Practice Specification
Forest Stand Improvement (Code 666)
Competing Vegetation Control

I. SCOPE

The work shall consist of conducting the operations specified within this Practice Specification at the locations as shown on the drawings or plans or designated areas as shown on the plan map. The species to be controlled, intensity of vegetation treatment, time of operations, and environmental protection and administrative requirements shall be as listed on the Implementation Requirements Sheet.

The primary purpose, setting, and use for Forest Stand Improvement-Competing Vegetation Control is to improve forest health and reduce wildfire hazard and pest impacts in conifer and mixed confer/hardwood forest stands with substantial understory of brush. Nearly all of California's forest types can benefit and be applicable for vegetation treatments in this specification. This is because on the vast majority of non-industrial private forestlands there has been a significant accumulation of brush fuels due to the absence of low intensity fires and lack of active vegetation management. As fire intervals have dramatically decreased, vegetation growth and accumulations of debris have increased. The result is dense shrub canopies contributing large volumes of fuel and more often than not, acting as "fuel ladders", carrying the inevitable wildfire from the forest floor into the tree canopy.

Given these widespread situations, use of vegetation treatment practices specified in this specification are likely the most frequently and important practice used for forestry by NRCS-CA. This is because reduction of competing vegetation contributes to improving forest health, reducing wildfire hazards, and improving forest resilience to stressor such as wildfire, bark beetle, and drought.

II. Silvicultural Prescriptions for Understory Competing Vegetation

Treatment prescriptions and methods are primarily driven by:

- objectives of the landowner,
- vegetative conditions and species composition,
- the level of fire hazard/fire history on the property and surrounding properties,
- location of the property in relations to human infrastructure,
- terrain,
- need for biodiversity and species of concerns, and
- commercial timber management goals.

There are a number of ways to quantify treatment specifications or "prescription metrics". For this specification the metrics used include "Canopy Closure", "Horizontal Spacing", "Height to Live Crown", and "Vertical Separation". Refer to the graphics for explanation of the specifications.

Fire hazard reduction objectives - For most situations in high fire hazard areas, creating horizontal and vertical space between understory vegetation and overstory trees is the driving objective in determining the treatment vegetation spacing.

- The general specification for horizontal spacing is reduce understory excess brush to 5% - 30% canopy closure or horizontal spacing or 2 times to 6 times the height of the brush.
- The general specification for vertical spacing between retained shrubs and residual overstory forest trees is minimum of 8 feet distance from the top of the shrub to the bottom of the live crown of the residual trees. This metric is also term "height to live crown. Alternatively, 3 times the height of the residual stand shrub.

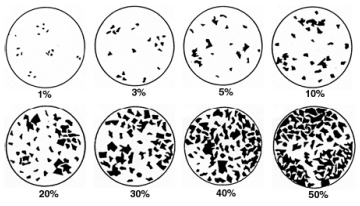
Greater levels of horizontal and vertical spacing are often used in densely populated Wildland Urban Interface areas, low fuel strategic locations identified in a fire control plan for wildfire suppression, or areas surrounded by dense untreated, steep forestland: 10% canopy closure or 4 times the height of shrubs, and >10 feet height to live crown vertical spacing or 3 times the height of the residual stand shrub.

Biodiversity objectives - When forest stands are surrounded by well managed lands with completed fire hazard reduction or when biodiversity objectives and threatened, endangered or species of concern (TES) species habit retention are primary objects, then greater levels of vegetation should be retained: 25% - 40% understory canopy closure and 8 ft distance of height to live crown.

Species composition and their contribution to wildlife habitat, food, and pollinators values is also critical in choosing intensity of treatment and selection/presence of species to be removed. Leaving berry-rich shrubs and mast producing oak instead of less desirable species can improve wildlife habitat conditions.

Commercial timber management objective – For clients with objectives of growing and harvesting commercial-sized timber, low levels of residual brush should be retained. Minimize understory shrub component to less than 20% canopy cover and increase height to live crown to 10 feet.

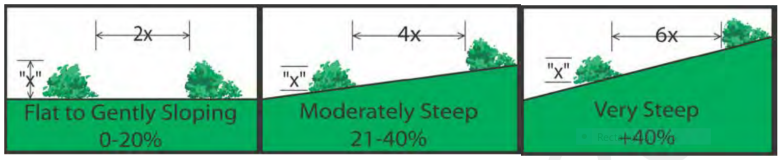
Below are graphic examples of vertical and horizontal spacing guidance:



This illustration shows different canopy densities from an aerial perspective. Shrub canopy densities are often measured through visual estimations using aids such as this to calibrate your view. More accurate densities can be determined using different plot measurements or transects.

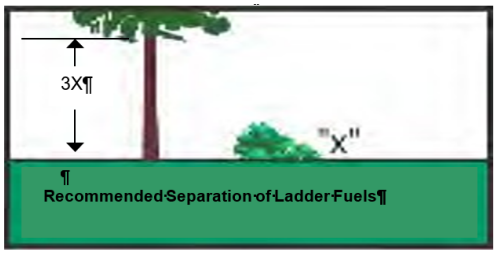
SHRUBS·AND·SMALL·TREES·(<15·ft·tall):·HORIZONTAL·SEPARATION·DISTANCES

Separation·distances·are·measured·between·canopies·(outer·most·branches)·and·not·between·trunks.· Separation·can·be·between·individual·shrubs/small·trees·or·groups·of·shrubs/small·trees.



VERTICAL·SEPARATION·DISTANCES·NEEDED·BETWEEN·FUEL·LAYERS¶

Removal·of·ladder·fuels·is·the·most·critical·feature·of·a·fuel·break.·Remove·shrubs·and·sma... ...es· within·the·drip·line·of·trees·when·sufficient·space·cannot·be·created·between·the·tree·crown·and·top·of· shrub/small·trees.··Pruning·residual·trees·will·also·contribute·to·creating·vertical·separation·of·fuels



Guidance on treatment method:

Mastication, hand cutting and hand pile/burn, and machine cutting and removal of debris for biomass utilization are the preferred methods of treatment. These are the most selective, least ground disturbing, emission reduction methods.

The most used commonly used EQIP practice scenario for Forest Stand Improvement is Competition Control, Mechanical Heavy. When mastication is known to be used, do not add Woody Residue Treatment (Code 384) as there is very likely no additional slash treatment needed. When most other methods are used, such as pushing, brush rake, and cutting, slash will be left on the site so add Woody Residue Treatment, Scenario Forest Slash - Heavy.

Treatment methods are often influenced by species composition and the expected vegetative response (resprouting) following treatment. Treatment of resprouting/coppice species (e.g. live oak, tanoak) will flourish when stems are severed and overstory tree canopies are thinned adding light to the forest floor. Brush species that revegetate via seed will flourish when brush is pushed/brush raked. Selecting a treatment method which results in less post treatment resprouting is the goal. Unfortunately, resprouting of brush is always likely and

pairing a post treatment chemical resprout control of herbicides is needed. Refer to CPS Brush Management (Code 314), and Practice Scenarios for Hand Chemical treatments.

For more information refer to: Applying CPS Forest Stand Improvement (Code 666) in Mixed Conifer Stands of the Sierra Nevada. M. McNichol, NRCS-CA Area 3 Forester, 2011.

III. CHEMICAL TREATMENT

Land users and applicators using chemical herbicides should be cautioned as follows:

All recommendations for the use of pesticides must be by a licensed Agricultural Pest Control Advisor, registered with the County Agricultural Commissioner, in the county where the pesticides will be applied.

For chemical treatment methods, the following will be specified on the Implementation Requirement sheet:

1) Herbicide name
2) Rate of Application or spray volumes
3) Acceptable dates of application
4) Any special herbicide requirements.

If herbicides are handled or applied improperly, or if unused portions are not disposed of safely, they may injure humans, domestic animals, desirable plants, fish or other wildlife, and may contaminate water bodies, nearby crops or other vegetation. Follow the directions and heed all precautions on the container label. Herbicides should not be used over or directly adjacent to ponds, lakes or streams. Landowners and applicators should be aware of and adhere to the provisions of local, county, state or federal laws and regulations concerning the use of agricultural chemicals.

Conformance with permits of all local, state and federal regulations for use of chemicals shall be the responsibility of the landowner. Permits for use of chemicals will specify legally required setbacks from watercourses, ponds, residences, etc.

IV. MECHANICAL METHODS OF TREATMENT

A. Cutting

Adaptation: On sites that have certain species that should be retained, or where reduced numbers of species are required, especially tree-types and large specimens such as manzanita, oaks, madrone, juniper, etc. Number, size, quality, and species to be saved should be determined before cutting begins. If necessary, saved trees should be marked to prevent unnecessary delay in selection by cutters.

Equipment: Chains saws, bow saws, axes, etc.

Operations: Material cut should be salvaged for fuelwood, sawlogs, poles, posts, chips, hogfuel, compost, particle board or other uses. When salvaged material is used for commercial sale, bartering or trading , an appropriate CAL FIRE forest practice permit of the Forest Practice Rules shall be filed with CAL FIRE by a Registered Professional Forester or Licensed Timber Operator as applicable. Remaining tops and limbs should be lopped and scattered or piled for burning or wildlife cover according to the amount of slash left. Stumps will be as low to the ground as possible with the equipment used. Material to be milled will be removed immediately or treated to prevent end checking.

Residual trees saved will be protected from damage during operations.

Wildlife and nesting den trees will not be cut.

Slash burning will be done in openings.

Refer to CPS Woody Residue Treatment (Code 384) for specification for treatment of residual slash.

B. Beating/Flailing/Mastication

Adaptation: Best used for areas supporting stands of mature big sagebrush, greenleaf manzanita, or other non-sprouting species. Sprouting species will require a follow-up treatment to control reemerging sprouts.

Equipment: Flail rotary and circular beaters, circular saw-type equipment, rotary mowers, masticators and the like, brush hogs, etc. All equipment should meet CAL-OSHA standards for operator protection.

Masticator type equipment may be used on slopes up to 35%. Short slope lengths on slopes up to 45%.

When using flail rotary and circular beaters, circular saw-type equipment, rotary mowers and brush hogs the area needs to be generally free of rocks.

Methods: Set equipment to operate about four inches above the ground so that low brush will be cut or shattered. Reduce speed in heavy brush to ensure all brush is cut.

Refer to Conservation Practice Standard (CPS) Woody Residue Treatment (Code 384) for additional specifications for mastication. Note: CPS Woody Residue Treatment scenarios are not typically included in EQIP agreements when CPS Forest Stand Improvement specifies use of Beating/Flailing/Mastication.

C. Brush Raking

Adaptation: Effective on sagebrush, rabbitbrush, and manzanitas.

Equipment: Bulldozer with brush rake. Rakes vary from front mounted to dump rakes that are towed.

Operation: Brush rakes shall penetrate deep enough to pull brush roots out of the ground.

Debris shall be push into windrows on the contour or piles and allowed time to dry. Burn when debris is dry and weather conditions are favorable. Soil accumulated in windrows or piles may need spreading following burning.

Brush raking of manzanita will require follow-up treatment because the soil disturbance will significantly increase the numbers of young manzanita seedlings.

Brush Raking will not be used on slopes exceeding 35%.

Refer to CPS Woody Residue Treatment (Code 384) for additional specifications for Tractor Piling and Windrow.

D. Pushing

Adaptation: Practical for juniper, oak, and tree type shrubs with large main stems. Stands of 20 to 30 percent canopy cover or less should not be considered if plants can be cut and salvaged for wood products.

Equipment: Bulldozer with blade, front end brush rake, or grubber.

Pushing will not be used on slopes exceeding 35%.

Operation: Push debris when the soils are moist (not wet) and burn or chip piles.

Uprooted trees may pushed into piles, or into windrows and burned. Tree boles greater than 10 inches DBH may be decked on site. All limbs and all tops to a 10-inch diameter will be chipped, shredded, or burned to reduce fuel accumulations. Boles will be decked in isolated areas where they will not create fuel hazards or other environmental resource concerns, such as impacts to water or soil quality.

Refer to CPS Woody Residue Treatment (Code 384) for additional specifications for Tractor Piling and Windrow.

E. Crushing

Adaptation: Effective on chamise, manzanitas.

Equipment: Bulldozer with blade or similar piece of equipment.

Operation: Blade is set about 4 to 6 inches above the ground to minimize soil disturbance. It is normally done on mature, brittle plants. It is not suitable on young flexible brush.

Refer to CPS Woody Residue Treatment (Code 384) for additional specifications for Crushing.

V. DISPOSAL REQUIREMENT

The method of disposal shall be as indicated on the Implementation Requirement sheet. Refer to CPS Woody Residue Treatment (Code 384) for additional/complete specifications for disposal of slash.

A. Pile and Burn

Piles and windrows may be burned completely or selectively. Piles left may be good wildlife cover, when created consistent with specification in CPS Early Successional Habitat Development/Management (Code 647).

When disposing of brush, pile and burn in openings between trees to prevent scorching of bark and needles of standing trees.

Burn piles during or immediately after a light precipitation. This will help keep the fires from creeping out of control along ground or blowing away from the pile into surrounding dry material. You may find it easier to cover a portion of the piles with small (4'x4') pieces of heavy decomposable paper prior to precipitation so that you have a dry spot to start your fire.

The piles shall be burned in accordance with the state fire laws as administered by your local fire control agency. Contact the County Air Pollution Control for burn days and applicable permits.

B. Removal

Complete removal of brush from the area to a location as staked in field or as specified on the Implementation Requirement sheet. Removal of slash also includes transportation for utilization at a biomass facility. When slash is removed and used for commercial purposes (sale, bartering or trading), an appropriate CAL FIRE forest practice permit of the Forest Practice Rules shall be filed with CAL FIRE by a Registered Professional Forester or Licensed Timber Operator as applicable.

C. Chipping and scattering of brush

Spread chips evenly over the treated area. If possible, do not place chips closer than 4 feet to residual shrubs and trees.

D. Lop & Scatter

Lop and scatter should only be used when there are low quantities of slash to treat. Use lop and scattering in areas not requiring the disposal of brush.

Limbs are to be cut from the main trunk so that the material lies within 30 inches of the ground, with less than 18 inches depth recommended. In high wildfire hazards areas, overall slash height will not exceed 18 inches.

Do not leave cut material under trees or near remaining brush clumps. Refer to CPS Woody Residue Treatment (Code 384) for additional specifications for additional information for lop and scatter treatment activities.

Large stems and portions of the main trunk larger than 3" in diameter are to be cut into pieces no longer than 30 inches or be removed from the area for firewood.

VI. SPECIAL REQUIREMENTS

1) Permitting and Environmental Compliance - All activities associated with applying practice shall comply with federal, state, tribal and local forestry and related laws and regulations. It is the landowner's

responsibility to obtain appropriate permits and/or applications prior to commencing an activity. Typical permits that may be needed include slash burning from an air quality control district, commercial harvesting permit from CAL FIRE when vegetation is used for commercial purposes, Pesticide Control Advisors Report when herbicides are applied, archeological protection review by NRCS, TES protections, and stream bed alteration permits.

Compliance with State fire protection statutes (Public Resource Code 4427) is required regarding equipment needed during open burning (sharp point shovel and fire extinguisher etc.) and fire suppression tools when operating internal combustion (Public Resource Code 4428). Advise clients to contact local CAL FIRE Office for information. Also, CAL FIRE will advise on periods of no/curtailed operations of equipment use and post operations fire patrols during extreme fire conditions such as Red Flag Warnings or Fire Weather Watch when issued by the National Weather Service.

2) Migratory Birds - Refer to Technical Note TN-Biology-CA-23 for timing forest stand improvement activities to minimize disturbance Migratory Birds. Follow other requirements described above as agreed upon in an ESA consultation with UFWS, NOAA Fisheries, or Requirements of a state or federal permit (i.e. Lake, Streambed Alteration Permit, 401 Water Quality Certification, 404 Clean Water Act.

3) Snags - Projects shall be designed and implemented to retain standing dead and dying trees (snags) as wildlife trees. Snag shall be retained where they pose a minimal hazard to human safety and do not affect infrastructure such as roads, buildings, utilities or public safety or commercial features. Desirable wildlife trees/snags for retention include dead or dying trees and live “culls”; and larger trees with large forked or horizontal branches, broken tops, or existing cavities.

Snag requirements:

a) Retain all snags >15” dbh and >15’ tall within Class I and II perennial watercourse protection zones and within 500’ of meadows.

b) Retain an average of 1-2 snags per acre for all other areas. Snags can be dispersed across the stand or can be clumped into groups of 5-10 when possible.

c) Exceptions to the above requirements:
   - Exception (i): Snags that can fall on roads and structures.
   - Exception (ii): Where required for insect or disease control.
   - Exception (iii): Where it is a threat to human health and safety (hazard).
   - Exception (iv): When a biologist recommends a greater quantity for protection of TES habitat.
   - Exception (v): Fuel breaks.
   - Exception (vi): When the forester and biologist agree the quantities may be reduced, such as to address post wildfire or insect mortality excess biomass/wildfire hazard resource concern in buffer zones.

d) Snags shall be designated prior to operations to ensure a sufficient number are retained, suitable snags are selected, and appropriate locations are sited.

4) TES - No known threatened, endangered, sensitive (TES) or rare plants or animals will be disturbed, harmed or harassed, except when authorized by the relevant regulatory agencies. Measures to avoid adverse effects to TES may be required if known species are present or suitable habitat is found on-site in areas accessible to TES. In consultation with NRCS Biologist, develop a project alternative that avoids or minimizes these potential effects. Avoidance and/or minimization measures may include:

- Buffer zones around nests and dens,
- Limitations to types of equipment and/or times used,
- Limited operating periods,
- TES monitoring prior to or during activities,
- Additional snag and downlog retention.
- Any requirements when provided from ESA consultation with USFWS, NOAA Fisheries, or requirements of a state or federal permit (i.e. Lake, Streambed Alteration Permit, 401 Water Quality Certification, 404 Clean Water Act.)

5) Biological retention areas – Areas of uncut live and dead trees, shrubs, and grass/forbs, are recommended to be retained on the site for biodiversity and erosion control purposes. Untreated patches may include watercourse buffers or coincide with unique features such as rock outcrops, down logs and snags, woodrat middens, or other valuable habitat elements.

When size of an individual untreated areas exceeds 2% of the size of the treatment area, it is excluded from payment. The sum of small untreated areas should not exceed 15% of treatment area. (Example: 10 acre/43,560 sq ft treatment unit. Maximum size of untreated area = .2 ac/ 8700 sq ft./ 93 ft by 93 ft. Maximum cumulative amount of untreated areas = 1.5 acres.

6) Watercourses and Meadow Protection Standards - The Implementation Requirements shall include information on watercourses, riparian areas, wetlands, including a map, in the project area. Protection measures/treatment limitations must be provided when the project affects any Class I or II perennial watercourses, or Class III seasonal/intermittent watercourses (see California Forest Practices rules section 14 CCR 895.1). Refer to the Table1 below for watercourse protection zones in non-anadromous water bodies. If slopes are greater than 40%, the buffer will extend to the topographic break above the stream. All watercourse riparian stream buffer areas exclude entry by heavy equipment, except at existing crossing or designated locations.

Vegetation treatment and heavy equipment is generally excluded in watercourse buffer zones, particularly in remote areas that are not associated with WUI areas or presence of public safety infrastructure. These exclusions are needed to continue large snag/wood recruitment and avoid impacts to species that utilize aquatic and riparian areas such as fish, red-legged and yellow-legged frogs, Pacific fisher, and great gray owl.

Table 1 – Protection measures/treatment limitations for watercourse protection zones (Buffer Zones)

	Class I wet	Class II wet	Class III dry	Class III wet	Wet meadow
Work Exclusion Zone (from channel edge or edge of meadow)	25 ft.	25 ft.	None	25 ft.	100 ft.
Heavy Equipment Exclusion Zone (Hand work only)	75 ft.	25 ft.	25 ft.	25 ft.	N/A
Total Buffer for Limited Work	**100 ft.**	**50 ft.**	**25 ft.**	**50 ft.**	**100 ft.**

Vegetative treatments and equipment entry within watercourse buffer zones can be included when an assessment is made that the buffer treatment is needed to protect human life, structures, or public safety and commercial infrastructure assets that are at risk to damage from wildfires. Vegetative treatments and equipment entry to address post wildfire and insect mortality resource concerns can also be included following an assessment and consultation with a NRCS biologist. Contact a NRCS biologist early in the planning process if working in the buffer zones. Consultations may be required with USFWS, NOAA Fisheries, or other state or federal regulatory agencies (i.e. Lake, Streambed Alteration Permit, 401 Water Quality Certification, 404 Clean Water Act.)

Forest management operations outside the watercourse buffer zones will ensure tree falling and other operations minimize felled trees enter into buffer zones. Slash will not be placed, piled or burned in any watercourse channel, buffer zone, or ephemeral drainage carrying seasonal runoff. Additional operating restrictions around ponds will apply, contact below NRCS Biologist for specification.

7) Use of heavy equipment - Thinning and shrub treatment projects often use mechanical cutting heavy machinery to cut, push or masticate vegetation. Special precautions should be taken to avoid environmental impacts from use of heavy equipment in these operations:

a) Do not damage boles (remove bark) of live, standing, residual trees during equipment operations.

b) CAL FIRE will advise on periods of no/curtailed operations of equipment use and post operations fire patrols during extreme fire conditions such as Red Flag Warnings or Fire Weather Watch when issued by the National Weather Service.

8) Maintaining Soil Quality/Soil Health - All operations will be planned and executed in a manner that maintains or improves soil quality. This includes using machinery that minimizes compaction, displacement, rutting and other disturbances to the forest floor. Surface organic material will be retained or improved throughout the treatment process.

Soils, site factors, and timing of application must be suitable for any ground-based equipment utilized to avoid excessive compaction, rutting, or damage to the soil surface layer.

Operations with heavy equipment shall not occur during periods of wet weather with saturated soil conditions as defined by the California Forest Practice Rules.

No new tractor trails or heavy equipment operations on slopes greater than 35%, except for limited distances on up to 45% slopes.

9) Pest Control -

a) Pine Beetle Infestations: When feasible, delay cutting live trees until the end of the bark beetle breeding period is completed, typically late fall. Avoid long time delays (2 months during March-September breeding season) between green vegetation piling and burning.

b) Sudden Oak Death (SOD) and Goldspotted Oak Borer: In areas with known infections of pathogen or insects, specific sanitation precaution will be implemented including no transport of woody debris outside the State designated Zone of Infestation, covering vegetative debris moved by vehicles, and equipment sanitization measures. Sanitation of equipment entering and leave these zones of infection is recommended. See Best management Practices:

- SOD: https://www.suddenoakdeath.org/wp-content/uploads/2014/12/forestry-08-10-with-new-2014-map.pdf
- Goldspotted Oak Borer: http://ipm.ucanr.edu/PMG/PESTNOTES/pn74163.html

10) Archeology - No operations may begin until archeological clearance is provided by NRCS. No operations will occur in known archeology or historical sites.

VII. GENERAL

When broadcast burning is used for slash disposal, client's qualified representative will prepare a burn plan per CPS Prescribed Burning (Code 338).

Where additional slash treatment is needed, use CPS Woody Residue Treatment (Code 384).

On sites with soils that are subject to excessive erosion, a plan shall be prepared to prevent or control the erosion.

The client or client's RPF representative shall conduct an on-site, pre-operational meeting with client's vegetation treatment contractor hired to perform the work. The meeting will review property lines, watercourse protection zones, equipment limitation zones, sensitive plant/animal species, known cultural sites, and possible seasonal restrictions for nesting birds.

VIII. BASIS OF ACCEPTANCE

Upon completion of the work conducted by the owner/client, a field inspection will be made to determine if 85 percent of the planned work as described within the Plan has been satisfactory completed.

IX. OPERATION AND MAINTENANCE

Once a year after the completion of the work, the owner/client will conduct a field inspection to determine the area that requires additional attention to advance the Forest Stand Improvement, and to identify locations that need work to reduce soil erosion.