



Natural Resources Conservation Service
CONSERVATION PRACTICE STANDARD
FOREST STAND IMPROVEMENT

Code 666

(Ac.)

DEFINITION

The manipulation of species composition, stand structure, or stand density by cutting or killing selected trees or understory vegetation to achieve desired forest conditions or obtain ecosystem services.

PURPOSE

- Improve and sustain forest health and productivity
- Reduce damage from pests and moisture stress
- Initiate forest stand regeneration
- Reduce fire risk and hazard and facilitate prescribed burning
- Restore or maintain natural plant communities
- Improve wildlife and pollinator habitat
- Alter quantity, quality, and timing of water yield
- Increase or maintain carbon storage

CONDITIONS WHERE PRACTICE APPLIES

All land where the quantity and quality of trees can be enhanced.

CRITERIA

General Criteria Applicable to All Purposes

Describe the extent or size and orientation of treatment area(s).

Identify and retain preferred tree and understory species to achieve all planned purposes and landowner objectives.

Use available guidelines for species and species groups to determine spacing, density, size-class distribution, number of trees, and amount of understory species to be retained. Schedule treatments to avoid overstocked conditions using approved silvicultural/ stocking guides.

Describe the current and desired future condition of each stand that will be treated. Include the species, cover type, and size-class distribution. Stocking will be described in terms of crop trees per acre, basal area per acre, trees per acre, between-tree spacing, or by any other appropriate and professionally accepted density or stocking protocol.

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State office](#) or visit the [Field Office Technical Guide](#).
<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg/>

NRCS, CA
August 2016

The harvest-regeneration strategy will be identified for all planned forest improvement harvesting:

- Uneven-aged management systems (e.g., single-tree selection, group selection, coppice selection)
- Even-aged management (e.g., clear-cut, seed-tree, shelterwood, coppice)

Refer to WIN-PST criteria in NRCS Conservation Practice Standard (CPS) Code 595, Integrated Pest Management, and comply with applicable State and local laws if an herbicide will be used.

Time tree felling to avoid buildup of insect or disease populations.

Implement forest stand improvement activities in ways that avoid or minimize soil erosion, compaction, rutting, and damage to remaining vegetation, and that maintain hydrologic conditions. Protect site resources by selecting the method, felling direction and timing of tree felling, and heavy equipment operation. For temporary access use NRCS CPS Code 655, Forest Trails and Landings, to protect soil and site resources from vehicle impacts.

Use NRCS CPS Code 560, Access Road, for more heavily used roads associated with forest stand improvement activities.

Where slash and debris will be generated, use NRCS CPS Code 384, Woody Residue Treatment, to appropriately treat slash and debris, as necessary, to assure that it will not present an unacceptable fire, safety, environmental, or pest hazard. Remaining woody material will be placed so that it does not interfere with the intended purpose or other management activities. Do not burn vegetative residues except where fire hazard or threats from diseases and insects are of concern or when other management objectives are best achieved through burning. When slash and other debris will be burned onsite use NRCS CPS Code 338, Prescribed Burning.

Comply with State best management practices for water quality (California Forest Practice Rules).

Additional Criteria to Improve and Sustain Forest Health and Productivity

Treatments, including woody biomass removal, will be sustainable and will not compromise soil organic matter, the recruitment and retention of coarse woody debris, or wildlife habitat. If needed, use NRCS CPS 384, Woody Residue Treatment. If applicable, use biomass harvesting guidelines (The Forest Guild, 2010) and/or State guidance.

Manipulate stand characteristics to mitigate risk of insects and disease. Examples of stand manipulations include creating a diversity of tree species and a mosaic of age classes.

Additional Criteria to Reduce Wildfire Risk and Hazard and Facilitate Prescribed Burning

Reduce stocking rates and alter spatial arrangement of trees to minimize crown-to-crown spread of fire.

Further treat or eliminate slash accumulations next to roads and trails.

Use criteria for wildfire risk and damage reduction, including reduction of ladder fuels, in NRCS CPS Codes 383, Fuel Break; 384, Woody Residue Treatment; 394, Firebreak, or 660 Tree/Shrub Pruning as appropriate.

Additional Criteria to Improve Wildlife and Pollinator Habitat

Manage for specific or a variety of cover types, species, size-classes, and stocking rates at the appropriate scale that meet desired wildlife habitat requirements.

Create, recruit, and maintain sufficient snags, nest, cavity, and den trees, and down woody material to meet requirements of desired species.

Use one or more of the following tools for improving wildlife habitat:

- State Wildlife Habitat Guidelines as described in the California Wildlife Habitat Relationships (CWHR),
- California Wildlife Habitat Evaluation Guide (Forestland & Woodland, Riparian, and/or Wetland)
- Stream and wetland habitat assessments
 - NRCS Stream Visual Assessment Protocol (SVAP)
 - Hydrogeomorphic Wetlands Assessment (HGM)
 - California Rapid Assessment Methods (CRAM)
 - Proper Functioning Condition Assessment (PFC)
- CA Biology Technical Note 24
- CA Biology Technical Note 25

For Pollinator habitat refer to the Pollinator Habitat Assessment on Range and Pasture.

Use habitat creation and maintenance criteria in NRCS CPS Codes 643, Restoration and Management of Rare and Declining Habitats; Code 645, Upland Wildlife Habitat Management; or Code 644, Wetland Wildlife Habitat Management, as appropriate, to manage wildlife-related activities.

Additional Criteria to Alter Quantity, Quality and Timing of Water Yield

Create a mosaic of age classes to increase water yield and stabilize seasonal water yield from watersheds.

Create openings in the forest canopy to allow more light to reach the ground, stimulating understory vegetation and diversifying plant species composition and vertical structure. These improvements will increase rainfall infiltration, snowfall accumulations, and reduce runoff thereby reducing soil erosion and improving water quality and quantity.

Additional Criteria to Increase Carbon Storage

Manage for tree species and stocking rates that have higher rates of growth and potential for carbon sequestration.

CONSIDERATIONS

Considerations for Wildlife and Pollinator Habitat

Consider removing vines from crop trees but retaining vines with wildlife value (e.g., grape and poison oak) on non-crop trees.

Increase quantity and quality of important mast (seeds, catkins, fruits, and nuts) sources for wildlife through crop tree management and other techniques.

Improve horizontal diversity or patchiness (of different age class units) across the forest for a variety of wildlife.

To the extent consistent with wildfire hazard reduction or other silvicultural objectives for commercial harvesting, improve or maintain vertical structure or vegetative layering in treated stands.

Favor declining wildlife species by providing appropriately sized treatment areas or blocks of habitat.

Time forest stand improvement activities to minimize disturbance of seasonal pollinator and wildlife activities, such as nesting, movement, etc. Refer to Tech Note 23 for NRCS process to reduce impacts to migratory birds. Refer to existing ESA consultations for process and measures to reduce impacts to federal listed fish and wildlife species. Refer to requirements of federal permits (CWA 404), and state permits (Streambed alteration permit 1600, Water Quality Certification 401).

Considerations for Improving and Sustaining Forest Health and Productivity

Silvicultural treatments that reduce wildfire hazards and pest risks should be a primary consideration in areas of high wildfire hazards. These include reducing understory tree and shrubs stocking levels, increasing both horizontal and vertical spacing between residual trees and shrubs, and slash treatment.

In developing the intermediate cuts before the final harvest cut, use a spacing guide which leaves a varying number of trees, depending upon site indices and average diameter class. Use spacing guide where this information is available.

Clients may only want to thin one time. If the stand exceeds 5 inches average diameter, an alternative is to increase the D+X spacing to that for a ten-inch diameter tree. Clients need to be aware that this may require more maintenance of the understory and pruning to maintain satisfactory growth and to develop quality material.

Leave healthy, full crowned, well-formed trees.

In mixed stands, favor the best adapted and highest quality species growing on the site.

Thin the highest site indices first.

Remove trees in the following categories: Crooked, dead or dying, diseased, and injured.

The best time for thinning to avoid Ips beetle

If available use sanitation-salvage and risk-rating criteria to determine trees to remove during forest stand improvement operations (see Thinning and Sanitation in Donaldson and Seybold 1998).

Silvicultural objectives and harvest-regeneration strategies may change over time and may be limited by prior management.

Consider enlisting the assistance of a professional forester when seeking to rehabilitate degraded stands that have been repeatedly subjected to exploitative harvesting (high-grading). Often a complex site-specific treatment plan must be developed to overcome repeated exploitative timber harvest.

Successful regeneration of desirable species is usually dependent upon timely application of forest stand improvement and other practices, such as prescribed burning, site preparation, tree and shrub establishment, prescribed grazing, and access control. Use of natural regeneration methods are acceptable when a sufficient quantity, quality and variety of species are found on the site.

The extent, timing, size of treatment area, or intensity of the practice application, should be adjusted to minimize cumulative effects (onsite and offsite), such as hydrologic and stream alteration, habitat fragmentation, nutrient cycling, biodiversity, and visual resources.

Consider retaining at least 1/4 to 1/3 of the slash, tops, and limbs after harvest to protect site productivity. When using whole-tree harvesting systems minimize the removal of needles or leaves by

harvesting in the dormant season, retaining fine woody materials onsite, or leaving felled trees onsite to allow for needle or leaf drop.

Consider controlling invasive plants if they are encountered while conducting forest stand improvement. Use NRCS CPS Codes 314, Brush Management; or 315, Herbaceous Weed control, as appropriate.

When available, report the minimum criteria (diameter at breast height, log length, etc.) for commercial forest products (sawtimber, pulpwood, etc.) in order to know when to direct a client to a professional forester.

Consider advising landowners to secure a written contract with a service provider that specifically describes the extent of activity, duration of activity, liability and responsibilities of each party, and amount and timing of payments for services provided.

Clients should be advised of responsibilities of wildfire control and consider the development of a wildfire control plan including “defensible” space, access routes, fire-season water source, and location of wildfire control facilities.

Considerations for the Harvest of Forest Products

Harvest, or other timber operations, for commercial purposes is under the control of the California Board of Forestry and Fire Protection.

Anything harvested for commercial purposes needs to have a harvest plan developed as per the Forest Practice Rules and prepared by a Registered Professional Forester

Timber operations refers to the cutting or removal, or both, of timber or other solid wood forest products, including Christmas trees and firewood, from timber-lands for commercial purposes. The minimum sized tree for a commercial saw log is 10 inch D.B.H. The log must be 10 feet long with a minimum diameter of 6 inches on the small end.

Discuss alternative harvest methods based on terrain and erosion hazard rating for soils.

Soil compaction should be considered in the design of the transportation and harvesting system.

Consider the development and/or maintenance of an adequate and permanent road system with permanent landings. At each entry, address access issues, install permanent erosion control structures and take steps to hydrologically disconnect drainages from road and trail system from natural water drainage systems. Take the opportunity to upgrade and/or repair forest infrastructure (e.g., roads, crossings, gates, etc.).

Discuss the establishment of buffer zones along streams and around mountain meadows, consistent with meadow or aspen forest restoration objectives.

Consideration for Use of Forest Biomass

Utilize excess woody debris (forest biomass) for renewable energy or other commercial uses. Commercial uses of biomass require a timber harvesting permit consistent with the California Forestry Practice Rules issued by the California Department of Forestry and Fire Protection.

Biomass removals, intensity and frequency will be managed to prevent long-term negative impacts on the stand.

The harvesting of biomass shall be accomplished in a manner that will not compromise the other intended purpose(s) and functions. If applicable refer to State woody biomass Best Management Practices (BMPs).

Considerations for Increasing Carbon Storage

Critical to maintaining forests as a carbon sink is to first ensure the forest is resilient to wildfire and pests.

To increase carbon storage, consider shifting from even-aged to uneven-aged management to increase the retention of carbon onsite. Use regeneration methods that encourage advanced regeneration and retention of mature trees, such as shelterwood, to retain carbon onsite for longer periods. Consider retaining snags and downed woody debris for additional onsite carbon storage, and adopt techniques for maintaining soil quality, including organic carbon retention.

To grow trees that can store carbon in durable manufactured products, consider lengthening rotations to retain mature trees longer and grow to larger sizes; also consider using crop tree management techniques (Perkey et al. 1994) to concentrate growth on suitable long-lived species.

Considerations for Visual Quality

When forest stand improvement is being used to improve visual quality consider leaving trees that are attractive in shape and structure or flower and are appropriate to the site, especially around structures, roads, and home sites.

PLANS AND SPECIFICATIONS

Plans and specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, implementation requirements (job sheets), technical notes, and narrative statements in the conservation plan, Forest Management Plan, or other acceptable documentation. Clearly state the goals and objectives of the forest stand improvement. Specific stand-stocking guidelines will clearly document both the pre- and post-treatment stand condition.

OPERATION AND MAINTENANCE

Prepare an Operation and Maintenance plan for the site and review it with the operator. The plan will describe actions that must be taken to ensure that the practice is applied correctly during its design life. As a minimum, include periodic inspections for assessment of insects, disease, and other pests, storm damage, and damage by trespass. Use NRCS CPS Code 655, Forest Trails and Landings, to control erosion on forest roads, skid trails, landings, and adjacent areas by installing/maintaining vegetative and structural practices. Treatments needed for pests—see Additional Criteria to Improve and Sustain Forest Health and Productivity section in this document. Treatments needed for storm damage—use NRCS CPS Code 384, Woody Residue Treatment, to appropriately treat slash and debris. Treatments for damage by trespass: use NRCS CPS Code 472, Access Control, to prevent future damage.

Following initial application some regrowth, resprouting, or reoccurrence should be expected. Spot treatment of individual plants or areas needing retreatment should be done as needed. These may need to be periodically controlled by any number of methods including cutting, use of prescribed fire, mowing or chemical application.^{1/} When chemicals are used, they must be used in accordance with label instructions and state regulations.

^{1/} Chemical application recommendations and application rates will be made by a licensed applicator, farm advisor.

REFERENCES

BLM, 1998. A User Guide to Assessing Proper Functioning Condition (PFC) and the Supporting Science for Lotic Areas. USDI-Bureau of Land Management TR 1737-15. 1998.

California Forest Practice Rules 2016. Procedure for Estimating Surface Soil Erosion Hazard Rating Sections 912.5 [912.32.5, 912.52.5]; Harvesting Practices and Erosion Control Sections 914 [934, 954] to 914.9 [934.9, 954.9]; Watercourse and Lake Protection Sections 916 [936, 956] to 916.12 [936.12, 956.12]; Logging Roads, Landings, and Logging Road Watercourse Crossings Sections 923 [943, 963] to 923.9.1[943.91.1, 963.9.1]. Available at: http://calfire.ca.gov/resource_mgt/downloads/2016_ForestPracticeRules-Act.pdf (verified August, 2016)

California Rapid Assessment Methods. Available at: <http://www.cramwetlands.org/> (Resources & Documents). (verified August, 2016).

CWHR Wildlife Habitats - California Wildlife Habitat Relationships System. 2016. Available at: <https://www.wildlife.ca.gov/Data/CWHR/Wildlife-Habitats> (verified August, 2016).

Donaldson, S., and S.J. Seybold. 1998. Thinning and Sanitation: Tools for the Management of Bark Beetles in the Lake Tahoe Basin. NV Cooperative Extension Service Fact Sheet 98-42. Available at: <http://www.unce.unr.edu/publications/files/ho/other/fs9842.pdf> (verified August, 2016).

Firewise Communities. Available at: <http://www.firewise.org/> (verified August, 2016).

Gartner, T., J. Mulligan, S. Rowan, and J. Gunn, eds. 2013. Natural Infrastructure: Investing in Forested Landscapes for Source Water Protection in the United States. World Resources Institute. Available at: <http://www.wri.org/publication/natural-infrastructure> (verified August, 2016).

The Forest Guild. 2010. Forest Biomass Retention and Harvesting Guidelines for the Northeast. Available at: http://www.forestguild.org/publications/research/2010/FG_Biomass_Guidelines_NE.pdf (verified August, 2016).

NRCS CA Pollinator Habitat Assessment Guide: Pasture and Rangeland. 2015. Available at: https://efotg.sc.egov.usda.gov/references/public/CA/Pollinator_Habitat_Assessment_Range-Pasture_8-2015.pdf (verified August, 2016).

NRCS, Stream Visual Assessment Protocol Version 2, 2009. Available at: https://efotg.sc.egov.usda.gov/references/public/CA/SVAP2_12-09.pdf (verified August, 2016).

NRCS, Hydrogeomorphic (HGM) Wetlands Assessment. Available at: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/water/wetlands/assess/>

NRCS CA Technical Note. TN-Biology-CA-23: Conservation Measures to Reduce Impacts to Nesting Migratory Birds. December 2015. Available at: [https://efotg.sc.egov.usda.gov/references/public/CA/TN_Biology-CA-23_\(12-15\).pdf](https://efotg.sc.egov.usda.gov/references/public/CA/TN_Biology-CA-23_(12-15).pdf)

NRCS CA Technical Note. TN-Biology-CA-24: Balancing wildlife needs with fuels management: A Conundrum CA Stewardship Program 2015 (Summer 2010). Available at: https://efotg.sc.egov.usda.gov/references/public/CA/Balancing_WildlifeNeeds_w_Fuels_Mgmt.pdf

NRCS CA Technical Note. TN-Biology-CA-25: Forest Wildlife: Forest Stewardship Series 8. Available at: https://efotg.sc.egov.usda.gov/references/public/CA/Forest_Wildlife_Pub8238.pdf

NRCS CA Wildlife Habitat Evaluation Guide: Available at:

https://efotg.sc.egov.usda.gov/references/public/CA/CA_WHEG_12-2013_Final.xlsx.

USDA-NRCS. National Biology Manual, National Forestry Handbook, and National Forestry Manual.

Available at the NRCS eDirectives system: <http://directives.sc.egov.usda.gov/default.aspx>.

USDA USFS: The Effects of Thinning and Similar Stand Treatments on Fire Behavior in Western Forests. PNW-GTR-463. Sept 1999. http://www.fs.fed.us/pnw/pubs/pnw_gtr463.pdf (verified Aug. 2016).

USDA USFS: Science Basis for Changing Forest Structure to Modify Wildfire Behavior and Severity. RMRS-GTR-120. April 2004. http://www.fs.fed.us/rm/pubs/rmrs_gtr120.pdf (verified August, 2016).

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION

**666B - FOREST STAND IMPROVEMENT
PONDEROSA PINE/JEFFREY PINE/
SIERRA NEVADA MIXED CONIFER**

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.

II. FOREST LAND WEEDING

Scalping will be a minimum of 5 feet in diameter with all the surface vegetation removed. If a mulch which will persist more than 3 years is used, the scalps may be a minimum of 4 feet in diameter.

Hardwood treatment: Cut or sever the stems or sprouts at the base within a minimum 5 foot diameter. If a mulch will persist more than three years is utilized the area may be a minimum of 4 feet in diameter.

Follow-up: Follow-up original weeding method once each year to determine results and recovery of released trees.

III. PONDEROSA PINE AND ASSOCIATED SPECIES

Start thinning operations in Ponderosa Pine at 15 to 20 years of age. Because the cost of thinning needs to be curtailed, only one thinning operation should be considered before the stand reaches merchantability. The thinning practice is often based upon one operation in tree sizes of average stand diameter from 6 to 10 inches D.B.H. In other cases, thinning should include treatment of all diameters sizes necessary to meet post-harvest basal area, tree per acre, and fire hazard reduction objectives. Thinning intensity should consider the minimum sized merchantable products. Stands averaging less than 6 inches dbh may require two thinning operations.

Timing thinning operations during November through April will lessen the possibility of bark beetle damage to the residual stand.

Ponderosa Pine, and the species associated with it, can sometimes and in some areas be sold as small sawlogs for dimension lumber, biomass chips for heat and power generation, poles, piling, firewood, and Christmas trees. Where this is the case, thinning can begin at or before the time the trees reach the size of the merchantable product. When harvested trees are used for a commercial purposes a harvest plan or permit must be developed as per the Forest Practice Rules and prepared by a Registered Professional Forester.

The spacing distance between leave trees is based upon maintaining a level of basal area that will reduce competition until the stand reaches merchantable size. Several different methods can be used to do this.

- 1) A simple method is to cut a pole the length of the spacing desired, and use this as the spacing distance between the leave trees. This is a particularly good system in young stands where the trees have not expressed dominance.
- 2) Use a standard D+ factor, where "D" is the diameter in inches changed to feet, plus the standard factor. Example: Ponderosa pine, D+6. Diameter is 7 inches. 7 feet + 6 feet = 13 foot spacing distance.
- 3) Spacing by a calculated and tabulated guide, based upon Site Index: Using any method, favor leave trees of superior form and vigor, rather than trying to achieve exact spacing. For example: Assume desired spacing is 14 feet. Some trees may actually be 12 feet apart, and others may be 15 feet apart, etc.

Tabulated in Table 1 are recommended thinning spacing guides for stands of ponderosa pine by Site Indexes. The calculations are based on the assumption that the rate of diameter growth will be increased 100 percent or more.

For pure stands of interior Douglas-fir, use Table 2.

IV. SLASH DISPOSAL

Slash disposal methods may include lopping and scattering, burning, chipping, etc.

Overall slash height will not exceed 30 inches, and less than 18 inches depth is recommended. In high wildfire hazards areas, overall slash height will not exceed 18 inches.

When slash is around infrastructure, more complete slash treatment is required. Refer to the California Forest Practice Rules for guidance on slash treatment requirements in these situations. For slash along public roads and main haul roads, all slash within one chain (66 feet) horizontally on each side of the road center will be reduced to a level acceptable to the local fire district or CAL FIRE within 3 months after operations

Ips (bark beetles) Control. *Ips pini*, pine engraver, found throughout California with the exception of the coastal ranges, normally only has one generation per year. *Ips paraconfusus*, California fivespined Ips, found west of the summits of the Cascades and Sierra Nevada's, including the Coast range, may have multiple generations per year depending upon locality and season. *Ips mexicanus*, Monterey pine Ips, is found in the coastal ranges. Up to three generations per year may occur.

The possibility of increased *Ips* activity is dependent upon site characteristics such as open or closed canopy, aspect, precipitation zone, and elevation. Forest management activities in low elevation ponderosa pine (below 3500 feet) and Jeffrey pine can be more susceptible to *Ips* than similar activities at higher activities. The best time to thin and avoid *Ips* beetle damage from thinning activities is from September through April. If *Ips* is anticipated to be a major problem slash from thinning activities will be treated.

Where *Ips* is considered to be a major problem:

- 1) All pine slash from 3 to 9 inches outside bark diameter will be cut into pieces no longer than 30 inches.
- 2) All pine slash exceeding 9 inches outside bark diameter will be cut into pieces no longer than 18 inches.
- 3) All pine slash will be monitored for infestations of Ips for a period of 1 year after thinning operations are complete. If the slash becomes infested, CAL FIRE will be notified for assistance in treating the infestation.
- 4) Preferably, treat slash via burning, chipping, or removal prior to the next insect breeding period.

V. SPECIAL REQUIREMENTS

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 a ESA consultations 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).

VI. 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.

VII. 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 require additional attention to advance the Forest Stand Improvement, and to identify locations that need work to reduce soil erosion.

Table 1. Thinning Guide for Ponderosa Pine based on Site Index (SI) by Meyer**Spacing for Ponderosa pine:**SI 113+ (D+5 Spacing when average diameter exceeds 6 inches [Growing Stock Level 106])

Tree Diameter at Breast Height (D.B.H.) (inches)	Trees per Acre to Leave at any age up to 10" D.B. H	Average Spacing between Leave Trees (Feet)
1-3	436	10
4-5	360	11
6	360	11
7	303	12
8	258	13
9	222	14
10	194	15

SI 85 - 112 (D+6 Spacing when average diameter exceeds 6 inches [Growing Stock Level 93])

Tree Diameter at Breast Height (D.B.H.) (inches)	Trees per Acre to Leave at any age up to 10" D.B. H	Average Spacing between Leave Trees (Feet)
1-3	436	10
4-5	360	11
6	303	12
7	258	13
8	222	14
9	194	15
10	170	16

SI 70 - 84 (D+7 Spacing when average diameter exceeds 6 inches [Growing Stock Level 82])

Tree Diameter at Breast Height (D.B.H.) (inches)	Trees per Acre to Leave at any age up to 10" D.B. H	Average Spacing between Leave Trees (Feet)
1-3	360	11
4-5	303	12
6	250	13
7	222	14
8	194	15
9	170	16
10	151	17

Table 1. Thinning Guide for Ponderosa Pine based on Site Index (SI) by Meyer (continued)**Spacing for Ponderosa pine (continued):**SI 60 - 69 (D+8 Spacing when average diameter exceeds 6 inches [Growing Stock Level 73])

Tree Diameter at Breast Height (D.B.H.) (inches)	Trees per Acre to Leave at any age up to 10" D.B. H	Average Spacing between Leave Trees (Feet)
1-3	303	12
4-5	250	13
6	222	14
7	194	15
8	170	16
9	151	17
10	134	18

Eastside Pine Type:SI 85+ (D+7 Spacing when average diameter exceeds 6 inches [Growing Stock Level 82])

Tree Diameter at Breast Height (D.B.H.) (inches)	Trees per Acre to Leave at any age up to 10" D.B. H	Average Spacing between Leave Trees (Feet)
1-3	360	11
4-5	303	12
6	250	13
7	222	14
8	194	15
9	170	16
10	151	17

SI 57 – 84 (D+8 Spacing when average diameter exceeds 6 inches [Growing Stock Level 73])

Tree Diameter at Breast Height (D.B.H.) (inches)	Trees per Acre to Leave at any age up to 10" D.B. H	Average Spacing between Leave Trees (Feet)
1-3	303	12
4-5	250	13
6	222	14
7	194	15
8	170	16
9	151	17
10	134	18

Table 1. Thinning Guide for Ponderosa Pine based on Site Index (SI) by Meyer (continued)**Eastside Pine Type (continued):**

SI 43 – 57 (D+10 Spacing when average diameter exceeds 6 inches [Growing Stock Level 60])

Tree Diameter at Breast Height (D.B.H.) (inches)	Trees per Acre to Leave at any age up to 10" D.B. H	Average Spacing between Leave Trees (Feet)
1-3	222	14
4-5	194	15
6	170	16
7	151	17
8	134	18
9	121	19
10	109	20

SI 42 or less (D+12 Spacing when average diameter exceeds 6 inches [Growing Stock Level 50])

Tree Diameter at Breast Height (D.B.H.) (inches)	Trees per Acre to Leave at any age up to 10" D.B. H	Average Spacing between Leave Trees (Feet)
1-3	194	15
4-5	151	17
6	134	18
7	121	19
8	109	20
9	99	21
10	90	22

Table 2. Managed Douglas-fir

PLANNING GUIDE-FOR MANAGED DOUGLAS-FIR

Site Index	100	120	140	160	180	200
Spacing (Ft)*	D+6	D+5	D+5	D+4	D+4	D+4
Thinning Cycle (Yrs)	12	10	8	6	4	3
Rotation for 12" Trees (Yrs)	72	60	48	36	25	20
Rotation for 16" Trees (Yrs)	96	80	64	48	32	25

* Add 1 or 2 feet for woodland grazing

U.S DEPARTMENT OF AGRICULTURE
 NATURAL RESOURCES CONSERVATION SERVICE
 CALIFORNIA

**IMPLEMENTATION REQUIREMENTS
 FOR
 666 - FOREST STAND IMPROVEMENT
 666B - FOREST STAND IMPROVEMENT
 PONDEROSA PINE/ SIERRAN MIXED CONIFER**

For: **Business Name:** _

Job Location:

County: El Dorado

Farm/Tract No.:

Contract No.:

Prepared By: C.Zimny/B. Hutcheson, RPF, NRCS contractor

Date: 8/8/18

IT SHALL BE THE RESPONSIBILITY OF THE OWNER TO OBTAIN ALL NECESSARY PERMITS AND/OR RIGHTS, AND TO COMPLY WITH ALL ORDINANCES AND LAWS PERTAINING TO THIS installation.

Installation shall be in accordance with the following drawings, specifications and special requirements. NO CHANGES ARE TO BE MADE IN THE DRAWINGS OR SPECIFICATIONS WITHOUT PRIOR APPROVAL OF THE NRCS TECHNICIAN.

1. **Drawing No. or Map Names:** See Plan Map. Practice applies to RMU 2; 29 ac;
2. **Practice Specification(s):** 666 Scenario # 10 - Wildlife, Fire, and Forest Health, Large Stem
3. **Work will be done during the following time period:** During times pursuant to wildlife assessment findings. No operations during saturated soil conditions as defined in the California Forest Practice Rules. Consistent with wildfire hazard limitations.
4. **Acres to be treated:** 29.0 acres
5. **Site Index:** 105; Dunning I and II Source: X On-Site

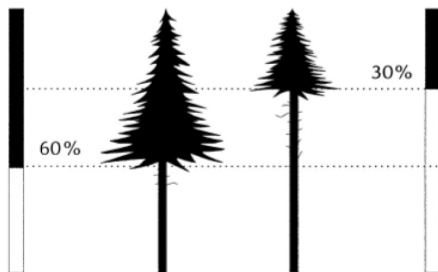
6. Pre- and Post- Treatment Conditions:

Measurement	Existing Conditions	Desired Conditions
Dominant Tree Species	Ponderosa pine (PP), Douglas-fir (DF), Black Oak (BO), Incense Cedar (IC) White fir (WF)and Sugar pine (SP)	Retain current species composition with favoring Black Oak.
Approx. Number of Trees per Acre	295 Trees/acre; plus regeneration	100 trees/acre (Overstory and understory excluding regeneration)

Average Distance between Trees	10 ft.	Five feet between tree crowns; approx. 20 ft. bole spacing (D+10) (see Tree Thinning below)
Average Tree Diameter	12 inches DBH	>16 "DBH
Tree Diameter Range	12-30 inches DBH	12-30 inches DBH
Basal Area	140 ft. sq.	110 ft. sq.
Tree Canopy Cover	65%	50%
Shrub composition	Bear clover, ceanothus, manzanita, snowberry	Retain mixed of species
Shrub cover (%)	10%	Retain 10%

7. Objectives and Treatment Prescription: Primary objectives are to reduce wildfire hazard, susceptibility of live forest to pest damage, and improve forest health through stocking control and brush reduction. Work will be done by hand treatment or machinery equipment . This will be accomplished by:

- A. **Dead and Dying Trees:** Treat dead and dying trees of all size classes (except those retained for snags and downs logs).
- B. **Tree thinning:**
- Thin live trees sizes 3 inches DBH minimum to 12 inches DBH maximum.
 - Thin to obtain five to 12 feet between tree crowns.
 - Space retained trees to a maximum up 20 feet bole spacing. Use D+10 as spacing guideline.
 - Trees to be removed shall be selected by the following criteria, in order - dead/dying trees, trees showing sign of disease/insect infestation, those which have been overtopped by adjacent trees, trees with poor bole/crown form. Retain trees that are healthy and have a live crown ratio of at least 30% see graphic)



- Priority of species for retention is as follows (highest to lowest priority):
 - Douglas fir
 - Ponderosa pine
 - White fir
 - Black or white oak. - Oak should be retained to a minimum of 10 sq. of basal area per acre.
 - Incense cedar
- A sample mark may be done at the request of the landowner or contractor.

- Stumps shall be left no higher than 6 inches on the up-hill side unless embedded metal or other safety concerns are evident.
- Felling practices shall protect the residual stand from damage.
- Operations will be in dry soil conditions to the greatest extent possible. Soils will not rut greater than 6 inches in depth over distances greater than 25%. Displacement will not affect more than 10% of any acre.

8. Tree Thinning Technique: Hand Thinning N/A Chemical Treatment Mechanical Thinning

9. Debris Disposal: All vegetation cut during thinning operations shall be treated by chipping or hand/tractor pile and burning. See Implementation requirement Practice 384.

10. Special Requirements:

For fire hazard reduction, all material will be removed from the treatment unit or treated as described above. If logs are to be decked on site, all limbs and all tops to a 10-inch diameter will be chipped, shredded, or burned to reduce fuel accumulations. Logs 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.

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.

No operations during periods of curtailed equipment use designated by local fire authorities or Cal Fire.

When logs or slash material is commercially utilized (removed and sold, barter or traded for services) a CAL FIRE forest practice permit shall be required. An appropriate permit (e.g. emergency notice or exemption) shall be filed by the land owner, Licensed Timber Operator, or Registered Professional Forester. Timber operations, including (but not limited to) Watercourse & Lake Protection Zones, and erosion control installations related to timber operations will follow requirements set forth in resulting guidance.

11. Watercourse and meadow protection standards (see attached map)

The project contains Class III (seasonal/intermittent) watercourses. Refer to the Table1 below for watercourse protection requirements.

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

	Class 1 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.

Buffer Zones distance apply to each side of watercourse. 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.

Forest management operations outside the watercourse buffer zones will ensure tree falling and other operations will not fell trees into buffer zones so that no part of the tree enters buffer. Slash will not be placed, piled or burned in any watercourse channel, buffer zone, or ephemeral drainage carrying seasonal runoff.

Flagging will be established to delineate watercourses, riparian areas, and wetland buffers.

12. Migratory Birds and TES

Project activities will not commence until a biologist concurrence is received.

Migratory Birds: Work will not occur during the migratory bird nesting season unless an assessment is conducted to determine active nesting or breeding behavior. Assessments will be completed by NRCS staff persons knowledge on migratory birds. Assessments shall be conducted within ten days prior to the start of work.

Project vegetation treatment work implemented before April 1st and after July 15th. is not required to conduct migratory bird assessments.

TES: No known threatened, endanger, sensitive (TES) or rare plants or animals, including migratory birds, will be disturbed or harmed. The treatment area contains known TES species and habitat for others. Great Grey Owl has been observed in the meadow area on the property. The meadow and other perennial stream areas contain habitat for Foothill Yellow Legged Frog.

Avoidance and/or minimization measures include the following:

Great Grey Owl – No operations during January through July within 500 feet of meadow or known nest sites unless an assessment is conducted to determine active nesting or breeding behavior.

Foothill Yellow Legged Frog– No operations during December through August in Class I and II watercourse buffer zones or 100 feet of meadows unless an assessment is conducted to determine presence of species.

13. Snags

Projects shall be designed and implemented to retain standing dead and dying trees (snags) as wildlife trees. 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:

Retain all snags >16” dbh and >24’ tall within Class I and II perennial watercourse buffer zones and within 500 feet of meadows.

Retain an average of 1-2 snags per acre for all other areas.

Snags shall be designated prior to operations.

Exceptions to the above requirements: Snags that can fall on roads and structures or are a threat to human health and safety (hazard).

14. Downlogs

Retain all pre-existing large wood on the forest floor, ≥ 18 inch dbh and 20’ length. Where debris is smaller diameter, retain at least six of the largest down logs per acre.

Exceptions to the above requirements: (a): When downlogs are serving as brood habitat for beetle infestation;(b): Where the density is such that it would contribute significantly to ground fuels.

15. Retention areas

Retain some woody debris and untreated areas for biological diversity. Retain small vegetated areas that coincide with unique features such as wet areas, riparin buffer zones, rocky or steep terrain, down logs and snags, or other valuable habitat elements. Target retaining/untreated 15% of the vegetation in the project area.

16. Archeology

No operations may begin until archeological clearance is providing by NRCS. No operations in known archeology or historical sites.

17. Basis of Acceptance

Upon completion of the work conducted by the owner/client, a field inspection will be made to determine if at least 85 percent of the planned work as described within the IR has been satisfactory completed. Individual untreated areas should not exceed 2% of the entire treatment unit. Untreated areas greater in size should be excluded from payment.

18. Operation and maintenance:

Competing vegetation will be kept under 25% canopy cover per acre over the lifespan of the practice. Practice life-10 years.

JOB CLASSIFICATION AND PRACTICE APPROVAL:

			JOB CLASS				
Practice Code/Name	Controlling Factors	Units	I	II	III	IV	V
666 Forest Stand Improvement	Stand Complexity	Number of Overstory Species	<4	<6	<10	All	All
	Site Sensitivity	Harvest Equipment Operability Rating from Soil Survey	Well Suited	Moderately Suited	Poorly Suited	All	All
	Fire Risk	Fuel Model and NWCG Fire Behavior Class	Woodland/ Grass, Low Fire Behavior	Low to Mod Fuel Load Shrub; Moderate Fire Behavior	High Fuel Load Shrub, Timber Slash; High or Extreme Fire Behavior	All	All

This project is Job Class: **III**

Plan Approved by: _____ Date: _____

LANDOWNER'S/OPERATOR'S ACKNOWLEDGEMENT:

The landowner/operator acknowledges that:

- a. They have received a copy of the maps, specifications, and additional requirements. They have an understanding of the contents and the requirements.
- b. They have obtained all the necessary permits.
- c. No changes will be made in the installation of the job without prior concurrence of the NRCS technician.
- d. Maintenance of the installed work is necessary for proper performance during the project life.

Accepted by: _____ Date: _____

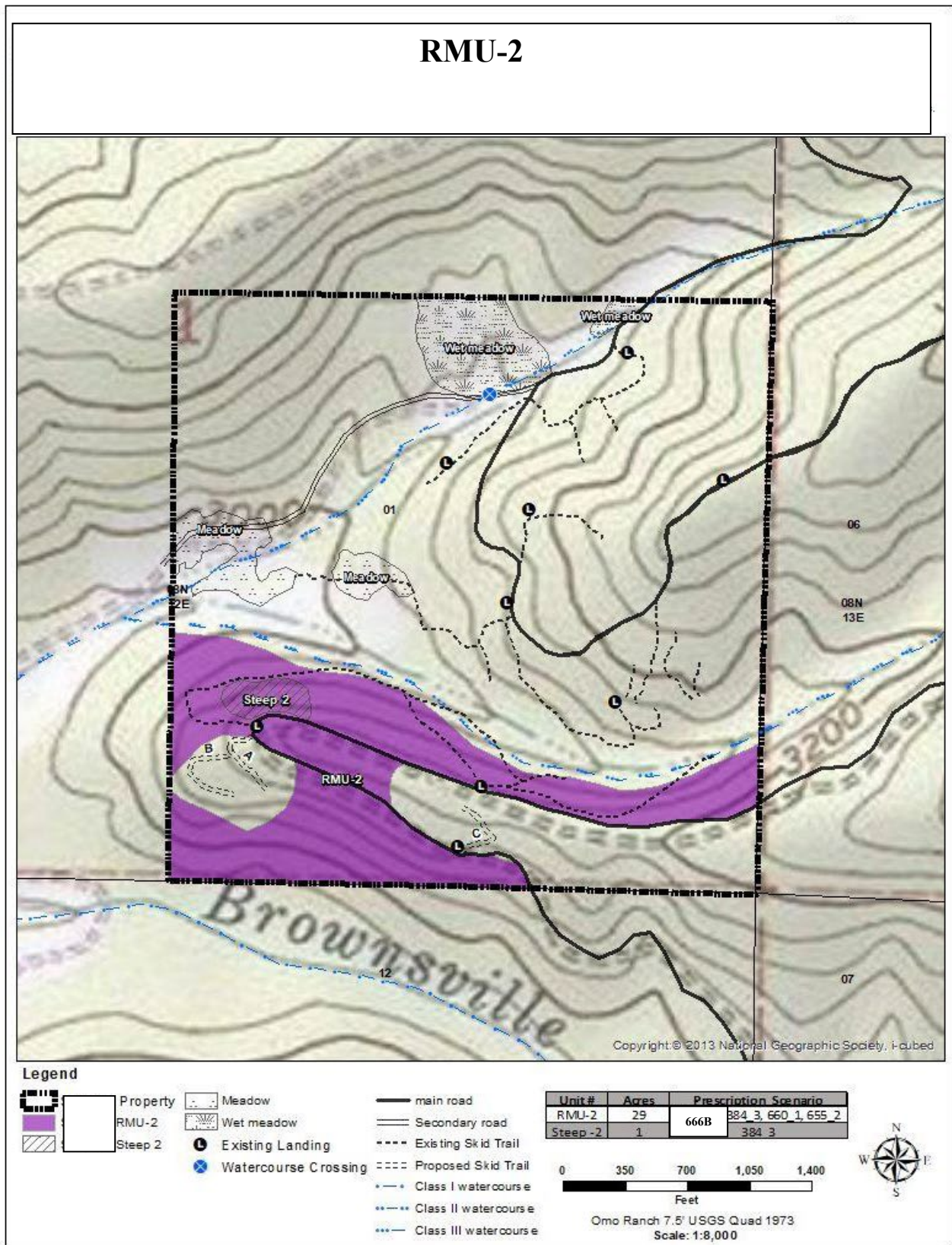
PRACTICE COMPLETION:

I have made an on site inspection of the site (or I am accepting owner/contractor documentation), and have determined that the job as installed does conform to the drawings and practice specifications.

Completion Certification by:

/s/ _____ Date _____

Watercourse map:



NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION

**666D – FOREST STAND IMPROVEMENT
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 and the time of operations shall be as listed on the Implementation Requirements Sheet.

II. 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.

III. 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. 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.

B. Beating/Flailing/Mastication

Adaptation: Limited to 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° with rocks on the surface. Short slope lengths on slopes up to 40 – 45°

When using flail rotary and circular beaters, circular saw-type equipment, rotary mowers and brush hogs the area needs to be free of rocks and on slopes less than 30°.

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 insure all brush is cut.

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 and allowed time to dry. Burn when debris is dry and weather conditions are favorable. Soil accumulated in windrows 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.

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 20 to 25%.

Operation: Push debris when the soils are moist (not wet).

Uprooted trees may be left in place, pushed into piles, or into windrows.

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.

IV. DISPOSAL REQUIREMENT

The method of disposal shall be as indicated on the Implementation Requirement sheet.

A. Pile and Burn

Piles and windrows may be burned completely or selectively. Piles left may be good wildlife cover.

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 plastic sheets 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.

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 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. For additional information on lop and scatter requirements for tree species see 666A, B, & C – Forest Stand Improvement, Specifications.

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.

V. SPECIAL REQUIREMENTS

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 a ESA consultations 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).

VI. GENERAL

When burning, the designated agency will prepare a burn plan per 338 – Prescribed Burning.

Where additional slash treatment is needed, use Practice 384 – Woody Residue Treatment.

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

VII. 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.

VIII. 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.

U.S DEPARTMENT OF AGRICULTURE
 NATURAL RESOURCES CONSERVATION SERVICE
 CALIFORNIA

**IMPLEMENTATION REQUIREMENTS
 FOR
 666 - FOREST STAND IMPROVEMENT**

666D COMPETITION CONTROL

For: **Business Name:** _

Job Location:

County:

Farm/Tract No.:

Contract No.:

Prepared By:

Date:

IT SHALL BE THE RESPONSIBILITY OF THE OWNER TO OBTAIN ALL NECESSARY PERMITS AND/OR RIGHTS, AND TO COMPLY WITH ALL ORDINANCES AND LAWS PERTAINING TO THIS installation.

Installation shall be in accordance with the following drawings, specifications and special requirements. NO CHANGES ARE TO BE MADE IN THE DRAWINGS OR SPECIFICATIONS WITHOUT PRIOR APPROVAL OF THE NRCS TECHNICIAN.

1. **Drawing No. or Map Names:** Plan Map, FMP, RMU 2:
2. **Practice Specification(s):** 666D Scenario #7 - Competition Control, Mechanical, Heavy Equipment
3. **Work will be done during the following time period:** During times pursuant to wildlife assessment findings. No operations during saturated soil conditions as defined in the California Forest Practice Rules. Consistent with wildfire hazard limitations.
4. **Acres to be treated:** 29.0 acres
5. **Site Index:** 95-105; Dunning I and II Source: X On-Site

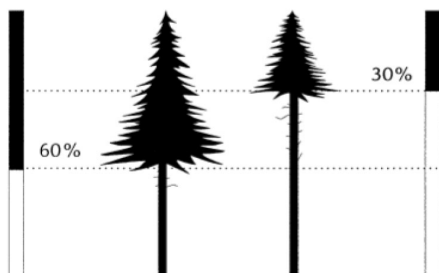
6. Pre- and Post- Treatment Conditions:

Measurement	Existing Conditions	Desired Conditions
Dominant Tree Species	Ponderosa pine (PP), Douglas-fir (DF), Black Oak (BO), Incense Cedar (IC) and Sugar pine (SP)	Retain current species composition with favoring Black Oak.
Approx. Number of Trees per Acre	100-500 Trees/acre; plus regeneration	100 trees/acre (Overstory and understory excluding regeneration)
Average Distance between Trees	10 ft.	Five Feet between tree crowns; approx. 20 ft. bole spacing (D+10)(see Tree Thinning below)

Average Tree Diameter	12 inches DBH	>16 "DBH
Tree Diameter Range	12-30 inches DBH	12-30 inches DBH
Basal Area	40 to 140 ft. sq.	120 ft. sq.
Tree Canopy Cover	20% -65%	50%
Shrub composition	Bear clover, ceanothus, manzanita, snowberry	Retain mixed of species
Shrub cover (%)	10% to 75%	Reduce to 10%-20 % cover

7. Objectives and Treatment Prescription: Primary objectives are to reduce wildfire hazard, susceptibility of live forest to pest damage, and improve forest health through stocking control and brush reduction. This will be accomplished by:

- A. **Dead and Dying Trees:** Treat dead and dying trees of all size classes (except those retained for snags and downs logs).
- B. **Tree thinning:**
- Thin live trees sizes 3 inches DBH minimum to 12 inches DBH maximum.
 - Thin to obtain five to 12 feet between tree crowns.
 - RMU 2 Space retained trees to a maximum up 25 foot bole spacing. Use D+10 as spacing guideline.
 - Trees to be removed shall be selected by the following criteria, in order - dead/dying trees, trees showing sign of disease/insect infestation, those which have been overtopped by adjacent trees, trees with poor bole/crown form. Retain trees that are healthy and have a live crown ratio of at least 30% see graphic)



- Priority of species for retention is as follows (highest to lowest priority):
 - a) Douglas fir
 - b) Ponderosa pine
 - c) White fir
 - d) Black or white oak.- Oak should be retained to a minimum of 10 sq. of basal area per acre.
 - e) Incense cedar
- A sample mark may be done at the request of the landowner or contractor.
- Stumps shall be left no higher than 6 inches on the up-hill side unless embedded metal or other safety concerns are evident.

- Felling practices shall protect the residual stand from damage.
- Operations will be in dry soil conditions to the greatest extent possible. Soils will not rut greater than 6 inches in depth over distances greater than 25%. Displacement will not affect more than 10% of any acre.

C. **Brush Mastication:** Brush vegetation will be reduced where densities create fuel and competition concerns. Manzanita and ceanothus are the primary species to control. Canopy closure of shrubs will be reduced to a target of 10% - 20% cover per acre. Horizontal spacing shall create space between shrubs of 2 times the height of the retained shrubs. The practice installation will reduce understory fuels and reduce moisture stress in the stand. Post-treatment shrub composition should contain all species from pre-treatment areas.

8. **Tree Thinning Technique:** Hand Thinning Chemical Treatment Mechanical Thinning

9. **Debris Disposal:** All vegetation cut during thinning operations shall be treated by mastication and deck or removal of excess large dead tree logs. For mastication, maximum allowable mulch depth: 4 inches (80% of mulched areas are 4" deep or less) or 6 inches depth when chipped/masticated material is placed in an isolated cleared area such as a landing. Maximum allowable residue slash lengths: Mastication operations will leave slash residues where 95% are less than 18 inches in length, 60% are less than 12 inches in length, and 40% are less than 8 inches in length. 5% of the material may be longer lengths.

10. Special Requirements:

For fire hazard reduction, all material will be removed from the treatment unit or treated as described above. If logs are to be decked on site, all limbs and all tops to a 10-inch diameter will be chipped, shredded, or burned to reduce fuel accumulations. Logs 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.

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.

No operations during periods of curtailed equipment use designated by local fire authorities or Cal Fire.

When logs or slash material is commercially utilized (removed and sold, barter or traded for services) a CAL FIRE forest practice permit shall be required. An appropriate permit (e.g. emergency notice or exemption) shall be filed by the land owner, Licensed Timber Operator, or Registered Professional Forester. Timber operations, including (but not limited to) Watercourse & Lake Protection Zones, and erosion control installations related to timber operations will follow requirements set forth in resulting guidance.

11. Watercourse and meadow protection standards (see attached map)

The project contains Class III (seasonal/intermittent) watercourses. Refer to the Table1 below for watercourse protection requirements.

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.

Buffer Zones distance apply to each side of watercourse. 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.

Forest management operations outside the watercourse buffer zones will ensure tree falling and other operations will not fell trees into buffer zones so that no part of the tree enters buffer. Slash will not be placed, piled or burned in any watercourse channel, buffer zone, or ephemeral drainage carrying seasonal runoff.

Flagging will be established to delineate watercourses, riparian areas, and wetland buffers.

12. Migratory Birds and TES

Project activities will not commence until a biologist concurrence is received.

Migratory Birds: Work will not occur during the migratory bird nesting season unless an assessment is conducted to determine active nesting or breeding behavior. Assessments will be completed by NRCS staff persons knowledge on migratory birds. Assessments shall be conducted within ten days prior to the start of work.

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TES: No known threatened, endanger, sensitive (TES) or rare plants or animals, including migratory birds, will be disturbed or harmed. The treatment area contains known TES species and habitat for others. Great Grey Owl has been observed in the meadow area on the property. The meadow and other perennial stream areas contain habitat for Foothill Yellow Legged Frog.

Avoidance and/or minimization measures include the following:

Great Grey Owl – No operations during January through July within 500 feet of meadow or known nest sites unless an assessment is conducted to determine active nesting or breeding behavior.

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Snag requirements:

Retain all snags >16” dbh and >24’ tall within Class I and II perennial watercourse buffer zones and within 500 feet of meadows.

Retain an average of 1-2 snags per acre for all other areas.

Snags shall be designated prior to operations.

Exceptions to the above requirements: Snags that can fall on roads and structures or are a threat to human health and safety (hazard).

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Exceptions to the above requirements: (a): When downlogs are serving as brood habitat for beetle infestation;(b): Where the density is such that it would contribute significantly to ground fuels.

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Retain some woody debris and untreated areas for biological diversity. Retain small vegetated areas that coincide with unique features such as wet areas, riparian buffer zones, rocky or steep terrain, down logs and snags, or other valuable habitat elements. Target retaining/untreated 15% of the vegetation in the project area.

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No operations may begin until archeological clearance is providing by NRCS. No operations in known archeology or historical sites.

17. Basis of Acceptance

Upon completion of the work conducted by the owner/client, a field inspection will be made to determine if at least 85 percent of the planned work as described within the IR has been satisfactory completed. Individual untreated areas should not exceed 2% of the entire treatment unit. Untreated areas greater in size should be excluded from payment.

18. Operation and maintenance:

Competing vegetation will be kept under 25% canopy cover per acre over the lifespan of the practice. Practice life-10 years.

JOB CLASSIFICATION AND PRACTICE APPROVAL:

			JOB CLASS				
Practice Code/Name	Controlling Factors	Units	I	II	III	IV	V
666 Forest Stand Improvement	Stand Complexity	Number of Overstory Species	<4	<6	<10	All	All
	Site Sensitivity	Harvest Equipment Operability Rating from Soil Survey	Well Suited	Moderately Suited	Poorly Suited	All	All
	Fire Risk	Fuel Model and NWCG Fire Behavior Class	Woodland/ Grass, Low Fire Behavior	Low to Mod Fuel Load Shrub; Moderate Fire Behavior	High Fuel Load Shrub, Timber Slash; High or Extreme Fire Behavior	All	All

This project is Job Class: **III**

Plan Approved by: _____ Date: _____

LANDOWNER'S/OPERATOR'S ACKNOWLEDGEMENT:

The landowner/operator acknowledges that:

- a. They have received a copy of the maps, specifications, and additional requirements. They have an understanding of the contents and the requirements.
- b. They have obtained all the necessary permits.
- c. No changes will be made in the installation of the job without prior concurrence of the NRCS technician.
- d. Maintenance of the installed work is necessary for proper performance during the project life.

Accepted by: _____ Date: _____

PRACTICE COMPLETION:

I have made an on site inspection of the site (or I am accepting owner/contractor documentation), and have determined that the job as installed does conform to the drawings and practice specifications.

Completion Certification by:

/s/ _____ Date _____

Watercourse map:

