United States Department of Agriculture

Conservation Enhancement Activity

CONSERVATION STEWARDSHIP PROGRAM

E314A

Brush management to improve wildlife habitat

Conservation Practice 314: Brush Management

APPLICABLE LAND USE: Pasture, Range, Forest, Associated Ag Land

RESOURCE CONCERN: Plants; Animals

ENHANCEMENT LIFE SPAN: 10 years

Enhancement Description

Brush management is employed to create a desired plant community, consistent with the related ecological site steady state, which will maintain or enhance the wildlife habitat desired for the identified wildlife species. It will be designed to provide plant structure, density and diversity needed to meet those habitat objectives. This enhancement does not apply to removal of woody vegetation by prescribed fire or removal of woody vegetation to facilitate a land use change.

Criteria

- This enhancement will be applied in a manner to achieve the desired control of the target woody species while protecting the desired species through mechanical, chemical, or biological methods, alone or in combination. NRCS will not develop biological or chemical treatment recommendations except for biological control using grazing animals. NRCS may provide clients with acceptable biological and/or chemical control references.

- Identify wildlife species of concern and landscape specific brush habitat functionality that is consistent with the related ecological site steady state or another desired state that will meet the objective.

- Brush management will be planned and applied in a manner to meet the habitat requirements for wildlife species of concern as determined by the state's NRCS Wildlife Habitation Evaluation Guide (WHEG).

- Evaluate wildlife habitat with the state NRCS WHEG and manage for a value of 0.60 or greater.
- Brush management will be designed to achieve the desired plant community based on species composition, structure, density, and canopy (or foliar) cover or height.
- Conduct treatments during periods of the year that accommodate reproduction and other life-cycle requirements of target wildlife and pollinator species.

CONSERVATION STEWARDSHIP PROGRAM

Documentation and Implementation Requirements

Participant will:

- ☐ Prior to implementation, meet with NRCS to complete the Wildlife Habitat Evaluation Guide (WHEG) evaluation at the site.
- ☐ Prior to implementation, determine and write down clear objectives for brush management and implementation of this enhancement.
- ☐ Prior to implementation, develop a map delineating the areas to be treated and enrolled in this enhancement.
- ☐ During implementation, maintain records of applied treatments (pesticide used, rate applied, timing, etc.) and grazing restrictions. The records must support the label requirements for re-entry or grazing restrictions when applicable.
- ☐ After implementation, reassess habitat condition with NRCS using the WHEG.
- ☐ After implementation, provide records for review by NRCS to verify enhancement was implemented to meet criteria.

NRCS will:

As needed, provide technical assistance to participant as requested.

- ☐ Prior to implementation, provide and explain NRCS Conservation Practice Standard Brush Management (Code 314) as it relates to implementing this enhancement.
- ☐ Prior to implementation, confirm brush management and grazing management plan objectives clearly identify the wildlife of concern for the area.
- ☐ Prior to implementation, meet with participant to complete WHEG evaluation at the site.
  Existing WHEG score =_____Planned Post Implementation WHEG score = _____
- ☐ Prior to implementation, NRCS will make cover or density measurements at georeferenced transects on key areas within the treatment area.
- ☐ After implementation, NRCS will return to georeferenced area to measure cover or density and report the results.
- ☐ After implementation, review records to verify participant implemented enhancement to meet criteria.

CONSERVATION STEWARDSHIP PROGRAM

- ☐ After implementation, review record of applied treatment (pesticide used, rate applied, timing, etc.) and grazing restrictions.
- ☐ After implementation, reassess habitat condition using the Wildlife Habitat Evaluation Guide.
  Post Implementation WHEG score = _____

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

CSP 2021
Mississippi Supplement
E314A

Brush Management For Improved Structure And Composition

Documentation Requirements:

- ☐ **Participant must be provided with attached job sheets (as appropriate for the land use): MS-ECS-314-01(JS/SS) for predominately grassland fields; MS-ECS-666-02(JS/SS) for pine forests; and MS-ECS-666-02B(JS/SS) for hardwood forests. If the "hack and squirt" method will be used, then MS-ECS-666-02A(JS/SS) should also be provided to the participant. This enhancement does not apply to removal of woody vegetation by prescribed fire or removal of woody vegetation to facilitate a land use change. However chemical herbicide treatments may be implemented in combination with other practices such as prescribed burning, practice code 338, or light strip disking, practice code 647, to release and improve species diversity of highly desirable vegetation to benefit wildlife. Refer to those specific practices for additional guidance. Mowing of woody vegetation alone is not an approved practice for this enhancement. However, mowing may be allowed as needed to prepare sites for necessary herbicide applications, strip-disking, etc. Mowing may also be used as a follow up treatment to remove standing dead woody debris.**
- ☐ **Records of applied treatments (pesticide used, rate applied, timing, etc.) - follow all herbicide label directions and restrictions relating to rates, timing and setbacks to insure control while reducing the possibilities of pesticides polluting surface and ground waters or affecting non-target species. Follow all rates and use recommendations found in the current Mississippi State University Extension Service's (MCES/MAFES) pesticide application guides, identify pest species properly, select proper methods, calibrate application equipment, and store/dispose of containers in a safe manner.**
- ☐ **Site specific WIN-PST evaluations will be conducted to identify measures to minimize/mitigate effects of herbicides. WIN-PST results will be documented in the conservation plan case file and also provided to the landowner in order to implement any required set back areas or mitigation requirements.**
- ☐ **The desired wildlife and/or pollinator species targeted for habitat management in the enhancement area must be identified by the participant. Targeted 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. (must list target species name in the attached job sheet/specification sheet).**
- ☐ **Mississippi Grassland, Pine Forest or CSP Hardwood Forest (as appropriate for the land use) Wildlife Habitat Evaluation Guides (WHEG's) must be completed for both before and after implementation of this enhancement. Minimum WHEG value after implementation must be 0.60 or greater.**
- ☐ **Practices will not be implemented during the primary nesting season of April 1 through August 15.**

WILDLIFE MANAGEMENT TECHNIQUES – QUALITY VEGETATION MANAGEMENT (QVM) FOR RESTORATION OF EARLY SUCCESSIONAL VEGETATION FOR WILDLIFE HABITAT IN GRASSLAND FIELDS

Definition: Quality vegetation management (QVM) is a technique that uses a combination of tools to restore early successional wildlife habitat through the removal of invasive, dense, undesirable woody species. To improve wildlife habitat conditions for many wildlife species, QVM is used to remove the invasive, dense, undesirable woody species in open to semi-open grassland fields (generally fields that have been unmanaged within the last five years) along with the removal of the grass thatch layer by using the combined application of the selective herbicide, imazapyr, with other practices such as prescribed burning or light strip disking.

Purpose: Open field areas dominated by native grasses, forbs and legumes provide critical habitat for many wildlife species associated with grasslands. In Mississippi, fire suppression and lack of active management (soil disturbance practices) in these open fields reduces early successional habitat desired by many wildlife species. When these fields are abandoned or left unmanaged for more than two to three years, natural succession leads to invasions of dense hardwood brush that inhibits germination of early successional herbaceous and shrub vegetation. If left unmanaged, fields can become completely overgrown with undesirable woody vegetation within five years. Management actions are needed to restore the early successional wildlife habitat that provides quality herbaceous food and cover plants in open fields. Restoration of herbaceous grassland communities through the removal of hardwood brush can release desirable native herbaceous species and improve early successional habitat quality of abandoned/unmanaged field areas. University research has shown chemical treatment to remove invasive dense hardwood brush with the herbicide, imazapyr, releases the desired native forbs, legumes, vines, shrubs, and grasses that are beneficial to wildlife inhabiting herbaceous grassland communities. Improved nesting and brood foraging habitats increase for ground nesting birds. Additionally, restoration of habitat with herbaceous vegetation cover and an open ground layer can increase avian diversity and abundance of regionally declining bird species (e.g. northern bobwhite and Bachman's sparrow).

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 by setting back the successional stage of an area. This practice increases stand diversity, reduces weed competition, increases plant vigor, recycles nutrients, reduces thatch and ground litter, and reduces wildfire hazards. Ground nesting habitat is improved by reducing stand density. Brood habitat is improved by opening up the ground layer. Prescribed burning in late winter to early spring is the preferred method for maintaining healthy stands of native warm season grasses.

Management: This practice should be applied in unmanaged field areas that have a substantial hardwood brush component. The practice can be used as a spot treatment to impact areas of advanced brush growth within an old field. The practice can also be applied in corridors or lanes in a meandering fashion within old fields where a large portion of the field is in advanced brush growth. Treated corridors should be a minimum of 50 feet wide. Winter prescribed burning removes woody debris and promotes establishment of herbaceous vegetation, especially legumes.

Management:(cont.) 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** 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; herbicide wiping equipment, such as wickbars or weedsweeps; 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 3-5 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. Light strip disking in fields 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 314 – Brush Management, 338 – Prescribed Burning, and 647 – Early Successional Habitat Management), technical notes, bulletins, and other job sheets for additional information concerning prescribed burning, light strip disking and woodland disking**.

Maintenance: Once the desired native vegetation has been established, a periodic cool season prescribed burn or light disking (every 3-5 years) will keep the vegetation in optimal quality for wildlife.

Quality Vegetative Management (QVM) / Brush Management 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"):

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:

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

WIN-PST Completed:	Y	N
Copy Provided to Participant		
In Case File		

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

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** _____

NRCS Natural Resources Conservation Service
MISSISSIPPI

MS-ECS-666-02 (JS/SS)
January 2018

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"):

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:

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

WIN-PST Completed:	Y	N
Copy Provided to Participant		
In Case File		

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

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** _____

NRCS Natural Resources Conservation Service
MISSISSIPPI

MS-ECS-666-02A (JS/SS)
January 2018

WILDLIFE MANAGEMENT TECHNIQUES – QUALITY VEGETATION MANAGEMENT (QVM) WITH "HACK & SQUIRT" METHOD OF APPLYING IMAZAPYR FOR CONTROL OF UNDESIRABLE HARDWOOD SPECIES

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; prescribed burning; and/or woodland strip disking.

Methodology: 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. The "hack and squirt" method of application is limited to treating 20 acres/year/forest stand. A minimum of 20 percent of the pine stand (up to 20 acres/year/forest stand) should be treated to assure the desired vegetation results.

Equipment / Supplies Needed:

- Appropriate herbicide for species to be controlled
- Trigger-activated squirt bottle (calibrated at 1ml/squirt) with chemical resistant seals*
- Small sharp ax or hatchet
- File for sharpening blade
- Safety Equipment, such as safety glasses, rubber gloves, chainsaw chaps

*(available from farm/chemical/forestry equipment suppliers & auto parts stores)

Mixture: **BEFORE APPLYING, READ AND FOLLOW ALL LABEL DIRECTIONS FOR THE SELECTED HERBICIDE.** Imazapyr is commercially available in two formulations, 4 pounds of active ingredient per gallon (lbs AI/gal) and 2 lbs AI/gal.

- A 20 percent solution of the Imazapyr formulation with 4 lbs AI/gal in water (25 ounces of Imazypyr + 103 ounces of water for a 1 gallon solution).

OR

- A 40 percent solution of the Imazapyr formulation with 2 lbs AI/gal in water (51 ounces of Imazypyr + 77 ounces of water for a 1 gallon solution). Recommended formulation for plants with waxy cuticles, such as gallberry.

Application:

- Make one cut or hack through the bark into the cambium layer for every 3 inches of tree diameter measured at breast height (DBH). Example: A 12 inch DBH tree will require four hacks. Strike the tree at a downward angle. Each cut should form a pocket that holds the herbicide to prevent spillage and waste. Space the cuts evenly around the tree.

- Apply 1 ml of herbicide/water solution into each cut.

- Adjust the nozzle of the spray bottle to deliver approximately 1 ml of solution for each trigger squeeze. Inexpensive plastic dose cups graduated in milliliters available at pharmacies and drug stores can be used to check calibration.

Timing: Treat between June through February with the "hack and squirt" application method to control undesirable woody lower and mid-canopy encroachment with minimal effects on forbs and grasses. Winter prescribed burning removes woody debris and promotes establishment of herbaceous vegetation, especially legumes.

Methodology:**(cont.)**

Species selection: Use of this method allows for more specific selection of species to be controlled. Below is a list of species recommended to be controlled to improve wildlife habitat value and their susceptibility to the herbicide. Species that are considered highly beneficial to wildlife should not be selected for herbicide application as this practice is primarily to restore/improve wildlife habitat.

Susceptible Species	*Less Susceptible Species	*plants with waxy cuticles
• Boxelder • Chinaberry • Chinese Tallow-tree • Cottonwood • Privet • Sweetgum • Willow • Yellow-poplar	• Ash • Sourwood • TiTi *These species are considered difficult-to-control and will require one additional cut for control. For example, on a 6" DBH stem that normally requires 2 cuts, make 1 additional cut for added control.	• Gallberry • Yaupon • Wax Myrtle *These species are considered difficult-to-control and will require treatment with the 40 percent solution of the Imazapyr formulation with 2 lbs AI/gal in water.

Treatment Response:

- Maximum treatment effectiveness occurs in the second growing season after treatment.
- In the first growing season after treatment, the most susceptible species (such as sweetgum) may die, but other species will lose foliage, produce a new flush of leaves which may exhibit abnormal leaf shapes, color, and clusters of small leaves or buds at branch and terminal tips. These trees should die in the second growing season following treatment.

***Imazapyr is a soil active material. Do not spray the herbicide solution on the soil near desirable hardwood tree/crop species.

Maintenance: Applying the herbicide alone will encourage the establishment of quality 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 3-5 years after the initial burn will help maintain the quality of the vegetation once the hardwood brush has been controlled. 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, light strip disking and woodland disking**.

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"):

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:

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

WIN-PST Completed:	Y	N
Copy Provided to Participant		
In Case File		

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

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** _____

WILDLIFE MANAGEMENT TECHNIQUES – QUALITY VEGETATION MANAGEMENT (QVM) WITH MANUAL HERBICIDE APPLICATION METHODS FOR MANAGING UNDESIRABLE VEGETATION IN HARDWOOD

Introduction: The practice of using herbicides in hardwood systems to control interfering understory and midstory vegetation and to promote desirable vegetation that improves habitat for many wildlife species is becoming more widespread. Several manual application techniques are very target-specific, meaning they can be used to control undesirable vegetation without impacting non-target plants like desirable advance regeneration or valuable crop trees.

Planning herbicide use in hardwood stands can be difficult. Land managers should be cautious when using herbicides in any hardwood forest management effort, but current herbicide options make suppressing unwanted vegetation both efficient and cost effective. Most targeted species can be controlled through careful consideration of effective herbicides and appropriate application timing. Numerous research studies have demonstrated that modern herbicides can be safely applied in forests. Commonly used and recommended forestry herbicides are very low in animal toxicity and do not accumulate in animal tissues. Because of their low toxicities and minimal environmental hazards, most herbicides used in forestry operations are classified as “non-restricted use,” meaning they are available to the general public and no license is required for landowners to buy them and apply them on their own land. Herbicide labels, which contain a description of the herbicides, safety recommendations, and detailed use information, are the user’s primary source of information regarding the safe and legal use of herbicides. Always read and follow all of the label instructions, which include personal protective equipment and storage requirements.

Using herbicides for timber stand improvement has some decided advantages over mechanical methods alone. Applying herbicide treatments to control individual trees is safer for most people to do than mechanical methods like girdling or chainsaw felling. Also cutting and girdling without applying herbicides will not control stump and root sprouts and often stimulate their development, thus making competition worse.

Methodology: This section provides information about field procedures on the use of the three of four primary manual application methods: 1) basal spray, 2) cut-stump, and 3) foliar spray. The fourth method is stem injection, commonly called “hack and squirt”. Job Sheet MS-ECS-666-02A (JS) describes the general procedure for the “hack and squirt” method.

Basal Bark Spray Treatments

Basal bark treatments are effective for controlling woody vines, shrubs, and trees. Apply any time of the year stems are dry, including the winter months. Proper plant identification is crucial during the dormant season due to the absence of foliage. Apply herbicide with a backpack sprayer using low pressure (20-40 psi) with a straight stream or flat fan tip. To control vegetation with a basal stem diameter of less than 3.0 inches apply a forestry recommended herbicide-oil mixture on one side of the basal stem to a height of 6 inches from the base. For stems greater than 3.0 inches basal diameter or with thick bark, treat both sides of the stem to a basal height of 12 inches to 24 inches. Apply herbicide just to the point of run-off. Treatment is applicable to stems <6.0 inches d.b.h. in areas involving <1,000 stems per acre.

Cut-Stump Surface Treatments

Cut-stump surface treatments: 1) are economical, 2) have minimal probability of non-target damage, 3) have minimal application time, and 4) can be used in the winter as long as the ground is not frozen. Do not apply during heavy sap flow (March through May). Horizontally cut stems at or near ground level; all cuts should be level, smooth, and free of debris. Immediately apply the herbicide to the outer 2 inches (cambial area) of large stump surfaces; delayed treatment may reduce the effectiveness of treatment. The entire surface of small stumps should be treated. Treatment is effective on all sizes of stumps of thin-barked trees. Root sprout mortality is greater around larger stumps. Using a dye is recommended to make it easier to keep track of treated stumps.

Foliar Treatments

All foliar treatments should be made after full leaf expansion in the spring and before fall colors are visible. Best results are obtained in late summer while foliage is still green. Apply only during rain-free periods. Allow herbicide treatments to dry for at least three hours at an air temperature above 60°F to ensure adequate absorption and translocation.

Foliar applications should be made with a low pressure (20-50 psi) backpack sprayer or similar hand-operated pump sprayer at rates of one gallon or less per minute. Apply herbicide with a flat spray tip or adjustable cone nozzle. Use a nonionic surfactant with all herbicide solutions, unless otherwise specified by the manufacturer's label. Surfactants increase the effectiveness of the herbicide by 1) reducing surface tension and ensuring complete foliar coverage, and 2) increasing the rate of absorption through the leaf cuticle. Apply herbicide to the leaves and stems of target plants using a consistent back and forth motion. Herbicide should thoroughly cover foliage, but not to the point of run-off. All recommended herbicides require complete foliar coverage to be effective. Applications made while walking backward will reduce the risk of the herbicide wicking onto the applicator's clothing.

Treatment is applicable to target stems less than 6 feet tall. It is difficult to foliar spray vegetation taller than 6 feet with a backpack sprayer. Foliar spraying tall vegetation increases the possibility of drift, which can damage nontarget vegetation.

General Recommendation for All Methods (including Hack and Squirt):

Herbicide recommendations - No single herbicide, rate, or application method works for all vegetation management needs. Each situation requires advanced assessment to ensure that the lowest risk, most efficient, and most cost-effective control program is chosen. Help and advice should be obtained from qualified sources, such as consulting foresters, local extension agents, chemical company representatives, herbicide distributors, and state agencies and universities. Note: Some chemicals, such as Imazapyr, are soil active materials. Do not spray these herbicide solutions on the soil near desirable tree/crop species.

Health and Safety - Personal protective equipment (PPE) reduces human exposure to pesticides. The type of PPE used depends on the product and the type of application. Failing to follow appropriate safety precautions and application procedures can lead to exposure from diluted chemicals. The greatest risk of pesticide exposure occurs when handling concentrates during mixing and loading. Pesticide container labels specify the minimum amount of PPE recommended by the manufacturer. Always check the label for the required PPE for the product you plan to use. Safety equipment, such as safety glasses, rubber gloves, chainsaw chaps are available from farm/chemical/forestry equipment suppliers.

Maintenance: Applying the herbicide alone will encourage the establishment of quality native vegetation. However, disking in 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 related NRCS technical specifications, technical notes, bulletins, and other job sheets for additional information concerning hack and squirt chemical application, light strip disking and woodland disking**.

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"):

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:

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

WIN-PST Completed:	Y	N
Copy Provided to Participant		
In Case File		

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

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** _____