



CONSERVATION ENHANCEMENT ACTIVITY

E412A

CONSERVATION STEWARDSHIP PROGRAM

Enhance a grassed waterway

Conservation Practice 412: Grassed Waterway

APPLICABLE LAND USE: Crop (Annual & Mixed); Crop (Perennial)

RESOURCE CONCERN ADDRESSED: Water Quality Degradation

ENHANCEMENT LIFE SPAN: 10 year

Enhancement Description

Extending, enlarging or increasing protection for an existing grassed waterway for better water quality protection.

Criteria

This enhancement shall include all the following:

- Enhance the waterway by improving either size, length or outlet, using one or more of the following options:
 - Lengthen the waterway further up the slope
 - Extend the waterway further past its current outlet location
 - Reshape, widen, or reconstruct part of the waterway to achieve more flow capacity
- Protect the waterway to help it function properly and improve life expectancy by completing 3 out of 4 the following:
 - Create GPS shapefiles and must be used by applicators for auto-shut off of equipment (spraying and/or fertilizing) passing by or through waterway
 - For fields that the producer owns or operates in the watershed, The STIR value shall be no greater than 40 for each crop in the rotation (maintain high residue)
 - Uniformly distribute residues over the entire field (don't bale residue)
 - Install drain tile on one or both sides of the waterway to maintain vegetation



Documentation and Implementation Requirements

CONSERVATION STEWARDSHIP PROGRAM

Participant will:

- Prior to implementation, choose which fields contain waterways that will be addressed using this enhancement. Decide what will be done from the criteria list.

Field	Waterway ID	Criteria Chosen

- IF selecting to GPS the boundary of the waterway, provide NRCS with the shapefiles.
- Prior to implementation, if seeding will be done, prepare the planned acres for vegetation establishment. Total planned amount of waterway = _____ feet. Prior to implementation, select grasses best suited to site conditions. Refer to NRCS Conservation Practice Standard Grassed Waterway (Code 412).

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Species	Seeding Rate (lb/ac pure live seed)	Note specific species characteristic(s)

NRCS will:

- As needed, provide technical assistance in selecting the best option that would meet the criteria of the enhancement.
- As needed, design the grassed waterway for the participant as requested.
- As needed, provide additional assistance to the participant as requested.
- If selecting the option to improve water infiltration in the watershed above the waterway, NRCS will provide the STIR value.



CONSERVATION STEWARDSHIP PROGRAM

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





CONSERVATION ENHANCEMENT ACTIVITY

E420A

CONSERVATION STEWARDSHIP PROGRAM

Establish pollinator habitat

Conservation Practice 420: Wildlife Habitat Planting

APPLICABLE LAND USE: Crop (Annual and Mixed), Crop (Perennial), Forest, Associated Ag Land, Farmstead

RESOURCE CONCERN: Animals

ENHANCEMENT LIFE SPAN: 1 Year

Enhancement Description

Seed or plug nectar and pollen producing plants to establish or improve pollinator habitat. These areas may include, but are not limited to, field borders, vegetative barriers, contour buffer strips, shelterbelts, hedgerows, windbreaks, conservation cover, and riparian forest and herbaceous buffers.

Criteria

- A Wildlife Habitat Evaluation Guide (WHEG), must be used to show that 0.5 planning criteria has been met for the inadequate wildlife habitat resource concern. The WHEG used to meet this criterion does not need to be specific to pollinator habitat. (If WHEG score is less than 0.5, consider E327A.)
- A WHEG specific to pollinator habitat must be used to show that, post implementation, the Enhancement is expected to result in the establishment of suitable pollinator habitat or will improve the habitat value of existing pollinator habitat. The following may be used to meet this criterion:
 - [For circumstances where planning criteria for pollinator habitat is currently below 0.5] Post implementation, planning criteria for pollinator habitat is equal to or greater than 0.6.

OR

- [For circumstances where planning criteria for pollinator habitat is at

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0.5 or greater] Post implementation, planning criteria for pollinator habitat increases at least 0.1

- Habitat areas must be at least 0.5 acres for each 40 acres of the selected land use. Where the selected land use is less than 40 acres, the required amount of habitat will be reduced according to the ratio of 0.5 acres to 40 acres. The NRCS State Biologist must agree to habitat areas less than 0.25 acres. Where the selected land use is greater than 40 acres, the 0.5 acre habitat areas(s) may be a single site or interspersed sites in the larger land use areas as agreed to by the NRCS State Biologist.
- Establish habitat for pollinators as described below:

A. Planting Criteria

1. NRCS at the state level will develop lists of plants suitable for pollinator habitat. The lists must emphasize as many native species as practical.
2. The habitat planting will include (as a minimum) three early, three mid, and three late flowering species from the NRCS state list including forbs, legumes, vines, and / or shrubs. Plants that produce toxic nectar will not be planted.
3. Any other use of the pollinator habitat area must not compromise its intended purpose.
4. Site selection should consider existing weed pressures and available methods of control. Delay planting if high weed pressure requires aggressive treatment.
5. Suppression of weeds and plant establishment will be accomplished according to the appropriate NRCS conservation practice standards and specifications.
6. Successful establishment is when the planting is providing at least 80% canopy cover, visually estimated, and that the resultant cover consists primarily of the early, mid, and late blooming species planted for pollinators.
7. Insecticides should not be used in the habitat planting area.
8. Herbicides are allowed during site preparation (prior to planting) when it is necessary to eliminate competing weeds from a planting area in order for nectar and pollen producing plants to establish.
9. After a pollinator enhancement has been planted, herbicides may be spotsprayed to remove broad-leaf weeds, or grass-selective herbicides may be applied to larger areas to eliminate persistent weedy grasses. Similarly, the



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entire site may be mowed in the first year post-planting to reduce annual or biennial weeds that persist (site should be mowed just before dominant annual weeds flower). Mowing height must not be too short so as to compromise the planting. A general guideline is 8 to 10 inches.

B. Operation and maintenance

1. Management and/or maintenance activities such as mowing, haying, burning, or grazing must be conducted outside of the growing season or bloom period. Maintenance should be done on less than 1/3 of the acreage during any given year, except during the first year post-planting as described in A 9 above.
2. Insecticides should not be used in the habitat planting area. Even non-synthetic botanical insecticides can harm beneficial insects. If adjacent crop areas are treated with insecticides use one or more of the following actions to limit insecticides in the pollinator habitat area:
 - i. Create insecticide free buffers in the first 25 feet of crop area,
 - ii. Use application methods that minimize drift to the adjacent habitat,
 - iii. Apply active ingredients in the evening when most insect pollinators are not active.
3. The planted habitat areas must be regularly inspected for invasive and/or noxious plants or other plants that may compromise the purpose of this enhancement. Undesirable species should be controlled using the method that is least likely to inadvertently impact pollinators. For example, spot-spraying with herbicide or physical removal of undesirable plants.
4. If habitat is part of an organic farming operation, only materials allowed according to the USDA National Organic Program’s National List of Allowed and Prohibited Substances may be used.



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Documentation and Implementation Requirements:

Participant will:

- Prior to implementation, develop a map showing the location of proposed habitat areas with notes on land use adjacent to proposed habitat areas to discuss with NRCS staff.
- During implementation, purchase specified seed mix or plant materials that meets pollinator-specific seeding or planting requirements provided by NRCS.
- During implementation, follow habitat establishment guidance provided by NRCS in the state specifications for NRCS Conservation Practice Standard Wildlife Habitat Planting (Code 420).
- After implementation, provide for review by NRCS a list of management and/or maintenance activities carried out to manage the habitat areas and the dates on which those activities occurred.
- After implementation, take and provide for review photographs as documentation of pollinator habitat area condition during blooming periods.



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NRCS will:

- Prior to implementation, discuss with participant the proposed habitat areas to verify they are in locations suitable for the enhancement.
- Prior to implementation, provide participant with suitable plant lists.
- Prior to implementation, provide and explain State specifications for NRCS Conservation Practice Standard Wildlife Habitat Planting (Code 420).
- Prior to implementation, use WHEG to document 0.5 five planning criteria for the terrestrial habitat resource concern. The WHEG does not need to be a pollinator WHEG.
- Prior to implementation, provide participant with a recommended seed mix and planting specifications per above criteria (grass/forb ratio; number of forb species per bloom period for pollinator habitat plantings)
- After implementation, verify successful establishment (per planting criteria above) by review of documentation and photographs.

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



OHIO SUPPLEMENT TO CONSERVATION ENHANCEMENT ACTIVITY

CONSERVATION STEWARDSHIP PROGRAM

E420A

Additional Criteria for Ohio

In addition to the criteria specified in the National job sheet E420A the following additional criteria apply in Ohio:

- For pollinator habitat, the following species found in the tables on pages 2 and 3 of this supplement are recommended; see Appendix A-Wildlife Habitat (Ohio FOTG, Section IV, Old Section IV, Appendices) for additional recommendations on species to plant. For a more comprehensive list see Recommended Pollinator Plant Species list found in FOTG, Section IV, Ecological Science Tools.

Additional Documentation Requirements for Ohio

- Documentation to show that the planting occurred within the approved planting time period and all other requirements were met.

OHIO SUPPLEMENT TO CONSERVATION ENHANCEMENT ACTIVITY

- Include a minimum of 9 species of pollinator-friendly forbs/legumes from acceptable species list; all mixes shall include 1 native legume (preferably partridge pea) and 1 native forb; in addition to the above 9 species, mixes must include a minimum of 2 milkweed species (1 species shall be common milkweed). Resulting in a minimum requirement of an 11 species seed mix. Wildflower and legume species planted are encouraged to be native. However, beneficial introduced flowering plants may be part of the seed mix. Introduced legumes are limited to alfalfa, alsike clover, crimson clover, and ladino clover. Introduced species shall not collectively exceed 15% of total mix.
- Must include a species mix covering all 3 bloom periods. The species mix shall provide at least 3 species in each of the following bloom periods: April - June 15th (early), June 15th – July (mid), and August – October (late). A comprehensive plant list can be found in Ohio FOTG titled: Recommended Pollinator Plant Species List.

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- At least 2 species of milkweed are required. Milkweed shall be planted at a minimum of 4,000 PLS/acre.
- Total seed mix (forbs/legumes) must be 40-50 PLS/square foot. All 9 minimum required species except for Milkweeds need to be included at 1% and should not exceed 15% of total mix. Once the minimum of 9 species of forbs or legumes and 2 milkweed species (1 species shall be common milkweed) is met, additional species can be planted at less than 1% of the mix.
- Grasses are not a required. If grass is included in the seed mix, non-sod-forming bunch grasses are preferred. Little Blue Stem is highly recommended in because of its height and structure. Indiangrass shall not be used. If grasses are included, no more than 25% of the seed mix based on PLS/square foot may be grasses. Of that 25%, at least 70% (based on PLS) shall be short species. Total seed mix (including grass) must be 40-50 PLS/square foot.

Species	Bloom Period	Bloom Color
Eastern Columbine (<i>Aquilegia canadensis</i>)	Early	Red
Golden Alexanders (<i>Zizia aurea</i>)	Early	Yellow
Tall White Beardtongue (<i>Penstemon digitalis</i>)	Early	White
Wild Lupine (<i>Lupinus perennis</i>)	Early	Blue
Blue False Indigo (<i>Baptisia australis</i>)	Early	Purple
Cow Parsnip (<i>Heracleum lanatum</i>)	Early	White
Golden Ragwort (<i>Senecio aureus</i>)	Early	Yellow
Northern Wild Senna (<i>Senna hebecarpa</i>)	Mid	Yellow
Wild Bergamot (<i>Monarda fistulosa</i>)	Mid	Pink
Purple Bergamot (<i>Monarda media</i>)	Mid	Red
Partridge Pea (<i>Chamaecrista fasciculata</i>)	Mid	Yellow
Black-eyed Susan (<i>Rudbeckia hirta</i>)	Mid	Yellow
Blue Vervain (<i>Verbena hastata</i>)	Mid	Purple
Butterfly Milkweed (<i>Asclepias tuberosa</i>)	Mid	Orange
Canada Tick-Trefoil (<i>Desmodium canadense</i>)	Mid	Pink
Joe-Pye Weed (<i>Eupatorium fistulosum</i>)	Mid	Pink
Culvers Root (<i>Desmanthus illinoiensis</i>)	Mid	White
Illinois Bundleflower (<i>Veronicastrum virginicum</i>)	Mid	White
Purple Coneflower (<i>Echinacea purpurea</i>)	Mid-Late	Purple
Swamp Milkweed (<i>Asclepias incarnata</i>)	Mid-Late	Pink
Common Milkweed (<i>Asclepias syriaca</i>)	Mid-Late	Pink
Brown-eyed Susan (<i>Rudbeckia triloba</i>)	Mid-Late	Yellow
New England Aster (<i>Aster novae-angliae</i>)	Late	Purple



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Smooth Blue Aster (<i>Aster laevis</i>)	Late	Blue
Gray-headed Coneflower (<i>Ratibida pinnata</i>)	Late	Yellow
Smooth Oxeye (<i>Heliopsis helianthoides</i>)	Late	Yellow
Blazingstar (<i>Liatris spicata</i>)	Late	Purple
Rough Goldenrod (<i>Solidago rugosa</i>)	Late	Yellow
Showy Goldenrod (<i>Solidago speciosa</i>)	Late	Yellow
Sneezeweed (<i>Helenium autumnale</i>)	Late	Yellow

VINES

Species	Bloom Period	Bloom Color
Trumpet Creeper (<i>Campsis radicans</i>)	Mid-Late	Orange, Red
Virginia Creeper (<i>Parthenocissus quinquefolia</i>)	Mid	Green-white
Virgin's Bower (<i>Clematis virginiana</i>)	Late	White



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Notes and comments on this National Enhancement

- A Wildlife Habitat Evaluation Guide (WHEG), must be used to show that 0.5 planning criteria has been met for the inadequate wildlife habitat resource concern. Use the existing Primary Habitat Suitability Index to determine this score.
 - o This enhancement is intended to enhance existing habitat.
 - o If there is currently no habitat, or the existing condition is poor, the participant may schedule CPS 420 in addition to E420. The planned Primary Habitat Suitability Index WHEG score for CPS 420 should bring the WHEG score to a minimum of a 0.5.
- A WHEG specific to pollinator habitat must be used to show that, post implementation, the Enhancement is expected to result in the establishment of suitable pollinator habitat or will improve the habitat value of existing pollinator habitat. Use the Ohio Pollinator Habitat Index.

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OHIO POLLINATOR HABITAT EVALUATION

Landowner/Operator		
Tract	Field Nos.	Acres
Completed by		Date

Evaluation Factor	Existing	Planned
1. Adjacent Features		
Check any of the features that are within 100 feet of plot; score 2 points for each checked item; record total (maximum 10 points)		
<input type="checkbox"/> Permanent herbaceous cover with diverse native wildflowers allowed to bloom <input type="checkbox"/> Pasture with >30% non-invasive flowering plants allowed to bloom <input type="checkbox"/> Woody/brushy cover composed of diverse, primarily native trees/shrubs <input type="checkbox"/> Windbreaks composed of coniferous trees or shrubs to reduce pesticide drift <input type="checkbox"/> Annual flowering crops allowed to bloom, insectary strips or bolting crops allowed to bloom		
2. Plot Species Diversity		
select score for each flowering season; maximum 30 points total; points are awarded as follows: 5+ species=10 points 3 – 4 species=5 points 1- 2 species=3 points 0 species=0 points		
2a. Spring blooming wildflowers, flowering shrubs, or pollinator friendly trees in plot		
2b. Summer blooming wildflowers, flowering shrubs, or pollinator friendly trees in plot		
2c. Fall blooming wildflowers, flowering shrubs, or pollinator friendly trees in plot		
3. Native Bee Nesting Habitat		
Check any of the features that occur within 50 feet of plot; score 2 points for each checked item; record total (maximum 10 points)		
<input type="checkbox"/> Areas of undisturbed native bunch grasses (clump-forming) <input type="checkbox"/> Areas with untilled, uncompacted, well-drained ground, either bare or with sparse vegetation (<20% vegetation cover) <input type="checkbox"/> Rock piles, rock borders, or rock walls <input type="checkbox"/> Dead wood, snags, and/or brush piles <input type="checkbox"/> Shrubby or woody plants with hollow or pithy stalks (e. g. elderberry, raspberry, sumac) and/or large, sturdy prairie plants with hollow or pithy stems (e. g. <i>Silphium</i> , <i>Amorpha</i>)		
4. Insecticide Use		
this applies to areas within 100 feet of pollinator plot (maximum 20 points)		
No use of insecticides (including organic-approved products); score 20 points		
OR		
If insecticides are used , check any of the following that apply, score 1.5 points for each checked item, record total		
<input type="checkbox"/> Most pest issues are addressed by non-chemical methods(e. g. use of row covers, plant collars, pheromone traps, mating disrupters, hand-picking, etc.) <input type="checkbox"/> No soil fumigation <input type="checkbox"/> Minimum 30' buffer between applications and pollinator plot <input type="checkbox"/> Insecticides with lowest toxicity to pollinators are prioritized <input type="checkbox"/> Applications are made when pest pressure warrants, based on scouting and economic thresholds <input type="checkbox"/> Application only occurs outside of bloom period <input type="checkbox"/> Spraying occurs only in calm conditions (e. g. ≤ 9 mph winds) <input type="checkbox"/> Spraying only occurs at night <input type="checkbox"/> Specialized spray equipment is used to reduce drift (e. g. electrostatic or hooded sprayers) <input type="checkbox"/> Spray equipment is calibrated regularly		
Total Pollinator Habitat Points (Maximum 70)		
Pollinator Habitat Index (Total/70)		

Guidance

This habitat evaluation form is primarily for use in assessing pollinator plots that exist or are planned for establishment. It focuses on the pollinator seeding area as well as some of the adjacent land to evaluate the general quality of the site for a variety of native pollinator species. Pollinator plots should have a diversity of flowering species that provide pollen, nectar and reproductive sites for these insects. The pollinator plots should be relatively free of disturbance that adversely affects the pollinator species.

Adjacent Features

Permanent herbaceous cover includes such areas as meadows, field borders, insectary strips, filter strips, odd areas, CRP

Non-invasive pasture would include species such red clover, white clover, alfalfa; these must be allowed to bloom

Woody cover could include hedgerows, wooded riparian buffers, woodlots, CRP, wildlife plantings
Windbreaks of primarily conifers provide little food value to pollinators but their role in protecting pollinator habitat is important

Annual flowering crops could include cover crops, annual bee pasture, sunflowers, bolting crops; these must be allowed to bloom

Species diversity

This is focused on the pollinator plot itself; for maximum benefit it must provide nectar or pollen sources throughout the growing season; evaluate the number of flowering species for each season separately

Native Bee Nesting Habitat

Many native bees nest either in the ground, cavities or hollow stems of plants. Having this habitat available close to foraging habitat improves the overall habitat for these pollinators.

Insecticide Use

The value of pollinator foraging or nesting habitat is severely compromised by using insecticides on or close to pollinator plots. Eliminating or mitigating the effects of insecticide usage near these plots improves their habitat value greatly.

Much of the information for this evaluation form was derived from the *Pollinator Habitat Assessment Form and Guide* (July 2015) produced by the Xerces Society for Invertebrate Conservation. This publication is useful to better understand some of these factors in assessing pollinator habitat. It is also an excellent source for evaluating pollinator habitat at a broader farm or landscape level. The publication can be found at <https://www.xerces.org/pollinator-resource-center/great-lakes>
You can download the full assessment publication as well as other information on pollinator habitat establishment and management, plants for pollinators, protecting pollinators from insecticides, pollinator identification and monitoring.



CONSERVATION ENHANCEMENT ACTIVITY

E420B

CONSERVATION STEWARDSHIP PROGRAM

Establish monarch butterfly habitat

Conservation Practice 420: Wildlife Habitat Planting

APPLICABLE LAND USE: Crop (Annual & Mixed); Crop (Perennial); Associated Ag Land; Farmstead

RESOURCE CONCERN: Animal

ENHANCEMENT LIFE SPAN: 5 years

Enhancement Description

Seed or plug milkweed (*Asclepias* spp.) and high-value monarch butterfly nectar plants to establish or improve monarch habitat. These areas may include, but are not limited to, field borders, vegetative barriers, contour buffer strips, shelterbelts, hedgerows, windbreaks, conservation cover, and riparian forest and herbaceous buffers.

Criteria

- Habitat areas must be at least 0.5 acres.
- A Wildlife Habitat Evaluation Guide (WHEG), must be used to show that 0.5 planning criteria has been met for the inadequate wildlife habitat resource concern. The WHEG used to meet this criterion does not need to be specific to monarch habitat. (If WHEG score is less than 0.5, consider E327B.)
- A WHEG specific to monarch habitat must be used to show that, post implementation, the Enhancement is expected to result in the establishment of suitable monarch habitat or will improve the habitat value of existing monarch habitat. The following may be used to meet this criterion:



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- [For circumstances where planning criteria for monarch habitat is currently below 0.5] Post implementation, planning criteria for monarch habitat is equal to or greater than 0.6.
 - OR
 - [For circumstances where planning criteria for monarch habitat is at 0.5 or greater] Post implementation, planning criteria for monarch habitat increases at least 0.1
- Establish and maintain habitat for monarch butterflies as described below:

A. Monarch butterflies

- Habitat will be established and/or maintained using lists of larval host plants and nectar plants suitable for monarch butterfly habitat as the guide. Lists are provided in the NRCS Field Office Technical Guide (FOTG).
- A grass component is commonly needed for ecological stability, weed control, and fuel for prescribed burning. The FOTG provides information on the grass/forb ratio for monarch habitat plantings.
- At least 60% of the forb seeds (pure live seed) in the planting mix will be from the monarch butterfly planting list (FOTG). This will ensure that plantings will provide food (nectar and pollen) for adult monarch butterflies. Milkweed seeds are included in meeting the 60% minimum because milkweeds are excellent nectar plants. The FOTG provides information on the required number of forb species per bloom period (early, mid, or late season) for monarch habitat plantings. Bloom periods are to coincide with monarch presence in the area.
- To provide food for monarch butterfly larvae, plantings will include at least one species of milkweed (*Asclepias* spp.) from the FOTG monarch butterfly planting list. All milkweed species used in the mix must be from this list and shall represent at least 1.5% of the total seeds in the mix. The total seeds include pure live seed from both grass and forbs. Tropical milkweed (*Asclepias curassavica*) shall not be planted.

Waiver: In some regions, a commercial source of native Asclepias species is limited or not available. In these situations, the NRCS State Conservationist may apply for a waiver, and only require that plantings



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include monarch nectaring species. In this situation, milkweed seed or plugs are still encouraged to be planted, if possible. If such a waiver is granted, the mix will result in at least 80% of the seed being from the state's monarch nectaring plant list.

- Any other use of the monarch butterfly habitat area must not compromise its intended purpose.

B. Planting criteria for monarch butterfly habitat

- Site selection should consider existing weed pressures and available methods of control. Delay planting and conduct an additional growing season of weed control if high weed pressure requires aggressive treatment.
 - Weed treatment and plant establishment will be accomplished according to the state's specifications for NRCS Conservation Practice Standard Wildlife Habitat Planting (Code 420) and other practice standards as appropriate.
 - Successful establishment is when:
 - a. The planting is providing at least 80 percent canopy cover, visually estimated;
 - b. Resultant cover consists of at least 500 milkweed plants per acre (approx. 1 stem per each 100-sq. ft.). A milkweed plant is defined as a single stem emerging from the ground; AND
 - c. two targeted nectar plants per bloom period are available when monarchs are present in the state.
 - Insecticides should not be used in the habitat planting area.
 - Herbicides are allowed prior to planting when it is necessary to eliminate competing weeds from a planting area in order for nectar and pollen producing plants to establish.
- C.** After a monarch habitat enhancement has been planted, herbicides may be spot-sprayed to remove broad-leaf weeds, or targeted application of grass-selective herbicides may be used in areas dominated by persistent weedy grasses. Similarly, the entire site may be mowed in the first year post-planting to reduce annual or biennial



weeds that persist (site should be mowed just before dominant annual weeds flower). Mowing height must not be too short so as to compromise the planting. A general guideline is 8 to 10 inches.

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D. Operation and maintenance for monarch butterfly habitat

- Management and/or maintenance activities such as mowing, haying, burning, or grazing shall be conducted outside of the season when monarch larvae or adults are present.
- Insecticides should not be used in the habitat planting area.
- The planted habitat areas shall be regularly inspected for invasive and/or noxious plants or other plants that may compromise the purpose of this enhancement. Undesirable species shall be controlled using Individual Plant Treatment methods, for example, spot-spraying with herbicide or physical removal of individual plants.



CONSERVATION STEWARDSHIP PROGRAM

Documentation and Implementation Requirements

Participant will:

- Prior to implementation, provide a map showing the location of proposed habitat areas with notes on land use adjacent to proposed habitat areas to discuss with NRCS staff.
- During implementation, purchase specified seed mix or plant materials that meets monarch-specific seeding or planting requirements provided by NRCS.
- During implementation, follow habitat establishment guidance provided by NRCS in the state specifications for NRCS Conservation Practice Standard Wildlife Habitat Planting (Code 420).
- After implementation, provide a list of management and/or maintenance activities carried out to manage the habitat areas and the dates on which those activities occurred.
- After implementation, provide photo documentation of monarch habitat areas during blooming periods.

NRCS will:

- Prior to implementation, use WHEG to document 0.5 five planning criteria for the terrestrial habitat resource concern. The WHEG does not need to be a monarch WHEG.
- Prior to implementation, assess habitat condition using a monarch WHEG to calculate current WHEG score and anticipated WHEG score after implementation of Enhancement.
Benchmark WHEG score = _____ Planned Post Implementation WHEG score = _____
- Prior to implementation, provide participant with suitable larval host plants and nectar plants lists.
- Prior to implementation, provide and explain State specifications for NRCS Conservation Practice Standard Wildlife Habitat Planting (Code 420).
- Prior to implementation, provide participant with a recommended seed mix and planting specifications per above criteria (grass/forb ratio; number of forb species per bloom period for monarch habitat plantings).



- After implementation, verify successful establishment (per planting criteria above).

CONSERVATION STEWARDSHIP PROGRAM

NRCS Documentation Review:

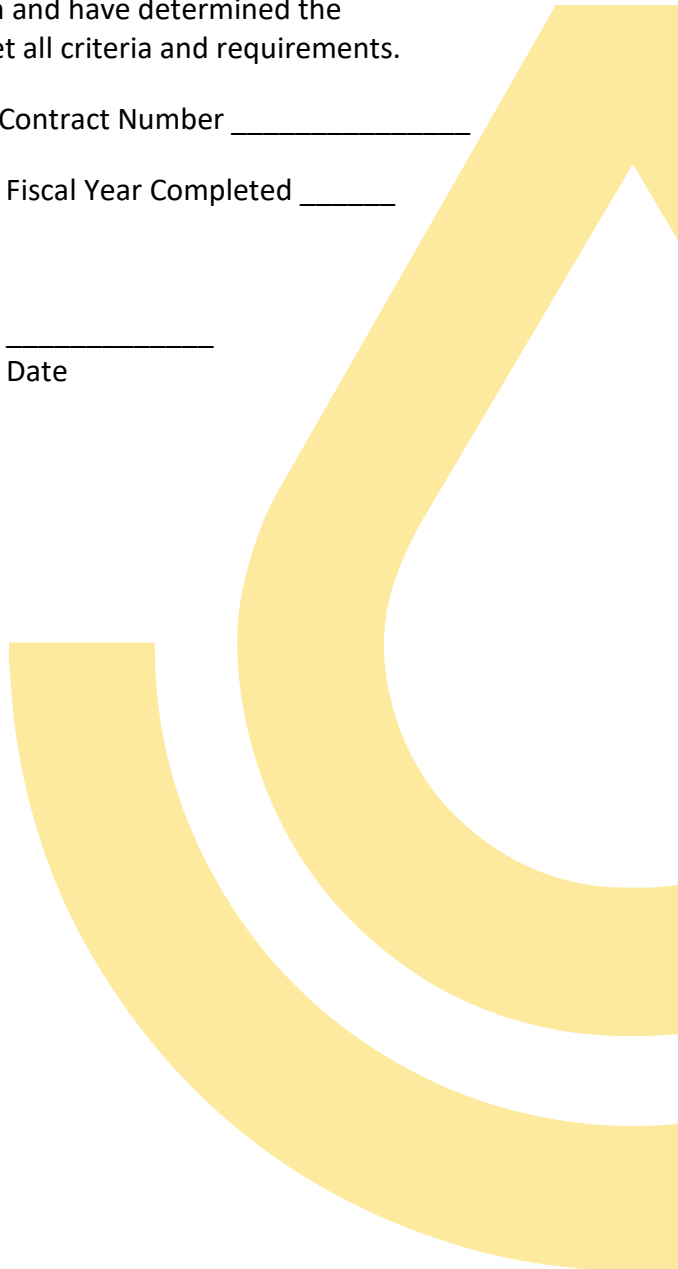
I have reviewed all required participant documentation and have determined the participant has implemented the enhancement and met all criteria and requirements.

Participant Name _____ Contract Number _____

Total Amount Applied _____ Fiscal Year Completed _____

NRCS Technical Adequacy Signature

Date





**OHIO SUPPLEMENT TO
CONSERVATION ENHANCEMENT ACTIVITY**

**CONSERVATION
STEWARDSHIP
PROGRAM**

E420B

Additional Criteria for Ohio

In addition to the criteria specified in the National job sheet E420B the following additional criteria apply in Ohio:

- The list below contains plant species that are highly and very highly recommended for monarch butterfly habitat establishment; use this list when selecting plant species to establish under this enhancement.
- Establishment may be done by seeding and/or planting plugs. Plugs are generally recommended for milkweed plants in all cases and for high value forbs especially in areas with already established vegetation.
- On page 4, C. Operation and maintenance for monarch butterfly habitat, the second bulletin states "Insecticides should not be used in the habitat planting area."; in addition to no spraying in the habitat planting area, also seriously consider the effects of drift if insecticides are applied to adjacent crop areas and consider use of measures to mitigate this effect.

Habitat conditions will be evaluated using the NRCS Monarch WHEG: Midwest or Appalachian Edition (depending on your location in Ohio) found in Ohio EFOTG, Section I, Assessment Procedures, 5. Wildlife Habitat, Monarch Butterfly.

Additional Documentation Requirements for Ohio

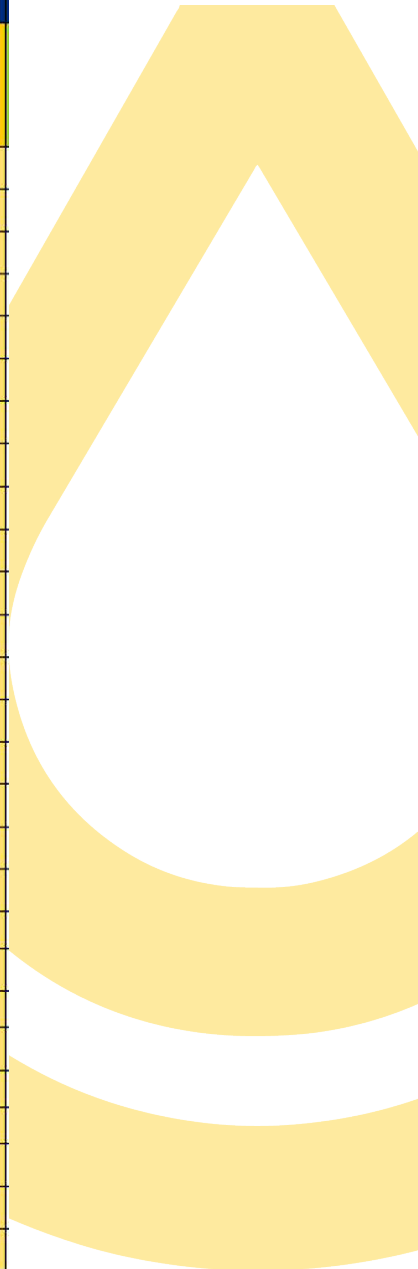
- Documentation to show that the planting occurred within the approved planting time period and all other requirements were met.

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Species name	Plant symbol	Common name	Growth habit	Monarch Value	Bloom Period		
					Early	Mid	Late
<i>Agastache nepetoides</i>	AGNE2	yellow giant hyssop	forb/herb, subshrub	High		x	x
<i>Amorpha canescens</i>	AMCA6	leadplant	shrub, subshrub	High		x	
<i>Amsonia tabernaemontana</i>	AMTA2	eastern bluestar	forb/herb	High	x		
<i>Apocynum cannabinum</i>	APCA	Indianhemp	forb/herb	High	x	x	
<i>Asclepias incarnata</i>	ASIN	swamp milkweed	forb/herb	Very High		x	x
<i>Asclepias ovallifolia</i>	ASOV	oval-leaf milkweed	forb/herb	High	x	x	
<i>Asclepias purpurascens</i>	ASPU2	purple milkweed	forb/herb	High	x	x	
<i>Asclepias speciosa</i>	ASSP	showy milkweed	forb/herb	High	x	x	x
<i>Asclepias sullivantii</i>	ASSU3	prairie milkweed	forb/herb	High		x	
<i>Asclepias syriaca</i>	ASSY	common milkweed	forb/herb	Very High		x	
<i>Asclepias tuberosa</i>	ASTU	butterfly weed	forb/herb	Very High	x	x	
<i>Asclepias verticillata</i>	ASVE	whorled milkweed	forb/herb	Very High	x	x	x
<i>Bidens aristosa</i>	BIAR	bearded beggarticks	forb/herb	Very High		x	
<i>Bidens laevis</i>	BILA	smooth beggartick	forb/herb	High		x	x
<i>Blephilia ciliata</i>	BECI	downy pagoda-plant	forb/herb	High	x	x	
<i>Blephilia hirsuta</i>	BLHI	hairy pagoda-plant	forb/herb	High	x	x	x
<i>Boltonia asteroides</i>	BOAS	white doll's daisy	forb/herb	High		x	x
<i>Brickellia eupatorioides</i>	BREU	false boneset	forb/herb, subshrub	High		x	x
<i>Cirsium discolor</i>	CIDI	field thistle	forb/herb	High		x	x
<i>Cirsium flodmanii</i>	CIFL	Flodman's thistle	forb/herb	High		x	x
<i>Cirsium muticum</i>	CIMI	swamp thistle	forb/herb	High		x	x
<i>Conoclinium coelestinum</i>	COCO13	blue mistflower	forb/herb	High		x	x
<i>Coreopsis palmata</i>	COPA10	stiff tickseed	forb/herb	High		x	
<i>Coreopsis tripteris</i>	COTR4	tall tickseed	forb/herb	High		x	x
<i>Dalea candida</i>	DACA7	white prairie clover	forb/herb, subshrub	High	x	x	
<i>Delphinium tricorne</i>	DETR	dwarf larkspur	forb/herb	High			
<i>Dicentra cucullaria</i>	DICU	dutchman's breeches	forb/herb	High	x		





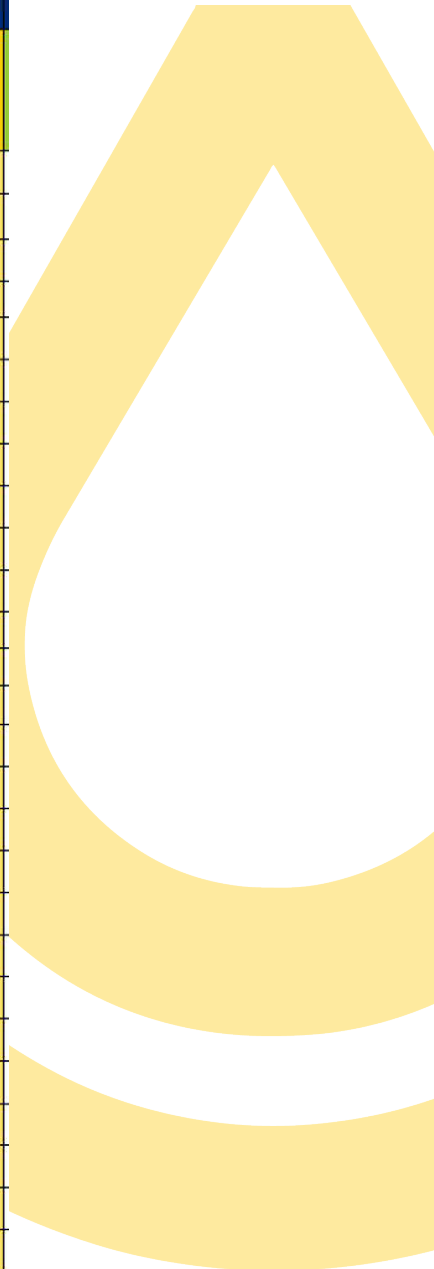
CONSERVATION STEWARDSHIP PROGRAM

Species name	Plant symbol	Common name	Growth habit	Monarch Value	Bloom Period		
					Early	Mid	Late
<i>Doellingeria umbellata</i>	DOUM2	parasol whitetop	forb/herb	High		x	x
<i>Echinacea angustifolia</i>	ECAN2	blacksamson echinacea	forb/herb	High	x	x	
<i>Echinacea pallida</i>	ECPA	pale purple coneflower	forb/herb	High	x	x	
<i>Echinacea purpurea</i>	ECPU	eastern purple coneflower	forb/herb	Very High	x	x	x
<i>Eryngium yuccifolium</i>	ERYU	rattlesnake master	forb/herb	High	x	x	
<i>Eupatorium altissimum</i>	EUAL3	tall thoroughwort	forb/herb	Very High		x	x
<i>Eupatorium perfoliatum</i>	EUPE3	common boneset	forb/herb	High		x	x
<i>Eupatorium serotinum</i>	EUSE2	late-flowering thoroughwort	forb/herb	Very High		x	x
<i>Euthamia graminifolia</i>	EUGR5	grass-leaved goldentop	forb/herb	Very High	x	x	x
<i>Eutrochium fistulosum</i>	EUF14	trumpetweed	forb/herb	High		x	x
<i>Eutrochium maculatum</i>	EUMA9	spotted joe pye weed	forb/herb	Very High		x	x
<i>Eutrochium purpureum</i>	EUPU21	sweetscented joe pye weed	forb/herb	High		x	x
<i>Helianthus annuus</i>	HEAN3	common sunflower	forb/herb	Very High		x	x
<i>Helianthus giganteus</i>	HEGI	giant sunflower	forb/herb	High		x	x
<i>Helianthus grosseserratus</i>	HEGR4	sawtooth sunflower	forb/herb	Very High		x	x
<i>Helianthus maximiliani</i>	HEMA2	Maximilian sunflower	forb/herb	High		x	x
<i>Helianthus pauciflorus</i>	HEPA19	stiff sunflower	forb/herb	High		x	x
<i>Helianthus strumosus</i>	HEST	Paleleaf woodland sunflower	forb/herb	High		x	x
<i>Helianthus tuberosus</i>	HETU	Jerusalem artichoke	forb/herb	High		x	x
<i>Helianthus *laetiflorus</i>	HELA	cheerful sunflower	forb/herb	High		x	x
<i>Heliopsis helianthoides</i>	HEHE5	smooth oxeye	forb/herb	High		x	x
<i>Krigia biflora</i>	KRBI	twoflower dwarf dandelion	forb/herb	High	x	x	
<i>Liatriis aspera</i>	LIAS	tall blazing star	forb/herb	Very High			x
<i>Liatriis cylindracea</i>	LICY	Ontario blazing star	forb/herb	Very High		x	
<i>Liatriis ligulistylis</i>	LILI	Rocky Mountain blazing star	forb/herb	Very High		x	x
<i>Liatriis punctata</i>	LIPU	dotted blazing star	forb/herb	High		x	x



CONSERVATION STEWARDSHIP PROGRAM

Species name	Plant symbol	Common name	Growth habit	Monarch Value	Bloom Period		
					Early	Mid	Late
<i>Liatris pycnostachya</i>	LIPY	prairie blazing star	forb/herb	High		x	x
<i>Liatris scariosa</i>	LISC2	devil's bite	forb/herb	High		x	x
<i>Liatris spicata</i>	LISP	dense blazing star	forb/herb	High		x	x
<i>Lilium superbum</i>	LISU	turk's-cap lily	forb/herb	High		x	x
<i>Lithospermum canescens</i>	LICA12	hoary puccoon	forb/herb	High	x	x	
<i>Lobelia siphilitica</i>	LOSI	great blue lobelia	forb/herb	High		x	x
<i>Mertensia virginica</i>	MEVI3	Virginia bluebells	forb/herb	High	x	x	
<i>Monarda fistulosa</i>	MOFI	wild bergamot	forb/herb, subshrub	High	x	x	x
<i>Monarda punctata</i>	MOPU	spotted beebalm	forb/herb, subshrub	High	x	x	
<i>Oligoneuron rigidum</i>	OLRI	stiff goldenrod	forb/herb	High		x	x
<i>Onosmodium bejarriense</i>	ONBE	western marbleseed	forb/herb	High		x	
<i>Phlox divaricata</i>	PHDI5	wild blue phlox	forb/herb	High	x		
<i>Phlox glaberrima</i>	PHGL4	smooth phlox	forb/herb	High	x	x	
<i>Phlox paniculata</i>	PHPA6	fall phlox	forb/herb	High		x	
<i>Physostegia virginiana</i>	PHVI8	obedient plant	forb/herb	High		x	x
<i>Rubus flagellaris</i>	RUFL	northern dewberry	subshrub	High	x	x	
<i>Rudbeckia hirta</i>	RUHI2	blackeyed Susan	forb/herb	High		x	x
<i>Silphium integrifolium</i>	SIIN2	wholeleaf rosinweed	forb/herb	High		x	x
<i>Silphium laciniatum</i>	SILA3	compassplant	forb/herb	High		x	x
<i>Silphium perfoliatum</i>	SIPE2	cup plant	forb/herb	High		x	x
<i>Sium suave</i>	SISU2	hemlock waterparsnip	forb/herb	High		x	x
<i>Solidago canadensis</i>	SOCA6	Canada goldenrod	forb/herb	High			x
<i>Solidago nemoralis</i>	SONE	gray goldenrod	forb/herb	High		x	x
<i>Solidago speciosa</i>	SOSP2	showy goldenrod	forb/herb	Very High			x
<i>Symphotrichum cordifolium</i>	SYCO4	common blue wood aster	forb/herb	High		x	x
<i>Symphotrichum laeve</i>	SYLA3	smooth aster	forb/herb	High		x	x
<i>Symphotrichum novae-angliae</i>	SYNO2	New England aster	forb/herb	Very High		x	x
<i>Symphotrichum oolentangiense</i>	SYOO	skyblue aster	forb/herb, subshrub	High		x	x





CONSERVATION STEWARDSHIP PROGRAM

Species name	Plant symbol	Common name	Growth habit	Monarch Value	Bloom Period		
					Early	Mid	Late
<i>Symphotrichum pilosum</i>	SYPI2	hairy white oldfield aster	forb/herb	High		x	x
<i>Verbena stricta</i>	VEST	hoary verbena	forb/herb	High		x	
<i>Vernonia baldwinii</i>	VEBA	Baldwin's ironweed	forb/herb	High		x	x
<i>Vernonia fasciculata</i>	VEFA2	prairie ironweed	forb/herb	High		x	x
<i>Veronicastrum virginicum</i>	VEVI4	Culver's root	forb/herb	High		x	x

Notes and comments on this National Enhancement

A Wildlife Habitat Evaluation Guide (WHEG), must be used to show that 0.5 planning criteria has been met for the inadequate wildlife habitat resource concern. Use the existing Primary Habitat Suitability Index to determine this score. This enhancement is intended to enhance existing habitat. If there is currently no habitat, or the existing condition is poor, the participant may schedule CPS 420 in addition to E420. The planned Primary Habitat Suitability Index WHEG score for CPS 420 should bring the WHEG score to a minimum of a 0.5.

Monarch Wildlife Habitat Evaluation Guide (WHEG): Midwest or Appalachian Edition 2.0 will be used to determine the final planned WHEG value after the enhancement or combination of conservation practices and enhancements are applied.



CONSERVATION ENHANCEMENT ACTIVITY

E449A

CONSERVATION STEWARDSHIP PROGRAM

Complete pumping plant evaluation for water savings

CONSERVATION PRACTICE: 449 - Irrigation Water Management

APPLICABLE LAND USE: Crop (Annual & Mixed); Crop (Perennial); Pasture; Associated Ag Land; Farmstead

RESOURCE CONCERN: Water

ENHANCEMENT LIFE SPAN: 1 years

Enhancement Description

Evaluation of all pumping plants to determine the potential to rehabilitate/replace/reconfigure pump performance to improve water delivery efficiency 10% or more.

Criteria

- Pump test evaluation will include all irrigation pumps on fields where the activity is implemented. There could be multiple pumps that are used on single or multiple fields.
- Minimum data necessary to complete the pumping evaluation:
 - Flow rate, instantaneous and for the season.
 - Pressure at different flow rates based on partial or complete irrigation.
 - Power usage to compute efficiency of the drive unit.
 - Area and fields irrigated.
 - Estimate of friction loss in pipelines based on pressure drop in lines during test.
- The irrigation water management plan is followed and includes, as per NRCS Conservation Standard Practice, Irrigation Water Management (Code 449):
 - An irrigation system layout map showing the main pipeline(s), irrigated area, soil moisture locations and depths (if used), and soils. If water level sensors are used, show locations and number of sensors used.
 - Methods used to measure or determine the flow rate or volume of the irrigation applications.



CONSERVATION STEWARDSHIP PROGRAM

- Measurement records showing the amount of water used to irrigate as it comes onto the farm and goes to each field.
- Documentation of the scientific method used for scheduling the timing and amount of irrigation applications.
- The Irrigation water management plan explains:
 - How irrigation system meets crop needs, while maximizing irrigation water efficiency.
 - Seasonal or annual planned water application volumes by crop.
 - Management allowable depletion (MAD) and depth of the managed crop root zone or water level for each crop and stage of growth.
 - Evaluation of irrigation system distribution uniformity and necessary changes to insure uniform irrigation.
 - Information on how to recognize irrigation induced erosion and how to mitigate it.
 - Indicate how data from the sensor locations and depths will be considered to make field-wide irrigation decisions.
 - Water application scheduling based on soil moisture or water level monitoring and or evapotranspiration monitoring from the weather station
- Recordkeeping documents for the irrigator to use during operation and management.

Documentation and Implementation Requirements

Participant will:

Prior to implementation

- Provide NRCS with a map showing the location of all fields and pumps connected to the irrigation system.
- Arrange for pump test evaluations of all irrigation pumps on fields where activity is implemented.
- Acquire an irrigation water management plan meeting NRCS Conservation Practice Standard Irrigation Water Management (Code 449) requirements.



CONSERVATION STEWARDSHIP PROGRAM

During implementation

- Follow the irrigation water management plan and keep records as required by the plan.
- Have a pump test evaluation performed on all irrigation pumps on fields where activity is implemented.

After implementation

- Make the following items available for review by NRCS to verify implementation of the enhancement:
 - Irrigation water management plan and records kept.
 - Pump test evaluation report(s).
 - Provide a list of any adjustments to improve system efficiency made as a result of the evaluation. Calculate the reduction of water use based on before and after conditions.

NRCS will:

Prior to implementation

- Provide and explain NRCS Conservation Practice Standard Irrigation Water Management (Code 449) to participant as it relates to implementing this enhancement.
- As needed, provide additional technical assistance to the participant as requested.

After implementation

- Verify implementation of the irrigation water management plan, by reviewing records kept during enhancement implementation.

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



CONSERVATION ENHANCEMENT ACTIVITY

E449C

CONSERVATION STEWARDSHIP PROGRAM

Advanced Automated IWM – Year 2-5, soil moisture monitoring

Conservation Practice 449: Irrigation Water Management

APPLICABLE LAND USE: Crop (Annual & Mixed); Crop (Perennial); Pasture

RESOURCE CONCERN: Water

PRACTICE LIFE SPAN: 1 year

Enhancement Description

Advanced automated irrigation water management using soil moisture or water level monitoring (installed as per IWM plan) with data loggers.

Criteria

Irrigation water management plan is followed and includes, as per NRCS Conservation Standard Practice Irrigation Water Management (Code 449):

- An irrigation system layout map showing the main pipeline(s), irrigated area, soil moisture locations and depths (if used), and soils. If water level sensors are used, show locations and number of sensors used.
- Methods used to measure or determine the flow rate or volume of the irrigation applications.
- Measurement records showing the amount of water used to irrigate as it comes onto the farm and goes to each field.
- Documentation of the scientific method used for scheduling the timing and amount of irrigation applications.
- Irrigation water management plan explains:

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CONSERVATION STEWARDSHIP PROGRAM

- How irrigation system meets crop needs, while maximizing irrigation water efficiency.
 - Seasonal or annual planned water application volumes by crop.
 - Management allowable depletion (MAD) and depth of the managed crop root zone or water level for each crop and stage of growth.
 - Evaluation of irrigation system distribution uniformity and necessary changes to insure uniform irrigation.
 - Information on how to recognize irrigation induced erosion and how to mitigate it.
 - How data from the sensor locations and depths will be considered to make field-wide irrigation decisions.
 - Water application scheduling based on soil moisture or water level monitoring and or evapotranspiration monitoring from the weather station
- Recordkeeping documents for the irrigator to use during operation and management.



CONSERVATION STEWARDSHIP PROGRAM

Documentation and Implementation Requirements

Participant will:

- Prior to implementation, acquire an irrigation water management plan meeting NRCS Conservation Practice Standard Irrigation Water Management (449) requirements.
- During implementation, record irrigation data such as location, date, duration, and flow rate of all irrigation operations, rainfall, evapotranspiration, and soil moisture or water level data.
- After implementation, make the follow items available for review by NRCS to verify implementation of the enhancement:
 - Irrigation water management plan and records kept
 - Changes made to address distribution uniformity deficiencies

NRCS will:

- Prior to implementation, provide and explain NRCS Conservation Practice Standard Irrigation Water Management (CPS 449) as it relates to implementing this enhancement
- As needed, provide additional technical assistance to the participant as requested.
- After implementation, verify implementation of the irrigation water management plan, by reviewing participant records kept during enhancement implementation.

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

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CONSERVATION ENHANCEMENT ACTIVITY

E449D

CONSERVATION STEWARDSHIP PROGRAM

Advanced Automated IWM – Year 1, Equipment and soil moisture or water level monitoring

Conservation Practice 449: Irrigation Water Management

APPLICABLE LAND USE: Crop (Annual & Mixed); Crop (Perennial); Pasture

RESOURCE CONCERN: Water

ENHANCEMENT LIFE SPAN: 1 year

Enhancement Description

Installing and monitoring soil moisture or water leveling equipment for advanced automated irrigation water management

Criteria

- Equipment may include; weather station, sensors, flow meter, data loggers, cellular service, as needed to monitor soil moisture, determine and forecast crop water use and remotely control irrigation system.
- Subscription service provided by others may be used as an alternative.
- Data to be monitored includes crop water use, status of heat and/or frost conditions to permit the producer to make informed irrigation decisions.
- The installation includes the purchase and installation of equipment, and a data logger to log continuous weather data including rainfall, temperature, solar radiation, humidity, wind

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CONSERVATION STEWARDSHIP PROGRAM

speed and soil moisture/water level sensors data that can be downloaded to a personal computer and associated graphing software.

- Producer monitors the station during the growing season to determine timing and amounts of water to apply based on soil moisture/water level sensors, field checks and weather station data.
- Producer keeps records of collected data and resulting irrigation decisions. This enhancement only applies to year one of IWM. The appropriate labor-only IWM enhancements apply in subsequent contract years.
- If a weather station is installed, install within 1 mile of fields where practice is implemented. The weather station will record each of the following (at a minimum of four times per hour),
 - o High and low temperature
 - o Precipitation
 - o Humidity
 - o Wind speed and duration
 - o Solar radiation
- Sensors, datalogger and required telemetry are installed on fields where practice is implemented as indicated in the Irrigation water management plan.
- Irrigation water management plan is followed and includes, as per NRCS Conservation Standard Practice Irrigation Water Management (Code 449):
 - o An irrigation system layout map showing the main pipeline(s), irrigated area, soil moisture locations and depths (if used), and soils. If water level sensors are used, show locations and number of sensors used.
 - o Methods used to measure or determine the flow rate or volume of the irrigation applications.
 - o Measurement records showing the amount of water used to irrigate, as it comes onto the farm and goes to each field.
 - o Documentation of the scientific method used for scheduling the timing and amount of irrigation applications.
 - o The Irrigation water management plan explains;

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CONSERVATION STEWARDSHIP PROGRAM

- How irrigation system meets crop needs, while maximizing irrigation water efficiency.
 - Seasonal or annual planned water application volumes by crop.
 - Management allowable depletion (MAD) and depth of the managed crop root zone or water level for each crop and stage of growth.
 - Evaluation of irrigation system distribution uniformity and necessary changes to insure uniform irrigation.
 - Information on how to recognize irrigation induced erosion and how to mitigate it.
 - Indicate how data from the sensor locations and depths will be considered to make field-wide irrigation decisions.
 - Water application scheduling based on soil moisture or water level monitoring and or evapotranspiration monitoring from the weather station.
- Recordkeeping documents for the irrigator to use during operation and management

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CONSERVATION STEWARDSHIP PROGRAM

Documentation and Implementation Requirements

Participant will:

- Prior to implementation, acquire an irrigation water management plan meeting NRCS Conservation Practice Standard Irrigation Water Management (Code 449) requirements.
- Prior to implementation, acquire NRCS approval of selected weather station, sensors, data logger, etc. or subscription service.
- During implementation, ensure installation meets manufacturer recommendations.
- During implementation, record irrigation data such as location, date, duration, and flow rate of all irrigation operations, rainfall, evapotranspiration, and soil moisture or water level data.
- After implementation, make the follow items available for review by NRCS to verify implementation of the enhancement:
 - Irrigation water management plan and records kept (i.e. , date, duration, and flow rate of all irrigation operations, rainfall, evapotranspiration, and soil moisture or water level data)
 - Changes made to address distribution uniformity deficiencies
 - Documentation of equipment installed (i.e. weather station, sensors, data logger, etc.) to NRCS
 - If a suscription service is used, provide location of equipment, date, duration, and flow rate of all irrigation operations, rainfall, evapotranspiration, and soil moisture or water level data.

NRCS will:

- Prior to implementation, provide and explain NRCS Conservation Practice Standard Irrigation Water Management (Code 449) as it relates to implementing this enhancement
- As needed, provide additional assistance to the participant as requested.
- Prior to implementation, review and approve producer’s selected weather station, sensors, data logger, etc. or subscription service.

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CONSERVATION STEWARDSHIP PROGRAM

- As needed, provide additional technical assistance to the participant as requested.
- After implementation, verify installation of weather station, sensors, etc.
- After implementation, verify implementation of the irrigation water management plan, by reviewing records kept during enhancement implementation.

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

E449D - Advanced Automated IWM – Year 1, Equipment and soil moisture or water level monitoring	August 2019	Page 5
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CONSERVATION ENHANCEMENT ACTIVITY

E449F

CONSERVATION STEWARDSHIP PROGRAM

Intermediate IWM— Year 1, Equipment with Soil moisture or Water Level monitoring

Conservation Practice 449: Irrigation Water Management

APPLICABLE LAND USE: Crop (Annual & Mixed); Crop (Perennial); Pasture

RESOURCE CONCERN ADDRESSED: Insufficient Water

ENHANCEMENT LIFE SPAN: 1 year

Enhancement Description

This activity involves monitoring soil moisture or water levels within a surface irrigated field for intermediate irrigation water management by utilizing technological equipment to gather field specific data concerning weather, soil moisture or water levels throughout the irrigation season. The equipment is installed and utilized to log data and retrieve the data periodically throughout the season, so irrigation decisions can be made based on scientific data. Maximum time between data retrievals is weekly.

Monitoring will be for the entire irrigation season and data gathered will be used to make sound decisions on irrigation water use.

Criteria

General

- Equipment may include: soil moisture sensor with data collection systems; weather stations that collect solar radiation, wind speed and direction, rainfall,

E449F - Intermediate IWM – Year 1, Equipment and soil moisture or water level monitoring	March 2020	Page 1
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CONSERVATION STEWARDSHIP PROGRAM

temperature; water level sensor with data collection system; permanent flowmeter

- Data to be monitored includes: irrigation water applied, crop water use, status of heat and/or frost conditions to permit the producer to make informed irrigation decisions.
- The installation includes the purchase and installation of equipment with data collection systems that can continuously record data throughout the irrigation season.
- Irrigation water management plan is followed and includes, as per NRCS Conservation Standard Practice Irrigation Water Management (Code 449):
 - An irrigation system layout map showing the main pipeline(s), irrigated area, soil moisture sensor/water level sensor locations (if used) and soils.
 - Method used to measure or determine the flow rate or volume of the irrigation water applications
 - Measurement records showing the amount of water used to irrigate as it comes on to the farm and goes into each field
 - Documentation of the scientific method used to schedule the timing and amount of irrigation application
 - Irrigation water management plan explaining:
 - How irrigation meets crop needs while maximizing irrigation water efficiency
 - Seasonal or annual planned water application volumes by crop
 - Management allowable depletion (MAD) and depth of the managed crop root zone or water level for each crop and stage of growth
 - Evaluation of irrigation system distribution uniformity and necessary changes to ensure uniform irrigation
 - Information on how to recognize irrigation induced erosion and how to mitigate it
 - Indicate how data from the sensor location and depths will be considered to make field-wide irrigation decisions
 - Water application scheduling based on soil moisture or water level monitoring and/or evapotranspiration monitoring from the weather station

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CONSERVATION STEWARDSHIP PROGRAM

- Recordkeeping documents for the irrigator to use during the operation and management

Additional Criteria of soil moisture devices

- Installation of each soil moisture set will include the ability to collect data at a minimum of 2 approved depths based on crop and soil characteristics of the region
- Number of soil moisture sets will be installed based on the irrigation water management plan designed per water source using the following criteria: field topography, crop rotation and the soils throughout the field.

Additional Criteria of flow measurement devices

- Permanent flow meters will be installed at all wells/reliefs that are included in the approved IWM plan

Additional Criteria of water level devices

- Sensor is installed in a basin field with a data logger with the ability to capture an image of the movement of the gauge. Images are captured at a minimum of twice a day

Additional Criteria of weather stations

- Weather station is installed in a central location as defined by the irrigation water management plan, but no more than 2 miles separation

- Weather stations will record each of the following at a minimum of four times per hour:

- High and low temperature
- Precipitation
- Humidity
- Wind speed and duration and direction
- Solar radiation

CONSERVATION STEWARDSHIP PROGRAM

E449F - Intermediate IWM – Year 1, Equipment and soil moisture or water level monitoring	March 2020	Page 3
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Documentation and Implementation Requirements

**CONSERVATION
STEWARDSHIP
PROGRAM**

Participant will:

Prior to implementation

- Acquire an irrigation water management plan meeting NRCS Conservation Practice Irrigation Water Management (Code 449) requirements
- Acquire NRCS approval of all irrigation water management devices that will be utilized for the plan implementation

During installation or implementation

- Ensure each irrigation water management device is installed to manufacturer recommendations
- Record irrigation data such as location, date, duration, and flow rate of all irrigation operations, rainfall, evapotranspiration, and soil moisture or water level data
- Monitor the devices during the growing season to determine timing and amounts of water to apply based on soil moisture/water level sensor, field checks and weather data

After implementation

- Make the following items available for review by NRCS to verify implementation of the enhancement:
 - Irrigation water management plan is followed, and records kept
 - Changes made to address distribution uniformity deficiencies
 - Utilization documentation of any sensor used throughout the growing season as well as certification of their proper installation

NRCS will:

Prior to implementation

- Provide and explain NRCS Conservation Practice Standard Irrigation Water Management (Code 449) as it relates to implementing this enhancement

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CONSERVATION STEWARDSHIP PROGRAM

- Provide additional assistance to the participant as requested
- Review and approve producer’s selected equipment After Implementation
- Verify installation of all irrigation water management equipment
- Verify implementation of the irrigation water management plan by:
 - Reviewing records kept during enhancement implementation

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



CONSERVATION ENHANCEMENT ACTIVITY

E449G

CONSERVATION STEWARDSHIP PROGRAM

Intermediate IWM— Years 2-5, Soil Moisture or Water Level monitoring

Conservation Practice 449: Irrigation Water Management

APPLICABLE LAND USE: Crop (Annual & Mixed); Crop (Perennial); Pasture

RESOURCE CONCERN ADDRESSED: Insufficient Water

ENHANCEMENT LIFE SPAN: 1 year

Enhancement Description

Intermediate irrigation water management involves monitoring soil moisture or water levels within an irrigated field by utilizing technological equipment to gather field specific data concerning weather, soil moisture or water levels throughout the irrigation season. The equipment was bought in year one and is utilized to log data through the season to be retrieved periodically so irrigation decisions can be made based on scientific data. Maximum time between data retrieval is weekly.

Monitoring will be for the entire irrigation season and data gathered will be used to make sound decisions on irrigation water use.

Criteria

General

- Equipment may include: soil moisture sensor with data collection systems; weather stations that collect solar radiation, wind speed and direction, rainfall, temperature; water level sensor with data collection system

E449G - Advanced Automated IWM – Year 1, Equipment and soil moisture or water level monitoring	March 2020	Page 1
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CONSERVATION STEWARDSHIP PROGRAM

- Data to be monitored includes: irrigation water applied, crop water use, status of heat and/or frost conditions to permit the producer to make informed irrigation decisions.
- Irrigation water management plan from year one is followed in accordance to the NRCS Conservation Standard Practice Irrigation Water Management (Code 449):
 - An irrigation system layout map showing the main pipeline(s), irrigated area, soil moisture sensor/water level sensor locations (if used) and soils.
 - Method used to measure or determine the flow rate or volume of the irrigation water applications
 - Measurement records showing the amount of water used to irrigate as it comes on to the farm and goes into each field
 - Documentation of the scientific method used to schedule the timing and amount of irrigation application
 - Irrigation water management plan explaining:
 - How irrigation meets crop needs while maximizing irrigation water efficiency
 - Seasonal or annual planned water application volumes by crop
 - Management allowable depletion (MAD) and depth of the managed crop root zone or water level for each crop and stage of growth
 - Evaluation of irrigation system distribution uniformity and necessary changes to ensure uniform irrigation
 - Information on how to recognize irrigation induced erosion and how to mitigate it
 - Indicate how data from the sensor location and depths will be considered to make field-wide irrigation decisions
 - Water application scheduling based on soil moisture or water level monitoring and/or evapotranspiration monitoring from the weather station
 - Recordkeeping documents for the irrigator to use during the operation and management

Additional Criteria of soil moisture devices

- Each year re-install the soil moisture set to collect data at a minimum of 2 approved

E449G - Advanced Automated IWM – Year 1, Equipment and soil moisture or water level monitoring	March 2020	Page 2
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CONSERVATION STEWARDSHIP PROGRAM

depths based on crop and soil characteristics of the region

- Number of soil moisture sets will be installed based on the irrigation water management plan designed per water source using the following criteria: field topography, crop rotation and the soils throughout the field.

Additional Criteria of water level devices

- Re-install sensor/gage each year in a basin field with a data logger with the ability to capture an image of the movement of the gauge. Images are captured at a minimum of twice a day.



E449G - Advanced Automated IWM – Year 1, Equipment and soil moisture or water level monitoring	March 2020	Page 3
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CONSERVATION STEWARDSHIP PROGRAM

Documentation and Implementation Requirements

Participant will:

Prior to implementation

- Review the irrigation water management plan to make any necessary adjustments from the previous year.
- Ensure the irrigation water management plan continues to meet the NRCS Conservation Practice Irrigation Water Management (Code 449) requirements.

During installation or implementation

- Ensure each irrigation water management device is re-installed to manufacturer recommendations
- Record irrigation data such as location, date, duration, and flow rate of all irrigation operations, rainfall, evapotranspiration, and soil moisture or water level data
- Monitor the devices during the growing season to determine timing and amounts of water to apply based on soil moisture/water level sensor, field checks and weather data

After implementation

- Make the following items available for review by NRCS to verify implementation of the enhancement:
 - Irrigation water management plan is followed, and records kept
 - Changes made to address distribution uniformity deficiencies
 - Utilization documentation of any sensor used throughout the growing season as well as certification of their proper installation

NRCS will:

Prior to implementation

- Provide and explain NRCS Conservation Practice Standard Irrigation Water

E449G - Advanced Automated IWM – Year 1, Equipment and soil moisture or water level monitoring	March 2020	Page 4
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CONSERVATION STEWARDSHIP PROGRAM

Management (Code 449) as it relates to implementing this enhancement

- Provide additional assistance to the participant as requested After Implementation
- Verify re-installation of all irrigation water management equipment each year
- Verify implementation of the irrigation water management plan by:
 - Reviewing records kept during each year of enhancement implementation

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



CONSERVATION ENHANCEMENT ACTIVITY

E449H

CONSERVATION STEWARDSHIP PROGRAM

Intermediate IWM— Years 2 -5, using soil moisture or water level monitoring

Conservation Practice 449: Irrigation Water Management

APPLICABLE LAND USE: Crop (Annual & Mixed); Crop (Perennial); Pasture

RESOURCE CONCERN: Water

ENHANCEMENT LIFE SPAN: 1 year

Enhancement Description

Monitoring soil moisture or water levels within an irrigated field for implementing an intermediate irrigation water management plan using soil moisture data to facilitate management decisions.

Criteria

- Equipment previously installed (through preceding enhancement) must include soil moisture sensors with data collection systems; weather stations that collect solar radiation, wind speed and direction, rainfall, temperature; water level sensor with data collection system; and permanent flowmeter.
- Monitoring of the following items required:
 - Irrigation water applied
 - Crop water use
 - Status of heat and/or frost conditions to permit the producer to make informed irrigation decisions

E449H - Intermediate IWM – Year 2 - 5, Soil moisture or Water level monitoring	May 2020	Page 1
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CONSERVATION STEWARDSHIP PROGRAM

- Perform regular maintenance and monitoring of equipment with data collection systems that continuously record data throughout the irrigation season.
- Follow an irrigation water management plan which includes, as per NRCS Conservation Standard Practice Irrigation Water Management (Code 449):
 - An irrigation system layout map showing the main pipeline(s), irrigated area, soil moisture sensor/water level sensor locations (if used), and soils.
 - Method used to measure or determine the flow rate or volume of the irrigation water applications.
 - Measurement records showing the amount of water used to irrigate as it comes on to the farm and goes into each field.
 - Documentation of the scientific method used to schedule the timing and amount of irrigation application.
 - Irrigation water management plan explaining:
 - How irrigation meets crop needs while maximizing irrigation water efficiency.
 - Seasonal or annual planned water application volumes by crop.
 - Management allowable depletion (MAD) and depth of the managed crop root zone or water level for each crop and stage of growth.
 - Evaluation of irrigation system distribution uniformity and necessary changes to ensure uniform irrigation.
 - Information on how to recognize irrigation induced erosion and how to mitigate it.
 - Indicate how data from the sensor location and depths will be considered to make field-wide irrigation decisions.



CONSERVATION STEWARDSHIP PROGRAM

- Water application scheduling based on soil moisture or water level monitoring and/or evapotranspiration monitoring from the weather station.
- Record keeping documents for the irrigator to use during the operation and management.

Additional Criteria of Soil Moisture Devices

- Soil moisture sensors collect data at a minimum of 2 approved depths based on crop and soil characteristics of the region.
- Number of soil moisture data sets will be based on the irrigation water management plan designed per water source using the following criteria: field topography, crop rotation and the soils throughout the field.

Additional Criteria of Flow Measurement Devices

- Permanent flow meters data collected at all wells/reliefs that are included in the approved IWM plan.

Additional Criteria of Water Level Devices

- Data from sensors installed in a basin field from data logger with the ability to capture an image of the movement of the gauge. Images are captured at a minimum of twice a day.

Additional Criteria of Weather Stations

- Weather station data from a central location as defined by the irrigation water management plan
- Weather station record includes each of the following at a minimum of four times per hour:
 - High and low temperature
 - Precipitation



- Humidity
- Wind speed and duration and direction
- Solar radiation.

CONSERVATION STEWARDSHIP PROGRAM





CONSERVATION STEWARDSHIP PROGRAM

Documentation and Implementation Requirements

Participant will:

- Prior to implementation, acquire an irrigation water management plan meeting NRCS Conservation Practice Standard Irrigation Water Management (Code 449) requirements.
- During implementation, ensure each irrigation water management device functions as intended.
- During implementation, record irrigation data such as location, date, duration, and flow rate of all irrigation operations, rainfall, evapotranspiration, and soil moisture or water level data.
- During implementation, monitor the devices during the growing season to determine timing and amounts of water to apply based on soil moisture/water level sensor, field checks and weather data.
- After implementation, make the following documentation available for review by NRCS to verify implementation of the enhancement:
 - Irrigation water management plan and associated records.
 - Changes made to address distribution uniformity deficiencies.
 - Documentation demonstrating utilization of any sensor used throughout the growing season.

NRCS will:

- Prior to implementation, provide and explain NRCS Conservation Practice Standard Irrigation Water Management (Code 449) requirements as it relates to implementing this enhancement, including applicable state specific job sheets.
- Prior to implementation, assist with data interpretations needed for management decision making.
- Prior to implementation, provide additional assistance to the participant as requested.



- After implementation, verify implementation of the irrigation water management plan by reviewing records kept during enhancement implementation.

CONSERVATION STEWARDSHIP PROGRAM

NRCS Documentation Review:

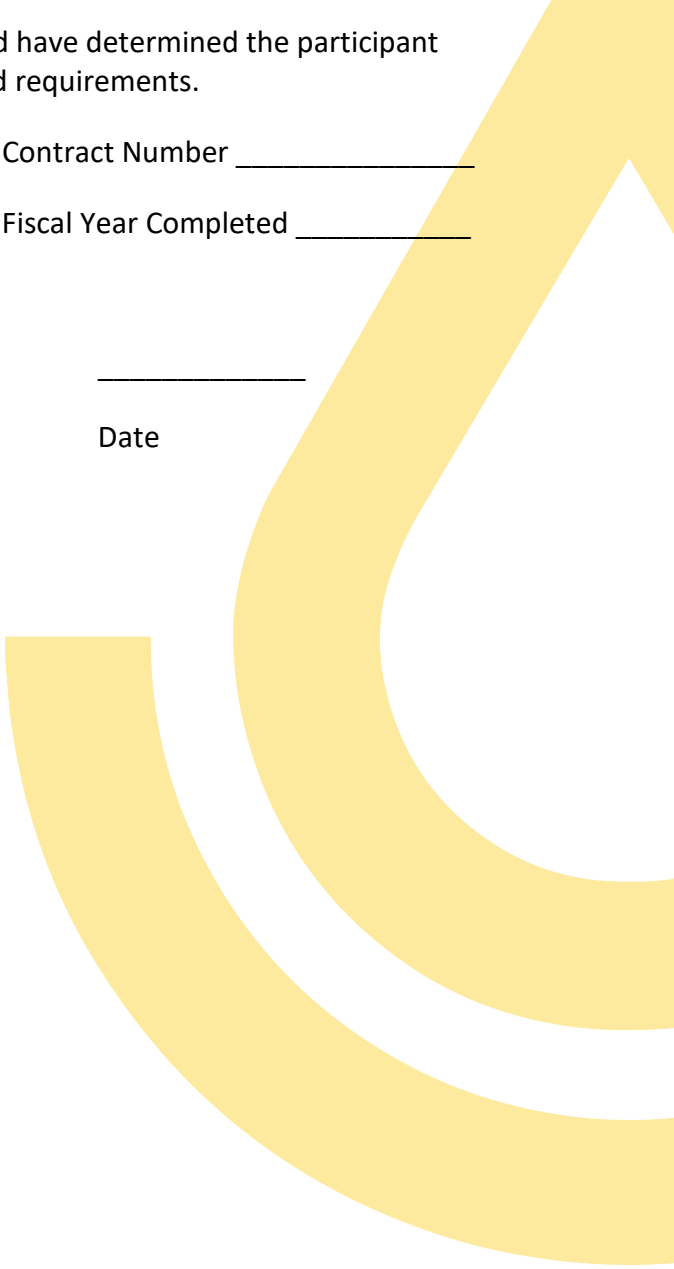
I have reviewed all required participant documentation and have determined the participant has implemented the enhancement and met all criteria and requirements.

Participant Name _____ Contract Number _____

Total Amount Applied _____ Fiscal Year Completed _____

NRCS Technical Adequacy Signature

Date





CONSERVATION STEWARDSHIP PROGRAM

CONSERVATION ENHANCEMENT ACTIVITY

E449I

IWM - Year 1, Retrofit Equipment with Speed Control on Sprinkler Irrigation System

Conservation Practice 449: Irrigation Water Management

APPLICABLE LAND USE: Crop (Annual & Mixed), Crop (Perennial), Pasture

RESOURCE CONCERN: Water

PRACTICE LIFE SPAN: 1 year

Enhancement Description

This enhancement consists of retrofitting an existing sprinkler irrigation system to integrate variable rate irrigation (VRI) speed control where the technology is not present. The added functionality of VRI speed control equipment allows for enhanced water application precision, efficiency, and uniformity along the length of the sprinkler irrigation system by varying the irrigation system speed within the irrigation pass. Renovation of the existing sprinkler irrigation system utilizing this enhancement includes the installation of an upgraded control panel capable of speed control programming and global positioning system (GPS) technology capable of providing real-time field position. Utilization of the VRI speed control and GPS equipment will be for the entire irrigation season and be based on spatially identified parameters such as variations in past yield data, soils, crop growth, topography, or computerized irrigation scheduling recommendations. This scenario requires that the existing sprinkler irrigation system meets Conservation Practice Standard (CPS) 442 uniformity and efficiency requirements. System equipment is installed in year 1 with this scenario and scenario E449G or E449C is used in years 2-5.

Criteria

- Documentation that ensures the speed control devices are compatible with the existing sprinkler irrigation system.
- Detailed drawings on how the speed control and GPS devices will connect to the existing sprinkler irrigation system, operate safely, and be protected.
- Irrigation water management (IWM) plan that follows the NRCS Conservation Practice Standard Irrigation Water Management (CPS449).
- The installation includes the purchase and installation of speed control and GPS devices. Components necessary for retrofit depend on the type of devices are installed and sprinkler irrigation system being renovated, but should consist of speed control and GPS devices as indicated below:



- Speed control unit with percentage timer setting capable of varying the irrigation system speed within the irrigation pass. Sprinkler irrigation tower speed is controlled by contactor coil voltage sent out by the percentage timer within the control panel.
- Satellite-guided GPS technology mounted on the sprinkler irrigation system provides real-time end tower location, speed, and direction information to the control panel.

CONSERVATION STEWARDSHIP PROGRAM





Documentation and Implementation Requirements

Participant will:

Prior to implementation

- Acquire an IWM plan meeting NRCS CPS Irrigation Water Management (Code 449) requirements.
- Develop a map delineating the location of the existing sprinkler irrigation system, speed control unit, satellite-based technology, and the fields they serve.
- Acquire NRCS approval of selected of selected speed control unit and satellite-based technology.

During implementation

- Ensure installation meets manufacturers recommendations.
- Provide documentation ensuring that the speed control device, GPS device, and supporting appurtenances allow the sprinkler irrigation system to operate safely and in the range of design operating conditions.
- Provide documentation of the protective structures meeting the requirements of the speed control and GPS devices. Ensure that the protective devices meet NRCS standards.
- Record each irrigation event, including the amount or depth of water applied, duration of the event, date of application, and any other requirements of the approved IWM Plan.

After implementation

- Copy of the record of each irrigation event, including the amount or depth of water applied, duration of the event, date of application, and any other requirements of the approved IWM plan.

NRCS will:

Prior to implementation

- Provide and explain NRCS Conservation Practice Standard Irrigation Water Management (Code 449) as it relates to implementing this enhancement.
- Provide and explain NRCS Conservation Practice Standard Sprinkler System (Code442) as it relates to implementing this enhancement.
- Provided additional assistance to the participant as requested.

**CONSERVATION
STEWARDSHIP
PROGRAM**



- Review and approve producer’s selected equipment

During Implementation

- Provide additional assistance to the participant as requested.

After Implementation

- Verify installation of the speed control devices, GPS devices, and supporting appurtenances are in accordance with manufacturer's specification.
- Verify that speed control and GPS devices are compatible with the existing sprinkler irrigation system.
- Verify implementation of the approved IWM plan by reviewing records kept during enhancement implementation.

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



CONSERVATION ENHANCEMENT ACTIVITY

E449J

Intermediate IWM – 20% Reduced Water usage

Conservation Practice 449: Irrigation Water Management

APPLICABLE LAND USE: Crop (Annual and Mixed), Crop (Perennial)

RESOURCE CONCERN ADDRESSED: Insufficient Water

ENHANCEMENT LIFE SPAN: 1 Years

Enhancement Description

Intermediate irrigation water management involves monitoring soil moisture or water levels within an irrigated field by utilizing technological equipment to gather field specific data concerning weather, soil moisture or water levels throughout the irrigation season. The equipment will be utilized to log data through the season to be retrieved periodically so irrigation decisions can be made based on scientific data. Maximum time between data retrieval is weekly.

Monitoring will be for the entire irrigation season and data gathered will be used to make sound decisions on irrigation water use.

Criteria

- Equipment may include: soil moisture sensor with data collection systems; weather stations that collect solar radiation, wind speed and direction, rainfall, temperature; water level sensor with data collection system
- Irrigation water management plan from year one is followed in accordance to the NRCS Conservation Practice Standard Irrigation Water Management (Code 449):
 - An irrigation system layout map showing the main pipeline(s), irrigated area, soil moisture sensor/water level sensor locations (if used) and soils.

E449J – Intermediate IWM – 20% Reduced Water usage	April 2021	Page 1
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- Method used to measure or determine the flow rate or volume of the irrigation water applications
- Measurement records showing the amount of water used to irrigate as it enters the farm and goes into each field
- Documentation of the scientific method used to schedule the timing and amount of irrigation application
- Irrigation water management plan explaining:
 - How irrigation meets crop needs while maximizing irrigation water efficiency
 - Seasonal or annual planned water application volumes by crop
 - Management allowable depletion (MAD) and depth of the managed crop root zone or water level for each crop and stage of growth
 - Evaluation of irrigation system distribution uniformity and necessary changes to ensure uniform irrigation
 - Information on how to recognize irrigation induced erosion and how to mitigate it
 - Indicate how data from the sensor location and depths will be considered to make field-wide irrigation decisions
 - Water application scheduling based on soil moisture or water level monitoring and/or evapotranspiration monitoring from the weather station
- Recordkeeping documents for the irrigator to use during the operation and management
- Irrigation usage will be reduced by at least 20% from previous years use and maintained at that level through the remainder of the contract.



Documentation and Implementation Requirements

Participant will:

Prior to implementation

- Review the irrigation water management plan to make any necessary adjustments from the previous year.
- Ensure the irrigation water management plan continues to meet the NRCS Conservation Practice Irrigation Water Management (Code 449) requirements.

During installation or implementation

- Record irrigation data such as location, date, duration, and flow rate of all irrigation operations, rainfall, evapotranspiration, and soil moisture or water level data
- Monitor the devices during the growing season to determine timing and amounts of water to apply based on soil moisture/water level sensor, field checks and weather data

After implementation

- Make the following items available for review by NRCS to verify implementation of the enhancement:
 - Irrigation water management plan is followed, and records kept
 - Changes made to address distribution uniformity deficiencies
 - Utilization documentation of any sensor used throughout the growing season as well as certification of their proper installation

NRCS will:

- Provide and explain NRCS Conservation Practice Standard Irrigation Water Management (Code 449) as it relates to implementing this enhancement
- Provide additional assistance to the participant as requested After Implementation
- Verify re-installation of all irrigation water management equipment each year
- Verify implementation of the irrigation water management plan by:
 - Reviewing records kept during each year of enhancement implementation



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





CONSERVATION ENHANCEMENT ACTIVITY

E472A

CONSERVATION STEWARDSHIP PROGRAM

Manage livestock access to waterbodies to reduce nutrients or pathogens to surface water

Conservation Practice 472: Access Control

APPLICABLE LAND USE: Crop (Annual & Mixed); Crop (Perennial); Pasture; Range; Forest; Associated Ag Land; Farmstead

RESOURCE CONCERN: Water

ENHANCEMENT LIFE SPAN: 10 years

Enhancement Description

Installation of structures and implementation of grazing management actions that restrict livestock access to waterbodies in order to reduce nutrient loading or reduce the introduction of pathogens from manure, bio-solids, or compost to surface waters.

Criteria

- Manage livestock access to provide positive benefits to surface water quality, resulting in better manure distribution and reduction of nutrient input into surface waters like streams, ditches and other waterbodies.
- Use-regulating activities (e.g., gates, fences, and other barriers) shall be implemented to eliminate livestock access to streams to reduce nutrients in surface water.
- Limit stream access to hardened stream crossings or water access points. Preferably, install alternative water sources away from water courses and waterbodies.
- Implement riparian area grazing management strategies, including herding and seasonal exclusion with a rotational grazing system.

E472A – Manage livestock access to waterbodies to reduce nutrients or pathogens to surface water	August 2019	Page 1
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CONSERVATION STEWARDSHIP PROGRAM

- Activities will complement the application schedule and life span of other practices specified in the conservation plan.
- Livestock activity will be monitored and regulated, and management plans will specify the intent, intensity, amounts, and timing of livestock exclusion access or exclusion from the target water course or waterbody. Activities may involve temporary or permanent livestock exclusion.
- Placement, location, dimensions, materials (e.g., gates), frequency of use (e.g., continuous), and frequency of monitoring shall be described for each activity,.





CONSERVATION STEWARDSHIP PROGRAM

Documentation and Implementation Requirements

Participant will:

- Prior to implementation, obtain a written grazing plan with guidelines and recommendations for matching the forage quantity and quality produced with the grazing and/or browsing demand from a qualified professional.
- For riparian grazing management strategies, prior to implementation, provide a grazing plan that includes a written narrative describing planned season of livestock grazing use.
- During implementation, keep pasture/herd in/out records.
- After implementation, make the following items available for review by NRCS to verify implementation of the enhancement:
 - Written grazing plan
 - Pasture/herd in/out records
 - Map showing locations of installed structures

NRCS will:

- As needed, provide additional technical assistance to the participant as requested.
- After implementation, complete forage utilization job sheet for NRCS Conservation Practice Standard Prescribed Grazing (Code 528).
- After implementation, verify implementation of the written grazing plan by reviewing plan and pasture/herd in/out records kept during enhancement implementation.



CONSERVATION STEWARDSHIP PROGRAM

CONSERVATION ENHANCEMENT ACTIVITY

E484A

Mulching to improve soil health

Conservation Practice 484: Mulching

APPLICABLE LAND USE: Crop (Annual & Mixed)

RESOURCE CONCERN: Soil

ENHANCEMENT LIFE SPAN: 1 year

Enhancement Description

Implement a crop rotation which utilizes mulch and addresses all four principle components of soil health – increases diversity of the cropping system; maintains residue throughout the year; keeps a living root; and minimizes soil chemical, physical, and biological disturbance. Plant-based mulching materials will be applied at least once during the rotation. The rotation will include at least four different crops and/or cover crops grown in a sequence that will produce a positive trend in the Organic Matter (OM) subfactor value over the life of the rotation, as determined by the Soil Conditioning Index (SCI). The current NRCS wind and water erosion prediction technologies must be used to document the rotation and SCI calculations.

Criteria

- Use plant-based mulching materials of suitable quantity and quality to add organic matter, provide food and shelter for soil biota, and protect the soil surface from raindrop impact and crusting while allowing for adequate soil aeration.
- Apply plant-based mulching materials with a carbon to nitrogen ratio (C:N) less than 30 to 1 to reduce soil nitrogen immobilization by soil biota (typical ratio examples – hairy vetch cover crop 11:1, fresh grass clippings 17:1, mature alfalfa hay 25:1, corn stalks 60:1, wheat straw 80:1, and pine needles 80-110:1).
- Do not apply mulch with C:N less than 20:1 to an area of designed flow in watercourses.



CONSERVATION STEWARDSHIP PROGRAM

- The crop rotation includes at least four crops and/or cover crops grown in a sequence.
- An evaluation of the system using the current approved SCI procedure results in zero or higher.
- Use mulch of sufficient ground cover and suitable thickness and texture to provide habitat for ground beetles, spiders, and other predators of weed seeds and crop pests.
- Select crops to be mulched, mulching materials, and rates of application that do not contribute to pest problems.
- For all organic or transitioning-to-organic operations, follow all National Organic Program (NOP) rules.



CONSERVATION STEWARDSHIP PROGRAM

Documentation and Implementation Requirements

Participant will:

- Prior to implementation, provide NRCS with the planned crop rotation and tillage operation(s) used for each crop. The crop rotation must include at least four crops and/or cover crops grown in a sequence.

Field	Acres	Planned Crops (in sequence)	Length of Crop Rotation (years)

Field	Crop	Field Operation	Timing of Field Operation (month/year)

- Prior to implementation, provide NRCS with the planned mulching information. Select crops to be mulched, mulching materials, and rates of application that do not contribute to pest problems.

Field	Crop	Mulching Material	Planned Rate of application (pounds/acre)	Planned Application Date

- During implementation, notify NRCS of any planned changes in the cropping system, crop management, or mulching to verify the planned system meets the enhancement criteria.
- During implementation, use mulch of sufficient ground cover and suitable thickness and texture to provide habitat for ground beetles, spiders, and other predators of weed seeds and crop pests.



CONSERVATION STEWARDSHIP PROGRAM

- After implementation, provide NRCS with the applied mulching information.

Field	Crop	Mulching Material	Actual Rate of application (pounds/acre)	Actual Application Date

- If changes were made to crop rotation or tillage operation(s) after implementation, complete the tables above to document the changes.

NRCS will:

- As needed, provide technical assistance to meet the criteria of the enhancement.
- Prior to implementation, verify that the crop rotation includes at least four crops and/or cover crops grown in a sequence.
- Prior to implementation, use information provided from the participant to calculate the Management SCI value using current NRCS wind and water erosion prediction technologies. **Management SCI Value = _____**
- During implementation, evaluate any planned changes in the cropping system, crop management, or mulching to verify the planned system meets the enhancement criteria.
- If changes were made from the planned system after implementation, use information provided from the participant to calculate Management SCI value to document that the applied system met the enhancement criteria. **Management SCI Value = _____**



NRCS Documentation Review:

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

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Participant Name _____ Contract Number _____

Total Amount Applied _____ Fiscal Year Completed _____

NRCS Technical Adequacy Signature

Date





**OHIO SUPPLEMENT TO
CONSERVATION ENHANCEMENT ACTIVITY**

**CONSERVATION
STEWARDSHIP
PROGRAM**

E484A

Additional Criteria for Ohio

In addition to the criteria specified in the National job sheet E484A the following additional criteria and criteria definitions apply in Ohio:

- Apply plant-based mulching materials with a carbon to nitrogen ratio (C:N) less than 30 to 1 to reduce soil nitrogen immobilization by soil biota.
- Do not apply mulch with C:N less than 20:1 to an area of designed flow in watercourses.
 - mature alfalfa hay 25:1
 - fresh grass clippings 17:1
 - hairy vetch cover crop clippings 11:1



CONSERVATION ENHANCEMENT ACTIVITY

E484B

CONSERVATION STEWARDSHIP PROGRAM

Reduce particulate matter emissions by using orchard or vineyard generated woody material as mulch

Conservation Practice: 484 Mulching

APPLICABLE LAND USE: Crop (perennial)

RESOURCE CONCERN: Air

ENHANCEMENT LIFE SPAN: 1 Year

Enhancement Description

Reduce particulate matter emissions by using orchard- or vineyard-generated woody materials as mulch. At least 90% of all woody materials are to be used as mulch on the operation. *An exception may be made when it is determined that infected material must be burned to preserve crop health.*

Criteria

- Non-infected, woody material will not be burned, but instead will be chipped and used as mulch. Infected material may be burned to preserve crop health, but 90% of all woody material must be mulched in order to count this enhancement as met.
- When mulching with wood products such as wood chips, bark, shavings, or other wood materials, apply a minimum two-inch thickness of particles that will remain in place during heavy rainfall or strong wind events, or both, if applicable.
- Mulching plan must be developed. Mulched material must meet guidelines laid out in a mulching plan for size of chips and thickness of cover applied.
- Mulch does not have to be applied to the immediate source area (orchard or vineyard), but instead may be applied anywhere needed on the operation that is designated in the mulching plan (e.g., other areas of farmstead or cropland).
- Avoid excessively thick or tightly packed mulches that can result in soggy, anaerobic conditions at the soil surface during wet weather or prevent rainfall or



overhead irrigation from reaching the soil during times of moisture deficit.

- Keep mulch three to six inches away from plant stems and crowns to prevent disease and pest problems. Additional weed control may be needed around the plant base area.
- For all organic or transitioning-to-organic operations, follow all National Organic Program (NOP) rules.



Documentation and Implementation Requirements

Participant will:

- Prior to implementation, provide NRCS with information for review about current and proposed management of orchard or vineyard generated woody materials.

Field	Crop	Acres	Current Management	Proposed Management

- Prior to implementation, provide NRCS with the proposed mulching plan for development. NRCS can provide assistance, as needed, in plan development. At a minimum, the plan must include:
 - o Purpose of mulching
 - o Type of mulch material
 - o Approximate amount of mulch material to be utilized
 - o Size of mulch pieces (size range or maximum size of pieces)
 - o Placement timing (planned and actual)
 - o Depth of mulch cover
 - o Any required site preparation
 - o Operation and maintenance information
 - o Map(s) of area where material is to be applied

Field	Crop/Location	Mulching Material	Planned Mulching Depth or Rate of Application (inches or pounds/acre)	Planned Application Date



- During implementation, notify NRCS of any planned changes in the mulching plan to verify changes meet the enhancement criteria.
- During implementation, use mulch of sufficient ground cover and suitable thickness and texture to provide habitat for ground beetles, spiders, and other predators of weed seeds and crop pests.
- During implementation, take photos of area mulched that document the average size of mulched material and depth of layer applied.
- After implementation, provide NRCS with the applied mulching information.

Field	Crop	Mulching Material	Actual Mulching Depth or Rate of Application (inches or pounds/acre)	Actual Application Date

- After implementation, provide mulching plan and photos for review of the area(s) mulched to document the average size of mulched material and depth of layer applied and to verify the planned system meets the enhancement criteria.

NRCS will:

- As needed, provide technical assistance to meet the criteria of the enhancement.
- Prior to implementation, review current and proposed management of orchard- or vineyard-generated woody materials. *Plan/contract the actual acres of the crop producing the woody materials to be managed.*
- Prior to implementation, verify that the mulching plan meets all criteria of the enhancement.
- During implementation, evaluate any planned changes in the mulching plan to ensure enhancement criteria are met.
- If changes were made after implementation, use information provided from the participant to verify the applied system meets the enhancement criteria.



NRCS Documentation Review:

I have reviewed all required participant documentation and 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

E484B - Reduce particulate matter emissions by using orchard or vineyard generated woody material as mulch		
August 2019		Page 5



CONSERVATION ENHANCEMENT ACTIVITY

E484C

CONSERVATION STEWARDSHIP PROGRAM

Mulching with natural materials in specialty crops for weed control

Conservation Practice 484: Mulching

APPLICABLE LAND USE: Crop (annual & mixed), Crop (perennial)

RESOURCE CONCERN ADDRESSED: Plants

ENHANCEMENT LIFE SPAN: 1 Year

Enhancement Description

Application of straw mulch or other state-approved natural material (such as wood chips, compost, green chop, dry hay, or sawdust) for weed control in specialty crops.

Criteria

Use mulch of sufficient ground cover, thickness, and texture to provide habitat for ground beetles, spiders, and other predators of weed seeds and crop pests. Mulch thickness will be determined by the size of the plant being mulched. Thickness of the mulch shall be adequate to prevent emergence of targeted weeds, but no less than four inches deep for dry mulches.

Grass-based green chop should be applied no greater than three inches deep as it will compact and rot. Add additional layers of green chop as decomposition occurs to maintain weed control. Do not use green chop from areas recently treated with herbicides.

Mulches shall be kept a minimum of three inches away from the stems of plants where disease is likely to occur. Depending on the crop, mulch distance may need to be up to six inches away from the stems.

Mulches applied around growing plants or prior to weed seedling development shall have 100% ground cover.

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Avoid finely divided residues (e.g. sawdust) and those rich in soluble carbohydrates (e.g. fresh chopped corn or other grasses) with a carbon to nitrogen ratio (C:N) greater than 30 that tie up soil nitrogen (N) and necessitate supplemental N applications.

CONSERVATION STEWARDSHIP PROGRAM

Avoid excessively thick or tightly packed mulches that can interfere with the movement of ground beetles and other beneficial organisms and may result in soggy, anaerobic conditions at the soil surface and increase the incidence of crop pests and diseases.





CONSERVATION STEWARDSHIP PROGRAM

Documentation and Implementation Requirements

Participant will:

- Prior to implementation, provide a map showing location of mulch application.
- Prior to implementation, provide NRCS with the planned mulching information. Select crops to be mulched, mulching materials, and rates of application that will provide weed suppression and do not contribute to pest problems.

Field	Crop	Mulching Material	Planned Rate of application (pounds/acre)	Planned Depth of Mulch (inches)	Planned Application Date

- During implementation, notify NRCS of any planned changes in the cropping system, crop management, or mulching to ensure enhancement criteria are met.
- During implementation, take photos of mulch after application, during the growing season, and at harvest.
- During implementation, use mulch of sufficient ground cover and suitable thickness and texture to provide habitat for ground beetles, spiders, and other predators of weed seeds and crop pests.
- During implementation, maintain all receipts or other records showing the quantity of mulch used.
- After implementation, provide NRCS with the applied mulching information and any additional information related to the mulching impacts on weed control or crop production.

Field	Crop	Mulching Material	Actual Rate of application (pounds/acre)	Actual Application Date



CONSERVATION STEWARDSHIP PROGRAM

NRCS will:

- As needed, provide technical assistance to meet the criteria of the enhancement.
- Prior to implementation, verify mulching materials to be used, depth of mulch, and quantity needed, and document on implementation requirements.
- Prior to implementation, use information provided from the participant to calculate the Management Soil Conditioning Index (SCI) value using current NRCS wind and water erosion prediction technologies. **Management SCI Value = _____**
- During implementation, evaluate any planned changes in the cropping system, crop management, or mulching to ensure enhancement criteria are met.
- After implementation, review the applied mulching information and records and recommend adjustments to the mulch specifications for subsequent years based on success of the enhancement.

NRCS Documentation Review:

I have reviewed all required participant documentation and 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