United States Department of Agriculture

CONSERVATION ENHANCEMENT ACTIVITY

E666D

CONSERVATION STEWARDSHIP PROGRAM

Forest management to enhance understory vegetation

Conservation Practice 666: Forest Stand Improvement

APPLICABLE LAND USE: Forest

RESOURCE CONCERN: Plants, Animals, Water

ENHANCEMENT LIFE SPAN: 10 Years

Enhancement Description:

Forest stand improvement that manages the structure and composition of overstory and understory vegetation to:

- Reduce vulnerability to damage by insects and diseases of forest trees. Canopy gaps and open understory allow for air circulation that reduces the incidence of disease, and the improved health of the residual trees increases their ability to withstand insect attacks
- Managing the understory vegetation will also reduce the risk of wildfire and promote development of herbaceous plants that benefit wildlife.
- Capture additional moisture and filters the water through the vegetation and soil.
- Managing the understory vegetation will increase available water to plants, minimize run-off and erosion, improve water quality, and limit nutrient entry into ground water.
- Reducing the number of trees per acre provides canopy openings that allow sunlight to reach the forest floor and promote the growth of herbaceous plants, improving wildlife shelter and cover in the forest understory.

This enhancement provides for management of the understory vegetation in a forested area by mechanical, chemical and/or manual methods to improve the plant species mix and the health of the residual vegetation. Managing the understory vegetation increases available water to the plants, minimizes runoff and erosion, and improves water quality. An adequately stocked forest provides inputs of leaves, needles, and woody twigs and stems to the forest floor, adding to soil organic matter and contributing to forest soil health. Desirable tree species and understory vegetation, with spacing that allows ground cover to develop, will allow moisture to infiltrate and be stored in the soil, releasing moisture over longer periods of time.

Criteria:

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States will apply general criteria from the NRCS National Conservation Practice Standard Forest Stand Improvement (Code 666) as listed below, and additional criteria as required by the NRCS State Office.

- The enhancement will be applied to sites which have an uncharacteristically dense understory of shrubs and small trees that limit development of ground cover.
- Develop or update a forest management plan in consultation with NRCS personnel and a professional forester to direct the management of the property.
- 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.
- 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.
- Vegetation may be treated by chemical methods such as spraying or single stem treatments, or mechanical methods like a heavy-duty brush cutter or similar equipment. Refer to criteria in NRCS Conservation Practice Standard Integrated Pest Management (Code 595), Brush Management (Code 314), and Herbaceous Weed Control (Code315).
- 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 Conservation Practice Standard Forest Trails and Landings (Code 655), to protect soil and site resources from vehicle impacts.
- Where slash and debris will be generated, use NRCS Conservation Practice Standard Woody Residue Treatment (Code 384) to appropriately treat slash and debris, as necessary, to assure that it will not present an unacceptable fire, safety, environmental, or pest hazard.

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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 Conservation Practice Standard Prescribed Burning (Code 338).

- The acres planned must have an "acceptable growing stock" level of at least the B line on an appropriate stocking chart.
- This enhancement requires implementation of the following activities (a through d) in the area where the enhancement applies.
    a. Excessive volatile live vegetation and woody debris –When volatile, live grasses and shrubs and/or woody debris are present, a reduction of these fuels may be accomplished by using heavy duty brush cutters or similar equipment.
    b. Closed canopy – When trees form a continuous closed canopy, thin the stand to allow for heat escape and to improve the health of residual trees and understory vegetation. Open the canopy by cutting or killing selected trees to allow sunlight to reach the forest floor. Reduce slash from the cut trees by cutting off the limbs as needed. An alternative is to use single tree injections to reduce the density of poor-quality trees and open up the canopy.
    c. Ladder fuels – When ladder fuels form connections between the ground and the higher levels of the canopy, thus increasing the risk of fire spreading into tree crowns, break the continuity of fuel between the ground and the upper canopy. Complete removal is not required provided the fuel continuity is disrupted.
    d. Undesirable Vegetation – Use control measures to reduce or eliminate undesirable vegetation and favor desirable vegetation for the site.
- Minimize damage to residual trees during the treatment process.
- If machinery is being used, operate under dry conditions when the machinery will not cause rutting and/or soil compaction.
- The enhancement will comply with all applicable federal, state, and local laws and regulations, and with States' Forestry Best Management Practices for Water Quality.

Documentation and Implementation Requirements:

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Participant will:

- ☐ Prior to implementation, review NRCS Conservation Practice Standard Forest Stand Improvement (Code 666) which contains information needed to meet criteria for this enhancement.
- ☐ Prior to implementation, develop an understanding of management practices that reduce a dense understory of small trees and brush, and the types of understory vegetation that will be encouraged by these practices. (Request NRCS technical assistance, as needed.)
- ☐ Prior to implementation, work with a professional forester to prepare or update a current Forest Management Plan (FMP) that includes activities required to implement this enhancement. The FMP will include guidelines for thinning the stand and maintaining fully stocked conditions as specified in enhancement criteria. Depending on the resource concern addressing the FMP will also include recommended practices for managing understory vegetation to:
  - o Minimize risks of insect and disease outbreaks.
  - o Include recommended practices for managing understory vegetation to favor moisture infiltration.
  - o The FMP will also include recommended practices for managing understory vegetation to favor wildlife cover and shelter.
  - o Include recommended practices for managing understory vegetation to capture nutrients.
- ☐ Prior to implementation, recognize that other NRCS Conservation Practice Standards may be needed to apply this enhancement. These may include:
  - o Brush Management (Code 314)
  - o Forest Trails and Landings (Code 655)
  - o Herbaceous Weed Control (Code 315)
  - o Integrated Pest Management (Code 595)
  - o Woody Residue Treatment (Code 384)
  - o Prescribed Burning (Code 338)
- ☐ Prior to implementation, acquire all necessary approvals and permits (i.e. local, state, or federal, as applicable).
- ☐ Prior to implementation, work with a professional forester who will mark trees and groups of trees to be removed or killed, and who will develop a strategy for controlling undesirable understory vegetation.

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- ☐ Prior to implementation, take pre-treatment photos of the site to show representative conditions.
- ☐ During implementation, follow FMP guidelines, criteria in NRCS Conservation Practice Standard Forest Stand Improvement (Code 666), and specifications provided by NRCS, to ensure that:
  - o Trees are removed, killed, or retained to achieve all planned purposes and landowner objectives.
  - o The desired spacing, density, size-class distribution, number of trees, and amount of understory is achieved.
  - o The operation avoids or minimizes damage to desirable vegetation.
- ☐ During implementation, follow state-approved Forestry Best Management Practices (BMPs) to protect streams, water quality, and minimize soil loss.
- ☐ During implementation, reduce stand stocking to correspond with the B-line of an appropriate stocking chart, retaining trees with larger, healthy crowns and undamaged trunks. If tree removal is not an option, reduce density by killing selected trees through girdling and/or chemically treatments.
- ☐ During implementation, control undesirable competing vegetation using appropriate methods for the tree species and site conditions. If prescribed burning will be used, work with NRCS and a professional forester or biologist to obtain a state approved prescribed burn plan. If using chemical methods, follow application and timing recommendations from an approved source.
- ☐ During implementation, limit the size of debris piles to minimize wildfire hazards.
- ☐ During implementation, as needed, evaluate and review with NRCS any planned changes to verify they meet the enhancement criteria.
- ☐ After implementation, take digital photos showing representative post-treatment conditions.
- ☐ After implementation, notify NRCS that the work has been completed and make treatment documentation records available for NRCS review and certification.

NRCS will:

- ☐ Prior to implementation, assist with interpretation of a current or updated FMP for sites where this enhancement will be applied.
- ☐ Prior to implementation, provide and explain the following NRCS Conservation Practice Standards as they relate to implementing this enhancement.

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- o Brush Management (Code 314)
- o Herbaceous Weed Control (Code 315)
- o Forest Stand Improvement (Code 666)
- o Woody Residue Treatment (Code 384)
- o Forest Trails and Landings (Code 655)
- o Integrated Pest Management (Code 595)
- o Prescribed Burning (Code 338)

- ☐ Prior to implementation, provide and explain the state's Forestry BMP guidelines.
- ☐ During implementation, provide technical assistance if requested by the participant.
- ☐ During implementation, evaluate any planned changes to verify they meet the enhancement criteria.
- ☐ During implementation, provide technical assistance if requested by the participant.
- ☐ After implementation, review treatment documentation records and certify that the enhancement was completed according to specifications in this enhancement, and in NRCS Conservation Practice Standard Forest Stand Improvement (Code 666).

NRCS Documentation Review:

I have reviewed all required participant documentation and have determined the participant has implemented the enhancement and met all criteria and requirements.

Participant Name _____ Contract Number _____

Total Amount Applied _____ Fiscal Year Completed _____

_____ _____

NRCS Technical Adequacy Signature Date

WILDLIFE MANAGEMENT TECHNIQUES – QUALITY VEGETATION MANAGEMENT (QVM) FOR RESTORATION OF WILDLIFE HABITAT IN PINE STANDS

Definition: Quality vegetation management (QVM) is a technique that uses a combination of tools to restore wildlife habitat through the removal of invasive, dense, undesirable woody species. To improve wildlife habitat conditions for many wildlife species in pine stands, QVM is used to remove the invasive, dense, undesirable woody species in the under and mid-story canopy along with the removal of the ground litter layer by using the combined application of the selective herbicide, imazapyr, and prescribed burning.

Purpose: Management actions are needed to restore wildlife habitat that provides quality herbaceous food and cover plants in pine stands. Unmanaged pine stands often contain a dense mid-story of invasive, undesirable woody species along with a thick ground litter layer that prevent growth of desirable foraging and nesting vegetation. In Mississippi, fire suppression and lack of active management in upland pine habitat commonly produces an under- and mid-story canopy that reduces habitat for many wildlife species. Herbaceous food and cover plants that are stimulated by fire and open canopy conditions decline over time without these management activities. Losses of habitat containing herbaceous vegetation and an open ground layer in upland pine stands have led to declines in populations of wildlife species including game species, such northern bobwhite quail and endangered non-game species, such as gopher tortoises and Bachman's sparrows.

University research has shown treatment of mid-rotation pine stands with imazapyr, in conjunction with silvicultural practices (thinning and/or prescribed burning) produces excellent results in releasing desirable, high quality native vegetation. This method of hardwood control releases preferred native forbs, legumes, vines, shrubs, and grasses that are beneficial to wildlife. QVM increases the number of plant species present and canopy cover of grasses, forbs, and native legumes. Therefore, nutritional carrying capacity increases significantly for most wildlife species. Improved nesting and brood foraging habitats increases carrying capacity for ground nesting birds. Additionally, restoration of habitat with herbaceous ground cover can increase avian diversity and abundance of regionally declining bird species (e.g. northern bobwhite, Bachman's sparrow, brown-headed nuthatch, common-yellow throat).

Prescribed burning for wildlife habitat is applying a controlled fire to a predetermined area as a habitat management tool. It is used to improve wildlife habitat on early successional/grassland areas and certain woodland areas by setting back the successional stage of an area, controlling undesirable vegetation, and reducing wildfire hazards. Ground nesting habitat is improved by reducing stand density. Prescribed burning in late winter to early spring is the preferred method for maintaining healthy stands of native warm season grasses. This practice increases stand diversity, reduces weed competition, increases plant vigor, recycles nutrients, and reduces thatch and ground litter. Winter prescribed burning also promotes establishment of herbaceous vegetation, especially legumes.

Management: This practice should be applied in pine stands (mid-rotation to sawtimber) that have been thinned within the last 3 years **or** have a basal area equal to or less than the site index **and** have a substantial hardwood component in the understory. Imazapyr should be applied between July through October before plants go dormant for calibrated applications to foliage (June through February for the "hack and squirt" application method) to control undesirable woody lower and mid-canopy encroachment with minimal effects on forbs and grasses.

Management:(cont.) A minimum of 20 percent of the pine stand (up to 100%) should be treated to assure the desired vegetation results. Imazapyr is commercially available in two formulations, 2 pounds of active ingredient per gallon (lbs AI/gal) and 4 lbs AI/gal. Therefore the herbicide should be applied at a rate of 0.5 – 0.75 pounds active ingredient **per acre** (maximum of 0.5 lbs AI**/acre** in longleaf/slash) to achieve hardwood brush control. Using this rate, hardwood brush control can be expected for approximately 10 years. Using a skidder with a tank and cluster nozzle spraying a 30 - 50 feet wide swath, the herbicide should be mixed in 20 gallons of water to treat one acre. Specific rates and use recommendations can be found on the pesticide label and in the current Mississippi State University Extension Service's (MCES/MAFES) Weed Control Guidelines for Mississippi. In addition tanks/sprayers mounted on all terrain vehicles/farm tractors and helicopter spraying are other methods that can be used to apply the herbicide. All equipment must be calibrated to assure that the proper rate is applied. **BEFORE APPLYING, READ AND FOLLOW ALL LABEL DIRECTIONS FOR THE SELECTED HERBICIDE.** The "hack and squirt" and other manual methods of herbicide application may be used according to guidelines in the MS-ECS-666-12A or MS-ECS-666-12B job sheets. Foliar spraying with non-calibrated hand held spray wands is currently not an approved application method.

Applying the herbicide alone will encourage the establishment of native vegetation. However, prescribed burning the treated area will enhance the establishment of the desired vegetation and speed the process considerably. Prescribed burning one to two years after the hardwood brush has been treated clears the leaf litter and small branches from the ground which allow sunlight to penetrate to mineral soil. This encourages the native plant seeds within the seed bank that require scarification to germinate. Prescribed burning every 2-5 years after the initial burn will help maintain the quality of the vegetation once the hardwood brush has been controlled. The prescribed burns should be conducted in late December through February (cool season) and should be primarily a backing-type fire. Consult with the County Forester or a consulting forester for information concerning prescribed burns. Disking in pine stands to incorporate the litter layer and to expose the soil after the herbicide has been used to control the hardwood brush is a practice that will encourage vegetation growth in areas where prescribed burning is not an alternative. This method of soil disturbance scarifies the plant seeds in the seed bank and provides a good seed bed for their germination. **Consult NRCS technical specifications (such as Practice Codes 666 – Forest Stand Improvement and 338 – Prescribed Burning), technical notes, bulletins, and other job sheets for additional information concerning prescribed burning, thinning, mulching, woodland disking, etc**.

Maintenance: Once the desired native vegetation has been established within the pine stand, a periodic cool season prescribed burn or disking (every 2-5 years) will keep the vegetation in optimal quality for wildlife. Vegetation and soil disturbances of higher frequency should not be needed. However, burning regimes of higher frequency, such as 1-3 years will not be detrimental to the vegetation established by use of imazapyr.

Considerations: This practice is not intended to be for site preparation for pine stand establishment nor is it intended for a release treatment in young pine stands that have not been thinned.

Quality Vegetative Management (QVM) / Forest Stand Improvement Objectives:
Identify targeted woody species to be treated (may be listed as a specific species, such as Chinese tallow tree; as "multiple non-native invasive woody species"; or as "dense, undesirable native woody species"):

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Identify the desired habitat type, structure, and composition of treated area - open grassland, grassland with shrub patches, openings in forest, pine forest, hardwood forest, or mixed forest:

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Record of Applied Treatments

Chemical Treatment: According to Pesticide Label or Land Grant University Recommendation

Treated Field Number(s)	Herbicide(s) Applied	Rate Applied	Acres Treated	Date Applied

Mechanical Treatment: Thinning, Mulching, Mowing (cannot be used alone as a treatment), etc.

Treated Field Number(s)	Method of Treatment Planned/ Equipment Used	Acres Applied	Date Applied

WIN-PST Completed:	
Copy Provided to Participant	Y N
In Case File	Y N
Not Applicable (Mechanical Treatment only)	Y N

Wildlife Habitat Management Considerations:
Identify desired wildlife and/or pollinator species targeted for habitat management for the treated area. Targeted wildlife species may be listed as "general local upland wildlife species"; or as a specific local wildlife species of concern for the state, such as, bobwhite quail, gopher tortoise, monarch, etc.; or N/A (for wildlife not a resource concern), whichever the Participant chooses to select: _____

Planner's Signature_____ **Date** _____

Participant's Signature_____ **Date** _____