criteria and factors limiting CCC coho salmon survival and abundance.
- 10.3.1.4. **Action Step:** NMFS should provide information to the appropriate regulatory bodies regarding the current status of CCC coho salmon, priority watershed processes needing consideration, and recommendations that provide no take or incidental take assurances.
- 10.3.1.5. **Action Step:** Consider establishing a multiagency task force to address high priority issues limiting coho salmon fishery in focus watersheds.
- 10.3.1.6. **Action Step:** Conduct population research and monitoring focusing on life stage survival (e.g., life cycle stations) within each diversity stratum including survival and fitness in wetland, estuaries and lagoons.
- 10.3.1.7. **Action Step:** Implement monitoring programs to assess spawner abundance and population viability and key habitat attributes. These programs will require consistent methods, reporting, databasing and adaptive management across the ESU to evaluate population and habitat responses to recovery actions. Long-term funding, for the continuation of current programs and their expansion, should be secured.
- 10.3.1.8. **Action Step:** Evaluate the efficacy and potential benefits of legislative creation of salmon refuges across the ESU. This legislation could be similar to the protections afforded to fish in Scott Creek by the California Legislature from 1915 until 1943. Some public lands are currently protected as wildlife refuges by local, State, or Federal entities. Potential watersheds include, but are not limited to, Waddell Creek, lower Scott Creek, San Vicente Creek, lower Big River, Garcia River, Usal Creek and Caspar Creek.

10.3.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

10.4. **Objective:** Address other natural or manmade factors affecting the species' continued existence

10.4.1. **Recovery Action:** Increase density, abundance, spatial structure and diversity

10.4.1.1. **Action Step:** Establish mechanisms to maintain existing genetic diversity through intervention and augmentation. This may include (1) juvenile capture from the wild and rearing in an established conservation hatchery for release as adults and (2) developing comprehensive broodstock programs similar to the Russian River Coho Salmon Captive Broodstock program.

10.4.1.2. **Action Step:** Evaluate expansion of the Warm Springs Hatchery broodstock program to include coho from other strata in the CCC ESU. Expansion of this

facility may be the most feasible and expeditious alternative for to conserve ESU broodstock.

- 10.4.1.3. **Action Step:** Utilize population models, recovery plan information and genetic information for each watershed and associated diversity strata to identify minimum redd or adult counts that would trigger augmentation or intervention for CCC coho salmon.
- 10.4.1.4. **Action Step:** Perform a feasibility study for new coho recovery conservation hatcheries.
- 10.4.1.5. **Action Step:** Provide logistical and financial support to ensure maximum productivity and effectiveness of current captive broodstock programs to include program improvement and expansion.
- 10.4.1.6. **Action Step:** Re-assess marking protocol of broodstock versus hatchery fish to minimize possible misidentification by recreational fishermen.
- 10.4.1.7. **Action Step:** Habitat protection, restoration, research and development of Conservation Banks and other private/public partnerships should work in concert with broodstock outplanting efforts and planning.

10.4.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

11. [Restoration- Water Quality](#)

11.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range

11.1.1. **Recovery Action:** Prevent impairment to water quality

- 11.1.1.1. **Action Step:** Conduct outreach to increase awareness of the effects of pesticides and contaminants that impact the continued existence and habitat of CCC coho salmon.
- 11.1.1.2. **Action Step:** Toxic waste products from industrial, mining, agricultural, and urban activities should receive the appropriate treatment before being discharged into any body of water.
- 11.1.1.3. **Action Step:** Support the development and implementation of stormwater BMPs in cities, towns and rural areas.
- 11.1.1.4. **Action Step:** Work with pesticide users to educate and advocate for an “integrative pest management framework (IPM)” for pesticide control. 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.

11.1.1.5. **Action Step:** Work with the academic, local, government and non-profit entities (Natural Resource Conservation District, San Francisco Estuary Institute, etc.) to support funding of research and use of pesticide alternatives. These alternatives may include technologies that reduce the amount of pesticides that need to be applied or pest management strategies (listed above) that require very little pesticide use.

11.1.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

11.2. **Objective:** Address the inadequacy of existing regulatory mechanisms

11.2.1. **Recovery Action:** Incorporate appropriate elements of the Recovery Plan into the state-sponsored and funded Integrated Regional Water Management Plan (IRWMP)

11.2.1.1. **Action Step:** Work with EPA, RWQCBs, and CDFG to identify and prioritize potential contaminants of concern and develop protective standards and programs in the CCC coho salmon ESU.

11.2.1.2. **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.

11.2.1.3. **Action Step:** Avoid, or at a minimum regulate, the use of commercial and industrial products (e.g. pesticides) with high potential for contamination of local waterways.

11.2.1.4. **Action Step:** Work with the California Pesticides Regulation Department (CPRD) to support changes to professional pesticide application methodologies and timing (e.g., change building infrastructure applications of pyrethroids on monthly schedules throughout the entire year including the rainy season to seasons of interest) to limit the potential exposure of watercourses to pesticide runoff.

11.2.1.5. **Action Step:** Work with the Regional Water Quality Control Board 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 cover by these methods.

11.2.1.6. **Action Step:** Work with agencies to advocate for refinement of the State adopted CWA general pesticide permit.

11.2.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

11.3. **Objective:** See also recommendations under Restoration - Sediment and Threat - Roads/Railroads

THREAT ABATEMENT ACTIONS

12. Threat- Agricultural Practices

12.1. **Objective:** Address the present or threatened destruction, modification or curtailment of habitat or range

12.1.1. **Recovery Action:** Prevent adverse alterations to riparian species composition and structure

12.1.1.1. **Action Step:** Encourage landowners to implement restoration projects as part of their ongoing practices in priority stream reaches and where riparian habitat is in poor or fair condition.

12.1.1.2. **Action Step:** Implement programs to purchase land/conservation easements to encourage the re-establishment and/or enhancement of natural riparian communities.

12.1.1.3. **Action Step:** Develop and implement riparian setbacks/buffers that protect existing native riparian species composition and structure.

12.1.1.4. **Action Step:** Ensure that mature trees within the stream riparian corridor are not disturbed or lost due to agricultural activities.

12.1.2. **Recovery Action:** Prevent impairment to hydrology

12.1.2.1. **Action Step:** If water is used for frost protection measures, flow metering should accompany water management to ensure flows are maintained for other beneficial uses.

12.1.2.2. **Action Step:** Maintain properly functioning conditions, and do not allow further degradation, of flow conditions.

12.1.2.3. **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.

12.1.3. **Recovery Action:** Prevent impairment to instream substrate/food productivity (gravel quality and quantity)

- 12.1.3.1. **Action Step:** Continue the use of cover crops in agriculture fields to reduce sediment runoff.
- 12.1.3.2. **Action Step:** Encourage and assist the NRCS and RCDs to increase the number of landowners participating in sediment reduction planning and implementation.
- 12.1.3.3. **Action Step:** Work with landowners to assess and address erosion control measures throughout the winter period.
- 12.1.4. **Recovery Action:** Prevent increased landscape disturbance
 - 12.1.4.1. **Action Step:** Complete Farm Conservation Plans (through the SRCD, NRCS, Fish Friendly Farming program or other cooperative conservation programs) to address sediment source reduction, riparian habitat, forest health, and restoration.
- 12.1.5. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions
- 12.2. **Objective:** Address the inadequacy of existing regulatory mechanisms
 - 12.2.1. **Recovery Action:** Prevent impairment to riparian species composition and structure
 - 12.2.1.1. **Action Step:** Develop riparian setbacks/buffers where they do not currently occur, and enforce requirements of local regulations where they do.
 - 12.2.1.2. **Action Step:** Work with EPA and CDFG 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 CCC coho salmon.
 - 12.2.1.3. **Action Step:** Reduce water pollutants such as fine sediments, pesticides, and other non-point sources, and point source waste discharges to protect habitat and life-history requirements.
 - 12.2.1.4. **Action Step:** Utilize HCPs, Safe Harbor or other regulatory authorities to protect coho salmon and their habitat.
 - 12.2.1.5. **Action Step:** Strongly encourage the counties, cities and local jurisdictions to take a greater leadership role to reduce ongoing impacts of agriculture to salmon and their habitats by working with their various departments on permitting, road maintenance, ordinances, etc.
 - 12.2.1.6. **Action Step:** Encourage amendments to Army Corps 404 Clean Water Act exemptions for farming, logging, and ranching activities to terminate Section

404(f) exemptions for discharges of dredged or fill material into US waters (channelization) associated with agriculture, logging, ranching and farming.

12.2.2. **Recovery Action:** Prevent increased landscape disturbance

12.2.2.1. **Action Step:** Prevent impacts from new vineyard development by enforcement of land use zoning appropriate to the site to protect floodplain and riparian processes.

12.2.2.2. **Action Step:** Incentive programs and incentive-based approaches should be explored for landowners who conduct operations in a manner compatible with salmonid recovery requirements.

12.2.2.3. **Action Step:** NMFS staff should provide technical support to encourage that county general plan updates and ordinances incorporate recovery goals of preventing impairment of, and restoring, coho salmon habitats.

12.2.3. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

13. Threat- Channel Modification

13.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range

13.1.1. **Recovery Action:** Prevent impairment to floodplain connectivity

13.1.1.1. **Action Step:** Flood control projects or other modifications facilitating new development (as opposed to protecting existing infrastructure) should be avoided.

13.1.1.2. **Action Step:** Beneficial long-term effects of natural disturbances, such as flooding and stream bank erosion, should be preserved or restored whenever possible.

13.1.2. **Recovery Action:** Prevent impairment to instream habitat complexity (reduced large wood and/or shelter)

13.1.2.1. **Action Step:** Channel modifying projects should be designed to ensure potential effects to CCC coho habitat are fully minimized or mitigated, and where possible, existing poor conditions are remediated.

13.1.2.2. **Action Step:** Eliminate the use of gabion baskets and undersized rock within the bankfull channel.

13.1.2.3. **Action Step:** Educate landowners, land managers, and County and municipal staffs on the importance of LWD to coho survival and recovery, and watershed processes.

13.1.2.4. **Action Step:** 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.

13.1.3. **Recovery Action:** Prevent impairment to passage

13.1.3.1. **Action Step:** Ensure that all future and existing channel designed for flood conveyance incorporate features enhance coho salmon migration under high and low flow conditions.

13.1.4. **Recovery Action:** Reduce adverse impacts to watershed processes

13.1.4.1. **Action Step:** Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (CDFG 2004).

13.1.4.2. **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.

13.1.5. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

13.2. **Objective:** Address the inadequacy of existing regulatory mechanisms

13.2.1. **Recovery Action:** Reduce adverse impacts to watershed processes

13.2.1.1. **Action Step:** Modify city and county regulatory and planning processes to eliminate provisions allowing new construction of permanent infrastructure that will adversely affect watershed processes, particularly within the 100-year flood prone zones in all historical CCC coho watersheds.

13.2.1.2. **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.

13.2.1.3. **Action Step:** Counties and municipalities should 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.

13.2.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

14. Threat- Disease/Predation/Competition

14.1. **Objective:** Address disease or predation

14.1.1. **Recovery Action:** Prevent reduced density, abundance, and diversity

- 14.1.1.1. **Action Step:** Provide funding to investigate and remediate impacts of disease and predation to overall ESU viability.
- 14.1.1.2. **Action Step:** Evaluate impacts of striped bass predation in coastal estuaries to juvenile and smolt coho salmon and implement abatement strategies where appropriate.
- 14.1.2. **Recovery Action:** NMFS staff will facilitate discussions with the outlined entities on those items found inadequate for Listing Factor C as outlined in the Federal Register Notice Chapter in Volume I
- 14.1.3. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions
- 14.2. **Objective:** Address the present of threatened destruction, modification or curtailment of habitat or range
 - 14.2.1. **Recovery Action:** Reduce the threat of invasive species to aquatic habitat across the NCCC domain
 - 14.2.1.1. **Action Step:** Support CDFG, and other resource agencies to control and contain invasive species in California.
 - 14.2.1.2. **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.
 - 14.2.1.3. **Action Step:** Promote the practice of Clean, Drain, and Dry for watercraft and equipment used in aquatic environments. Additional information can be found at www.dfg.ca.gov/invasives.

15. Threat- Fire/Fuel Management

- 15.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range
 - 15.1.1. **Recovery Action:** Prevent adverse alterations to riparian species composition and structure
 - 15.1.1.1. **Action Step:** Review prescribed fire plans to ensure they provide adequate protection for riparian corridors.
 - 15.1.2. **Recovery Action:** Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)
 - 15.1.2.1. **Action Step:** Collaborate with CalFire to coordinate firefighting and post fire response with the resource agencies.

15.1.3. **Recovery Action:** Prevent impairment to water quality

15.1.3.1. **Action Step:** Locate chemicals, petroleum products, latrines, camp sites, etc., as far from fish bearing streams and tributary watercourses as possible. Place on flat ground.

15.1.4. **Recovery Action:** Prevent impairment to watershed processes

15.1.4.1. **Action Step:** Identify historical fire frequency, intensities and durations and manage fuel loads in a manner consistent with historical parameters.

15.1.4.2. **Action Step:** Include CDFG 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 CDFG/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.

15.1.5. **Recovery Action:** Prevent impairment to hydrology

15.1.5.1. **Action Step:** Obtain water from lakes and reservoirs not occupied by listed salmonids when possible. Require all water trucks/tenders be fitted with CDFG 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.

15.1.6. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

15.2. **Objective:** Address the inadequacy of existing regulatory mechanisms

15.2.1. **Recovery Action:** Prevent impairment to watershed processes

15.2.1.1. **Action Step:** Work with County planners to define future impacts of proposed urban and infrastructure development on fire suppression and fuel load buildup.

15.2.1.2. **Action Step:** Establish fire contingency plans that involve CalFire, local fire districts and regulatory agencies with expertise in fisheries issues.

15.2.1.3. **Action Step:** Disseminate NMFS' October 9, 2007, jeopardy biological opinion on the use of fire retardants and its impacts to salmonids, to local firefighting agencies and CalFire.

15.2.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

16. Threat- Fishing/Collecting

16.1. **Objective:** Address the overutilization for commercial, recreational, scientific or educational purposes

16.1.1. **Recovery Action:** Prevent reduced density, abundance and diversity

16.1.1.1. **Action Step:** Fisheries managers should use recovery criteria explained in this recovery plan to manage fisheries consistent with recovery of CCC coho salmon. The assessment of fishery impacts requires data to inform management, and if those data are not currently collected a system to do so should be established. 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.

16.1.1.2. **Action Step:** Work with CDFG and Fish and Game Commission to refine freshwater sport fishing regulations to minimize unintentional and unauthorized take, and incidental mortality, of CCC coho salmon by anglers during the CCC coho salmon 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 specifically for the 28 focus watersheds identified for coho recovery. This effort should include close coordination with CDFG Wardens and development of outreach programs.

16.1.1.3. **Action Step:** Work with CDFG to develop protective regulations and seek funds for additional Game Wardens to minimize impacts from fishing during the migratory period for CCC coho salmon (e.g., until sandbars open naturally) within one mile of the river mouths of the 28 focus watersheds.

16.1.1.4. **Action Step:** The streams of Albion, Big River, Cottaneva, Garcia, Gualala, Navarro, Noyo, and Ten Mile do not have hatchery trout or steelhead, yet the California Freshwater Sport Fishing Regulations sets forth bag limits for these watersheds. Resources such as the Northern California Atlas & Gazetteer (DeLorme 2011) use the Regulations to provide anglers a list of watersheds where fishing is allowed. The Regulations should be amended to reflect current fisheries conditions.

16.1.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

17. Threat- Hatcheries

17.1. **Objective:** Address other natural or manmade factors affecting the species' continued existence

17.1.1. **Recovery Action:** Improve density, abundance and diversity of CCC coho salmon populations

17.1.1.1. **Action Step:** Work with hatchery managers to implement the recommendations in the California Hatchery Scientific Review Group report (California HSRG 2012), where appropriate.

17.1.1.2. **Action Step:** Ensure the threat of hatcheries remains low for the CCC coho salmon for current, and all future, hatchery programs. Develop a HGMP under section 10 (a) (1) that comports with the hatchery criteria identified in Spence et al. (2008).

17.1.2. **Recovery Action:** NMFS staff will facilitate discussions with the outlined entities on those items found inadequate for Listing Factor E as outlined in the Federal Register Notice Chapter in Volume I

17.1.3. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

17.2. **Objective:** See Restoration-Viability for specific recommendations regarding hatchery practices.

18. [Threat- Livestock](#)

18.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range

18.1.1. **Recovery Action:** Improve watershed conditions

18.1.1.1. **Action Step:** Aid willing landowners to fence livestock from the stream channel and riparian zones and develop offstream alternative water sources.

18.1.1.2. **Action Step:** Livestock and Ranch Managers should 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).

18.1.1.3. **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.

18.1.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

18.2. **Objective:** Address the inadequacy of existing regulatory mechanisms

18.2.1. **Recovery Action:** Prevent impairment to water quality (e.g. turbidity, suspended sediment)

- 18.2.1.1. **Action Step:** Establish conservative residual dry matter (RDM) target per acre to ensure areas are not overgrazed by leaving 1000 lbs RDM (residual dry matter)/acre left end of grazing season. Remove cattle from pasture before soils dry out.
- 18.2.1.2. **Action Step:** Implement water quality standards as outlined in the University of California guidelines for water quality protection (Ristow 2006).
- 18.2.1.3. **Action Step:** Implement recommendations of the California Rangeland Water Quality Management Program.

18.2.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

19. Threat- Logging

19.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range

19.1.1. **Recovery Action:** Prevent conversions and improve forest conditions throughout the ESU

19.1.1.1. **Action Step:** California BOF could consider requiring (1) EIRs for all conversions, (2) adopting a Conversion THP, (3) elimination of the subdivision exemption, (4) raising 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 forest conversions.

19.1.1.2. **Action Step:** Work with California BOF, CalFire, CDFG, professional organizations and landowners to protect forest lands from conversion, promote sustainable forestry practices and provide landowner incentives for growing late seral forests in riparian areas and conducting restoration actions.

19.1.1.3. **Action Step:** Support the Monitoring Study Group and encourage coordination with other state programs and monitoring.

19.1.2. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

19.2. **Objective:** Address the inadequacy of existing regulatory mechanisms

19.2.1. **Recovery Action:** Prevent impairment to watershed processes

19.2.1.1. **Action Step:** Discourage Counties from rezoning forestlands or identified TPZ areas to rural residential or other land uses (e.g., vineyards).

- 19.2.1.2. **Action Step:** Establish greater oversight and post-harvest monitoring by the permitting agency for operations within high value habitat areas in focus watersheds.
- 19.2.1.3. **Action Step:** Increase THP inspections by CalFire especially during winter months.
- 19.2.1.4. **Action Step:** Partner in the development of a framework similar to Washington State that establishes a scientific framework for monitoring the effectiveness of practices in meeting watershed process goals and a decision-making process that is adaptive to the new information.
- 19.2.1.5. **Action Step:** Work with CalFire and BOF to explore no-take rules and/or apply for a statewide Forestry HCP (similar to that developed in Washington State), GCP, safe harbor agreements, and seek funding opportunities to support the effort.
- 19.2.1.6. **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.
- 19.2.1.7. **Action Step:** Investigate opportunities to programmatically permit the forest certification program to authorize incidental take for landowners through Section 10(a)(1)(B).
- 19.2.1.8. **Action Step:** NMFS and CDFG should continue to provide information and recommendations to the BOF regarding salmonid priorities and needed revisions to forest practices that are in compliance with the ESA.
- 19.2.1.9. **Action Step:** Work with the BOF, CalFire, CDFG, professional organizations and landowners to modify the timber harvest permitting process to provide opportunities and incentives for LWD recruitment during timber harvest operations.
- 19.2.1.10. **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).
- 19.2.1.11. **Action Step:** The State should consider a Salmonid Watershed Database (similar to the CDFG Northern Spotted Owl database) for RPFs to acquire standardized information on populations and habitat conditions in the watersheds associated with their harvest plan.

19.2.2. **Recovery Action:** Prevent reduced density, abundance, and diversity

19.2.2.1. **Action Step:** The BOF should consider designating CCC coho salmon as a sensitive species. The majority of CCC coho salmon populations persist on forestlands and a sensitive species designation could provide increased protection from potential timber harvest impacts.

19.2.3. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

20. Threat- Mining

20.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range

20.1.1. **Recovery Action:** Prevent adverse alterations to riparian species composition and structure

20.1.1.1. **Action Step:** Ensure protection of natural in-channel, floodplain, and riparian habitats from, in-river sand and gravel mining practices.

20.1.2. **Recovery Action:** Prevent impairment to watershed processes

20.1.2.1. **Action Step:** NMFS gravel mining guidelines (Sediment Removal Guidelines) should be strictly adhered to for all existing and proposed projects.

20.1.3. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

21. Threat- Recreation

21.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of the species habitat or range

21.1.1. **Recovery Action:** Implement ESU and population level recovery actions for Recreation, Restoration-Sediment and Threat-Roads

22. Threat- Residential/Commercial Development

22.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of habitat or range

22.1.1. **Recovery Action:** Prevent impairment to watershed processes

22.1.1.1. **Action Step:** Institutionalize programs to purchase land/conservation easements to encourage the re-establishment and/or enhancement of natural riparian communities.

22.1.2. **Recovery Action:** Prevent impairment to water quality (increased turbidity, suspended sediment, and/or toxicity)

- 22.1.2.1. **Action Step:** Design new developments to avoid unstable slopes, wetlands, areas of high habitat value, and similarly constrained sites that occur adjacent to a CCC coho salmon watercourse.
- 22.1.2.2. **Action Step:** Maintain intact and properly functioning riparian buffers to filter and prevent fine sediment input from entering streams.
- 22.1.2.3. **Action Step:** Disperse discharge from new or upgraded commercial and residential areas into a spatially distributed network rather than a few point discharges, which can result in locally severe erosion and disruption of riparian vegetation and instream habitat.
- 22.1.2.4. **Action Step:** Toxic waste products from urban activities should receive the appropriate treatment before being discharged into any body of water that may enter any historic CCC coho salmon stream.
- 22.1.3. **Recovery Action:** Prevent impairment to stream hydrology (impaired water flow)
 - 22.1.3.1. **Action Step:** Restore patterns of sediment and water runoff, including surface and subsurface drainage, to the greatest extent possible to the natural hydrologic pattern for the watershed in timing, quantity, and quality.
- 22.1.4. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions
- 22.2. **Objective:** Address the inadequacy of existing regulatory mechanisms
 - 22.2.1. **Recovery Action:** Prevent impairment to water quality (increased turbidity, suspended sediment, and/or toxicity)
 - 22.2.1.1. **Action Step:** Implement performance standards in Stormwater Management Plans.
 - 22.2.1.2. **Action Step:** New development in all historical CCC coho salmon watersheds should meet a zero net increase in storm-water runoff, changes in duration, or magnitude of peak flow.
 - 22.2.1.3. **Action Step:** Address impacts from failing septic systems in rural areas.
 - 22.2.2. **Recovery Action:** Prevent impairment to stream hydrology (impaired water flow)
 - 22.2.2.1. **Action Step:** As mitigation for hydrograph consequences, municipalities and counties should investigate funding of larger detention devices in key watersheds with ongoing channel degradation or in sub-watersheds where impervious surface area > 10 percent.

- 22.2.2.2. **Action Step:** Support the development and implementation of regulations for activities that intercept groundwater recharge.
 - 22.2.2.3. **Action Step:** Standards and recommendations regarding development should apply to all jurisdictions, including school districts and other special districts not subject to county and/or state related ordinances or policies.
 - 22.2.2.4. **Action Step:** Develop legislation that will fund county planning for environmentally sound growth water supply development and work in coordination with California Dept. of Housing, Association of Bay Area Governments and other government associations (CDFG 2004).
- 22.2.3. **Recovery Action:** Prevent impairment to watershed processes
- 22.2.3.1. **Action Step:** Enforce existing building permit programs to minimize unpermitted construction.
 - 22.2.3.2. **Action Step:** Modify Federal, State, city and county regulatory and planning processes to eliminate provisions allowing new construction of permanent infrastructure that will adversely affect watershed processes, particularly within the 100-year flood prone zones in all historic CCC coho salmon watersheds.
 - 22.2.3.3. **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.
 - 22.2.3.4. **Action Step:** Identify forestlands or oak woodland areas at high risk of conversion, and develop incentives and alternatives for landowners to discourage conversion.
 - 22.2.3.5. **Action Step:** Standards and recommendations regarding local development should apply to all jurisdictions, including school districts and other special districts not subject to county and/or state related ordinances or policies.
 - 22.2.3.6. **Action Step:** Encourage infill and high density developments over dispersal of low density rural residential development.
 - 22.2.3.7. **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).
- 22.2.4. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

23. Threat- Roads/Railroads

23.1. **Objective:** Address the present or threatened destruction, modification or curtailment of habitat or range

23.1.1. **Recovery Action:** Prevent impairment to watershed hydrology

23.1.1.1. **Action Step:** Hydrologically disconnect roads and ensure road use, maintenance, and construction are not resulting in riparian losses and sediment discharge to streams.

23.1.1.2. **Action Step:** Restoration projects that upgrade or decommission high risk roads adjacent to streams supporting coho salmon should be considered an extremely high priority for funding (e.g., PCSRF).

23.1.1.3. **Action Step:** Conduct road and sediment reduction assessments to identify sediment related and runoff related problems and determine level of hydrologic connectivity.

23.1.1.4. **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.

23.1.1.5. **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.

23.1.1.6. **Action Step:** Design new roadways to avoid unstable slopes, wetland, floodplains and other areas of high habitat value.

23.1.2. **Recovery Action:** Prevent impairment to instream substrate/food productivity

23.1.2.1. **Action Step:** Implement strategies to decommission and/or upgrade high risk roads (and skid trails on forestlands), maintain existing roads and construct new roads.

23.1.2.2. **Action Step:** Design and implement a program of BMPs for road maintenance on private roads similar to programs for public roads (Sommarstrom, 2002).

23.1.2.3. **Action Step:** Use best management practices for road construction, maintenance on private roads similar to programs for public roads (e.g. Hagans & Weaver, 1994; Sommarstrom, 2002; Oregon Department of Transportation, 1999).

23.1.3. **Recovery Action:** Prevent impairment to passage and migration

- 23.1.3.1. **Action Step:** Adopt NMFS Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a) and review appropriate barrier databases when developing new or retrofitting existing road crossings.
- 23.1.3.2. **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.
- 23.1.3.3. **Action Step:** Update the California Fish Passage Assessment Database with road related barriers to fish passage on an annual basis.
- 23.1.3.4. **Action Step:** All new crossings and upgrades to existing crossings (bridges, culverts, fills, and other crossings) should accommodate 100-year flood flows and associated bedload and debris.
- 23.1.3.5. **Action Step:** For impact pile driving 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 outlined in NMFS 2008 to avoid CCC coho.

23.1.4. **Recovery Action:** Prevent adverse alterations to riparian species composition and structure

- 23.1.4.1. **Action Step:** Educate county and city public works departments, flood control districts and planning departments, etc., on the critical importance of maintaining a mature riparian and healthy riparian zone for salmonids.

23.1.5. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

23.2. **Objective:** Address the inadequacy of regulatory mechanisms

23.2.1. **Recovery Action:** Prevent adverse alterations to riparian species composition and structure

- 23.2.1.1. **Action Step:** Minimize new road construction within riparian corridors. Limit construction of new road crossings.
- 23.2.1.2. **Action Step:** Encourage implementation of Vegetation Management Plans for the roadside maintenance activities to discourage or eliminate unwanted

vegetation and promote desirable (native) vegetation (County of Santa Cruz's Integrated Vegetation Management Plan for Roads Near Perennial Waters (URS, 2011)).

23.2.2. **Recovery Action:** Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)

23.2.2.1. **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.

23.2.2.2. **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.

23.2.2.3. **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.

23.2.2.4. **Action Step:** Conduct annual inspections of roads prior to winter. Correct conditions that are likely to deliver sediment to streams.

23.2.2.5. **Action Step:** Encourage enforcement of existing regulations regarding grading, riparian and building violations and sediment release from county roads.

23.2.2.6. **Action Step:** Reduce sediment sources from road networks, maintenance activities and other actions that deliver sediment to stream channels through improved or new laws and policies, and/or enforcement of existing laws and policies.

23.2.3. **Recovery Action:** Prevent impairment to floodplain connectivity (impaired quality & extent)

23.2.3.1. **Action Step:** Protect channel migration zones and their riparian areas by designing new roads to allow streams to meander in historical patterns.

23.2.4. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

24. Threat- Severe Weather Patterns

24.1. **Objective:** Address other natural or manmade factors affecting the species continued existence

24.1.1. **Recovery Action:** Prevent impairment to watershed processes due to climate change

- 24.1.1.1. **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). 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.
- 24.1.1.2. **Action Step:** Promote and support policies that explicitly maintain instream flow by limiting water withdrawals, enhancing floodplain connectivity by opening historically flooded areas where possible, removing anthropogenic barriers for fish passage, and riparian forest to increase habitat resilience.
- 24.1.1.3. **Action Step:** Develop a climate strategy that addresses simultaneously the reduction of fossil fuels and the protection of forestlands. 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.
- 24.1.1.4. **Action Step:** Expand research and monitoring to improve predictions of climate change and its effects on salmon recovery. 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.
- 24.1.1.5. **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 to assess the impacts on coho salmon.
- 24.1.1.6. **Action Step:** Maintain headwater areas in an undisturbed state to ensure a continuous source of cool water downstream.
- 24.1.1.7. **Action Step:** Maximize connectivity, and increase diversity, of instream habitats to allow a full range of opportunities for salmon to exploit as environmental conditions shift.

- 24.1.2. **Recovery Action:** Prevent impairment to watershed processes due to droughts and flooding events
- 24.1.2.1. **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, CDFG, NMFS, and others to develop emergency rules for augmenting water supplies and mitigating the effects of drought and extreme climate on CCC coho salmon and their habitats.
- 24.1.2.2. **Action Step:** Institute water conservation strategies that provide for drought contingencies without relying on interception of surface flows or groundwater depletion.
- 24.1.2.3. **Action Step:** Coordinate protection measures and develop rules for augmenting water supplies and mitigating the effects of drought on salmonids.
- 24.1.2.4. **Action Step:** Design habitat restoration projects to account for long-term changes including sea level rise, flooding frequency and loss of sediment, by increasing resiliency of existing habitat types and facilitating upstream passage (California State Coastal Conservancy et al. 2010).
- 24.1.3. **Recovery Action:** NMFS staff will facilitate discussions with the outlined entities on those items found inadequate for Listing Factor E as outlined in the Federal Register Notice Chapter in Volume I
- 24.1.4. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

25. Threat- Water Diversion/Impoundment

- 25.1. **Objective:** Address the inadequacy of regulatory mechanisms
- 25.1.1. **Recovery Action:** Improve flow conditions
- 25.1.1.1. **Action Step:** Establish comprehensive stream flow evaluation programs to determine instream flow needs for coho salmon.
- 25.1.1.2. **Action Step:** Determine and monitor 1600 program compliance related to water diversions (CDFG 2004).
- 25.1.1.3. **Action Step:** Counties should consider forbearance agreements that eliminate withdrawals during low-flow conditions.
- 25.1.1.4. **Action Step:** Develop water conservation measures at local and State levels to include a drought management plan for each watershed that is triggered by minimum flow requirements.

- 25.1.1.5. **Action Step:** CDFG staff should conduct compliance audits of Lake and Streambed Alteration Agreements (LSAA) in priority watersheds. Audits would be conducted using a two tiered approach in all focus CCC coho salmon watersheds – compliance checks on existing agreements and compliance review to identify unpermitted activities impacting coho. Mitigation measures for LSAA agreements should be standardized per specific life history impacts.
- 25.1.1.6. **Action Step:** For those streams known to support CCC coho salmon, including those with ongoing diversions, consider petitioning SWRCB to declare the stream as fully appropriated during the summer months. Encourage existing water rights holders and new applicants to shift the timing or manner, of diversion, from a less protective to a more protective practice.
- 25.1.1.7. **Action Step:** Collaborate and support the SWRCB and local agencies to increase oversight and responsibility for regulating groundwater extraction from aquifers hydrologically connected to surface flows.
- 25.1.1.8. **Action Step:** Local governments should integrate meaningful groundwater regulation for land use planning and increase their coordination with State agencies to ensure applicants secure the necessary State permits (e.g., water rights) as part of the local permitting processes.
- 25.1.1.9. **Action Step:** Collaborate and support the SWRCB to prioritize review and processing of water right projects within the 28 focus populations and 11 supplemental populations, enforce existing bypass flow requirements and reduce the impacts of authorized surface water diversions for populations where water flow is identified as a limiting factor.
- 25.1.1.10. **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 so they are fully protective of CCC coho salmon.
- 25.1.1.11. **Action Step:** Until site specific studies are conducted, implement and enforce the North Coast Instream Flow Policy developed and adopted pursuant to AB2121 for the 28 focus populations and 11 supplemental population. AB2121 codified (in sections 1259.2 and 1259.4 of the California Water Code) portions of CDFG and NMFS Water Diversion Guidelines to ensure protective flows for all life stages of coho salmon.
- 25.1.1.12. **Action Step:** Work with CDFG and SWRCB to develop specific regulatory mechanisms to fully and effectively implement CDFG Code Section 5937 requirements.

25.1.1.13. **Action Step:** Evaluate benefits of requiring State and Federal Incidental Take Permits for all new water diversions in watersheds with extant populations of CCC coho salmon.

25.1.1.14. **Action Step:** The State Water Resources Control Board should implement the new frost protection regulations for the Russian River as soon as possible to protect CCC coho salmon.

25.1.1.15. **Action Step:** The State Water Resources Control Board should be encouraged 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 divested to protect instream uses.

25.1.2. **Recovery Action:** Prevent impairment to stream hydrology (impaired water flow)

25.1.2.1. **Action Step:** Promote passive diversion devices designed to allow diversion of water only when minimum streamflow requirements are met or exceeded (CDFG 2004).

25.1.2.2. **Action Step:** Promote conjunctive use of water with water projects whenever possible.

25.1.2.3. **Action Step:** Require the SWRCB to conduct interagency consultation with the California Department of Fish and Game, and seek technical assistance from NMFS on the issuance of water rights permits.

25.1.2.4. **Action Step:** Request that SWRCB review and/or modify water use based on the needs of coho salmon and authorized diverters (CDFG 2004).

25.1.2.5. **Action Step:** Site and compliance visits by CDFG should be instituted for Lake and Streambed Alteration Agreements that relate to Appropriative and Riparian diversions. Consideration should be made to dedicate wardens to conduct these visits in Core areas.

25.1.3. **Recovery Action:** Prevent reduced density, abundance, and diversity

25.1.3.1. **Action Step:** Adequately screen water diversions to prevent juvenile salmonid mortalities.

25.1.4. **Recovery Action:** During five-year status reviews update, if necessary, recovery actions

26. Threat- Watershed Process

26.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of the species habitat or range

26.1.1. **Recovery Action:** Implement ESU level recovery actions for Landscape Patterns