



**FOREST SERVICE HANDBOOK
ANGELES NATIONAL FOREST (R5)
ARCADIA, CA**

FSH 2509.22 – SOIL AND WATER CONSERVATION PRACTICES HANDBOOK

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Digest: This supplement sets forth guidance for the delineation and management of Riparian Conservation Areas (RCAs) on the Angeles National Forest. This supplement works in concert with information contained in the 2005 southern California National Forests' revised land and resource management plans (forest plans).

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02 - OBJECTIVE

1. To present practical, clear guidance for identifying, describing, and delineating Riparian Conservation Areas.
2. To aid assessments of multiple-use capability and suitability in Riparian Conservation Areas.
3. To establish a process for analyzing riparian conditions for the benefit of riparian-dependent resources during management actions within Riparian Conservation Areas.

05 - DEFINITIONS

Aquatic Ecosystems. Stream channels, lakes, reservoirs, ponds, wetlands, vernal pools, seeps, springs, or estuary beds, the water itself, and biotic communities that occur therein.

Bankfull. The bankfull stage corresponds to the discharge at which channel maintenance is the most effective, that is, the discharge for moving sediment, forming or removing bars, forming or changing bends and meanders, and generally doing work that results in the average morphological characteristics of channels (Dunne and Leopold 1978). In channels with flood plains it can be defined as the incipient point of flooding when the channel flows out onto the floodplain.

Channel Incision. The condition in which rivers erode their beds and downcutting occurs.

Duff and Humus. Decomposed plant material that accumulates as a result of litter fall. Humus is the total of the organic compounds in soil exclusive of undecayed plant and animal tissues, their “partial decomposition” products, and the soil biomass. The term is often used synonymously with soil organic matter.

Erosion. The removal of soil by the action of water or wind. Erosion potential should be determined by a combination of the following: soil type, percent slope, percent ground cover, ground disturbance, distance from the stream, and amount and intensity of wind/rainfall. Soil stabilization is determined based on the above site factors.

Litter. Organic plant material that falls to the ground and is decomposing. Plant parts are easily identified and often species may also be identifiable.

Percent Ground Cover. The percentage of ground surface covered by material (rocks, stumps, branches, leaves, litter, duff and living plants less than 5 feet tall.)

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Proper Functioning Condition. Riparian-wetland areas are functioning properly when adequate vegetation, landform, or debris is present to: dissipate energies associated with wind action, wave action, and overland flow from adjacent sites, thereby reducing erosion and improving water quality; filter sediment and aid floodplain development; improve flood-water retention and ground-water recharge; develop root masses that stabilize islands and shoreline features against cutting action; restrict water percolation; develop diverse ponding characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, water-bird breeding, and other uses; and support greater biodiversity (Bureau of Land Management 1998 and 1999).

Riparian Conservation Areas (RCAs). An area delineated next to water features requiring special management practices to maintain and/or improve watershed and riparian-dependent resource conditions (see chapter 2, section 2.5 for more information).

Riparian-Dependent Resources. Natural resources that owe their existence to the riparian area, such as fish, amphibians, reptiles, fairy shrimp and other aquatic invertebrates, plants, birds and mammals, as well as soil and water conditions.

Riparian Ecosystems. The transition zone between the aquatic ecosystem and the adjacent terrestrial ecosystems identified by soil characteristics and distinctive vegetation communities that require free or unbound water (see chapter 2, section 2.2 for more information).

Slash. Organic plant debris resulting from cutting of trees and shrubs. Includes limbs, twigs, and wood chunks.

Streambank. The margins of a stream channel.

Stream Edge. The high water line associated with “bankfull” discharge of perennial streams, or the mean high waterline of lakes and reservoirs.

Streams. All flowing natural waters.

Perennial – Streams that flow continuously throughout the year. They receive water not only from precipitation, but also from subterranean sources such as springs and seeps. They owe their permanency to the groundwater in the area adjoining the stream being at higher elevation than the streambed. Water flowing directly below the channel substrates (gravels) also serves to maintain riparian vegetative conditions.

Intermittent – Streams that flow only at certain times of the year, less than perennial, when they receive water from springs or from melting snow.

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Ephemeral – Streams that flow only in direct response to precipitation, and whose channel is at all times above the water table.

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1.1 - RIPARIAN AREAS

The union of land and water creates a rich and complex ecology. Riparian areas collect and transport water, soil, and organic material from upslope and upstream. They comprise the most potentially productive and diverse components of forest and range ecosystems (section 2.2, exhibit 01). Fish, some wildlife, and some plant species depend on riparian areas for their existence. Riparian areas also provide sources of water for many hikers and backcountry users, as well as the primary setting for many activity specializations such as fishing and waterplay. They constitute the attractive landscape focal points for a majority of recreation uses.

This Forest Service Handbook (FSH) supplement provides guidance for field personnel who manage streams and riparian resources at the site-specific project level. Information contained herein is to be used together with standards and design criteria found in the 2005 southern California national forests' revised land and resource management plans (forest plans).

Riparian Conservation Areas (RCAs) include locations containing aquatic and terrestrial ecosystems -- lands adjacent to perennial, intermittent, and ephemeral streams as well as in and around meadows, lakes, reservoirs, ponds, wetlands, vernal pools, seeps, springs, and other water bodies. These are especially important areas because they are geographical areas where slope and fluvial processes are tightly inter-connected; terrestrial and aquatic systems strongly interact; and are important migration and travel corridors for many species. Land management activities have the potential to disrupt ecosystem processes and interactions resulting in adverse effects over the short and long term.

Riparian Conservation Areas are managed to maintain or improve conditions for riparian-dependent natural resources. Activities should be (a) neutral, (b) move the area closer towards the riparian area desired condition, or (c) move towards the riparian management objectives defined in the forest plans. Watersheds are managed to maintain functioning riparian areas and improve or restore degraded riparian areas to proper functioning condition for native populations of riparian-dependent species.

A Five-Step Project Screening process for RCAs describing how to delineate these areas was developed for part 3 of the forest plans and is referenced in standard S47 and Appendix E.

Guidance found in this FSH supplement is not meant to by-pass the interdisciplinary team (IDT) process involved in project environmental analysis or the protection of other resources. At the site-specific project level, Interdisciplinary Team (IDT) interactions, application of the forest plans Five-Step Project Screening process for RCAs, and use of this FSH supplement should lead to riparian-dependent resource maintenance and/or restoration.

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CHAPTER 1 – IMPORTANCE OF RIPARIAN AREAS

1.11 – Aquatic Habitat

Aquatic organisms require riparian areas for their existence. The collection of water in streams and lakes creates a dynamic aquatic habitat. It may expand to comprise most of the drainage network during runoff periods or collect in pools or moist areas during dry seasons. The quality of aquatic habitat at a site depends on local features and on conditions in the source-area watershed. Local vegetation and geology largely determine the quality of over-bank cover and the structure of the channel. Upstream vegetation, ground cover, and geomorphology largely determine the nature of the food chain and the flow, sediment, and temperature regimes of the water.

1.12 – Wildlife Habitat

Wildlife use riparian areas more than any other type of habitat. Many of the wildlife species in the Southwest depend on riparian habitat for all or part of their life cycles. In addition, a large number of the wildlife species prefer riparian over other habitats. The highest densities of many species are found in association with riparian habitats, including species not considered riparian dependent. Surface water attracts animals. Enriched nutrients and moisture increase the amount, quality, and diversity of food and cover. Riparian areas provide thermal and escape cover and migration corridors for many animals.

1.13 – Watershed Condition

Riparian areas are basic to the hydrologic function of watersheds. Ground cover promotes infiltration and conserves water, soil, and nutrients on-site. Infiltrant soil moisture recharges ground water and base flows. Trees and shrubs regulate floods by dissipating flow energies, control water temperature by shading streams, improve channel structure by adding debris, and supply food to aquatic fauna. Watershed conditions upstream affect riparian areas by influencing the size, frequency, duration, and water quality of floods and base flows.

1.14 – Land Uses

Water of high quality flows from National Forest System lands and many uses depend on this water and forest riparian areas. Surface water attracts wildlife and livestock and is vital to human use such as for drinking water. Enriched nutrients and moisture create productive timber and forage sites. Gentle terrain, aesthetic values, and pleasant microclimates attract recreationists. Various stream characteristics provide the sole source for certain types of fishing and waterplay. Stream and riverbeds often contain valuable mineral deposits. Riparian areas thus can present both opportunities and conflicts for multiple-use planning.

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2.1 - COMPOSITION OF RIPARIAN CONSERVATION AREAS

Riparian Conservation Areas (RCAs) comprise management consideration zones. They combine the ecologic concerns of riparian ecosystems with the hydrologic concerns of floodplains and streamside slopes. Riparian areas include (FSM 2526):

1. All riparian ecosystems
2. All 100-year recurrence interval floodplains
3. All other lands within at least 100 horizontal feet of the annual high-water edge of perennial or interrupted water bodies.

To help establish the boundaries of Riparian Conservation Areas (RCAs) utilize forest plans, part 3, standard S47 and Appendix E. This FSH supplement presents guidelines for managing RCAs (see chapter 3).

2.2 - RIPARIAN ECOSYSTEMS

Riparian ecosystems are distinguished by the presence of free water within the common rooting depth of native perennial plants at least seasonally (10 percent of the time or more). Riparian ecosystems are normally associated with seeps, springs, streams, marshes, ponds, or lakes. They commonly comprise a mixture of water (aquatic) and land (phreatic) ecosystems.

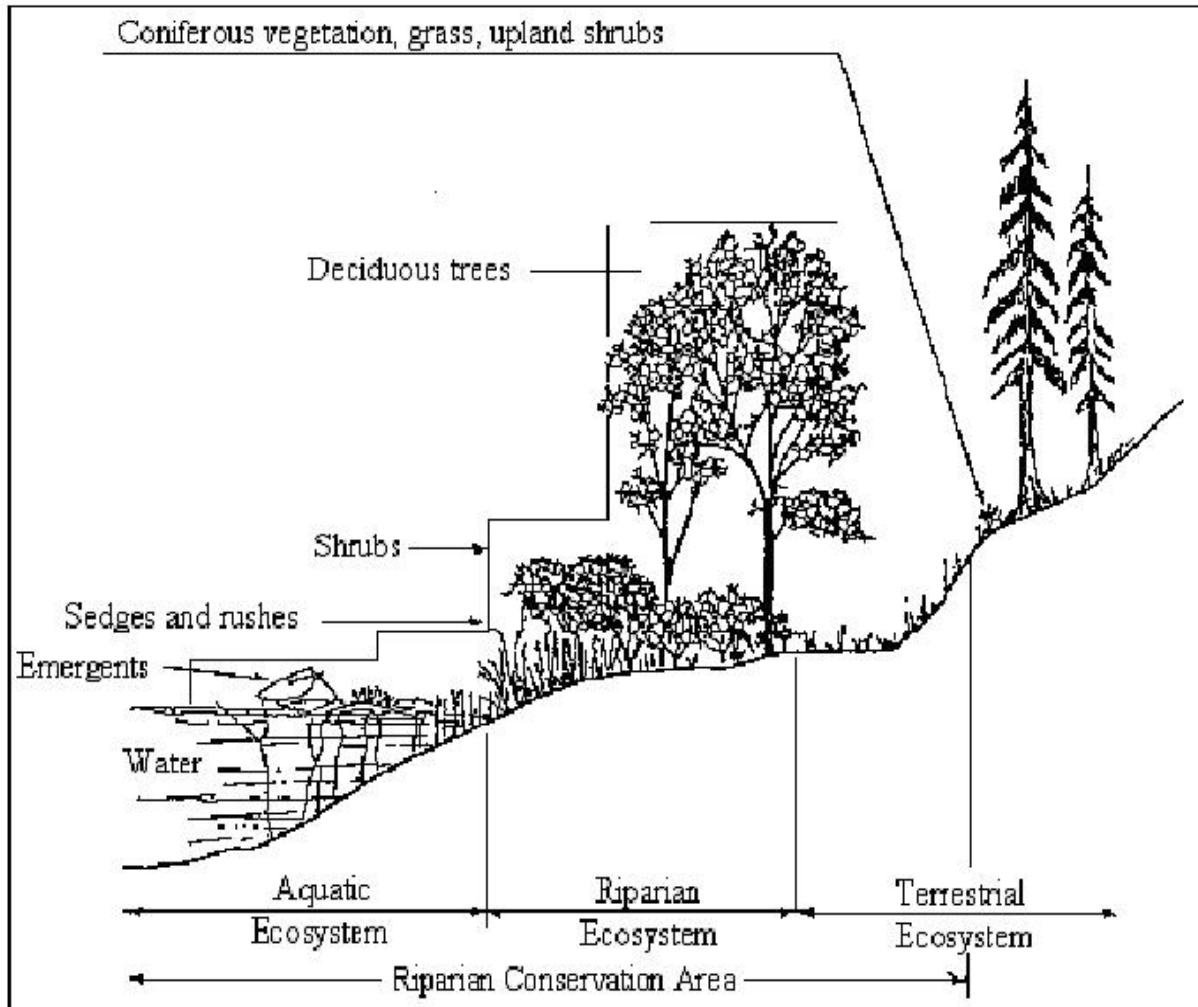
"Free water" occurs from ground water saturation or concentration of downslope-moving subsurface water. Plants can often reliably indicate this condition. In the absence of reliable indicator plants use soil properties or plant communities.

The transition zone between the aquatic ecosystem and the adjacent terrestrial ecosystems can be identified by soil characteristics and distinctive vegetation communities that require free or unbound water (see section 2.2, exhibit 01). Although southern California meadows are generally "dry meadows" and are not truly "aquatic", they are associated with high water tables during portions of the year. Dry meadows are susceptible to impacts from compaction, erosion and head cutting, and should be protected using the measures found in the forest plans, part 3, as well as guidance outlined in this FSH supplement chapter 3, sections 3.21 – 3.38.

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2.2 - Exhibit 01

Riparian ecosystems are identified by vegetation that requires adequate amounts of free or unbound water (modified after Thomas et al. 1979).



2.21 - Indicator Plants

Plants that require at least seasonally free water for all or part of their life cycle indicate a riparian ecosystem. Riparian plants may include, but are not limited to, the following woody and herbaceous species (*Note: not all of the species occur exclusively within riparian areas [for example: oaks, coast redwoods, and so forth]*):

- Acer sp.* (maples)
- Alnus sp.* (alders)
- Baccharis salicifoli* (mulefat)
- Cornus sp.* (dogwoods)

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Emergent vegetation: *Typha sp.* (cattails)
Platanus sp. (sycamores)
Populus sp. (poplars, cottonwoods, aspens)
Quercus sp. (oaks)

Riparian associated grasses and grass-like plants: *Carex sp.*, *Scirpus sp.*, and *Eleocharis sp.* (sedges), and *Juncus sp.* (rushes)
Salix sp. (willows)
Sequoia sempervirens (coast redwood)
Umbellularia sp. (California bay)

Note: At the site-specific level even plants such as berry vines and others may need to be considered as they provide habitat for some amphibian species.

2.22 - Soil Properties

Soils having properties characteristic of at least seasonally free water indicate a riparian ecosystem.

2.23 - Plant Communities

Plant communities distinctly taller or denser than surrounding upland communities and "free water associated" indicate a riparian ecosystem. "Free water associated" means that though the existing dominant plants do not require seasonally free water, they would be associated with plants that do require it (section 2.21) if plant succession were to progress toward a climax community.

2.3 - FLOODPLAINS

Floodplains include, at a minimum, all areas subject to flooding at least once every 100 years (FSM 2527). Use topographic maps and aerial photos at a 1:24,000 or more detailed scale to identify significant floodplains. Include all detectable flat valley bottoms (toeslope-to-toeslope) and all alluvial fans. For specific projects involving capital investment, determine 100-year flood levels to identify floodplains.

2.4 - OTHER LANDS INCLUDED IN RIPARIAN ECOSYSTEMS

Regardless of riparian ecosystem or floodplain width, include all lands within at least 100 horizontal feet of the mean annual high-water edge of perennial or interrupted water bodies in the riparian area (FSM 2526). The Zero Code, section 05 of this FSH supplement contains definitions of perennial, intermittent, and ephemeral streams. Where Forest resources or data are limited, identify major perennial and interrupted water bodies using maps of the State Water Resources Departments, the U.S. Geological Survey, and the U.S. Fish and Wildlife Service.

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2.5 - RIPARIAN CONSERVATION AREAS (RCA)

An area delineated next to water features requiring special management practices to maintain and/or improve watershed and riparian-dependent resource conditions. Riparian Conservation Areas (RCAs) may overlap all land use designations. RCAs include the following areas:

1. Perennial streams, intermittent streams, aquatic ecosystems, meadows and any other areas with riparian conditions (lakes, reservoirs, ponds, wetlands, vernal pools, seeps, and springs), floodplains and inner gorges.
2. Suitable or occupied riparian habitat delineated for threatened, endangered, proposed, candidate, and/or sensitive species.

Perennial streams not having identifiable riparian vegetation should still be managed under RCA guidance. Ephemeral channels carry water to intermittent streams and should be protected to the extent that they do not contribute substantial amounts of sediment and other deleterious materials into the system due to management activities.

The forest plans environmental geographic information systems (GIS) layer and the species accounts, which are located in the forest plans reading room, display or describe water body types and special protection distances for any threatened, endangered, proposed, candidate, or sensitive species. This specific portion of the landscape is managed primarily to protect, maintain, or improve:

1. Water quality,
2. Site productivity,
3. Channel stability,
4. Riparian vegetation, and
5. Riparian-dependent species and habitat including: threatened, endangered, proposed, candidate and sensitive species, as well as many non-federally listed fish, wildlife, and plants

Instructions for project level delineation of RCAs are found in standard S47 and Appendix E in part 3 of the forest plans. Generally, all areas within a horizontal distance of approximately 328 feet (100 meters) from each edge of perennial streams and lakes/reservoirs or within approximately 98 feet (30 meters) of the edge of seasonally flowing/intermittent streams are delineated as RCAs. See this FSH supplement, chapter 3, for management techniques to use within RCAs.

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3.02 - OBJECTIVE

To provide guidance for the consistent delineation and management of Riparian Conservation Areas (RCAs) across the forest. This FSH supplement works in concert with information contained in the 2005 revised forest plans.

3.1 - MAJOR MANAGEMENT CONCERNS

Fish, other aquatic species, some wildlife, and some vegetation rely on water and riparian areas. Important management actions that may use riparian areas on National Forest System lands include timber, grazing, transportation, recreation, mining, and energy management. Understanding the major management concerns of these uses is needed to focus the riparian description on the most meaningful traits. The following list outlines some major management concerns of the riparian resources and uses:

1. Water - flood hazards, channel stability, erosion and sedimentation processes, water quantity and quality.
2. Fish and other aquatic species - food, habitat, channel structure, water quantity and quality.
3. Wildlife - food, habitat, water quantity and quality, microclimate, migration.
4. Vegetation - diversity of species, size classes, and distribution.
5. Timber - site productivity, access, pests.
6. Grazing - water supply, forage, microclimate.
7. Transportation - road location and channel crossing potential, flood hazards, construction materials.
8. Recreation - development potential, aesthetics, microclimate, flood hazards, fishing and hunting potential.
9. Mining - mineral deposits, access, water supply.
10. Energy - dam site potential, water supply.

3.2 - APPLICATION

Apply the Five-Step Project Screening process for Riparian Conservation Areas (RCAs) described in part 3 of the forest plans, standard S47 and Appendix E. In addition, use the

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applicable guidance found in this FSH supplement for site-specific management techniques when conducting activities within RCAs.

1. Stream Protection Measures (Overview). A variety of forest management activities may occur within RCAs, both as planned activities and as emergency actions. The stream protection measures found in chapter 3, sections 3.21 – 3.38 of this FSH supplement apply to all RCAs. The measures are not intended to exclude streamside areas from management for forage, wildlife, water uses or other management activities. They are intended to assist in the design and implementation of projects that maintain and improve conditions for riparian-dependent resources.

3.21 - Stream Protection Measures General to ALL MANAGEMENT ACTIVITIES

1. *ALL APPLICABLE BEST MANAGEMENT PRACTICES (BMPs)* (USDA Forest Service 2000a) *SHOULD BE IDENTIFIED AND FOLLOWED IN ALL GROUND DISTURBING FOREST MANAGEMENT ACTIONS*, including in all contracts, operating plans, and work orders.
2. Prevent or limit activities that could cause channel aggradations or disaggradations (incisions).
3. Limit any activities on defined ground water recharge areas that may introduce contaminants to the groundwater, prevent or significantly reduce water infiltration, or that prevent groundwater from reaching wells.
4. Limit any chemical applications in or near RCAs and use containment methods that minimize risk of entry to surface and ground water.
5. Limit disturbance on incised slopes, meadows, streams, and rehabilitate damage caused by the activity to restore or improve riparian areas.
6. When stabilizing damaged streams, preferentially use methods that emphasize natural stream restoration designs and vegetative stabilization. Use native vegetation for stream restorations whenever possible (USDA Forest Service 2001).
7. Existing uses, activities, or occupancy within RCA's should be evaluated for risks or impacts and mitigated during special use renewal or re-issuance. If mitigation measures are not effective, reassess with the option to modify or eliminate the use, activity or occupancy when impacts are unacceptable.
8. Living native woody riparian vegetation should not be cut or removed, except during road, trail or facility maintenance and where riparian management objectives can be met.
9. Maintain vegetation where practicable to provide adequate shade to meet riparian objectives (based on the potential of the site).

3.22 - General to Any Vegetation Manipulation Projects (other than Prescribed Fire described in section 3.23)

A minimum protective ground cover objective shall be established and maintained **where natural conditions allow** throughout the year. Utilize section 3.22, exhibit 01, Minimum

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Effective Ground Cover based on Erosion Hazard Rating, and the process described in Forest Service Handbook (FSH) 2509.22, Chapter 50 ex, 2(IIc), and the Plumas National Forest Soil Assessment Report (Churchill and others 2002) for guidance on all vegetation-disturbing projects. These minimum effective ground cover percentages were developed primarily for hillslope areas adjacent to riparian areas. Adjustments will need to be made by an earth scientist for prescribing minimum effective ground cover percentages within RCAs. In addition to consulting an earth scientist, refer to FSH 2509.18 regarding soil compaction guidance.

The Erosion Hazard Rating (EHR) is used to guide land management activities on erosive lands. During project activities, minimize excessive loss of organic matter and limit soil disturbance according to the EHR as follows:

3.22 - Exhibit 01

Minimum Effective Ground Cover based on Erosion Hazard Rating.

EHR	Minimum Effective Ground Cover
Low (4-5)	40 percent
Moderate (6-8)	50 percent
High (9-10)	60 percent
Very High (11-13)	70 percent

EHR	Minimum Effective Ground Cover
4 to 8	Conduct normal activities
9 to 10	Minimize or modify use of soil-disturbing activities
11 to 13	Severely limit soil-disturbing activities

1. Protective ground cover consists of any combination of living plants, litter, slash and duff.

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2. Litter and slash should be 2 inches deep, and made up of material 4 inches or less in diameter to qualify as protective ground cover in mixed conifer forests. In other areas outside of mixed conifer forests determine amounts based on local conditions.
3. In forested types duff or humus should be an average of 1 inch deep to qualify as protective groundcover or within site potential. *Note:* this condition seldom exists in chaparral.
4. The USDA Region 5 Rangeland Analysis and Planning Guide (USDA Forest Service 1997) is one source to use for techniques to determine ground cover at the site-specific level.

Vegetation management (removal or alteration) within an RCA should not reduce riparian ground cover by more than 30 percent (maximum) of that which naturally occurs within the project area (does not apply to wildfires or other unplanned emergency actions). Vegetation treatments designed to rejuvenate or protect riparian vegetation, which would only temporarily alter vegetation, are not limited.

Where percent ground cover is less than prescribed, treatments should be applied that increase cover to minimum standards as natural conditions allow. Possible treatments include: establishment of living plants, introduction of litter, slash or other treatments as prescribed by an earth scientist or biologist.

3.23 - Prescribed Fire Projects

Take precautions to ensure protection and/or maintenance of sensitive riparian resources in the design and timing of prescribed burns. Design prescribed burns using species-specific criteria to avoid or minimize adverse effects to riparian-dependent resources and threatened, endangered, proposed, candidate and sensitive species habitats. This does not preclude prescribed burning (for example: backing fires) in riparian areas.

3.24 - Vegetation and Fuels Management and Site Preparation

Excess fuels (resulting from tree or shrub removal or road construction) and undesirable vegetation may be treated as follows:

Catastrophic Events:

1. Where catastrophic events, such as drought kill, insect infestations, large areas of tree blow-downs, floods, and/or fire result in degraded riparian conditions; tree mortality removal, fuelwood cutting and rehabilitation methods may be implemented after applying forest plans standard S47 and Appendix E found in part 3. Ground cover may be re-established along with riparian vegetation.

Silvicultural Treatments or Fuelwood Cutting:

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1. Silvicultural treatments involving tree removal within an RCA should only be implemented to meet the riparian management objectives.
2. Remove trees (including fuelwood) only when an assessment determines that present and future woody debris needs are or would be met and other riparian management objectives are not adversely affected, except for health and safety or community protection needs.
3. Trees may be removed under any silvicultural system, except clear-cut, unless required for forest health or human health and safety needs. No self-propelled ground skidding equipment is allowed within the RCA (exceptions would require input by an earth scientist and/or biologist as described in standard S47 and Appendix E of the forest plans). Maintain a minimum ground cover (as described in Stream Protection Measures section 3.22 above) and ensure shade is adequate to preserve the water temperature regime.

Hand Piling and Burning, Jackpot Burning and/or Broadcast Burning:

1. These activities are permitted, provided that they do not reduce the protective ground cover below the level determined using Stream Protection Measures, unless required for health and safety or community protection needs. Supplemental mulch, living plants, or other treatments should be applied to restore percent ground cover to the required minimum where recovery of natural vegetation is expected to be insufficient. Suitable mulch material includes 2 inches of litter or slash, less than 4 inches in diameter, 1 inch of straw, hay or wood and bark chips that provides for the minimum percent ground cover (see section 3.22, exhibit 01).

Equipment Operation:

1. Self-propelled ground skidding equipment should not be used for fuels management projects, including activities such as tree removal, slash treatment, or site preparation (exceptions would require input by an earth scientist and/or biologist as described in forest plans standard S47 and Appendix E).

Roads and Landings:

1. Only designated temporary roads, classified roads, channel crossings, and their approaches should be allowed within RCAs.
2. Existing roads should be moved, obliterated, and revegetated if it is environmentally favorable to do so, as funding permits.
3. The location of temporary roads should be determined, through involvement by an earth scientist or biologist and/or other qualified personnel (such as: sale administrator) to minimize the chance of off-site sediment delivery to RCAs.
4. All constructed roads built near an RCA should have full slope stabilization treatment.
5. All temporary roads should be removed after use.
6. Skid roads and skid trails should not be constructed within the RCA. However, in those situations where it is authorized, the contracting officer/forest officer may designate equipment-crossing locations for skidding operations on intermittent and ephemeral

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channels (also see Road Construction and Maintenance section 3.30 below). Existing skid roads, skid trails, and landings, assessed on a site-specific basis, should generally not be reconstructed for use, but should be re-vegetated after the activity has ended. Obliteration efforts may be necessary on such temporary facilities to promote rapid re-vegetation.

7. No new landings should be built in the RCA. Old landings should be properly drained and an acceptable ground cover established. *Note:* If it would be environmentally favorable to use the landing once more instead of constructing a new one, then do so using special protective measures as specified by an earth scientist or biologist.

3.25 - Administration of Water Flow and Use

1. Review new special use permit applications for surface and ground water extraction and for transport of water across National Forest System lands and assess the potential impacts on aquatic and riparian ecosystems on or off the forest. Proponents should demonstrate that proposed development would meet the riparian management objectives. Apply forest plans standards S45, S46, S47, and S48 as applicable.

3.26 - Wildland Fire Suppression

1. *FIRE FIGHTER AND PUBLIC SAFETY WILL NOT BE COMPROMISED.*
2. Apply guidance found in FSM 5130 - Wildland Fire Suppression. Avoid construction of dozer and hand lines within RCAs whenever possible. When dozer lines must be constructed, use Minimum Impact Suppression Tactics (MIST), including raising the blade and walking dozers across riparian and aquatic areas (forest plans, part 3, Appendix B). Construct hand lines along the outer perimeter of riparian areas based on high severity fire behavior. Install erosion control measures to protect riparian areas.
3. Refer to "Guidelines for Aerial Applications of Retardants and Foams in Aquatic Environments" (USDA Forest Service 2000b) in forest plans, part 3, Appendix F regarding avoidance of the delivery of chemical retardant, foam, or additives to surface waters (also see MIST). Specifically, direct the use of fire retardant and Class A foam away from riparian areas. Avoid applying retardant and Class A foam to flowing watercourses.
4. A Resource Advisor should be assigned, at the discretion of the Line Officer, to wildland fires to assist in resource protection and considerations during suppression activities.
5. Apply "Guidelines for Emergency Consultation with National Oceanic and Atmospheric Administration (NOAA) Fisheries for Wildland Fires" (National Marine Fisheries Service 2002) and the U.S. Fish and Wildlife Service Guidelines for Emergency Wildfire Suppression.
6. Consider life cycle and habitat requirements of threatened, endangered, proposed, candidate, and sensitive species when developing suppression strategies and tactics in RCAs. Tactics that may affect these species and habitats can include line construction,

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staging, travel routes, water drops, mop-up, and selection of available water-use sites (for water drafting and dipping).

7. The Incident Commander (IC) or Resource Advisor should inform firefighters on the ground and in the air of locations and types of threatened, endangered, proposed, candidate and sensitive species and habitats within or near the incident. In addition, review the requirements of the Endangered Species Act (ESA) 1973, as amended.
8. Avoid “burning out” or “backfires” within RCAs when possible. Low intensity burning may be acceptable. Consult the Resource Advisor during planning sessions regarding the effects of different strategies and tactics in an effort to minimize or avoid impacts to RCAs.
9. Avoid or minimize concentrations of people and equipment, staging areas, helibases, helispots, base camps and drop points in or adjacent to RCAs. If the only suitable location for such activities is within an RCA and time permits, seek a review and recommendation by a Resource Advisor. The Resource Advisor should recommend the location and use conditions, with avoidance of adverse effects to aquatic resources a primary goal. Use an interdisciplinary team to pre-determine incident base and helibase locations during pre-suppression planning.
10. Staging areas, helibases, and other areas that concentrate people and equipment should be rehabilitated or mitigated after the incident.
11. Avoid or minimize opportunities for the introduction of invasive nonnative species (weeds) by working to remove soil and seeds from firefighting equipment prior to use in wildland fire suppression and rehabilitation (for example: truck washing stations and the location of helibases, and so forth). Follow guidance found in forest plans, part 3, Appendix M, Southern California Forest’s Noxious Weed Management Strategy.
12. Conduct monitoring to determine if wildland fire suppression strategies and tactics are meeting riparian objectives found in part 1 of the forest plans. As monitoring results become available, share the results with the Incident Commanders (IC), Line Officers, the Burned-Area Emergency Response (BAER) team leaders, and the forest and regional BAER coordinators.

3.27 - Wildland Fire Rehabilitation

1. Utilize the Burned-Area Emergency Response manual (FSM 2520) and the Burned-Area Emergency Stabilization – Burned-Area Emergency Response handbook and technical reference (FSH 2509.13).
2. Retain adequate down woody material within the riparian area and stream channel, as much as possible. Downed trees with root wads still anchored in the ground should be retained in place. Woody debris well anchored within the active stream channel should be retained in place, with the exception of debris removal BAER treatments prescribed to mitigate potential flood hazards.
3. Prior to implementation, develop prescriptions for the use of plant materials for BAER by a plant resource specialist. This should help ensure that the project is feasible and that

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suitable material is used. Refer to the Introduction of Species section 3.35 below for specific guidelines regarding the selection of appropriate plant materials.

4. Riparian areas should be evaluated by soil and hydrology specialists to determine the most effective treatment to reduce sediment input into the stream.

3.28 - Law Enforcement Activities

1. Work with biologists and earth scientists to avoid activities that would impact RCAs and threatened, endangered, proposed, candidate, or sensitive species habitat (for example: training events, clean-up, or eradication efforts).

3.29 - Administration of Recreation Uses and Special Designation Areas

Developed recreation sites, general forest (dispersed) recreation areas, forest system trails, Wild and Scenic Rivers, Wilderness, and recreation special uses management:

1. Apply forest plans standards S34 and S50, and Appendix D-Adaptive Mitigation for Recreation Uses, to protect threatened, endangered, proposed, candidate and sensitive species and other riparian-dependent resources.
2. Apply protection measures for special designation areas as described in FSM 2320 Wilderness Management and FSM 2370 Wild and Scenic River Management.

3.30 - Road Construction and Maintenance

Interagency Coordination and Permitting:

1. Notify the local Army Corps of Engineers office of individual projects that fall outside a General Permit or nationwide permit for road maintenance. Follow the Corps 404 permit application directions for individual projects involving dredging or filling of Waters of the United States (streams, washes, wetlands), not covered by a General Permit, nationwide permit, or specifically exempted from permit.
2. Contact the Regional Water Quality Control Board to obtain a waiver or certification of projects requiring a Corps 404 permit.
3. Inform local California Department of Fish and Game warden or other designated contact of planned projects with the potential to affect stream channels or riparian areas. (*Note:* pursuant to an existing Memorandum Of Understanding (MOU), the Forest Service is not required to go through the normal application procedures nor pay fees for these projects.)

Road Construction and Maintenance Guidelines (including designing, constructing, and maintaining forest system roads and road crossings):

1. When new or existing routes through RCAs (including meadows) negatively affect riparian-dependent resources, repair, re-route, remove or redesign them to the greatest extent possible.

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2. Design routes to minimize the use of berms, in-sloping, and ditches in order to reduce sources of erosion and sediment contribution to RCAs.
3. Keep road construction to the minimum necessary for approved operating plans or contracts. Construct and maintain roads to minimize damage to riparian and aquatic resources. Roads in and adjacent to RCAs should receive priority for analysis of continued use. When determined that a road is no longer needed through NEPA analysis decommission, obliterate, stabilize, restore, and barricade as necessary (FSH 7709).
4. New culverts, bridges and other stream crossing structures should be designed to accommodate at least a 50-year flood event, including associated bedload and debris movement. Temporary roads (scheduled for less than 1 year of use) do not need to meet this standard, but should follow FSH 7709 regarding schedule for removal procedures. Priority for upgrading existing structures should be based on the potential impact to and the ecological value of the riparian/aquatic resources affected. Crossings should be designed and maintained to prevent diversion of streamflow out of channel. Structures should be designed and maintained to accommodate aquatic species passage (for example: fish, amphibians, and reptiles).
5. Access to work sites should be via pre-existing routes to the greatest extent possible. If new temporary routes are needed, these routes should be reviewed by an earth scientist or biologist prior to approval. All new ground disturbances should be held to the minimal amount necessary to accomplish the job.
6. Minimize removal of existing willows or other native woody riparian species within the project site. After temporary road construction and use is terminated, the site should be returned to pre-existing contours and revegetated where deemed appropriate by the earth scientist or biologist.
7. The Forest Service and/or contractor(s) should develop a Water Pollution Control Plan. This plan should specify details related to sediment and hazardous materials control, dewatering or diversion structures, fueling and equipment management practices, and other factors determined by the forest project engineer and earth scientist or biologist.
8. Designate debris/sediment disposal sites in advance and follow procedures outlined by the earth scientist.
9. Equipment storage, fueling and staging areas should be located on upland sites and use spill containment measures that result in minimal risks of direct drainage into RCAs.
10. Erodible fill material should not be deposited into actively flowing water unless completely unavoidable. Appropriate diversion or sediment control measures should be used to minimize sedimentation of surface water.
11. Equipment or temporarily stored materials should be removed from the stream channel following daily completion of work.
12. Brush, loose soils, or other similar debris material should not be stockpiled within the stream channel or on its banks where it may impact federally listed (threatened, endangered, proposed or candidate) species or wash into the stream.
13. All vehicles and equipment operated within active streams should be inspected daily to insure they are free of any leaks of fuel, cooling, or lubricating fluids.

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14. When needed, diversions of stream flows should be conducted using sandbags or other methods requiring minimal instream disturbance. Silt fencing or other sediment trapping materials should be installed at the downstream end of construction activity to minimize the transport of sediment off-site. Settling ponds, where sediment is collected, should be cleaned out with the sediment deposited on upland areas to prevent the sediment from entering the stream with the onset of the rainy season. Care should be exercised while removing silt fences, to the extent feasible, to prevent debris or sediment from entering the stream.
15. Hazardous materials should be stored at safe distances from RCAs in a designated location designed to contain any spills. All refueling of vehicles should be conducted at designated sites outlined in the project spill plan to prevent any spillage from entering the stream. Cleanup of all project related spills of hazardous materials should follow the Forest Hazardous Materials Response Plan. Spills of hazardous materials should be cleaned up immediately and contaminated soils removed to approved disposal areas (see section 3.33 also).
16. Asphalt or cement equipment should not be rinsed in, or excess products dumped into any creek or other waterway. Asphalt or concrete effluent should not be allowed to enter into wetted stream or RCAs. Remove effluents from standing water before diverting the streambed back to its natural channel. Take all necessary precautions to prevent release of asphalt, cement, or other toxic substances into surface waters. Where work is contracted, refer to Cal Trans, Storm Water Quality Handbooks for guidance and specifications (California Department of Transportation 2003).

Special considerations and actions regarding threatened, endangered, proposed or candidate species are as follows:

1. Prior to initiation of work and where required by a biological opinion, site surveys for the presence of all federally listed species potentially present in the project area(s) should be conducted by biologists using U.S. Fish and Wildlife Service/NOAA Fisheries approved protocols. The final site survey(s) should be conducted as close to initiation of work as possible to ensure detection and possible relocation of species. If any federally listed species are found in the project area during pre-work surveys, additional surveys should be conducted weekly throughout the duration of the project. This should ensure that these species are not re-entering the work area where they may be harmed. If species are found on these subsequent surveys, they should be relocated to nearby suitable habitat. In addition, these newly located emphasis species should be promptly reported to the U.S. Fish and Wildlife Service or NOAA Fisheries by the project biologist. Include information covering the date, time of capture or movement, specific location, habitat type occupied, approximate size, age, sex and apparent health of the species, and a description of the relocation site(s) used.
2. Prior to any construction activities covered by a biological opinion, in projects that would require Endangered Species Act (ESA) section 7 consultation with U.S. Fish and Wildlife

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Service and/or NOAA Fisheries, a biologist should conduct a briefing session for agency and construction personnel involved in projects. At a minimum, this briefing should cover:

- a. Species and habitat identification,
 - b. Protective measures relating to the ESA: the necessity for adhering to the terms and conditions of the consultation, and the penalties associated with violating the ESA,
 - c. Identifying, in the field, the clearly marked boundaries of the project acceptable for disturbance (including clearly defined upstream and downstream limits and lateral limits on either side of the stream, reviewed by the biologist),
 - d. Discuss response procedures if a listed species is encountered during work activity.
3. The forest should submit the name(s) and credentials of all biologists who should handle listed species to the U.S. Fish and Wildlife Service or NOAA Fisheries, at least 15 days prior to the onset of project work. Under exceptional circumstances, when the qualified biologist is absent and imminent threat exists to a federally listed species, any agency employee may move listed species from danger to a suitable habitat out of the project impact zone.
 4. Upon initiation of work, if any listed species are observed in the project area, the biologist or designee should be notified immediately. The biologist should safely move, or capture and relocate the listed species to a predetermined relocation site outside of the influence of the project work area.
 5. The biologist, or approved designee, should visit the site(s) periodically throughout the duration of the project(s). These inspections would insure all feasible measures are being employed to minimize disturbance of stream habitat and any federally listed species. The biologist, or designee, working through the contracting officer may halt work activity if necessary to avoid loss of listed species.
 6. Project related vehicle travel should be minimized to avoid or to reduce impacts to aquatic species and RCAs. Project planning and implementation should include daylight or seasonal restrictions concerning vehicle travel specific to species requirements, (night travel should be avoided for the protection of some species).
 7. If high flows occur during project activities an earth scientist, biologist, or designee should be consulted to determine appropriate actions for the protection of federally listed species and suitable habitat.
 8. Pets of project personnel and employees should not be allowed on site where they may come into contact with any of the federally listed species.
 9. Plans to replace or alter structures should be reviewed by a biologist to ensure they are consistent with biological needs of federally listed species. If project plans change to affect the environment in a different manner, notify the district or forest biologist to re-evaluate impacts before any physical work occurs.

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10. A biologist, or designee, should be present when heavy equipment is used in a flowing channel. The contracting officer/inspector must notify the biologist at least three days prior to initiation of construction activities to allow adequate time for site visits and surveys.
11. Implement all applicable Best Management Practices (BMPs) (see section 3.21), especially:
 - a. Post-storm inspections and maintenance,
 - b. Identification and correction of serious road drainage problems that may contribute to the degradation of RCAs. Riparian resources should receive high priority in road operations and maintenance,
 - c. Regulation of traffic during wet periods to prevent damage to riparian resources (wet weather closures). Establish and document the purpose of each road within the forest road management system,
12. Monitor these actions and use monitoring results to bring operations into compliance with conservation objectives and the forest plans standards. Monitoring would verify the implementation and effectiveness of the above actions to ensure they comply with management objectives.

3.31 - Lands and Special Uses

Land Exchanges, Acquisitions and Sales:

1. All proposed land transactions should include a full evaluation of riparian and aquatic resources on Federal lands, and if necessary, private parcels.

Rights-of-way:

1. All proposed rights-of-way grants should include a full evaluation of riparian and aquatic resources on Federal lands, and if necessary, in private parcels.
2. Locate all new rights-of-way grants on private lands outside RCAs to the extent possible.

Special Uses:

1. In accordance with FSH 2709.11, schedule to review all surface water diversions to ensure compliance with applicable environmental laws such as the Endangered Species Act, Safe Drinking Water Act, Clean Water Act, and so forth.
2. Ensure that proof of water right is established prior to issuing or re-issuing Special Use Permits (S.U.P.).

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3. Where water use is part of a permit or is evident ensure that all S.U.P. applicants have secured the appropriate U.S. Army Corps of Engineers 404 permit, California Department of Fish and Game 1601 Stream Alteration Agreement, and California Regional Water Quality Control Board 401 Certification before issuing a S.U.P. that would result in channel alteration.
4. When issuing S.U.P.s recognize and incorporate traditional uses (for example: Native American gathering of basketry material) and identify possible effects on RCAs and threatened, endangered, proposed, candidate and sensitive species and habitats.

3.32 - Administration of Prospecting and Mining

1. New mineral activities that are likely to cause significant disturbances to surface resources and any modifications, renewals, and reauthorizations of existing approved plans of operation, contracts, or permits implement the forest plans standard S47 and Appendix E.
2. Use forest plans database to identify which mining areas on the forest need special attention. Include review of Plans of Operation (P.O.O.) to ensure that protection of RCAs and riparian resources is provided.
3. Require P.O.O.s for operations and reclamation activities and bonds for all mineral operations that are likely to cause significant surface disturbance within riparian habitat where threatened, endangered, proposed, candidate, and sensitive species may be affected. Plans of operation in threatened, endangered, proposed, candidate, and sensitive habitat should include closures during breeding seasons if necessary.
4. Locate structures, support facilities, and roads outside RCAs where practicable. Where no alternative to placing facilities in RCAs exists, locate them in a way to minimize adverse impacts. Road construction should be kept to the minimum necessary for approved P.O.O.s. Construct and maintain such roads to minimize damage to RCAs and riparian resources. When a road is no longer required, P.O.O.s should include instructions to the miner regarding road obliteration and rehabilitation and reflect that Forest Service would conduct or oversee the roadwork.
5. Avoid the placement of mine tailings, soil and overburden, similar materials or wastes, and sanitary waste facilities in RCAs. Where these restrictions are not feasible, design the activity to eliminate discharges that could cause detrimental effects. Monitor facilities and mining residue in or adjacent to RCAs to ensure discharges are not causing detrimental effects. When detrimental effects are identified take actions to bring them into conformance.
6. For leasable minerals, avoid surface occupancy within RCAs where contracts and leases do not exist. Modify or amend existing operating plans where possible to move towards the riparian desired conditions described in part 1 of the forest plans.
7. Sand and gravel extraction under the Minerals Materials Act should be approved in RCAs if the project follows forest plans standard S47 and Appendix E. Consider only permitting sand, river rock, and gravel mining and extraction within RCAs if no

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alternatives exist, if the action(s) would not retard or prevent the movement towards the riparian desired conditions found in the forest plans, and if long term impacts to riparian-dependent species can be avoided or minimized. Develop site-specific plans prior to any extraction as described in forest plans standard S43.

8. Do not issue permits or authorizations for noncommercial collection of rocks and minerals in areas where such activities may affect threatened, endangered, proposed, candidate, and sensitive species or their habitat.

3.33 - Hazardous Materials

1. Utilize direction found in the forest Hazardous Materials Response Plan to guide responding to Hazmat situations.
2. Fuels and other toxicants should not be stored within RCAs. Refueling should not occur within RCAs unless there are no other alternatives. Refueling sites should be approved by the Forest Service and have an approved spill containment plan.
3. Keep potentially hazardous materials within RCAs only as needed and only at sites designed according to health, safety and resource protection regulations.
4. Place new sources of chemical and pathogenic pollutants so that they do not reach surface or ground water (Clean Water Act, Section 208).
5. Asphalt or concrete equipment should not be rinsed in, or excess products placed into any stream reach. All necessary precautions should be taken to prevent release of asphalt or wet concrete or other toxic substances into surface waters (see section 3.30).
6. Work closely with the district and forest Hazmat Coordinator to guide removal of unauthorized dumps or spills.

3.34 - Livestock and Grazing

1. Rangeland and allotment management practices to achieve desired conditions are: regulating/adjusting livestock numbers and distribution, the season and degree of use, the placement of structural improvements, and salt placement locations.
2. Locate all livestock handling facilities outside of RCAs.
3. Where RCAs are not meeting or moving towards desired conditions, plan and implement rangeland management practices that minimize the impacts. Examples are: develop water sources away from riparian areas, use natural barriers such as logs or brush to discourage use of streams, adjust season of use, and/or construct fences to create riparian enclosures. Fences should be considered as the last management option where possible.
4. A proper functioning condition assessment (Bureau of Land Management 1998 and 1999) should be done during the NEPA analysis or whenever there are indicators that an RCA is not meeting or moving towards desired conditions.
5. Educate and involve the permittee in proper management of RCAs. Incorporate standards found in part 3 of the forest plans into the term grazing permit, part 3, terms and conditions section.

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6. Develop a livestock management program with the permittee that emphasizes RCA short and long term goals and strategies, and an adaptive management approach should be considered in the planning process.
7. Monitor RCAs with the permittee and an interdisciplinary team, when possible.
8. Salt or mineral supplements should not be located within ¼ mile of riparian areas or water sources except as authorized by the forest officer (forest plans standard S53).

3.35 - Introduction of Species (Nonnative Wildlife and Plants)

1. Ensure that invasive nonnative species eradication programs using physical or chemical controls receive full review by appropriate agencies. This review should cover all water quality and public safety concerns in addition to those for any riparian-dependent or threatened, endangered, proposed, candidate, and sensitive species that may be affected.

3.36 - Hydroelectric Project Management

1. Locate new hydroelectric ancillary facilities outside of RCAs, wherever possible. Apply forest plans standard S47 and Appendix E.

3.37 - Fish, Wildlife, Rare Plants and Watershed Management

Species Habitat, Vegetation, or Watershed Restoration:

1. Design, construct and operate fish, wildlife, and watershed restoration, enhancement or interpretive activities in a manner that contributes to the movement towards RCA desired condition as defined in part 1 of the forest plans.

3.38 - Facility Developments

1. Locate structures, support facilities, and roads outside RCAs where practicable. Where no alternative exists, locate them in a way to minimize adverse impacts. Avoid new developments in RCAs unless they are needed for essential management objectives or purposes. Developments include: bridges, approaches, water diversion structures, campgrounds, picnic areas, Forest Service administration sites, recreation residences, and so forth.
2. Adverse impacts associated with occupancy, modification, or development of floodplains shall be avoided or mitigated.