Appendix H – Activity Cards

Restoration and Enhancement of In-Channel Habitat	
Condition, Situation, Trigger	This activity category typically applies to reaches of the mainstem Trinity River or tributaries where channel diversity is limited, and habitat complexity needs to be restored and/or enhanced. This activity category also applies to areas where side channels, alcoves, and other backwater habitats have been filled or blocked from the main channel, disconnecting them from most if not all flow events.
Applicable ACS Objectives	1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted. 2. Maintain and restore spatial and temporal connectivity within and between watersheds. 3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations. 4. 4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.
Proposed Treatments	"Restoration and Enhancement of In-Channel Habitat" includes: installation of habitat elements such as vegetation, loose large wood with and without rootwads, Structured Log Jams (SLJ) installation using vibratory pile-driving techniques (stabilizing the SLJs with timber piles), in-stream boulders, beaver dam analogues (BDAs), post-assisted log structures (PALS), spawning gravel, and other low-tech process-based restoration (LTPBR) techniques. Also included in this category is channel and streambank excavation, grading of floodplains, the addition of weir-like structures (constructed of logs and or rock) that do not impede fish passage, riparian vegetation removal (where necessary), construction of gravel and skeletal bars, construction of floodplain surfaces with elevations allowing periodic inundation, removal of riparian berms, bedrock fracturing (where necessary) using blasting techniques, and revegetation of restored floodplain surfaces.
Equipment Used	Excavators, bulldozers, dump trucks, front-end loaders, vibratory pile driver (used in the dry), chainsaws, hand tools, and hydraulic post pounders. Explosives may be used in the dry for bedrock fracturing.
Timing	In-water work would be restricted to the dry season (June 15 to October 15 for tributaries and July 15 to October 15 for the mainstem). Work in intermittent streams may continue beyond November 1, as long as weather conditions permit, and the stream channel remains dry. Work above OHWM can occur at other times of the year but would adhere to conservation measures such as wildlife seasonal restrictions and the use of erosion and sediment control BMPs. Post-project revegetation will take place during wet conditions (fall/winter) and will generally occur in riparian areas to maximize use by fish and wildlife species. Extended in water work periods may also be required depending on the project.
Duration	Each restoration effort would typically be completed in 1-2 construction seasons with the exception of related vegetation management, monitoring, and adaptive management actions.
Monitoring Metrics	Linear feet of restored/enhanced instream habitat

Floodplain Restoration	
Condition, Situation, Trigger	This activity category typically applies to areas where floodplains have been disconnected from adjacent streams and rivers. Aimed primarily at restoring hydraulic connections and inundation across the floodplain to improve the diversity and complexity of aquatic, meadow, and riparian habitat, ecosystem function, and geomorphic function within the watershed.
Applicable ACS Objectives	1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted. 2. Maintain and restore spatial and temporal connectivity within and between watersheds. 4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities. 7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.
Proposed Treatments	"Floodplain Restoration" may include: the setback, breaching, modification, and removal of levees, berms, and dikes as well as floodplain lowering (e.g., mine tailing excavation) or fill in support of hydraulic reconnection across the floodplain (including restoration to stage zero, which creates streams that are fully connected with their floodplains, typically with multi-thread channels). This activity category also includes rock placement (including engineered stream material, riffle ramps, or weirs); filling or reshaping of on- and off-channel gravel pits; LTPBR techniques such as BDAs and PALS; and other strategies to aggrade the channel and improve connectivity within the floodplain. Meadow and floodplain restoration may involve reconnecting down-cut or incising channels to their floodplains to restore hydrologic processes and meadow health; filling incised, entrenched channels; creating new stream channels; regrading floodplains or realigning channels; or installing stabilization structures (e.g., Zeedyk structures). Projects using fill to address channel incision should also incorporate habitat elements that offset the likelihood for incision to re-occur such as adding large wood and channel roughness.
Equipment Used	Excavators, bulldozers, dump trucks, front-end loaders, rock/gravel processors, chainsaws, hand tools, hydraulic post pounders, and similar equipment.
Timing	• In-water work would be restricted to the dry season (June 15 to October 15 for tributaries and July 15 to October 15 for the mainstem). Work in intermittent streams may continue beyond November 1, as long as weather conditions permit, and the stream channel remains dry. • Extended in water work periods may also be required depending on the project. • Post-project revegetation will take place during wet conditions (fall/winter) and will generally occur in riparian areas to maximize use by fish and wildlife species.
Duration	Each restoration effort would be completed in 1-2 construction seasons with the exception of related vegetation management, monitoring, and adaptive management actions.
Monitoring Metrics	Acres of floodplain habitat (aquatic, riparian, wetland, meadow) hydraulically reconnected

Removal or Retrofitting of Fish Passage Barriers, Small Dams, Flood Gates, Pilings and Other In-water Structures	
Condition, Situation, Trigger	The presence of any in-stream structure (small dam, fords, diversions, flood gates, pilings, legacy structures, etc.) that is blocking/obstructing hydrologic connectivity, fish passage, and/or habitat function.
Applicable ACS Objectives	1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted. 2. Maintain and restore spatial and temporal connectivity within and between watersheds. 3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations. 4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities. 5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport. 6. Maintain and restore instream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected. 7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.
Proposed Treatments	"Removal or Retrofitting of Fish Passage Barriers, Small Dams, Flood Gates, Pilings and Other In-water Structures" includes: removal or retrofitting (for fish passage) of small dams, diversions, flood gates, and legacy structures; separation of streams from artificial impoundments (e.g., ponds or lakes) by realigning and/or rerouting channels around or through these artificial waterbodies and/or through the use of vertical concrete or sheet-pile walls; fish passage enhancement at stream confluences through manual movement of deposited or placed material; and removal or retrofitting (for fish passage) of undersized, deteriorated, misaligned, or otherwise dysfunctional culverts (culvert replacement is included in the "Road Rehabilitation" activity category) or any other sort of fish passage barrier.
Equipment Used	Excavators, cranes, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement these projects. Any use of blasting techniques for small dam removal must be justified by site-specific conditions, including equipment access difficulties.
Timing	• In-water work would be restricted to the dry season (June 15 to October 15 for tributaries and July 15 to October 15 for the mainstem). Work in intermittent streams may continue beyond November 1, as long as weather conditions permit, and the stream channel remains dry. • Work above OHWM can occur at other times of the year but would adhere to conservation measures such as wildlife seasonal restrictions and the use of erosion and sediment control BMPs. • Post-project revegetation will take place during wet conditions (fall/winter) and will generally occur in riparian areas to maximize use by fish and wildlife species.
Duration	Each restoration effort would be completed in 1-2 construction seasons with the exception of related vegetation management, monitoring, and adaptive management actions.
Monitoring Metrics	Number of instream structures removed or retrofitted

Water Conservation Projects	
Condition, Situation, Trigger	Across the watershed, water use and associated infrastructure warrant improvement and efficiency upgrades to ensure that instream flows are available for fish and wildlife species and associated habitat. Particularly, wherever there are stream diversions that continue to withdraw water when streamflows are at low-flow conditions water conservation systems are warranted.
Applicable ACS Objectives	1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted. 6. Maintain and restore instream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected. 7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.
Proposed Treatments	"Water Conservation Projects" include: water conservation and efficiency outreach; the Well Grant Program (to mitigate for adverse effects of restoration flows on water supplies of private riverside landowners), Instream Flow Dedication (Water Code 1707), storage and forbearance programs, and other similar programs; monitoring to determine low flow thresholds; designing, permitting, and implementing individualized water conservation systems and associated infrastructure (e.g., fish screens). Instream flow restoration from diversion projects will be designed to reduce water withdrawals especially during low flow conditions. New systems may include more efficient intake hoses (i.e., better overall functioning not higher flow conveyance) and low volume pumps; the installation of slow flow systems such as trickle fill, solar, and ram pumps, water storage (off-stream storage tanks and ponds and associated off-channel infrastructure) to raise water tables and other techniques to slow runoff; and full-season forbearance systems to eliminate stream withdrawal during lowest flow periods.
Equipment Used	Excavators, bulldozers, dump trucks, ditch-digging equipment, front-end loaders, and similar equipment may be used to install new and/or improved water systems.
Timing	• In-water work would be restricted to the dry season (June 15 to October 15 for tributaries and July 15 to October 15 for the mainstem). Work in intermittent streams may continue beyond November 1, as long as weather conditions permit, and the stream channel remains dry. • Work above OHWM can occur at other times of the year but would adhere to conservation measures such as wildlife seasonal restrictions and the use of erosion and sediment control BMPs. • Post-project revegetation will take place during wet conditions (fall/winter) and will generally occur in riparian areas to maximize use by fish and wildlife species.
Duration:	Each construction effort would typically be completed in 1-2 construction seasons; however, water conservation efforts and related adaptive management could be ongoing in many situations.
Monitoring Metrics	Volume (cubic feet) of annual average instream water savings; or volume of water diverted during the wet season instead of during the low-flow period.

Salmon Carcass Placement	
Condition, Situation, Trigger	All tributaries where salmon or steelhead runs currently occur but have been reduced compared to historic levels or used to occur but have now been eliminated; in which case, instream food webs are now experiencing a reduction of marine-derived nutrients that support aquatic organisms, including but not limited to juvenile salmonids.
Applicable ACS Objectives	4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.
Proposed Treatments	"Salmon carcass placement" entails obtaining excess carcasses from the Trinity River Hatchery and placing them in throughout the Trinity River watershed, where needed. Distribution of carcasses would occur where anadromous fish are known to be present within the watershed or within areas historically accessible to anadromous fish. Carcasses would be placed randomly within aquatic and riparian areas by placing individual or small groups of carcasses on the ground, in the water, or wedging them into accumulated wood.
Equipment Used	Trucks would be used to transport the fish carcasses from the hatchery to the placement sites and handtools would be used to distribute the carcasses at the site.
Timing	Carcasses would be placed during the normal migration and spawning times (October through January typically), as would naturally occur in the watershed.
Duration	This activity would occur when excess carcasses are available as determined by hatchery managers and when technicians are available to perform the carcass placement.
Monitoring Metrics	Number of HUC 12 tributaries that were supplemented with salmon carcasses per year

Remote Site Incubation (RSI) Supplementation	
Condition, Situation, Trigger	All tributaries where salmon or steelhead runs currently occur but have been reduced compared to historic levels or used to occur but have now been eliminated. RSI's are used for supplementation in tributary streams. There is evidence that incubating and releasing salmonid fry in this way increases the survival of the fry compared to more traditional hatchery practices.
Applicable ACS Objectives	4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.
Proposed Treatments	RSI systems have been utilized throughout anadromous streams of the Pacific Coast to incubate, hatch, and stock various salmonid species as a supplementation tool in remote settings. Units consist of a clarifying tank, an incubation tank, a live cart tank, piping between the water intake and the tanks, a head box (at the upstream water intake point), and gravity-fed water. Salmonid eggs are loaded into the unit and after several weeks, fry volitionally leave the RSI system upon hatching.
Equipment Used	Trucks would be used to transport the eggs and supplies from the Trinity River Hatchery (TRH) to the RSI sites and handtools would be used to install, monitor, maintain, and disassemble the systems.
Timing	Throughout the year, corresponding to salmonid egg availability and life history timelines.
Duration	This activity would occur as determined by NMFS, fish biologists, and hatchery managers.
Monitoring Metrics	Egg survival. Snorkel surveys performed as allowed to document presence, visual health, and distribution.

Bioengineered Bank Stabilization	
Condition, Situation, Trigger	Where streambanks are either actively eroding or at threat of eroding in locations where site conditions do not allow for natural channel meander. Streambank erosion may be a result of either scour related to streamflows or stormwater discharges from overland flows. Bioengineered bank stabilization may be incorporated into the design for a site where other restoration activity categories are proposed (e.g., culvert removal).
Applicable ACS Objectives	3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations. 8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.
Proposed Treatments	Bioengineered Bank Stabilization" may include the following activities individually or as in combination: bank reshaping; slope grading; coir log installation; deformable soil reinforcement (e.g., soil lifts, geogrids) using biodegradable materials; revetment consisting of trees, native plant material installation (herbaceous plants, shrubs, trees), or willow walls; willow siltation baffles; brush mattresses; brush check dams; and brush bundles. Bioengineered project types may also include the placement of large wood in combination with buried riprap, overlain with soil and native vegetation plantings and protected by livestock exclusion fencing. Bioengineered bank stabilization techniques use a minimal amount of hard materials (e.g., rock) and are not intended to include traditional hard engineering techniques. Utilize native materials (logs, cobbles, boulders, etc.) whenever possible, particularly in steeper headwater streams where native materials are readily available. The use of boulders should be limited in scope and quantity, to the minimum necessary to stabilize the slope and protect it from expected stream or overland flows during storms. Boulder structures must be part of a larger restoration design and must include a riparian revegetation element.
Equipment Used	Handtools (when possible), self-propelled logging yarders, excavators, backhoes, or dump trucks.
Timing	• In-water work would be restricted to the dry season (June 15 to October 15 for tributaries and July 15 to October 15 for the mainstem). Work in intermittent streams may continue beyond November 1, as long as weather conditions permit, and the stream channel remains dry. • Work above OHWM can occur at other times of the year but would adhere to conservation measures such as wildlife seasonal restrictions and the use of erosion and sediment control BMPs. • Post-project revegetation will take place during wet conditions (fall/winter) and will generally occur in riparian areas to maximize use by fish and wildlife species.
Duration	Each restoration effort would be completed in 1-2 construction seasons with the exception of related vegetation management, monitoring, and adaptive management actions.
Monitoring Metrics	Linear feet of streambank stabilized

Aquatic, Wetland, Meadow, Riparian, and Upslope Habitat Enhancement, Including Removal of Nonnative Invasive Species and Revegetation with Native Plants	
Condition, Situation, Trigger	In aquatic, wetland, meadow, riparian, and upslope areas within the watershed where the vegetative community has been disturbed by past land practices, wildfire, introduction of nonnative species, or construction activities and where habitat functions (e.g., water quality, biodiversity, etc.) are not properly functioning.
Applicable ACS Objectives	8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability. 9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species
Proposed Treatments	"Aquatic, Wetland, Meadow, Riparian, and Upslope Habitat Enhancement" may involve: removing nonnative terrestrial and aquatic invasive plant species by manual and mechanical methods (i.e., no herbicides); removal of legacy ditches (from prior activities such as mining); removing trees where necessary for watershed restoration (and salvaging for instream placement when appropriate); and revegetating areas with native herbaceous plants (including sedges, rushes, grasses, and forbs), shrubs, and trees. In addition, this activity category includes gathering and installing willow cuttings, stakes, mats, and fences; temporary irrigation; and coordination with upstream operators to control dam releases or instream flow levels to provide water during plant establishment. There are a number of manual and mechanical non-native invasive plant removal methods including prescribed burning, mowing, prescribed grazing, etc. The "Aquatic, Wetland, Meadow, Riparian, and Upslope Habitat Enhancement" activity category would potentially be implemented in correspondence to any of the other restoration activity categories.
Equipment Used	Hand tools, self-propelled logging yarders, excavators, backhoes, dump trucks, chainsaws, and hydraulic post pounders.
Timing	• In-water work would be restricted to the dry season (June 15 to October 15 for tributaries and July 15 to October 15 for the mainstem). Work in intermittent streams may continue beyond November 1, as long as weather conditions permit, and the stream channel remains dry. • Work above OHWM can occur at other times of the year but would adhere to conservation measures such as wildlife seasonal restrictions and the use of erosion and sediment control BMPs. • Post-project revegetation will take place during wet conditions (fall/winter) and will generally occur in riparian areas to maximize use by fish and wildlife species. • Tree removal, clearing, and grubbing during the bird nesting season (January 1 through August 31 for raptors; mid-March through August 15 for non-raptors) would be avoided to the extent possible. When tree removal, clearing, and grubbing activities cannot avoid the bird nesting season, nest clearance surveys per the California Fish and Game Code guidance would be required.
Duration	Each restoration effort would be completed in 1-2 construction seasons with the exception of related vegetation management, monitoring, and adaptive management actions.
Monitoring Metrics	Acres of area restored with native vegetation; acres of invasive plant removal

Road Decommissioning, Maintenance, and Rehabilitation	
Condition, Situation, Trigger	Locations where road-cuts, fill-slopes along roads, and infrastructure (much of which is aging) are not functioning properly as well as locations where roadside drainage is inadequate as shown by rilled or rutted roads and gullied roadside ditches. These conditions have resulted in fine sedimentation, stream channel erosion, and other road-related conditions that are degrading downslope aquatic habitat. In addition, locations along roadways with undersized, deteriorated, misaligned, or otherwise dysfunctional culverts or bridges that warrant replacement.
Applicable ACS Objectives	3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations. 4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities. 5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.
Proposed Treatments	• "Road Maintenance" includes: grading; rocking; and clearing, repairing, or adding drainage structures on existing roads to spread out overland flows and minimize erosion and sedimentation improving downslope hydrologic function. • "Road Rehabilitation" includes out-sloping (shaping the roadway surface to drain toward the fill slope or outside edge of the hillside), roadway rocking, installing rolling dips and critical dips, the addition of water energy dissipaters, the addition of new drainage structures, addressing subsurface water (e.g., underdrains, French drains, French mattresses, permeable fills, etc.), culvert and bridge replacement, and the installation of rock buttresses to stabilize slopes (following slope failures) in an effort to improve drainage and minimize erosion and sedimentation. Constructing or installing a stream crossing, culvert, or bridge may include site excavation, formation, and pouring of a concrete foundation and walls/abutments; installation of metal piles using impact driving techniques for permanent and/or temporary bridge structures; installation of the crossing structure; and placement of bioengineered or rock slope protection (RSP) to protect abutments, piers, and walls. • "Road Decommissioning" includes removing stream-crossing structures, culverts, fords, and other types of stream crossings (e.g., "Humboldt crossings"). Depending on slope, soil type, and other factors, these activities could also include reshaping, ripping, removing berms, seeding, and mulching the decommissioned roadway surface. If the decommissioned road surface is sloped at all, outsloping would need to occur to the extent feasible so that it self-drains. If the decommissioned road surface drains onto unstable highly erodible slopes, it is appropriate to leave a berm in this area to prevent further erosion of soils.
Equipment Used	Excavators, graders, compactors, backhoes, pavers, cranes, vibratory and impact pile drivers, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement these roadway projects.
Timing	• In-water work would be restricted to the dry season (June 15 to October 15 for tributaries and July 15 to October 15 for the mainstem). Work in intermittent streams may continue beyond November 1, as long as weather conditions permit, and the stream channel remains dry. • Work above OHWM can occur at other times of the year but would adhere to conservation measures such as wildlife seasonal restrictions and the use of erosion and sediment control BMPs. • Post-project revegetation will take place during wet conditions (fall/winter) and will generally occur in riparian areas to maximize use by fish and wildlife species.
Duration	Each restoration effort would be completed in 1-2 construction seasons with the exception of related vegetation management, monitoring, and adaptive management actions.
Monitoring Metrics	Number of culverts and stream crossings replaced or removed; linear feet of roadway/trail improved or decommissioned; linear feet of roadway out-sloped