Monarch Butterfly

Conference Report

A collaboration of the

Natural Resources Conservation Service

and the

U.S. Fish and Wildlife Service

December 2016

1.0 INTRODUCTION

This document explains and describes a collaborative landscape level partnership between the Natural Resources Conservation Service (NRCS) and others – including the United States Fish and Wildlife Service (USFWS) - to benefit the Monarch Butterfly (*Danaus plexippus plexippus*). The primary focus of the partnership analyzed herein is the design and application of selected NRCS conservation practice standards and enhancements to benefit the Monarch Butterfly. These conservation practice standards and enhancements are applied by NRCS when providing technical and financial assistance to eligible landowners using its Farm Bill authorities.

It is important to note that the Proposed Action does not include NRCS actions that:

- Result in the conversion of suitable Monarch butterfly habitat types to other land uses, including crop production;
- Involve the application of pesticides/herbicides other than to implement certain conservation practice standards and enhancements as described in this document to benefit the monarch butterfly, including but not limited to Integrated Pest Management (595) and Herbaceous Weed Control (315);
- Involve the construction or maintenance of existing/new public infrastructure such as bridges, reservoirs, roads or highways; and
- Involve commercial energy development or its associated infrastructure.

While the covered species, the Monarch Butterfly (*Danaus plexippus plexippus*) is not a protected species under the Endangered Species Act of 1973, as amended (ESA), NRCS would like to utilize the conference procedures available within the ESA's section 7 consultation authorities to initiate conservation actions now for the Monarch butterfly and thereby receive ESA predictability should the monarch butterfly be listed. Part 2.3.8 provides a detailed explanation on the ESA predictability component of this Conference Report.

Use of the conference procedures is only required when a Federal agency proposes an activity that is likely to jeopardize the continued existence of a species that has been proposed for listing under the ESA or the proposed activity is likely to destroy or adversely modify proposed critical habitat (see 50 CFR 402.10). Preparation of "Conference Report" is recommended when a proposed Federal action may affect a proposed or candidate species but the action is not likely to jeopardize the continued existence of a proposed or candidate species. (Refer to Chapter 6 of the USFWS Consultation Handbook). In this situation, the conference procedures are being used to assist a Federal agency in planning a proposed action to conserve a species not yet proposed for listing or determined to be a candidate for listing. The conference process is designed to assist the Federal agency in identifying and resolving potential conflicts at an early stage in the planning process. During the conference, the USFWS may provide advisory recommendations on ways to minimize or avoid adverse effects and to identify beneficial actions. The conclusions reached during a conference are to be documented by the USFWS and provided to the action agency in a document whose organization, content, and magnitude is expected to vary based on the complexity of the conference (50 CFR 402.10(e)).

Therefore, and at NRCS' request, this Report contains the USFWS' analysis of the expected adverse, benign, and beneficial effects likely to result from implementation of the Proposed Action within the Action Area (see Figure 1). Overall effective implementation of the Proposed Action described in this

Report are designed and anticipated to result in a positive population response by monarch butterflies by reducing or eliminating potential adverse effects. However, the herein described management, restoration, creation and enhancement activities may also result in short-term adverse effects in order to secure the expected long-term benefits to the monarch butterfly as a whole.

2.0 DESCRIPTION OF THE PROPOSED ACTION

The specific federal agency action under evaluation is the implementation of the selected conservation practice standards and enhancements through NRCS administered programs (Environmental Quality Incentives Program, Conservation Stewardship Program, Wetlands Reserve Enhancement provisions of the Agricultural Conservation Easement Program, etc.), as these create the circumstances by which NRCS' assistance to eligible landowners generates activities that produce potential adverse (and beneficial) indirect and direct effects on the monarch butterfly.

Although NRCS has developed a specific effort entitled the Monarch Habitat Development Project (Monarch Project), the Proposed Action includes other Conservation Practice Standard/Enhancements as an element of the larger Monarch butterfly partnership. Therefore the Conference Report includes the Monarch Project and these additional actions. Other features of the Proposed Action described herein (including but not limited to Parts 2.3.1 thru 2.3.7 and Part 7 below) are designed to enhance the effectiveness of the conservation practice standards and enhancements, further manage detrimental effects, accentuate beneficial effects, provide for outcome based monitoring, and to otherwise support the implementation of the Proposed Action. It is important for the reader to understand that the ESA predictability and expected beneficial conservation outcomes are not tied to a specific NRCS program or effort (e.g., the Conference Report is program neutral and it is not limited to the Monarch Project). Instead, coverage within this Conference Report is predicated by following specific elements and requirements while working with eligible landowners in the Action Area to produce a Conservation Plan. The Conservation Plan will become the instrument of ESA predictability.

Further, while geographically limited to the Action Area at this point, both NRCS and USFWS expect that the use of this approach to facilitate conservation of the species will grow geographically and have designed the Proposed Action to be scalable and more expansive.

NRCS is using a targeted conservation systems approach to implement specific conservation practice standards and enhancements to increase monarch habitat while ensuring compatibility with the eligible landowners' expectations for their property. The NRCS conservation practice standards and enhancements to be used have been conditioned through conservation measures to maximize beneficial effects and minimize detrimental effects when the practices are implemented by landowners who participate following the NRCS planning process and other design elements described herein. While NRCS and USFWS' expect that the Proposed Action will have long term benefits to the Monarch Butterfly and its habitat needs, short-term adverse effects to potentially any member of the species during its life stages (egg, larva/caterpillar, pupa, and adult) in order to secure long-term benefits to the species as a whole may occur.

The Proposed Action focuses on the Eastern population of the monarch butterfly, which occurs in all states east of the Rocky Mountains. NRCS is targeting the effort to the core migration route and the primary breeding range of the butterfly. The Proposed Action will focus on two sub-regions with the

monarch's primary migratory flyway and breeding areas – the Midwest and Southern Great Plains (Figure 1). For each of these sub-regions, NRCS developed a Habitat Strategy (see section 2.3.2.1 and 2.3.2.2) for additional information.

Generally, the Midwest Habitat Strategy is focused on plantings of milkweed (*Asclepias* spp.) and monarch nectaring forbs in wetlands and other marginal lands. In the southern Great Plains Habitat Strategy, the effort is focused on improving monarch butterfly habitat on existing grasslands.

Both NRCS and USFWS anticipate that work products (including the management actions, applied conservation practice standards and enhancements as conditioned by the conservation measures, specific decision support tools, etc.) generated as part of this partnership will facilitate future NRCS-USFWS efforts in other areas (e.g. beyond the current Action Area) of the monarch's range in the lower 48 states and may prove useful for other monarch butterfly conservation efforts outside of the scope of this NRCS-USFWS partnership (see Part 3.2.4), such as NRCS technical assistance administered through the Farm Service Agency's Conservation Reserve Program.

2.1 Scope

The duration of the proposed action is 30-years (2016-2047), with opportunities to improve implementation of the Proposed Action annually and review of the its outcomes and effects at five year intervals.

2.2 Action Area

The "Action Area" is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." (50 CFR 402.02). The geographic scope of the Proposed Action will initially focus on 10 priority states (Indiana, Illinois, Iowa, Kansas, Minnesota, Missouri, Ohio, Oklahoma, Texas, and Wisconsin) (Figure 1 below).

Modifications to the initial geographic scope are expected and anticipated over the 30-year life of the Proposed Action and associated USFW-NRCS partnership. Any expansion of the geographic scope will require the development of appropriate landscape level targeting and assessment tools (WHEGs, planting lists, etc.) to ensure that the long-term goals of the Proposed Action are being achieved. This process will be done in collaboration with the USFWS and other invited conservation partners (Part 7.0 below).

2.3 Implementation Elements of the Proposed Action

The implementation of the Proposed Action involves the following elements: (1) A Landscape and Targeted Focus; (2) Use of selected NRCS Conservation Practices and Enhancements (including core and supporting practices); (3) Application of the best science to support creating desired habitat conditions; (4) Incorporation of jointly developed conservation measures; (5) A science supported monitoring and assessment element; (6) Staff and partnership training and involvement; and (7) ESA predictability to eligible and participating landowners. Each of these implementation elements is discussed in detail below.

2.3.1 A Landscape and Targeted Focus

The Proposed Action is structured to facilitate landscape-level improvements across the species' range while recognizing that threats and conservation opportunities may differ geographically within the Action Area. Close collaboration of many stakeholders, including local, State, and Federal agencies,

and NGOs, will ensure that NRCS activities complement efforts already underway. The implementation of the Proposed Action is integrated into the daily operations of NRCS' existing Farm Bill authorities. As part of the scope of the consultation, it is therefore important for the reader to understand the NRCS' existing Conservation Planning processes and component elements that will be used to implement the Proposed Action[1].

USFWS has identified the migratory corridor from Texas to the upper Midwest as a key region for monarch habitat efforts (USFWS 2015). This 10-state area is geographically depicted in Figure 1 below. NRCS developed unique implementation strategies for the Midwest sub-region and the Southern Great Plains sub-region and are further explained in Parts 2.3.2.1 and 2.3.2.2 below.

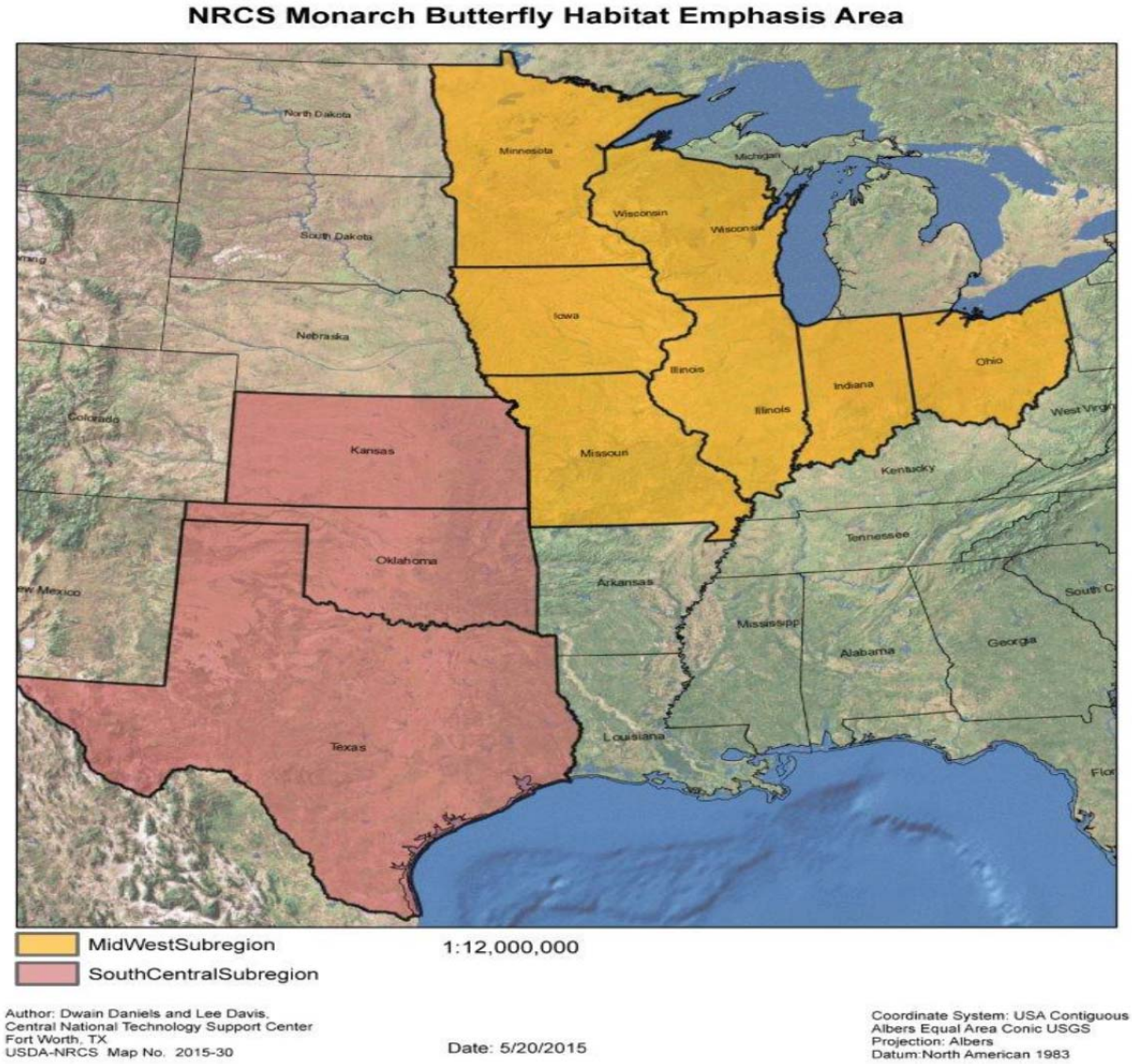
Each State NRCS office has developed ranking and screening criteria for potentially eligible landowners within those affected counties of the sub-regions. The ranking and screening criteria will prioritize funding for landowners that agree to the process and procedures outlined herein for developing a Conservation Plan that will benefit the monarch butterfly. The USFWS will continue to work with NRCS over the duration of the Proposed Action and adapt the ranking and screening criteria as new information becomes available on how to optimize the implementation of the covered NRCS conservation practice standards to benefit the monarch butterfly. More information about the adaptive management elements of the Proposed Action are discussed in Part 7 of this document.

The southern Great Plains (South Central) sub-region includes Kansas, Oklahoma and Texas. Most of the adult monarchs that winter in Mexico produce the first generation of monarchs in the southern Great Plains. The central parts of these states are also home to the fall monarch migrationl. The primary milkweed species to be targeted in this subregion are spider milkweed (*A. asperula*), zizotes milkweed (*A. oenotheroides)* and green antelope horn (*A. viridis)* (USDA NRCS 2015). In contrast to common milkweed (*A. syriaca)* found in the Midwest, the species of milkweeds found in this sub-region are not tolerant of tillage and are not commonly found in cropland. Each of these species is relatively low-growing (1-2 feet tall), highly shade intolerant and are commonly found on grazing lands. NRCS will primarily target grazing lands in this sub-region. Other NRCS funded activities in this sub-region will improve habitat through periodic soil and plant disturbances (i.e. light disking, summer burning) which increase milkweeds and high-nectar forbs on lands under NRCS conservation easements.

The summer breeding habitats within the Midwest sub-region is likely the most important and significant to the species. Loss of monarch habitat in this sub-region has been high in recent years (Pleasants and Oberhauser 2012). Common milkweed will be the key host plant species to target in this sub-region, but other species may play a significant role. The recent drop in grain prices may provide opportunities for NRCS to target monarch habitat creation and enhancement actions envisioned herein on these less productive croplands. Additionally, the use of NRCS easement lands has been identified as a significant opportunity in this sub-region.

[1] The NRCS' Conservation Planning process is further outlined in Appendix I.

Figure 1 Action Area.



2.3.2 Selected Conservation Practices

To ensure that the conservation outcomes (Part 2.4 below) of the Proposed Action are met, NRCS and the USFWS worked together to identify the covered conservation practices (Table 1). Practices implemented consist of:

- Designation of an umbrella conservation practice standard, Upland Wildlife Management (Practice 645), to guide all landowner conservation plans. This is an important distinction as an umbrella conservation practice establishes the wildlife-focused objectives for addressing resource concerns on a client's property while simultaneously ensuring that conservation of the monarch is the primary objective.
- Core conservation practices specifically chosen to ensure that the most important conservation outcomes are achieved for the monarch as identified from the umbrella practice.

- Supporting practices, which, without the guidance and use of the umbrella and core practices, might have limited value to monarchs; and
- Practice-specific conservation measures that can minimize or eliminate short-term detrimental effects of the installation/application of conservation practices on monarch.

The type of practice is important in this context as explained below.

All conservation plans developed under the Proposed Action will have Upland Wildlife Management (645) as the umbrella practice. An umbrella practice is critical to addressing the client's targeted resource concern(s) for the proposed action and achieving the desired environmental outcome(s). NRCS Planners will conduct a wildlife habitat evaluation specific to the monarch, using the applicable sub-region Monarch Wildlife Habitat Evaluation Guides (WHEG) (Appendix II), to identify limiting factors to address in order of their significance on that client's property. The WHEG is based upon the best available scientific information and supporting decision support tools on specific resource issues such as pest management, agronomy, and other relevant disciplines. The identification of the monarch's limiting factors at the site level is essential to ensure: (1) that the appropriate core practices are identified and prioritized; (2) that the appropriate supporting practices are identified and prioritized; and (3) that the monarch butterfly habitat goals for that particular Conservation Plan are being effectively achieved.

Implementing the Proposed Action under the umbrella practice concept eliminates the possibility of using practices that benefit landowners exclusively but not the monarch. The purpose of the 645 umbrella Conservation Practice Standard is to treat upland wildlife habitat concerns identified during the conservation planning process to (1) provide shelter, cover, and food in proper amounts, locations, and times to sustain the monarch during all phases of its life cycle, or (2) to enable movement. NRCS will subsequently select and implement specific core and supporting practices to address those factors limiting the species. The identification of the monarch's limiting factors at the individual property owner level is essential to informing the use of the 645 Upland Wildlife Habitat Management practice. The application and installation of all of the conservation practices will also follow the conservation measures and other requirements of this document and be guided by the WHEG/assessment tool.

Table 1. Covered Conservation Practices

Conservation Practice Standard[2]	Code	Category
Upland Wildlife Habitat Management	645	Umbrella
Brush Management	314	Core
Conservation Cover	327	Core
Prescribed Burning	338	Core
Field Border	386	Core
Riparian Herbaceous Cover	390	Core
Forage Harvest Management	511	Core
Prescribed Grazing	528	Core
Range Planting	550	Core
Early Successional Habitat Development/Management	647	Core
Herbaceous Weed Control	315	Supporting

[2] For additional information on the Conservation Practice Standard, please refer to the NRCS Field Office Technical Guide (e-FOTG) at the following website: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg/

Pond	378	Supporting
Fence	382	Supporting
Fire Break	394	Supporting
Livestock Pipeline	516	Supporting
Pumping Plant	533	Supporting
Heavy Use Area Protection	561	Supporting
Integrated Pest Management	595	Supporting
Watering Facility	614	Supporting
Water Well	642	Supporting
Wetland Wildlife Habitat Management	644	Supporting
Well Decommissioning	351	Supporting
Cover Crop	340	Supporting
Critical Area Planting	342	Supporting
Filter Strip	393	Supporting
High Tunnel System	325	Supporting
Restoration & Management of Rare & Declining Habitats	643	Supporting
Riparian Forest Buffer	391	Supporting
Wetland Enhancement	659	Supporting
Wetland Restoration	657	Supporting
Diversion	362	Supporting
Obstruction Removal	500	Supporting
Subsurface Drain	606	Supporting
Underground Outlet	620	Supporting
Mulching	484	Supporting
Nutrient Management	590	Supporting
Conservation Crop Rotation	328	Supporting
Residue and Tillage Management	329,345	Supporting
Dike	356	Supporting
Structure for Water Control	587	Supporting
Fish Passage	396	Supporting
Use Exclusion	472	Supporting

2.3.3 Enhancement Activities

In addition to above conservation practices, NRCS utilizes Enhancement Activities through the NRCS Conservation Stewardship Program (CSP). Enhancement Activities are similar to conservation practices in that they are used to treat natural resources and improve conservation performance. However, they are installed at a level of management intensity that exceeds the sustainable level for a given resource concern, and those directly related to a conservation practice standard are applied in a manner that exceeds the minimum treatment requirements of the standard.

There are Enhancement Activities directly related to the covered conservation practices. Those Enhancement Activities identified were given the same level of evaluation and conditioning, and will have the same requirements, as their corresponding covered practices (including the requirement to

follow the conservation measures listed in Table 2 below).[3] The CSP Enhancements can be accessed at: https://www.nrcs.usda.gov/wps/portal/nrcs/cspsearch/national/programs/financial/csp/?rc=allr&lu=alll#cspTable.

2.3.2.1 Midwest Habitat Strategy

This Proposed Action's Midwest sub-region includes Illinois, Indiana, Iowa, Minnesota, Missouri, Ohio, and Wisconsin. These seven states account for 58 percent of corn and 54 percent of soybeans grown in the United States (USDA NASS 2015). Based on 1996 data, 50 percent of wintering monarchs in Mexico were born in the Midwest (Wassenaar and Hobson, 1998). This sub-region has experienced the greatest habitat loss for monarchs because of multiple causes, but predominantly from conversions of grasslands and rangelands to cropland (Hartzler 2010; Pleasants and Oberhauser, 2012).

The sub-region is home to many milkweed species, but monarch experts agree three have greater significance. They are:

• Common milkweed (*A. syriaca)*: This large species is very common to disturbed lands in the Midwest and eastern United States, and will be the most important species for monarch restoration or habitat enhancement. Prior to the development of glyphosate herbicide, this species was very common in cropland fields as other herbicides were not effective in control. Common milkweed is rhizomatous, aggressive and can be difficult to control without the proper use of herbicides. It appears to prefer moderately well and well drained soils and spreads rapidly after plowing in spring. Summer plowing appears to reduce the vigor and population. Winter cropping (cash or cover crop) reduces the occurrence of common milkweed. Tissue analysis of monarchs wintering in Mexico during 1995-1996 demonstrated that 85-92 percent of monarchs fed on common milkweed (*A. syriaca*) growing in the central, northern and eastern United States (Wassenaar and Hobson, 1998).
• Swamp milkweed (*A. incarnata)*: This tall rhizomatous species occurs in open lands in wetlands and along wetlands edges. Being rhizomatous, it tends to occur as colonies, rather than individuals.
• Butterfly milkweed (*A. tuberosa*): This non-rhizomatous species occurs sporadically in open lands on sandy, well-drained soils.

The aggressive growth habits and milky sap of common milkweed prohibit acceptance of milkweed in cropland. The milky sap interferes with crop harvesting machinery. While livestock avoid feeding on milkweed in pastures, when cut and cured with hay, it becomes more palatable and poses a greater risk of making cattle sick. Thus, hay producers have a low tolerance to milkweed (Shane 2008). For these reasons, NRCS anticipates that the largest gains and interest will be on lands not being used for agricultural production in this sub-region.

NRCS identified the highest potential for gains in habitat in the Midwest sub-region to be on lands in various USDA cropland retirement programs, particularly lands currently enrolled in Wetland Reserve Program (WRP) and lands to be enrolled in a wetland easement through the Agricultural Conservation Easement Program (ACEP).

The Conservation Reserve Program (CRP) administered by the Farm Services Agency, was identified as having significant potential to create or enhance Monarch butterfly habitat. There are opportunities for

[3] The list of CSP Enhancements and Conservation Practice Standards will likely change and evolve over the life of the Proposed Action. Any changes will be administered through the process outlined in Part 7.0 of this document.

the development of larger blocks of habitat on lands enrolled in CRP and wetland easements. Because the current land uses in this sub-region are cropland and intensively managed pastures and hay fields, NRCS anticipates less potential of habitat gains. Nonetheless, establishment/ enhancement and management of regionally appropriate milkweed and nectar plants through these land retirement programs provides opportunities to establish blocks of quality habitat for monarchs.

The most immediate potential is for habitat enhancement on lands currently enrolled under WRP. The WRP enables NRCS to work with landowners to implement measures on the land that increase wildlife habitat. NRCS pays 100 percent of the cost for these efforts on permanent easements. Targeted funding will be made available in fiscal year 2016 to implement monarch habitat efforts on existing WRP easements. Staff will apply the *USDA NRCS Monarch Butterfly (Danaus plexippus plexippus): Wildlife Habitat Evaluation Guide WHEG: Monarch Butterfly Midwest subregion* to selected lands currently under easement. For an explanation of the WHEG, see Part 2.3.4., below.

Based on the results of the WHEG, each NRCS state office will request funds to implement various habitat improvement activities on existing WRP easement lands. The most common activities anticipated include prescribed burning or disking, followed by planting of milkweed and monarch nectar plants.

2.3.2.2 Southern Great Plains (South Central) Habitat Strategy

The Proposed Action's southern Great Plains (or South Central) sub-region includes Kansas, Oklahoma and Texas. This area provides essential migratory and nesting habitat for monarchs arriving from Mexico in the spring. Additionally, it provides essential nectar plants for migrating monarchs in the fall of the year. Recent data (Flockhart et al. 2013) suggest that fall monarch reproduction in the southern Great Plains may contribute to the wintering population in Mexico at a higher proportion than demonstrated by the 1996-1997 data (Wassenaar and Hobson 1998). Although the contribution of the wintering population with a natal origin of the southern Great Plains remains in question, data from Flockhart et al. (2013), coupled with data from the Monarch Larva Monitoring Project (Prysby and Oberhauser 2004) and Baum and Sharber (2012) suggests that opportunities to increase fall monarch breeding habitat in the southern Great Plains may warrant further consideration (e.g. research, consideration during the conservation planning process).

During the fall migration, the vast majority of the eastern population of monarchs funnels through the central part of these three states. Multi-year monitoring from citizen observational data (Journey North 2015) support that the location of this fall migration funnel is somewhat dynamic dependent on prevailing winds during the migration. These data demonstrate the essential importance of fall nectar sources in central portions of these three states to monarch.

To enhance monarch recovery in the Southern Great Plains sub-region, three milkweed species have been identified (Best 2015). They are:
• Spider milkweed (*A. asperula)*: This narrow-leafed species is particularly common to central Texas and is most adapted to shallow calcareous soils common to the Edwards Plateau of central Texas. It also occurs in Oklahoma and Kansas but to a lesser degree. It occurs primarily on grazed lands but also on areas maintained by periodic mowing and shallow soils that are not grazed. It appears to prefer shallow soils that range from slightly alkaline to calcareous.
• Zizotes milkweed (*A. oenotheroides)*: This wide-leaf species is common in northern Mexico, southern, central and north-central Texas. It also occurs in Oklahoma. Zizotes milkweed is well adapted to deep,

neutral to moderately alkaline clays and clay loam soils, and occurs primarily on grazed lands as well as on areas maintained by periodic mowing. Introduced grasses common to southern Texas may be contributing to the decline of this milkweed species.
• Green antelope horn (*A. viridis)*: This wide-leaf species is common to central Texas, Oklahoma and Kansas. Because of the larger range, many consider this species to be the key species for first generational monarchs. It occurs almost exclusively on grazed lands and non-agricultural areas periodically mowed, such as roadsides, parks and urban lands. It appears to prefer deep loams and fine sandy loam soils but tolerates deep finer textures soils. This species prefers soils that are slightly acid to slightly alkaline. Unlike spider milkweed, it rarely occurs on shallow soils.

Each of these species is one to two feet tall and shade intolerant. Thus, these milkweed species are not well adapted for hayland or cropland. Rather, they evolved under patchwork grazing by bison (*Bison bison*) (Gates and Aune 2008) and burned conditions common in the southern Great Plains. They flourish on lands that are grazed. Commercial seed propagation and the cultural practices for establishment of these three species are very limited. NRCS will not allocate significant resources for planting of milkweed in this sub-region. Rather, resources will be allocated to protect and enhance existing stands of milkweed and to promote an increase in nectaring species.

Monarchs limit lipid intake during migration and use a "fuel as you go" approach. As they near Mexico, monarchs begin to build lipid reserves needed to overwinter (Brower et al. 2006) in the cool and damp climate. Failure to build fat reserves would impact survival during the long winter dormancy period. For these reasons, NRCS will concentrate on increasing availability and distribution of fall nectaring habitat in the southern Great Plains sub-region. It is important to note that *A.* species are an excellent source of nectar. Prescribed burning during summer has increased availability of milkweed for the fall migration (Baum and Sharber 2012). Similarly, summer mowing appears to increases availability of milkweed nectaring resources in the fall (reported in NRCS 2015). NRCS will allocate resources in an attempt to increase availability of fall nectaring plants in the southern Great Plains sub-region.

The red imported fire ant (*Solenopsis invicta*) has been identified as potentially having a significant negative impact to the monarch population (Calvert 2004). Following observations in 1996, Calvert initiated as study that demonstrated that the red imported fire ant reduced survival of monarchs in central Texas to the fifth instar from 20 percent to 0.2 percent, a 100 factor decline (Calvert 2004). Fire ant population densities are related to soil type. Shallow, droughty soils support lower densities, as do deep sands. NRCS will attempt to target habitat development efforts in southern Oklahoma and Texas in areas with lower fire ant densities. Additionally, NRCS will consider the development of a fire ant control pilot study on WRP easements, similar to the efforts by the USFWS on the Attwater Prairie Chicken National Wildlife Refuge (Morrow et al. 2015).

NRCS identified the highest potential for gains in habitat in the southern Great Plains sub-region to be on private grazing lands, particularly sites supporting native grass. Conversion from introduced monoculture grass systems to species rich native grasslands will be a high priority as will implementation of grazing systems that maximize plant species richness.

Most of the CRP contracts in the Southern Great Plains sub-region are in the western portions of the state and are not heavily used by monarchs in most years. For this reason, the potential for CRP in these three states is considered lower than in the Midwest sub-region.

The NRCS conservation planner will apply the *WHEG: Monarch Butterfly Southern Great Plains sub-region* to identify various habitat improvement activities that would increase habitat. For an explanation of the WHEG, see Part 2.3.4., below.

2.3.4 Use of Best Science to Support Creating Desired Habitat Conditions

To support effective application of each of the conservation practices, NRCS and the USFWS and other partners have developed specific sub-region Wildlife Habitat Evaluation Guides (WHEG) for the monarch (Appendix II). The purpose of the WHEG is to assess current monarch habitat conditions, provide habitat development alternatives based on these initial findings, and predict and plan outcomes of improvements to the monarch's habitat conditions using the selected Conservation Practices Standards and Enhancements as conditioned by the conservation measures. Use of the WHEG (or other decision support tools concurred upon by USFWS) is mandatory for developing a landowner plan eligible for the ESA predictability and coverage under this Conference Report.

After completing the Monarch WHEG, the planner works with the client to develop and evaluate alternatives to address the monarch habitat conditions that do not meet quality criteria. A conservation practice may be a structural or vegetative measure, or a management activity used to restore, enhance or protect monarch habitat. The suite of Practices/Enhancements chosen becomes the Conservation Plan, a record of the client's decisions.

It is important to note that the conservation planning for the Proposed Action will be progressive and adaptive and is particularly relevant to development of wildlife habitat on both highly altered lands in the Midwest region (focus of the Midwest sub-region WHEG) and development of wildlife habitat on semi-arid grasslands in the Southern Great Plains region (focus of the sub-region Southern Great Plains WHEG). Temporary and permanent changes to soils, the seed banks and the resulting plant community from past or current row-crop farming and grazing regimes can complicate habitat restoration efforts (see Part 4.3). If vegetative establishment is selected by the client, then seeding specifications will be developed based on regional plant lists[4]. The development of targeted conditions for any perennial grassland habitat is seldom accomplished during a single year, and creating rich herbaceous communities can require more time and effort. Additionally, the results of habitat development efforts are seldom static, particularly when the objective is early successional or mid-successional (seral) conditions. Thus, the commitment of the land manager interested in optimizing habitats on grasslands, often requires multiple resource inventories (formal or informal), conducted during different seasons and over many years. As explained in greater detail below, the development of site specific management actions and application of specific prescriptions to manage adverse effects is a central aspect of creating the expected beneficial outcomes for the Monarch butterfly.

Modifications to the WHEG are expected and anticipated over the 30-year life of the Proposed Action and associated USFW-NRCS partnership efforts to conserve the species. Incorporating the lessons learned through the use of the WHEGs (or other decision support tools[5] concurred upon by USFWS)

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[4] Available at http://nrcs.usda.gov/monarchs , supplemented by state NRCS pollinator lists revised to target milkweed and monarch nectar sources.

[5] Over the life of the Proposed Action, the WHEGs may evolve in sophistication and strategy as they incorporate new information. Further, NRCS, with concurrence from USFWS, may pursue the use of Ecological Site Descriptions (ESD) as the preferred assessment method. ESDs are described at the following website: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/ecoscience/desc/

into the project planning process will help NRCS and USFWS adaptively manage the implementation of conservation practice standards and associated conservation measures. It is anticipated that changes to these decision support tools may be necessary to ensure that the long-term goals of the Proposed Action are being achieved. This process will be done in collaboration with the USFWS and other invited conservation partners (Part 7.0 below).

2.3.5. Incorporation of Jointly Developed Conservation Measures

Conservation Measures are additional criteria added to the conservation practice standard(s) and enhancement(s) that reduce or eliminate the short-term adverse effects on species from practice implementation. Conservation Measures were developed in collaboration with the USFWS, species experts, and are considered mandatory requirements for the affected landowners' planning and contracts conducted in the action area and under this proposed action. The purpose of the Conservation Measures is to modify the timing, application, and implementation of practices to ensure that optimal benefits to the monarch butterfly are achieved, to minimize risk to individuals, and to generate the expected beneficial conservation outcomes. For each of the Conservation Practice Standards identified in Table 1 above, a description of the Conservation Practice Standard, its definition and purpose, its specific application for the proposed action, and identified Conservation Measures appear in Appendix III.

2.3.6 Monitoring and Assessment

The NRCS designs are based on USDA-NRCS Standards and Specifications with an additional operation and maintenance plan for each practice included in the conservation plan provided to the landowner. To certify completion of the practice NRCS will complete a "construction check" to ensure that the practice was installed according to NRCS standards and specifications. Status reviews are conducted annually throughout the life of the contract to monitor progress on application of supporting and core management practices and to schedule future technical and financial assistance to eligible landowners.

2.3.7. Training

The agencies have agreed to pursue training on implementation of the proposed action, a schedule to be determined during the annual meeting of the partners outlined in the Part 7.0 below.

2.3.8. ESA Predictability

The Proposed Action is a collaborative partnership between the USFWS and NRCS that strategically targets technical and financial assistance to improve habitat for this declining species while also offering ESA predictability (up to 30 years) to eligible participants. The ESA predictability provides the participants with long term clarity that they will be in compliance with the ESA if and when the monarch butterfly is listed under the ESA. The ESA predictability and conservation measures apply regardless of the NRCS program funding and are instead tied to the covered conservation practices/enhancements and the completed Conservation Plan.

Consistent with an agreement between the USFWS and NRCS, described in an exchange of letters in August, 2012 (Appendix IV), the USFWS prepared this Conference Report for NRCS under Section 7 of the ESA. This will exempt any incidental take associated with implementing the specified conservation practices and measures included in each participant's conservation plan if and when the monarch butterfly becomes a species protected by the ESA.

Recognizing that continued implementation of the conservation practices and enhancements by participating producers beyond the term of the NRCS contract would advance the longer-term goals of the Proposed Action and both agencies missions; the USFWS is evaluating the effects of implementing the specified practices over a 30-year period. Eligible participants who choose to use or maintain the conservation practices and enhancements and associated conservation measures included in their respective conservation plan will have the predictability of knowing that ESA issues associated with their implementation of the specified conservation practices/enhancements for up to 30 years have already been addressed, if the monarch is listed. NRCS has developed a protocol to track participation in the Proposed Action and will be providing this information as a component of its annual report. NRCS will bundle and report ongoing as well as new accomplishments annually to the USFWS as outlined in Part 7 below.

It is expected that additional conservation actions related to the covered practices and enhancements may be developed over the 30-year life of the Proposed Action. As this occurs, USFWS and NRCS will collaborate on including any new conservation practices, enhancements, and CRP practices by amending this document. As part of the process outlined in Part 7 below, this may necessitate the revision and/or development of new conservation measures to ensure consistency with the NRCS-USFWS ESA predictability agreement explained further in Appendix IV.

2.4 Expected Conservation Outcomes

As previously stated, the Action Area is the core migration route and the primary breeding range for the monarch butterfly. NRCS is providing technical and financial assistance to help eligible landowners establish and enhance monarch habitat. In the Midwest, the effort is focused on plantings of milkweed (*A.* spp.) and monarch nectaring forbs in wetlands and marginal agricultural lands. In the southern Great Plains, the effort is focused on improving monarch habitat on existing grasslands.

Specifically, the following management actions will be performed under the proposed action which is expected to benefit the monarch butterfly:

(a) Habitat creation actions which improve the availability of flowering (nectar) resources and the abundance of milkweeds on marginal agricultural lands.
(b) Habitat restoration actions which will create the appropriate site conditions that promote larval abundance and survival.
(c) Habitat enhancement actions using a variety of manipulation techniques (grazing, fire, mowing, plantings, etc.) that create monarch compatible management scenarios within actively managed rangelands and marginal agricultural lands.

Over the 30-year life of this Proposed Action, the expected conservation outcome will be more acreage of eligible lands with a vegetative community structure conducive to sustaining the migration and breeding needs of the species.

3.0 SPECIES COVERED & ENVIRONMENTAL BASELINE

3.1.1. Selected Biology

The following information was summarized from the North American Monarch Conservation Plan (2008).

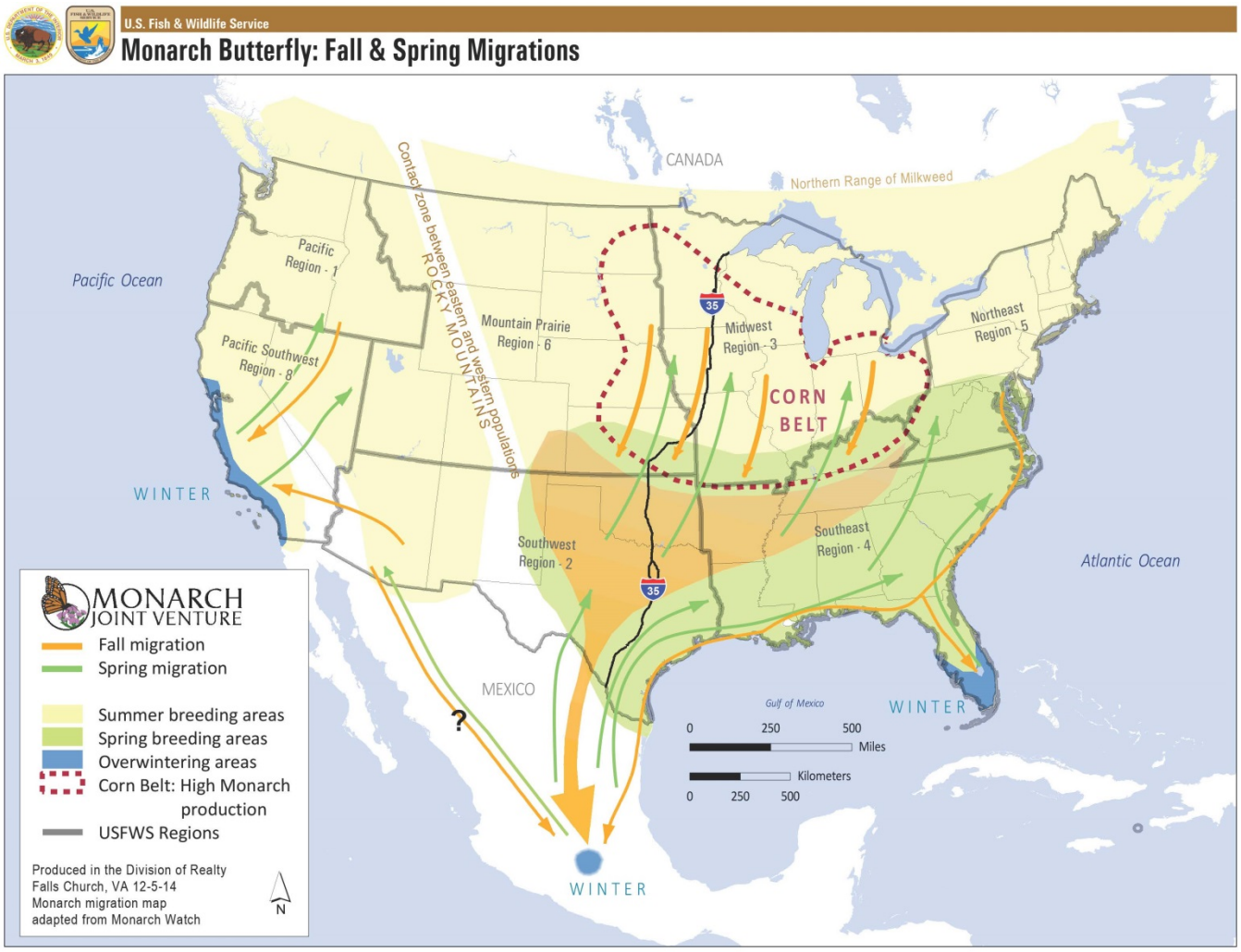
The North American monarch butterfly (*Danaus plexippus plexippus*) migration is one of nature's most spectacular natural phenomena. The geographic range of the monarch butterfly includes areas in Canada, the U.S., and Mexico. The species is widespread across the lower 48 States. Each fall, eastern monarchs breed east of the Rocky Mountains and migrate to forests in the mountains of central Mexico, whereas western monarchs generally migrate to the coast of California (Figure 1). Monarchs occur in a variety of habitats including rangelands, farms, riparian areas, deserts, prairies, meadows, open forests, woodlands, cities, gardens, and roadsides, where they search for their larval host plant milkweed (*A.* sp.) and nectar sources.

Migratory North American monarchs undergo several generations per year. Adults are generalists that feed on a wide variety of flowers, flower nectar and water. The summer generation adults live between two and five weeks. The late generation adults migrate, and then overwinter at sites in central Mexico and California. These overwintering individuals live seven to nine months, without breeding and laying eggs until the following spring as they re-migrate toward their spring and summer breeding ranges.

Monarchs only lay their eggs on milkweed plants. Adult females lay eggs singly, secreting a glue-like substance that attaches the egg to a milkweed plant. The larvae emerge in three to five days, with shorter development times corresponding to warmer temperatures. Larvae (caterpillars) feed only on leaves of milkweed (*A.* spp). In this, they are strict specialists. Monarch larvae undergo five instars (intervals between molts) over a period of nine to 13 days. Once fifth instar larvae are fully grown, they leave their milkweed host plant to search for an elevated and usually well-hidden pupation site.

The pupa stage lasts nine to 15 days under normal summer conditions. This is the least-studied stage of monarchs, due to the difficulty in finding pupae in the wild.

Figure 1. Monarch Migratory and Life History



3.1.2 Overwintering Areas

Mexico established the Monarch Butterfly Biosphere Reserve in 1980 to protect the monarch's mountainous home. Just over 60 miles from Mexico City, the 138,000 acre reserve is sectioned off into several sanctuaries that provide winter refuge to the millions of monarchs who migrate to Mexico each fall. From roughly late October through February, monarchs live in the forested mountains of Mexico, where temperatures are mild enough for survival. This habitat is only found on 12 mountaintops on the planet, and is essential to the persistence of the monarch and its migration.

The monarchs cluster in Mexico's rare *oyamel* fir forests, occasionally taking shelter in pines and other trees. The *oyamel* trees provide much needed refuge and protect the butterflies from extreme temperatures, rain, snow and predators.

While in Mexico, monarchs go through four stages: arrival, the establishment of overwintering colonies, colony movement and finally, spring dispersal. After arrival, monarchs will fly around during the day and seek out the best location for colony establishment. As temperatures drop, monarch movement

decreases, and the butterflies form large, dense clusters on *oyamel* branches. By mid-December, monarchs have settled into their overwintering homes. The butterflies roost on tree trunks and tree branches.

Serious conservation challenges exist to maintain the integrity of these overwintering areas. Part 3.2.1 below discusses some of these internal elements within the Country of Mexico. Significant international collaboration is continuing between the Countries of Canada, the United States, and Mexico to conserve the monarch butterfly.

3.1.3 Population Ecology

Understanding the factors influencing the monarch's population dynamics and ecology is on-going. Climate, mortality rates, host plant and nectar resource availability and quality, and parasites are discussed.

At least two general theories are posited regarding the spring migration from the wintering sites in Mexico. Summarized by Miller et al (2012), the migration strategy is characterized as either "successive brood" or "single sweep" migration. The former hypothesis proposes that overwintering monarchs migrate north and reach the south-central portions of the USA, lay eggs, and die, leaving the re-colonization of the Great Lakes region (states of Minnesota, Wisconsin, Michigan, and Ontario Canada) to the 1st spring generation. The later hypothesis proposes that re-colonization is accomplished by the overwintering generation arriving into the U.S. southern states in early spring to lay eggs, but then continuing northward towards the Great Lakes region, effectively recolonizing the entire eastern breeding range in one generation.

Initially explored by Malcolm et al (1993), these investigators used evaluated cardenolide concentrations, cardenolide "finger prints" and wind wear of migrant butterflies captured along two latitudinal transects in the spring of 1985, concluding that the evidence supports the successive brood hypothesis. A later investigation, Miller et al (2012), confirmed that both hypotheses are correct – in that: (1) the majority of the northern breeding range was recolonized by the first generation of monarchs (90%); and (2) a small number of individuals (estimated at ~10%) originated directly from Mexico. Additionally, they found that 62% of monarchs sampled in the Great Lakes originated from the Central U.S., suggesting that this region is important for sustaining production in the northern breeding areas.

Climatic elements (e.g., temperature & moisture) - both local and regionally and associated with both short term annual and longer frequency scales - affect local, regional and species level survival rates (at all life stages) and reproductive fitness of monarch butterflies. Saunders et al (2016) modelled weekly site-specific summer abundances (1996-2011) of monarch butterflies in the Midwestern USA as a function of climate conditions experienced during a shared spring migration/breeding phase in Texas and separate summer recruitment periods in Ohio and Illinois. This ecological model predicted Monarchs breeding in the Midwest exhibit spatio-temporal synchrony in Ohio and Illinois; and that cooler spring temperatures, average to above average precipitation in Texas, and cooler than average summer temperatures are associated with higher population abundances in both states. Further, because annual spring weather conditions in Texas primarily drive yearly abundances, as opposed to localized summer effects, year-specific counts are often difficult to predict reliably, specifically when predictive spring conditions are outside the range of typical regional conditions (Saunders et al 2016). Stevens and Fry (2010) reported a similar effect of moisture on the Western Monarch populations, concluding that

variation in moisture availability, as measured by Palmer's drought severity index (PDSI)[6], across the western region predicted monarch abundance.

Zipkin et al (2012) assessed and modeled the role of climate conditions experienced both during a spring migration/breeding phase in Texas as well as during subsequent arrival and breeding during the main recruitment period in Ohio for the monarch. Using data from a state-wide butterfly monitoring network in Ohio, the results suggest that climate acts in conflicting ways during the spring and summer seasons. Zipkin et al (2012) reported that high spring precipitation in Texas is associated with the largest annual population growth in Ohio and the earliest arrival to the summer breeding ground, as are intermediate spring temperatures in Texas. Further, the authors found that the timing of monarch arrivals to the summer breeding grounds is not affected by climate conditions within Ohio. Once in Ohio for summer breeding, precipitation has minimal impacts on overall abundances, whereas warmer summer temperatures are generally associated with the highest expected abundances, yet this effect is mitigated by the average seasonal temperature of each location in that the warmest sites receive no benefit of above average summer temperatures (Zipkin 2012).

The role of internal mechanisms affecting monarch population dynamics such as larval density dependency was explored by Flockhart et al (2012). In their study, they found that larval mortality in monarch butterflies increases with larval density due to intraspecific competition for resources. This was most pronounced in the southern areas of the range (corresponding to the Southern Great Plains sub-region). Further, the pupae at high density sites were generally smaller and took longer to develop into adults – implicating a potential reduction in fitness. The implication is that large numbers of overwintered butterflies from Mexico that return to lay eggs for the first generation may experience higher levels of larval mortality and contribute significantly fewer offspring on a per capita basis than would smaller populations (Flockhart et al 2012). However, other investigations have contrasting results (Lindsey et al. 2009; Atterholt and Solensky 2010, finding that larval density did not influence development time from egg to eclosion[7].

Mortality rates of monarchs from eggs to fifth instar may reach as high as 95% (Oberhauser et al 2001; Oberhauser et al 2015; Anda and Oberhauser 2015). Predation is thought to be the main source of this mortality, with a meta-analysis of the published literature identifying mammals, birds, and greater than 20 orders of other insects preying upon all stages of monarchs (summarized in Oberhauser et al 2015). Anda and Oberhauser (2015) evaluated fourteen independent variables on immature daily survival rates – noting that six has significant explanatory power (1) monarch age (time an individual has been in the current age class), (2) herbivory (estimate percent damage to the plant from herbivory), (3) egg position on the plant, (4) spider presence, (5) aphid infestation level, and (6) presence of flowers on the host milkweed plant.

Calvert (2004) identified the red imported fire ant (*Solenopsis invicta*) as potentially having a significantly negative impact to the monarch population. Following observations in 1996, Calvert initiated a study that demonstrated that the red imported fire ant reduced survival of monarchs in central Texas to the fifth instar from 20 percent to 0.2 percent, a 100 factor decline (Calvert 2004). Fire ant population densities are related to soil type. Shallow, droughty soils support lower densities, as do deep sands (NRCS 2015).

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[6] Information on the PDSI can be accessed at: http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml

[7] Eclosion is the emergence of an insect from a pupa or egg.

The influence of parasites has been reported to increase adult mortality and reduce fitness in monarchs. The protozoan (*Ophryocystis elektroscirrha* (*OE*)) occurs throughout the range of the monarch and is highly transmissible. This parasite harms monarchs by causing reduced longevity, smaller body size, wing deformities, reduced mating success, and lower flight performance (summarized from Altizer and de Roode 2015). Growler et al (2015) found that the larval diet of milkweed strongly influences the growth rate of *OE*; toxic secondary plant chemicals known as cardenolides correlate strongly with parasite resistance of the host. Thus larvae feeding on milkweed plants with greater cardenolide concentrations in the larval diet lead to lower parasite growth rates. Satterfield et al (2015) used field sampling, citizen science data and experimental inoculations to quantify infection prevalence and parasite virulence among both migratory and sedentary monarch populations. They reported that infection prevalence was markedly higher among sedentary monarchs compared with migratory monarchs, indicating that diminished migration increases infection risk. Altizer and de Roode (2015) also concluded that monarchs may use migration as a behavioral defense mechanism against infection, and offered that other key mechanisms are used by monarchs to defend themselves against parasite infections, including (1) geographically distinct monarch families varied genetically in their susceptibility to infection; (2) the species' innate resistance; and (3) milkweed-derived defenses and evidence of self-medication. While additional understanding of the relationship of the evolutionary significance of the monarch-parasite dynamic to both behavior and population ecology is necessary, the influence of parasites such as *OE* on monarchs may be significant in the context of long term climate change (Nail and Oberhauser 2015).

The use of migration to limit *OE* prevalence may be at risk with long term climate change; with recent observations of sedentary (winter breeding) monarch populations becoming more established in the southern USA (primarily Florida and the Gulf of Mexico states). As reported in Altizer et al (2015), this suggest that shifts from migratory to sedentary behavior will likely lead to greater *OE* infection prevalence for North American monarchs.

3.1.4. Population Trends

Monitoring population trends of Monarch butterflies takes a variety of forms, using differing methodology, and with many different organizations, agencies, and educational groups involved. Monitoring programs can be generally broken down into the following categories:

(1) Breeding Population;
(2) Population Census, including at the overwintering sites;
(3) Migratory Population; and
(4) Monitoring and Assessment of Individual Butterfly Health and Condition

These efforts are summarized in Oberhauser et al 2009, with additional information on the involved organizations further found in Part 3.2.4 below.

Overwintering population trends are not necessarily congruent with observed population trends at the summer breeding locations or during migration. Ries et al (2015), analyzed trends using three monitoring programs, one focused on overwinter colony size and two focused on summer breeding grounds. They discovered an alarming steepening in the decline of winter colony size since 2008. However, population indices from two independent summer monitoring programs were characterized by high year-to-year variability and no statistically detectable trends over time. The authors concluded two possible reasons for this disconnect: 1) biases in the placement of summer transects could be missing declines in largely agricultural regions where much of the past recruitment is thought to have occurred

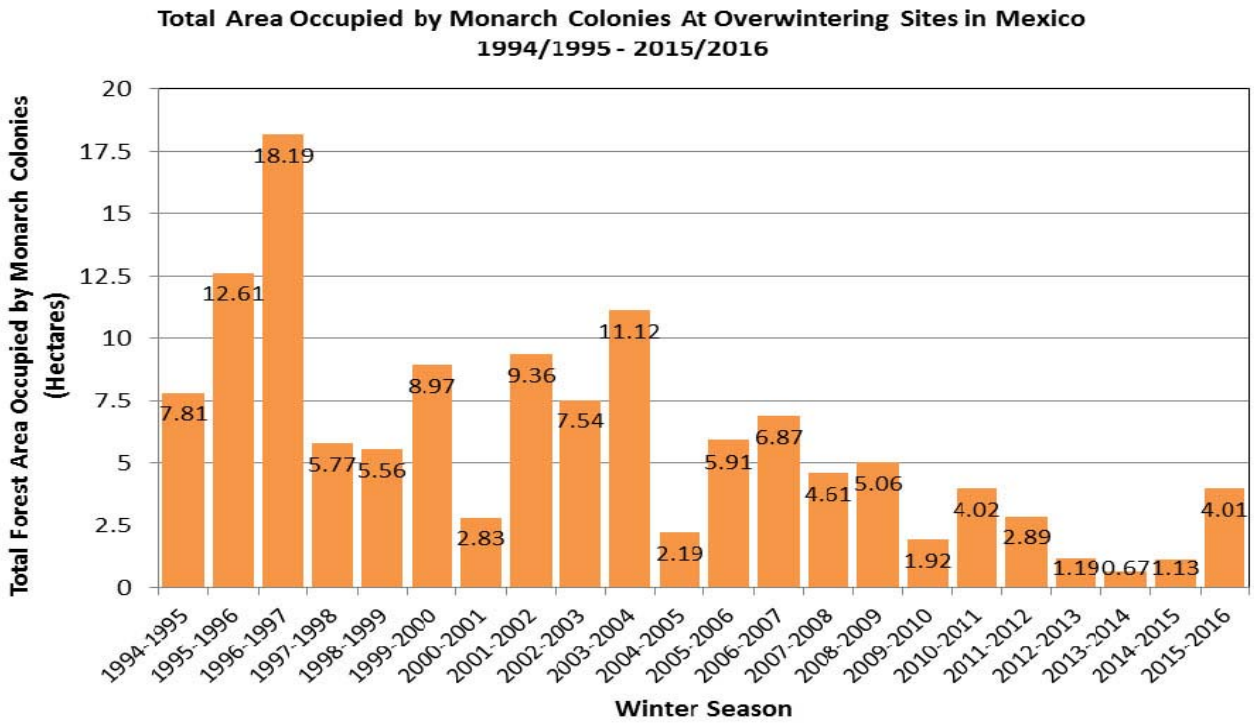
(Pleasants and Oberhauser 2013) or that significant year-to-year variability is making it difficult to statistically detect a trend, and 2) losses during fall migration could potentially contribute to overwinter declines.

Due to this inherent complexity in assessing population trends and divergence in the data collection and approaches, the best available population size estimate for the eastern population is the number of individuals at the overwintering sites. The number of monarchs that overwinter in Mexico has been extrapolated from the combined area of overwintering sites (Brower et al. 2012), with the accepted assumption that approximately 50 million individual monarchs occurs per hectare (methodology reported in Slayback et al 2007).

Since the winter of 2004-05, the World Wildlife Fund – Telcel Alliance, in conjunction with the Mexican National Commission on Protected Natural Areas' (CONANP) Monarch Reserve Office under Semarnat, has monitored monarch butterfly hibernation colonies in Mexico. Long term population data illustrates a progressively downward trend after a peak in 1996-97 survey data (~ one billion monarchs occupying 18.19 ha (44.5 acres) of habitat). Recent 2016 wintering data is available, with monitoring data showing that the area occupied by the monarch butterfly in the pine and sacred oyamel fir (*Abies religiosa*) forests in Mexico State and Michoacán totaled 4.01 hectares (9.91 acres), three times more than last season's 1.13 hectares (2.79 acres) (CONANP 2016).

This data is illustrated in Figure 2 below.

Figure 2. Trends in Monarch Overwintering Sites in Mexico



Data from 1994-2003 were collected by personnel of the Monarch Butterfly Biosphere Reserve (MBBR) of the National Commission of Protected Natural Areas (CONANP) in Mexico. Data from 2004-2016 were collected by the WWF-Telcel Alliance, in coordination with the Directorate of the MBBR.

Semmens, et al. (2016) developed a quasi-extinction risk and population target model for the monarch butterfly and found that the population has a substantial probability of quasi-extinction[8], from 11% to 57% over 20 years, with acknowledgment that the uncertainty of these estimates is large. Their modelling exercise assumed overwintering habitat area as a proxy for population size, and did not account for density dependence. Nevertheless the authors concluded that their estimates of quasi-extinction risk are likely robust, given that the population is in decline and has fluctuated widely (Semmens, et al. 2016).

3.2. Environmental Baseline Factors Affecting the Species in the Action Area

3.2.1 Degradation of Overwintering Sites, including the influence of extreme weather events.

Some degradation of the monarch's wintering sites within Mexico is of conservation concern. Vidal et al (2014) evaluated aerial photographs, satellite images, and field surveys to monitor forest cover in the core zones of the 56,252 ha (~139,002 ac) Monarch Butterfly Biosphere Reserve (MBBR) in Mexico from 2001 to 2012. Over this 11 year period, 1,254 ha (3,099 ac) were deforested (i.e., cleared areas had <10% canopy cover) and another 925 ha (2,286 ac) were degraded (i.e., areas for which canopy forest decreased). Actions attributed to these losses were primarily attributed to large-scale logging (affecting 1,503 ha (3,714 ac)) and small-scale logging (affecting 554 ha (1,369 ac)). Although many successes in maintaining the integrity of the MBBR have been accomplished, including enhancing the local communities support of an eco-tourist industry and federal enforcement to control logging, the authors concluded that a multi-stakeholder, regional, sustainable-development strategy is needed to protect the reserve (Vidal et al 2014). Illegal logging still remains an issue within the MBBR (Brower et al 2016).

Zagorski (2016) summarized the status and conservation threats on the MBBR, highlighting that severe winter storms recorded for the period from 1981-2010 resulted in losses of adult monarchs ranging from between 50 – 80 percent (references cited therein). As part of her evaluation of the long term sustainability of the integrity of the forests of the MBBR, Zagorski modelled the effects of climate change on forest resources with consideration of the potential changes in land use from local population growth and economies. She concluded that the long-term persistence of both the MBBR's role in conservation of the monarch is uncertain; with an estimated 38.6% to 69.8% of current monarch habitat potentially lost within the MBBR by 2050, potentially affecting 14 of the 19 current monarch colonies, while throughout the Trans-Mexican Volcanic Belt[9], 52% to 76% of suitable habitat could disappear as a result of higher temperatures and changes in precipitation (Zagorski 2016).

In addition to outright adverse land use changes, the long term sustainability of forest health is of a concern within the MBBR. Monarch butterflies favor mature (tree height more than 20 m (66 ft)) closed canopy forest patches to form overwintering colonies (Keiman and Franco 2004). Allende et al (2016) concluded that tree growth in the MBBR is reduced in years of low January–May precipitation combined with high summer (September of the previous year) temperatures, a scenario which is likely to occur as a consequence of global climate change.

3.2.2 Habitat Degradation – Especially the Loss of Milkweed

Plants in the milkweed family (*A. sp*) are the sole host plant for the monarch butterfly. A body of researchers has concluded that the decline of milkweed host plants is the primary influence on monarch

[8] Defined as the loss of a viable migratory population of monarchs in eastern North America.

[9] The range of soil and site conditions supporting the preferred tree assemblages compatible with monarch butterfly over-wintering such as *oyamel* fir forests

population status (e.g., Oberhauser et al. 2001, Brower et al. 2012, Pleasants and Oberhauser 2013). The decline of milkweeds, according to the above research, is primarily connected and as a result of the increased use of the genetically modified herbicide-resistant crops, especially in the agricultural Midwest region of the USA. Some enumeration of the loss has been attempted – Pleasants (2016) estimated that almost a billion milkweeds have been lost since 1999 – in both the agricultural landscape of the Midwest but also within the lower Great Plains Region due primarily to development and conversion of grasslands to cultivated lands.

Pleasants posited that two possible mechanisms explain the relationship between milkweed loss and monarch production loss. One is that as the number of milkweeds decreases, female monarchs are forced to crowd onto the remaining milkweed stems, with the result being lower survival rates. The second mechanism proposed by Peasants (2016) is that female monarchs, because of their inability to locate remaining milkweed plants, will cumulatively lay fewer eggs (over their lifetime).

Hartlzer (2010) conducted surveys of common milkweed in Iowa corn and soybean fields between 1999 and 2009. Initial surveys conducted in 1999 found that low densities of common milkweed occurred in approximately 50% of Iowa corn and soybean fields. In 2009, common milkweed was present in only 8% of surveyed fields, and the area within infested fields occupied by common milkweed was reduced by approximately 90% compared to 1999 (Hartzler 2010). Pleasants and Oberhauser (2013) reported that egg densities on milkweeds in agricultural fields were significantly higher than on milkweeds in non-agricultural habitats each year by an average factor of 3.89. Based on 1996 data, 50 percent of wintering monarchs in Mexico were born in the Midwest (Wassenaar and Hobson, 1998). Collectively, this work suggests that the relative value of this reproductive habitat is much more significant to the species' persistence than milkweed in other areas of the monarch's range.

Pleasants and Oberhauser (2013), estimated Midwest annual monarch production using data on the number of monarch eggs per milkweed plant for milkweeds in different habitats, the density of milkweeds in different habitats, and the area occupied by those habitats on the landscape. Their work estimated a 58% decline in milkweeds on the Midwest landscape and an 81% decline in monarch production in the Midwest from 1999 to 2010. Monarch production in the Midwest each year was positively correlated with the size of the subsequent overwintering population in Mexico. Taken together, these results strongly suggest that a loss of agricultural milkweeds is a major contributor to the decline in the monarch population (Pleasants and Oberhauser 2013).

Another body of scientific inquiry has led others (Inamine et al. 2016, Davis and Dyer 2015) to conclude that milkweed is not a limiting factor; rather, that the elements of the fall migration affecting survival rates (such as nectar sources, habitat fragmentation, the integrity of the overwintering site, etc.) are the keys to the monarch's population dynamics. These authors evaluated the status of monarch butterflies using multiple datasets covering 22 years of monarch monitoring programs across North America to retrospectively investigate associations between population dynamics in different regions, and to identify stages contributing to the recent population decline. Using count data reported to the North American Butterfly Association (NABA) and other citizen scientist data, the authors analyzed the relationships between butterfly population indices at successive stages of the annual migratory cycle to assess demographic connections and to address the roles of migrant population size versus temporal trends that reflect changes in habitat or resource quality. Inamine et al. (2016) found a sharp annual population decline in the first breeding generation in the southern USA, driven by the progressively smaller numbers of spring migrants from the overwintering grounds in Mexico, with monarch populations building regionally during the summer generations. Contrary to the work cited above

implicating milkweed loss, Inamine et al. (2016) did not find statistically significant temporal trends in stage-to-stage population relationships in the mid-western or northeastern USA. In contrast, there are statistically significant negative temporal trends at the overwintering grounds in Mexico; Inamine et al. (2016) concluding that monarch success during the fall migration and re-establishment strongly contributes to the butterfly decline. Davis and Dyer (2015) also conducted a meta-analysis of some of the population status literature and concluded that there had been no decline over the past two decades in summer breeding numbers for the eastern North America population.

In addition to the observed decline in milkweeds in the Midwest, cropland expansion into grassland and particularly within lands enrolled in the CRP has been another identified factor implicating monarch habitat decline. Commodity price supports, U.S. agricultural policies, and the increased demand for bio-fuels have recently resulted in expansions of crop production (typically corn and soybeans) into areas previously considered grasslands and other areas not previously considered tillable and sustainable for these cropping systems (Lark et al 2015). During the period of 2008-2012, the authors concluded that cropland expansion occurred most rapidly on lands that are less suitable for cultivation, with up to 42% of the recent expansion coming from lands exiting the CRP and the remaining coming from pasture/rangeland (Lark et al 2015). Since 2012, this trend has continued, resulting in more lands going back into row crop/intensive agricultural. According to the Farm Services Agency compiled data, all 9 states within the Action Area are seeing continual decreases in total enrolled CRP acreage for the period of 2012-2015 (https://www.fsa.usda.gov/programs-and-services/conservation-programs/reports-and-statistics/conservation-reserve-program-statistics/index).

Land use changes from grasslands and rangelands to row crops have important implications to other pollinators. For example, Koh et al (2016) modeled wild bee abundance in the USA between 2008 and 2013, estimating that bee abundance declined across 23% of the USA land area. Most of the areas of modelled decreases occurred in the agricultural regions of the Midwestern and Great Plains states and in the Mississippi river valley, with eleven states - including all states within the Proposed Action - collectively accounting for 60% of the predicated decrease in wild bee abundance (Koh et al 2016). While not a completely quantitative approach with uncertainties – this effort attempts to integrate known causation factors affecting pollinator abundance and land use change.

Pleasants (2016) concluded that a total of 425 million milkweeds would need to be added to increase the monarch support capacity by just one more overwintering hectare, with 1.6 billion more needed to meet the 6 ha (of wintering occupied habitat) goal established by the Pollinator Health Task Force in 2015.

3.2.3 Highway Mortality

Impacts of highways on monarch butterfly (and, more generally, pollinator) mortality is only now emerging as an area of conservation concern. What few studies that are available demonstrate that mortality from vehicle strikes is a potentially important conservation challenge. For example, Baxter-Gilbert et al (2015) documented road mortality of pollinating insects along a 2 kilometer (km) stretch of highway in Ontario, Canada and used their findings to extrapolate expected levels of road mortality across a number of landscape scales. They asserted that their extrapolations demonstrate the potential for loss of hundreds of thousands (on the studied highway) to hundreds of billions (generalized across North America) of Lepidopterans, Hymenopterans and pollinating Dipterans each summer. Further, they concluded that projections of such high levels of annual road mortality highlight the need for research to assess whether the mortality levels observed are contributing to the substantial declines of pollinating insects occurring on a global scale (Baxter-Gilbert et al 2015).

The most explicit study on mortality of monarch butterfly due to highway collisions is provided by McKenna et al, 2001. Their work documented 1,824 road-killed Lepidoptera during a six week, 13 roadside transect evaluation in central Illinois during the months of September and October 1998. Rates of monarch butterfly deaths were reported as between 0 and 6.50 deaths per 100 m (33.3 ft) of road. Based on these data and methods reported therein, the authors estimated that the number of monarchs killed along interstate highways in Illinois in one week during the study may have been more than 500,000 individuals (McKenna et al 2001).

Butterflies, perhaps due to their size, ease of visibility, and at-risk flight behavior, are reported as among the most common groups of insects killed along roads (Rao and Girish 2007; McKenna et. al. 2001; Skórka et al. 2013). The effect of traffic volume on mortality rates is unclear. Some studies indicate increasing traffic volume increased mortalities (Rao and Girish 2007; Zielin et al. 2010; Skórka et al. 2013). Other studies did not find that the amount of traffic on adjacent roads influences the numbers of butterflies (Munguira and Thomas 1992; Thomas et al. 2002; Saarinen et al. 2005) in habitat areas near roads and highways.

Although no explicit results are available for the monarch butterflies of the positive effects of roadway habitats, the potential benefits of roadside habitats to support butterflies and moths has been evaluated (Ries, et al. 2001; Ries et al 2001a; Saarinen et al 2005; Valtonen et al. 2006) and for other pollinators such as bees (Hopwood et al. 2010).

More information about the negative and beneficial effects of roadway habitat (and other linear habitat features such as electrical transmission lines/pipeline right-of-ways) on pollinators is summarized in (Federal Highways Administration 2015; Hopwood et al 2015; Muñoz *et al* 2015; Wojick and Buchmann 2012).

3.2.4 Related Monarch Butterfly Conservation Efforts

Together, Canada, Mexico, and the United States created the North American Monarch Conservation Plan (NAMCP), a long-term cooperative agenda to conserve the monarch butterfly and its unique migratory phenomenon. The NAMCP focuses on protecting habitat in overwintering sites in Mexico and along the butterfly's breeding and migration corridors that span North America. The NAMCP identifies the need for a coordinated program to monitor monarch populations and habitat and provide the data to assess the effectiveness of conservation measures. NAMCP objectives and actions are linked to existing conservation initiatives in the three countries.

The U.S. monarch conservation strategy focuses on three priority geographic areas: spring breeding habitat in Texas and Oklahoma, summer breeding habitat in the Midwest "Corn Belt", and key areas for the western population. The best available science indicates that a landscape-scale "All Hands, All Lands" habitat strategy is required. All sectors - protected areas, roadsides, rights-of-ways, agricultural lands, and urban areas – must be engaged. Public-private partnerships are critical.

The Monarch Joint Venture (MJV) is a partnership of federal and state agencies, nongovernmental organizations, and academic programs that are working together to protect the monarch migration across the lower 48 United States. Recognizing that North American monarch conservation is a responsibility of Mexico, Canada and the USA, as identified in the North American Monarch Conservation Plan, the mission of the MJV is to coordinate efforts throughout the USA to conserve and protect monarch populations and their migratory phenomena by developing and implementing science based habitat

conservation and restoration measures in collaboration with multiple stakeholders. The MJV's mission will be achieved by coordinating and facilitating partnerships and communications in the U.S. and North America to deliver a combination of habitat conservation, education, and research and monitoring efforts and projects. More information and background can be found at: www.monarchjointventure.org.

In 2014, a Presidential Executive Memorandum (PEM) was issued to create a federal strategy to promote the health of honey bees and other pollinators, including the monarch butterfly. The PEM was issued because of the breadth, severity, and persistence of pollinator losses and recognized the value of expanding U.S. federal agencies' efforts to reverse pollinator losses and help restore populations to healthy levels. The PEM identified specific outcomes expected from the participating federal agencies[10]– including new public-private partnerships, increased citizen engagement, and pollinator conservation actions. The PEM established a National Pollinator Health Task Force which issued the National Strategy to Promote the Health of Honey Bees and Other Pollinators [11] (Strategy) in May of 2015. Two of the three overarching goals in the strategy are related to monarch butterfly population and habitat:

> Monarch Butterflies: Increase the Eastern population of the monarch butterfly to 225 million butterflies occupying an area of approximately 15 acres (6 hectares) in the overwintering grounds in Mexico, through domestic/international actions and public-private partnerships by 2020.
>
> Pollinator Habitat Acreage: Restore or enhance 7 million acres of land for pollinators over the next 5 years through Federal actions and public/private partnerships.

The Strategy includes a pollinator protection plan for each participating Federal agency. The plans seek to increase and improve pollinator habitat where possible and practicable on federal facilities via (1) facility landscaping, including easements; (2) land management; (3) policies with respect to road and other rights-of-way; (4) educational gardens; (5) use of integrated vegetation and pest management; (6) increased native vegetation; and (7) application of pollinator-friendly best management practices and seed mixes.

In 2015, the National Fish and Wildlife Foundation (NFWF) established the Monarch Butterfly Conservation Fund to protect, conserve and increase habitat for this iconic insect and other pollinators. Created with an initial $1.2 million commitment from USFWS, and funding from other federal agencies including NRCS, the fund pools additional funding from other private and public donors and matching resources from grantees. The first round of $3.3 million in grant awards was announced in September 2015 and was matched by more than $6.7 million in grantee contributions for habitat restoration, capacity building, and native seed production and distribution projects. The second round of grants was

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[10] Participating federal agencies include: the State Department, Department of Agriculture, Department of Defense, Department of Energy, Department of the Interior, Department of Housing and Urban Development, Department of Transportation, Council on Environmental Quality; Domestic Policy Council; General Services Administration; National Science Foundation; National Security Council Staff; Office of Management and Budget; Office of Science and Technology Policy; and other interested executive departments, agencies, and offices.

[11] Available at: https://www.whitehouse.gov/sites/default/files/microsites/ostp/Pollinator%20Health%20Strategy%202015.pdf

awarded in August 2016 totaling $3 million with $6 million in matching contributions to address the same three priority conservation needs as in 2015 http://www.nfwf.org/monarch/Pages/home.aspx

The USFWS is partnering with the National Wildlife Federation (NWF) through the *Mayors' Monarch Pledge* campaign to create habitat and educate citizens in communities nationwide. Agencies, conservation and gardening organizations, and garden industry members have joined together to create the National Pollinator Garden Network and recently launched the *Million Pollinator Garden Challenge* campaign to raise awareness and register a million pollinator friendly gardens by the end of 2016.

The Association of Fish and Wildlife Agencies (AFWA) supports voluntary and incentive-based efforts to address threats of loss, fragmentation and modification of monarch breeding habitat including a better understanding of monarch host plants and how land use practices affect the distribution and abundance of numerous milkweed species (*Resolution 2014-1: Support for the Monarch Butterfly Conservation)* http://www.fishwildlife.org/files/Resolutions_AFWA2014.pdf.

Other state level efforts include:

- USFWS and AFWA have joined forces to take creative actions on behalf of monarch butterflies and other pollinators through a Memorandum of Understanding: *Collaborative Efforts to Conserve the Monarch Butterfly and Other Native Pollinators*.. AFWA tasked state agencies with developing projects supported by financial assistance funds from USFWS, which directly or indirectly benefit the monarch butterfly and other pollinators within the parameters of the management authority of state agencies. This includes working with all the regional associations. http://www.fws.gov/savethemonarch/pdfs/FWS-AFWA-Letter-Supporting-Monarch-and-Pollinator-Conservation-10March2015.pdf

- The Midwest Association of Fish and Wildlife Agencies (MAFWA) has taken a lead role in coordinating state planning efforts in collaboration with conservation partners including the U.S. Fish and Wildlife Service along the flyway of the eastern population. This includes leading a Mid-America Monarch Conservation Plan efforts, which also includes Texas and Oklahoma. http://www.fishwildlife.org/files/AFWA_Monarch_Report_Oct_23_2015.pdf

Regional and in-state efforts are underway to expand and improve pollinator habitat along transportation rights-of-ways. The Federal Highways Administration (FHWA) has developed best management practices for roadside vegetation management along highways working with the Xerces Society. A cornerstone project with the transportation sector is the designation of Interstate-35 (I-35) as the "Monarch Highway." This partnership-based project provides a model for creating habitat and conducting public outreach along a major transportation corridor to support monarch conservation.

The Energy Resources Center at the University of Illinois-Chicago facilitates a "Rights-of-Way as Habitat Working Group" focused on utilities, transportation authorities, and other interested parties in the Midwest. This effort promotes wildlife habitat development along rights-of-way, networking opportunities for organizations interested in habitat project implementation, and the development of a database that can be used to guide adaptive management practices. http://www.erc.uic.edu/biofuels-bioenergy/pollinator-habitat/rights-of-way-as-habitat/

The Monarch Conservation Science Partnership (MCSP) works through partners to consolidate, synthesize, and deliver applied science that informs and drives adaptive landscape-scale conservation for the monarch butterfly. The MCSP is a collaboration of scientists and resource managers (USGS, USFWS, state partners, MJV, academia, and others) brought together to develop models and tools to empower strategic monarch conservation. The MCSP focuses on the areas of science planning, development of decision support tools, population modeling and monitoring, and research related to monarchs, milkweed, and nectar plants. http://www.umesc.usgs.gov/management/dss/monarch.html

Numerous citizen-science opportunities currently exist within the United States and Mexico to track monarch migrations, establish status of overwintering sites, and monitor larval populations on milkweed. Successful citizen-science programs have protocols in place that may be standardized as universally recognized methods to monitor monarch populations. These include: (1) MonarchNet has been a centralized resource of monarch monitoring data from a number of butterfly and monarch butterfly-focused citizen-science programs since 2009; (2) Monarch Watch has implemented an internationally accepted tagging method that gives even untrained observers the opportunity to report encounters with marked monarch butterflies in any location they are found. The dataset currently has more than 1 million tagged monarch butterflies and more than 16,000 reported tag recoveries; (3) The Butterfly and Moth Information Network hosts Butterflies and Moths of North America, or BAMONA, a Web site to provide general information about nearly 6,000 Lepidoptera species with high-quality photos and identification tools; (4) The North American Butterfly Association (NABA) hosts a butterfly count program for citizen scientists to collect data about any North American butterfly population; (5) Journey North tracks certain migratory species, including monarch butterflies, to record seasonal and climate-related changes; (6) eButterfly enables citizen scientists across North America to report butterfly sightings and upload and store their photos in a personal profile; (7) The Monarch Larva Monitoring Project, since 1997, has used citizen scientists to track monarch eggs and larvae on milkweed across North America during the breeding season; and (8) Project Monarch Health, a collaborative study between citizen scientists and the University of Georgia, seeks to better understand *Ophryocystis elektroscirrha,* a microscopic protozoan parasite of monarch butterflies, more commonly known as OE.

These efforts have significantly enhanced monarch butterfly science and management (Ries and Oberhauser 2015); Oberhauser et al (2015).

Other monarch related partnership efforts are summarized in the 2008 North American Monarch Conservation Plan.

4.0 EFFECTS OF THE ACTION

The effects of the action are the direct and indirect impacts of the proposed federal action on the species and critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR § 402.02).

4.1 Effects Introduction

The NRCS and USFWS have evaluated the identified conservation practices and enhancements to determine how the individual practices have the potential to produce beneficial and adverse effects to monarchs and its habitat requirements. The NRCS collaborated with USFWS to develop specific conservation measures included in this consultation. The NRCS and USFWS have determined that, as implemented, the conservation measures will result in ameliorating, minimizing, or eliminating potential

adverse effects. However, even with the implementation of the conservation measures, some remaining adverse effects may occur to monarchs as described below. Nevertheless, the USFWS and NRCS have determined that the conservation measures, in concert with the other elements of the Proposed Action, will cumulatively generate long term beneficial effects in the form of more habitats under management and more threats being addressed and minimized.

Planning and execution of NRCS' assistance to private landowners depends upon the completion of a Conservation Plan for each eligible participant. Consequently, the agencies recognize that each conservation practice will be designed to work synergistically with other conservation practices and enhancements as a conservation management system to achieve the purposes of the selected core and supporting practices. This linkage between conservation practices and enhancements produces benefits and minimizes adverse effects to the species. Appendix III provides a comprehensive narrative of the covered conservation practice/enhancements in the document, its purpose, and the identification of the appropriate conservation measures.

4.2 Potential Adverse Effects (AE) from the Proposed Action include the following:

The USFWS and NRCS identified the following potential adverse effects that may result from implementation of the Proposed Action on the monarch butterfly. To address the adverse effects identified, the NRCS and USFWS developed specific conservation measures which are designed to minimize, avoid, or eliminate these adverse effects (summarized in Table 2) below.

Table 2. Potential Adverse Effects and Developed Conservation Measures

Potential Adverse Effect	Conservation Measure
AE1 Temporary soil and vegetation disturbance and/or compaction, including effects from habitat manipulation actions such as prescribed burning, mowing and grazing. AE2 Increased potential of introduction of Invasive Species. AE 3 Permanent removal of desired vegetation. AE 4 Exposure to herbicides and other synthetic compounds.	CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation. CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants. CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

This document considers the effects of implementing the covered conservation practice standards, CSP enhancements, and CRP standards over a 30-year period, from 2016 to 2047. Annual evaluations of the approaches will occur, with a more comprehensive review occurring at 5 year intervals (Part 7 of this document).

4.2.1 Temporary soil and vegetation disturbance and/or compaction (AE1*)*

Temporary soil disturbance and vegetation removal are expected from the implementation of most of the conservation practice standards and enhancements. This disturbance may result in loss of cover and increase the potential for invasive plants and/or species that will take advantage of the disturbance and become overabundant or a nuisance. Soil compaction actions may cumulatively change the ability of the site to support desired plant communities or result in the invasion of unwanted invasive species (discussed in Part 4.2.2 below).

Sources of the disturbance would include use of equipment (post-hole diggers, tractors, and other machinery) as well as practices that involve the planting or manipulation of vegetation (examples such as brush management, shrub control, prescribed burning, riparian forest buffer, and range planting). Common potential adverse effects include degradation of habitat conditions and the potential for increased habitat fragmentation if the scale of the disturbance is large enough and the potential to create opportunities for colonization of these disturbed sites by invasive/non-target plants.

If these adverse effects are distributed throughout the landscape at a broad enough scale, it is possible that the expected conservation value of the restoration/planting action(s) could be negated. Further, in light of the continuing loss of milkweed and nectar resources throughout the action areas (see Part 3.2.2 above); individual fitness might be reduced and may have adverse population level effects to both the migratory and breeding populations. However, the USFWS does not anticipate these adverse effects will be manifested at any adverse scale because of varying landowner interest, landowner ownership patterns, and NRCS contractual limitations. Therefore, the net effect will be that practice installation and maintenance within eligible lands covered by the Proposed Action may result in only localized and short-term disturbance(s), but are expected to produce long-term restoration, maintenance and enhancement gains by improving and maintaining habitat conditions for the monarch butterfly.

NRCS will cost and plan various management prescriptions that may cause temporary soil and/or vegetative disturbances; including mowing, grazing, and the use of fire. Each of these actions is further evaluated separately below. The use of chemical control of vegetation is evaluated in Part 4.2.4 below.

4.2.1.1 Effects of Mowing

The specific literature on the effects of mowing on monarchs is limited. Mowing can be an effective management tool to control woody and weedy species and manage undesirable species from setting seed if timed appropriately. However, mowing too often and during certain times of the year may result in high mortality to monarchs and other wildlife, including pollinators (Monarch Joint Venture 2015).

In a specific evaluation of the effects of various mowing strategies in upstate New York on common milkweed, Fischer et al (2015) determined that mowing spurred the regrowth of milkweed and sustained a more continuously suitable habitat for monarch oviposition and larval development than the control (un-mowed) sites. Further, significantly more eggs were laid on the fresh re-sprouted milkweeds that on the older and taller control plants (Fischer et al 2015). The authors cautioned that timing of mowing is

critical and must be determined empirically for different milkweed species and in different locations for such benefits to monarchs to be repeated in other parts of the range.

Recently, the Monarch Joint Venture (2014) provided a monarch best practice guide for mowing. The guidance provided management windows separated primarily by latitude, to avoid primary breeding activities and peak migratory activity. Further, the guidance included additional considerations, such as (1) avoid mowing the entire habitat; (2) avoiding known monarch breeding areas; (3) avoid mowing while preferred forbs and milkweeds are blooming/before they have dispersed seed; (4) limit mowing to twice per year, and even less if possible; (5) using a flush bar and cut at reduced speeds to allow wildlife to escape; (6) establishing cutting heights; and (7) avoiding nighttime mowing.

4.2.1.2 Effects of Grazing

The specific literature on the effects of grazing livestock on monarchs is limited. Much more research is available on the effects of grazing management systems on floristic resources, focused on other species of butterflies and moths, other pollinators, and in the context of specific vegetative communities. The USFWS believes that information on the effects of grazing on pollinators has relevance to evaluating the effects of grazing on monarch butterfly. The relevant literature is summarized below.

The presence of livestock may create physical disturbances to monarch. Livestock grazing can adversely impact butterfly populations directly by trampling during immobile life stages (egg, larvae, and pupae) or when weather conditions may restrict adult movement (Warren 1993). Grazing can also adversely impact butterfly populations indirectly by altering plant community composition (Stoner and Joern 2004), removing adult nectar resources, introducing invasive weeds (Hayes and Holl 2003), and changing hydrology in mesic/hydric habitats (Belsky etal 1999). Grazing can also result in adverse, benign and beneficial effects on butterflies depending upon stocking densities. Light rotational grazing can maintain vegetation heights and habitat heterogeneity favorable to some butterflies (Ravenscroft 1994). For instance, the silver-spotted skipper (*Epargyreus clarus*) has not only shown a positive response to moderate grazing, but depends on it to maintain the structure of its host plant (Thomas and Jones 1993; Davies et al. 2005). Generally, Hartfield et al (2015) recommended that grazing periods compatible with butterfly persistence should be short with relatively long recovery periods for the habitat, and grazing should not take place during the adult flight period since butterflies are utilizing nectar sources and looking for oviposition sites during this time.

Gillen and Sims (2004) reported that in the sand sage brush grasslands in the southern Great Plains, richness in annual forb was not affected by stocking rates, including heavy grazing, and that forb populations were more responsive to weather. Thacker et al (2012) reported that moderately stocked rangeland had a greater abundance of forbs than lightly stocked pastures. Light to moderate levels of grazing usually result in a richer diversity of plant species than do heavy levels of grazing or no grazing at all, especially in the more humid grasslands such as the tall-grass prairie in the USA (Risser et al. 1981). Moderate grazing by bison increased plant biodiversity on tallgrass systems (Collins et al. 1998; Hartnett et al. 1996), and moderate grazing by cattle increased plant biodiversity on tallgrass (Collins 1987), mixed-grass prairie (Biondini et al. 1998), and shortgrass steppe (Milchunas et al. 1990, 1992). Very heavy grazing that removed 90% of above-ground biomass reduced diversity on mixed-grass prairie (Biondini et al. 1998).

Smith and Cherry (2014) studied the impacts of different management schemes used to maintain semi-natural grasslands, including mowing every 3 years, mowing annually, and continuous summertime

grazing. They reported that fields with minimal management, being mowed only once every 3 years, had the largest benefit to butterfly communities with species richness, abundance, and diversity was significantly higher in these fields (Smith and Cherry 2014). In comparison with grazed fields, they reported that mowed field had significantly higher species richness and diversity, although abundance was not significantly different. The response of individual butterfly species also showed negative effects of grazing on habitat specialists, with the author's conclusion that a varying response by different groups of species as well as individual species indicated the importance of multiple management techniques for conserving a wide range of pollinators (Smith and Cherry 2014). This conclusion is supported by Davis et al (2008) that found that in remnant tall grass prairie fragments, management strategies affected bees and butterflies in somewhat of an inverse relationship (e.g., some strategies have greater benefits to bee species richness whereas some strategies have greater benefits to butterfly richness).

It is important to note that there are some variations in reported plant species response – ranging from adverse to benign, to beneficial. Further, comparisons are somewhat problematic as quantitative definitions on what constitutes "light", "moderate" and "severe" grazing are not always clear in the literature.

The primary tool NRCS will use for monarch butterfly conservation and management in the South Central (Southern Great Plains) Sub-Region is prescribed grazing. During planning of Prescribed Grazing (528) Standard and Specification, all prescribed grazing plans will be designed to A) address the monarch's limited factors in order of priority; B) improve overall rangeland health, C) be sustainable on the landscape, and D) be monitored so informed adjustments can be made, when necessary. Further, all required supporting practices (i.e., fence, well, spring development, pipeline, etc.) will be planned and designed to minimize disturbance and to enhance monarch feeding and breeding habitat through the installation of a sustainable livestock management program. The USFWS supports the application of site-specific restoration and management strategies which will increase milkweed and nectar plant persistence and robustness in the monarch's breeding range through developing compatible grazing systems.

4.2.1.3 Effects of Prescribed Burning

In the southern Great Plains of North America, fire exclusion has contributed to the conversion of many rangelands from native grassland to woody shrublands dominated by mesquite (*Prosopis glandulosa Torr*.) and cactus (*Opuntia spp*.) (Teague et al 2008).

Timing of prescribed burning will affect both individual herbaceous species response and overall floristic composition but is expected to increase the abundance of annual and perennial forbs. For example, Ruthven et al (2016) examined the effects of winter burns on the abundance and diversity of forbs and grasses on three rangeland sites during the first and second growing seasons post burn in the western South Texas Plains. Forb and grass species richness and diversity were similar among treatments and growing seasons, with most grasses unaffected by burning. Date of burn influenced herbaceous vegetation response with greatest forb densities on early winter burns and highest grass densities on mid-winter burns (Ruthven et al 2016).

Timing of burning may illicit differing ecological responses of monarchs. For example, Baum and Sharber (2012) evaluated the effects of summer prescribed fire on *A. viridis* and the use of *A. viridis* by monarch butterflies and concluded that summer prescribed fire may provide host plant patches and/or

corridors for pre-migrant monarchs during a time when host plant availability may be limited in other areas.

4.2.1.4 Synthesis of expected restoration scenarios involving temporary disturbances related to habitat manipulation using fire, plowing, mowing, or grazing.

Within the Action Area, the availability of milkweeds and nectar sources for both spring and fall migration and breeding is essential to maintaining the fitness of the species. Management practices that manipulate vegetation (e.g., mowing, grazing, burning, etc.) will have differing influences on milkweed viability and health. Baum and Mueller (2015) investigated the role of management prescriptions on the common milkweed (*A. syrica*) in north-central Oklahoma. They posited that disturbance regimes may influence interactions with predators and parasites, and suggested that milkweed distribution, morphology, phenology and reproductive success are affected by timing and frequency of disturbance. They concluded that while more management science is needed, the focus in the southern Great Plains for using a disturbance regime for monarchs should be to increase host plant availability during their late summer and early fall breeding period (Baum and Mueller 2015).

Prescribed fire and grazing are suggested management techniques for preventing shrub encroachment and suppressing non-native species, especially in areas with functionally distinct native and exotic grasses (Taylor, et al 2012). Specific restoration strategies combining fire, grazing, and other habitat manipulation actions (active seeding under range planting, mowing, and/or deploying herbicides for invasive species control, for example) and over a long period of time may be the optimal scenario to achieve the floristic resources supporting monarch butterflies. Clark (2014) found that, in south Texas, both seasonal fire and grazing can be used together to decrease shrub and invasive grass cover and maintain preferred grass diversity. Smith and Cherry (2014) concluded that butterfly species respond differently to mowing and grazing – some experience declines and some species will increase.

Within the Midwest sub-region, NRCS expects to focus on lands not currently under agricultural production (including haying and pasture) due to landowner conflicts with existing haying and pasture operations. NRCS' efforts will therefore target those fields and areas in various USDA cropland retirement programs (e.g., CRP, WRP, and ACEP). Typically these are previously cultivated lands with erodible soils that have been retired from active tillage and annual plantings and been converted into perennial grassland systems. These lands can be considered suitable for grazing and offer many economic and ecological advantages. Often primary conservation objectives are to reduce erosion on highly erodible cropland, decrease sedimentation, improve water quality, foster wildlife habitat, curb the production of surplus commodities, and provide income support for farmers (Young and Osborn, 1990).

By applying the covered conservation practices and enhancements, a common scenario is that NRCS would facilitate the plantings (drilling and/or plowing) of regionally appropriate seed mixtures of both monarch nectar resource and the appropriate species of milkweed to enhance monarch reproduction. In addition to plantings and seeding, some habitat management and/or manipulation is likely to assist in the maintenance of this desired flora – including mowing, grazing, and/or burning prescriptions suitable for that particular parcel of land.

Conservation measures will ensure coordination with the local conservation partners to determine overall practice applicability, location, extent, configuration, and timing of these vegetative manipulation techniques. The application of this local knowledge is cumulatively expected to further minimize or eliminate significant areas of permanent removal of preferred vegetation, minimize the

intensity and duration of any localized adverse responses from temporary loss of supporting vegetative structure via mowing, grazing and/or burning, and ensure long term conservation benefits to the monarch accrue. The installation of these practices is expected to address limiting factors to monarch persistence across of the landscape (both collectively and cumulatively) and is anticipated to produce long-term landscape benefits which exceed any temporary adverse effects to the species.

4.2.2 Potential for Increasing Invasive Species (AE2)

Many of NRCS' selected conservation practice standards and enhancements for the Proposed Action involve mechanized equipment and the placement of infrastructure (pumping plants, fence, pond, etc.) that will cause temporary and permanent soil disturbances. Within the action area, such disturbances have the potential to increase the presence and extent of invasive plant species, such as *Sericea lespedeza*, eastern red cedar (*Juniperus virginiana*), salt cedar (*Tamarix* spp), annual brome grasses (*Bromus* spp) and cheatgrass (*Bromus tectorum*), among others. For rangelands in the Southern Great Plains; as these invasive species increase, native plant species diversity is decreasing (NRCS 2014), Mack et al. 2007, Davies 2011, Fink and Wilson 2011).

Within many of the covered conservation practice standards and enhancements, NRCS already has explicit requirements for evaluating, assessing, and monitoring for the potential to increase invasive species after practice implementation. The applied conservation measures will ensure coordination with the local conservation partners to determine overall practice applicability, location, extent, configuration, and timing. The application of this local knowledge is cumulatively expected to further minimize or eliminate the conditions upon which significant invasive species infestations can occur/persist. Further, using the applicable monarch WHEG, the installation of these practices and enhancements are expected to address limiting factors to monarch persistence across of the landscape (both collectively and cumulatively) that are anticipated to produce benefits which exceed any temporary adverse effects to the species.

Coupled with the relatively small area of disturbances created by the Proposed Action collectively across the landscape, the USFWS believes that the risk of additional significant invasive species problems being created will be adequately managed and will not produce adverse effects in the form of population dynamics or habitat availability.

4.2.3 Permanent removal of desired vegetation (AE3)

This adverse effect is a result of permanent removal of habitat conditions and specific vegetative loss caused by the installation of the conservation practice/enhancement or the expectation that, once implemented, permanent degradation of habitat conditions for the monarch butterfly will have resulted. Certain supporting structural practices and enhancements (pumping plant, pond, watering facility, water well, pipeline, fence, etc.), which are implemented as components of the core practices have the potential to result in the permanent removal/loss of monarch butterfly habitat.

The primary adverse effect is the permanent loss of feeding and nesting habitat which can lead to a decline in local population fitness, and if the areal extent is large, adverse consequences to the resident (summer) and/or the migratory populations. However, the USFWS does not anticipate these adverse effects will be manifested at any such scale. Permanent loss of significant areas of existing monarch habitat is extremely unlikely for the following reasons (1) limited construction footprints; (2) existing restoration requirements will remediate any local habitat losses; and (3) short term duration of the practice installation makes the feasibility of a large scale disturbance over a long enough period of time during the most critical period of monarch migration/use an extremely unlikely occurrence.

Most of the selected structural practices and enhancements will produce localized losses which can be minimized using the identified recommended conservation measure(s) and existing standards and criteria for those affected conservation practice(s)/enhancement(s). The applied conservation measures will ensure coordination with the local conservation partners to determine overall practice applicability, location, extent, configuration, and timing. The application of this local knowledge is cumulatively expected to further minimize or eliminate significant areas of permanent removal of preferred vegetation. Further, using the applicable monarch WHEG, the installation of these practices/enhancements are expected to address limiting factors to monarch persistence across of the landscape (both collectively and cumulatively) that are anticipated to produce benefits which exceed any temporary adverse effects to the species.

4.2.4 Exposure to pesticides and herbicides (AE4)

It is important to note that the actions evaluated for this Conference Report and the associated USFWS regulatory conclusions do not envision the application of commercially available insecticides or herbicides used to support intensively managed croplands. The focus of the Proposed Action is the use of pesticides and/or herbicides specifically selected to support achieving restoration and enhancement objectives for the monarch using an Integrated Pest Management (IPM) approach.

Conservation Practice Standard (595) IPM is a site-specific combination of pest prevention, pest avoidance, pest monitoring, and pest suppression strategies. Management strategies employed under the IPM standard are intended to prevent or mitigate pest management risks for identified natural resource concerns such as the monarch butterfly. In creating an IPM plan (this is a "sub-plan" within the Landowners' Conservation Plan) within the monarch focus areas, NRCS will integrate landowner objectives, local resource inventories, ecological site description information, and habitat needs of the monarch butterfly to plan and design the practice. Further, this conservation practice standard/enhancement uses a combination of management techniques and other conservation practices to prevent or mitigate pesticide drift and/or direct contact with all monarch life-stages and monarch habitats. Planners have tools available to develop IPM plans such as Agronomy Technical Note 5, Pest Management in the Conservation Planning Process[12], which provides IPM techniques and conservation practices for reducing pesticide environmental risk through prevention or mitigation. IPM techniques may include timing of application, spot application, biological or mechanical controls and other. In addition, planners have Agronomy Technical Note No. 9 Preventing or Mitigating Potential Negative Impacts of Pesticides on Pollinators Using Integrated Pest Management and Other Conservation Practices[13]. These tools, which depend upon the proper application of the techniques and structural conservation practice standards/enhancements, will be critical to provide benefits for monarch butterflies within an IPM plan.

The applied conservation measures will ensure coordination with the local conservation partners to determine overall practice applicability, location, extent, configuration, and timing. The application of this local knowledge is cumulatively expected to further minimize or eliminate risks to monarchs from applying these compounds. Coupled with the relatively small area where chemical treatments are necessary by the Proposed Action collectively across the landscape, the USFWS believes that the exposures of monarchs to these compounds will be adequately managed and will not produce adverse effects in the form of population dynamics or habitat availability. Lastly, using the applicable monarch

[12] https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1043138.pdf
[13] http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=34828.wba

WHEG, the applications will be designed to address limiting factors to monarch persistence across of the landscape (both collectively and cumulatively), therefore producing long-term benefits which exceed any temporary adverse effects to the species.

4.3 Beneficial Effects

The central feature of the Proposed Action is working with eligible landowners to combat the decline of monarch butterflies by planting milkweed and other nectar-rich plants as well as designing land management and grazing systems which are compatible with the needs of the species. One expected significant benefit of this work will be that on these eligible lands milkweed and nectar-rich plants will be planted along field borders, in buffers along waterways or around wetlands, in marginal agricultural lands currently with grass, and in pastures and other suitable locations. Further, more grazed lands will incorporate features conserving and optimizing habitat for pollinators and the monarch specifically. Additionally, other land management actions will result in habitat disturbance regimes (mowing, burning, grazing, plantings) that are explicitly designed to be compatible and timed to support monarch migration and nesting success. Cumulatively, the actions should provide additional food and host plant resources to monarch butterflies during migration and reproduction and result in more acreage with the Action Area under a management strategy compatible with the monarch's life history needs.

Restoration and planting actions are expected to increase oviposition of monarchs. Cutting and Tallamy (2015) found that areas planted and designed specifically to cultivate milkweed and nectar producing species of flowers enhanced monarch ovipositing as compared to unmanaged sites (monarchs oviposited at 2.0 and 6.2 times more eggs per plant per observation in the two year study). Modeling suggests that isolated patches of milkweed distributed at low density across the landscape could profoundly increase the number of eggs that a monarch lays during its lifetime (Zalucki and Lammers 2010). While characterized as "gardens," the application proposed by NRCS is similar (e.g., milkweed plantings, cultivation, and management) and has full relevance and benefit comparable with NRCS' planned habitat restoration actions under the Proposed Action. The USFWS expects that this benefit will accrue to the monarch, potentially enhancing its long term reproductive fitness.

Within intensively managed agricultural landscapes, managed and created habitat will have value to the monarch and other pollinators (Cole and Stockan 2015; Farhat et al (2014). Planting more milkweeds will support more monarchs and create the circumstances which enhance immature monarch survival (Nail et al 2015). A more uniform distribution of milkweed habitat units would appear to be more suitable than a few large clusters far apart (Zalucki et al 2015).

NRCS' actions under the Proposed Action will enhance semi-natural prairie habitat (and to enhance other existing grassland systems) which is also anticipated to promote increased biodiversity of invertebrate populations, including pollinators other than monarch. Farhat et al (2014) found that butterfly biodiversity increased with restoration actions that increased planting diversity – both habitat generalists, as well as species considered to be on conservation concern. Further, the authors concluded that while marginal grasslands associated with agriculture are not equivalent to lands managed specifically for conservation, these areas may still remain valuable to butterfly conservation – including their intrinsic value as well as corridors and stepping stones (Farhat et al 2014; Panzer 2010; Dover and Settele 2009). Researchers found that planting native forbs and other perennials covering as few as 10 percent area in an intensively managed agricultural landscape in Iowa enhanced butterfly and other pollinators diversity and richness and provided significant water quality benefits (reduced sediment

export by 95 percent, total phosphorus export by 90 percent and total nitrogen export by nearly 85 percent when compared to losses from the 100 percent row-crop (no-till) watersheds (Iowa State University 2014)).

Additionally, the USFWS anticipates long-term biodiversity and monarch benefits as these restoration sites are sustained on the landscape[14]. Summerfield et al (2007) evaluated moths at tallgrass prairie restoration sites and remnants in central Iowa in 2004–2005. Their analysis revealed that older restorations and prairie remnants supported higher species richness compared to recently planted sites, and those restoration sites older than 7 years were clearly converging on the species composition of remnants. These results suggest that moth communities in restorations and prairie remnants are highly variable in time but that as restorations age, they appear to re-accumulate moth species found in prairie remnants. The long-term persistence of a particular species assemblage within a given site, however, might be a difficult endpoint to attain in central Iowa prairies because of significant annual variation in species occurrence.

Landscape context and configuration (e.g., linear or block) may play a role in obtaining a conservation response for other pollinators (such as bees). Davis et al (2008) examined differences in the butterfly, bee, and forb community composition in linear and block prairie remnants, determined correlations between species diversity among butterflies, bees and forbs in the 20 prairie remnants sampled, and examined correlations of community similarity among butterflies, bees and forbs. They concluded that distinct communities exist for butterflies and forbs in block versus linear sites and that the bee and forb communities in block and linear sites can be distinguished on the basis of a few species. Diversity of one group was a poor predictor of diversity in another, except for a significant inverse relationship between bees and butterflies, indicating these two pollinator taxa may be responding very differently to microhabitat components within fragmented ecosystems (Davis et al 2008).

Because of the opportunistic nature of NRCS' effort (in that the Proposed Action in part relies upon the voluntary cooperation and participation of eligible landowners), we expect that the advantages and benefits provided to both the monarch and other pollinators will accrue at similar rates (e.g., the ability of NRCS' programs to restore and/or enhance both linear and block patches into plant communities with management systems compatible for monarchs (and other insects, including bees)) will be functionally equal. More research/management science is needed to determine the optimal configuration of landscape fragments and their connectedness to sustain monarchs during migration and which optimize breeding and immature stage survival rates. As progress moves forward over the 30-year life of the Proposed Action, the USFWS anticipates both site and landscape level benefits to all pollinators will be realized – especially as the adaptive management elements of the partnership are applied and as the science support element provides additional information into the future.

In addition to the importance of landscape context and configuration, land use legacies must also be considered in designing management actions for butterflies and other pollinators. Debinski et al (2011) describe the results of an experimental grassland management project that compared abundance, species richness, and diversity responses of ants (Order Hymenoptera, Family Formicidae), butterflies (Order Lepidoptera), and leaf beetles (Order Coleoptera, Family Chrysomelidae) to three grassland treatments: burn only, graze-and-burn, and patch-burn graze. Importantly, they ascertained that prior land use

[14] It is expected that the incentives created by the ESA Predictability feature will encourage participating landowners to continue implementing the Conservation Plan after NRCS' financial assistance dollars have been expended.

(plowing, heavy grazing by cattle, and burning) leaves legacies that affect abundance, richness, and diversity of each of the evaluated insects. Specifically, tracts that were plowed and later reconstructed, and tracts with a history of heavy grazing have lower richness and diversity than grassland remnants and those that lacked a history of heavy grazing. Tracts with longer pre-treatment since fire (denoted as the number of years since fire had been applied to each tract – ranging from 0 to 15 years) have higher diversity and abundance of all three insect taxa.

To assist in controlling the effects of fire ants, NRCS will attempt to target habitat development efforts in southern Oklahoma and Texas in areas with lower fire ant densities. Additionally, NRCS will consider the development of a fire ant control pilot study on WRP easements, similar to the efforts by the USFWS on the Attwater Prairie Chicken National Wildlife Refuge (Morrow et al. 2015).

Lastly, as summarized in Part 3.2.2 above, the scientific community continues to debate the relative value of focusing on either (1) restoration of milkweeds in the summer breeding range or (2) enhancing monarch survival during their fall mitigation by creating and enhancing nectar resources. It is therefore important to note that NRCS' proposed action will emphasize restoration and other beneficial management actions in both the summer and migratory seasons of the species. Oberhauser et al (2016) generated a spatially explicit demographic model simulating the multi-generational annual cycle of the eastern monarch population, and used the model to examine restoration scenarios which might slow or eliminate the monarch's population decline. The authors concluded that simultaneous restoration efforts across all regions, with a focus in the Southern and North Central breeding ranges and while also addressing other threats to monarchs, is the most effective strategy to increase the monarch population growth rate. The Proposed Action is a landscape restoration and management program and the USFWS expects significant benefits to accrue to the species in both the short and long term.

4.4 Summary of Effects

The scope of each type of activity that could be authorized under the Proposed Action is narrowly prescribed, and is further limited by conservation measures and inherent NRCS design standards tailored to avoid direct and indirect adverse effects of those actions. Administrative controls (e.g., use of the umbrella practices, NRCS planning policies, contracting requirements, and the application of local expert knowledge) are in place to ensure that requirements related to the scope of actions allowed and the mandatory conservation measures operate to limit direct and indirect lethal effects.

USFWS expects that the majority of incidental take will be in the form of death of the immature stages or temporary harassment of adult monarchs during conservation practice/enhancement installation and operation. Adverse impacts (including those that conform to incidental take) are likely to be small in magnitude, limited in geographic area, and temporary (meaning not continuous, recurring, or chronic). The Proposed Action will produce long term beneficial effects that will outweigh the identified short term adverse effects.

While it is important to establish suitable controls, the restoration and management of monarchs within prairie remnants, within agricultural landscapes, and within compatible grazing systems is an emerging area of conservation science. Adaptive management at the site and landscape scales must be built into the Proposed Action over its 30-year life span (Part 7 below). The conservation measure that acknowledges and affirms the use of site-specific solutions and local expert knowledge recognizes and builds upon this premise. Further, this conservation measure will optimize the flexibility of site-specific restoration, planting, and enhancement strategies facilitated by the selected conservation practice

standards/enhancements in the appropriate mix for that site and for that participant's conservation plan. The treatment methods selected will consider the factors identified in the applicable WHEG and the ecological site characteristics, and other decision support tools identified herein.

Research has demonstrated that different milkweed species response differently to habitat manipulation; and the same milkweed species may respond differently to the same treatment in different parts of the range (summarized in Brower and Fink 2015). The response of the forb/nectar resource component can be just as variable. The USFWS supports the application of a site specific approach to maximize the conservation success for the Proposed Action. This is the key feature of the partnership, as illustrated by the conservation measures, and it is greatest strength in addressing the complex life history and conservation challenges for the monarch to persist on the North American landscape.

Nectar resources are essential during the fall migration to build reserves to support monarchs while overwintering in Mexico (Brower et al 2015). Improved and enhanced nectar resources and the increased availability of the appropriate species of milkweed are expected to support both spring and fall migrations and immature stage survival. Further, improving milkweed availability in the agricultural landscapes of the Midwest sub-region will accentuate and supplement existing host plant resources as well as mitigate the effects of continuing loss of milkweed in other areas of this sub-region.

While the monarch's response to the envisioned restoration and management actions described above is expected to be positive to its life history needs, the rate and intensity of that positive response will be governed by site specific characteristics (such as its prior land use management), climate and rainfall patterns, and orientation/landscape position of the site. These factors affecting restoration actions are complicated by conservation challenges acting at the species/landscape scale – such as severe weather, conditions at the overwintering sites and flood/drought conditions. This uneven characterization of the benefits is expected due to the sheer geographic area/varying habitat and land use conditions across the action area. Despite many circumstances being beyond the partnership's control, we nevertheless expect habitat availability and quality to increase within the Action Area for the species.

Because monarch butterflies are always moving, they need to have the right plants at the right time along their migration route. Caterpillars need to feed on milkweed to complete their life cycle, and adult butterflies need the right nectar producing plants in bloom for needed energy. Restoration actions using brush management, prescribed burning, prescribed grazing systems, and the selection of active planting strategies – amongst the other covered conservation practice standards/enhancements, when implemented using the approaches and methods described herein are anticipated to support these critical aspects of the monarch's life history needs in the Action Area and result in long term benefits to the species over its expected 30-year duration

5.0 CUMULATIVE EFFECTS

Cumulatively, the USFWS finds that effective implementation of conservation practice standards and enhancements and associated conservation measures are anticipated to result in a positive population response by the species. This positive response is expected as threats are reduced; notably in addressing milkweed/nectar species availability across the landscape. This will be measured through the installation of conservation practice standards/enhancements and resource threats addressed or removed. At this point in the implementation of the Proposed Action and our analysis, these benefits, however, cannot be articulated in quantified metrics such as absolute increases in numbers of monarchs or incremental

improvements in population growth trajectory. The science support component will provide information over time to better refine both the benefits and consequences of the methods, approaches and tools used to achieve the stated conservation objectives.

6.0 EFFECTS DETERINATION

After reviewing the current status of the monarch butterfly, the effects of the Proposed Action, and the expected cumulative effects, the USFWS determines that the Proposed Action is not likely to jeopardize the continued existence of the species. We base our conclusion on the following:

- The long term cumulative outcome of the Proposed Action is to create, enhance, or restore habitats supporting the monarch's life history requirements. These long term benefits more than compensate for the identified short-term temporary adverse effects.
- The Proposed Action will expand habitat for the species on eligible lands within the Action Area and will support successful migrations and enhance reproductive success.
- Incorporation of the stated conservation measures into individual Conservation Plans minimizes adverse effects as explained above and is expected to produce long term beneficial effects on the species' habitat requirements and life history needs.

7.0 ADMINSTRATIVE MANAGEMENT

To ensure continuity and consistency throughout the 30-year term of the document, NRCS and USFWS have jointly agreed to the following administrative procedures.

NRCS conservation practice standards and enhancements undergo periodic review, usually on a 5-year cycle. Additionally, at irregular intervals (on an as needed basis), changes are made to the standard/enhancement, specification, or the practice name as new technologies and methods are developed. Should changes be made to any conservation practice/enhancement, NRCS will provide information regarding the changes and justify why the practice/enhancement still meets the requirements and conservation measures as provided in this Conference Report.

7.1 Annual Meeting

The above process for modifications can be included in the annual review conducted between the USFWS and NRCS and other invited partners and experts. During the annual review meeting, information such as a summary of the previous years' changes, new science, new research and pertinent partnership information will be discussed and incorporated where agreed.

On an annual basis, the NRCS will provide a summary of accomplishments of the Proposed Action, including but not limited to:

a. Acreage and frequency of each core conservation practice standard/enhancement at the state level;
b. Compiled results from the WHEGs which demonstrate long term beneficial effects, as this information becomes available;
c. A summary of changes, if any, in the covered conservation practice standards/enhancements (e.g. changes in covered activities, plans and/or specifications, quality criteria, payment schedules, Job Sheets, etc.); and,
d. Information as it becomes available on the efficacy of the conservation measures and expected benefits.

7.2 Yearly Report

The NRCS will provide an annual assessment of the accomplishments no later than July 1 of each year. The first report shall be July 1, 2018.

7.3 NRCS changes in Conservation Practice(s) and Enhancement(s), Payment schedules and/or Job Sheets

The NRCS will notify the USFWS of conservation practices and enhancements that receive major updates to the practice standard, changes in covered actions as a result from payment schedule modifications, or changes in criteria and considerations in the affected job sheet(s).

7.4 Partnership Commitment to Developing an Adaptive Management Framework

Both NRCS and USFWS recognize the value of an adaptive management approach to the Proposed Action and agree to develop a formalized plan of Adaptive Management Framework (Framework). This Framework will ensure investments in science and management actions will achieve desired outcomes, preserve the integrity of the ESA predictability into the future, and will entail working collaboratively within the limits of regulatory requirements and constraints while still maintaining the authorities of individual agencies. During the next year, NRCS and USFWS will develop the Framework including; (1) identified areas of uncertainty, (2) suggested research actions to help address uncertainties, and an (3) initial set of objectives by which management actions, the effectiveness of the conservation measures, and other design elements of the Monarch Habitat Development Project can be assessed. In addition, a four-phased conceptual framework for implementing adaptive management will be pursued. These phases include planning, assessing, integrating and adapting. Working through the collaborative process outlined in this Framework, NRCS and USFWS commit to reach consensus on operational decisions to the maximum extent possible, while still retaining individual agency discretion to make decisions (as appropriate). To that end, NRCS and USFWS seek to use the flexibility provided by an adaptive management approach in a way that balances gaining knowledge to improve future management decisions with taking actions in the face of uncertainty and achieving the best near-term outcomes possible.

7.5 Steering Committee

To oversee the administration of the Conference Report and the Proposed Action over its expected 30-year life, NRCS and USFWS agree to create a Steering Committee. The Steering Committee will include representatives from the national headquarters of both agencies, as well as regional and local units, and other invited parties. A primary goal of the Steering Committee is to ensure consistency in application of the components of the Proposed Action across the 10-state Action Area. Further, the Steering Committee will govern the Monarch Partnership embodied within this Conference Report in accordance with the NRCS and USFWS Partnership Agreement A-3A75-16-937 and the USFWS Director's Order 217.

8.0 CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency actions. The USFWS offers the following conservation recommendations:

USFWS offices have the appropriate level of awareness and understanding of the conservation measures, the use of the monitoring elements as proposed, and other operational components identified in the Conference Report and Proposed Action.

2. As the science support and monitoring elements of the Proposed Action begin to produce information and data, NRCS will share this information with a wide range and diverse collection of conservation partners to further enhance the expected conservation outcomes.
3. Continue to work with USFWS and other invited experts to fine tune the ranking criteria and prioritization of eligible landowners to optimize the conservation benefits of the Proposed Action as new information becomes available and as the adaptive management information is collected and assessed.
4. Work with USFWS and other invited experts to improve the Windows Pesticide Screen Tool (WIN-PST), related decision support tools, and guidance documents such as Agronomy Notes 5 and 9 as new scientific information becomes available on the monarch's needs.
5. Develop appropriate scale landscape level evaluation and assessment tools which guide conservation planning and financial assistance to maximize the benefits of the Proposed Action.
6. Support additional research and management science evaluations to further reduce losses of applied herbicides and pesticides, including the use of improved application technology such as simultaneous spraying of polyelectrolyte solutions with these compounds to reduce runoff, reduce drift, and optimize efficiency.

9.0 REINITIATION-CLOSING STATEMENT

This concludes the Conference Report for the potential effects of the Proposed Action. If the monarch butterfly is proposed to be listed under the ESA, the agencies will consider development of a conference opinion. The NRCS may request that we work together to prepare a Biological Opinion if the monarch is listed. The request must be in writing. During review of the proposed action if the USFWS finds that there have been no significant changes in the expected benefits or adverse effects analyzed herein, or the information used during the conference, the USFWS will modify the Conference Opinion to produce a biological opinion and no further section 7 consultations will be necessary.

Thomas O. Melius — Dec. 28, 2016

Regional Director — Date
Great Lakes Region
U.S. Fish and Wildlife Service

10.0 LIST OF TABLES AND APPENDICES

Tables

Table 1 – Covered Conservation Practice Standards

Table 2 – Potential Adverse Effects and Conservation Measures

Appendices

Appendix I – NRCS Planning Framework

Appendix II – WHEGs

Appendix III - Detailed Explanation of Each Conservation Practice Standard, CSP Enhancement, and CRP Standard with Potential Adverse Effects and Associated Conservation Measures

Appendix IV – ESA Predictability

11.0 Appendix I. NRCS Conservation Planning Process and the Conservation Plan

Introduction

NRCS is USDA's technical agency for providing assistance to private land managers, conservation districts, Tribes, and other organizations in planning and carrying out conservation activities and programs. The NRCS works with private landowners through conservation planning and assistance designed to benefit the soil, water, air, plants, and animals that result in productive lands and healthy ecosystems. The NRCS's conservation programs help people reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. Public benefits include enhanced natural resources that help sustain agricultural productivity and environmental quality while supporting continued economic development, recreation, and scenic beauty.

The NRCS is neither a regulatory nor a land management agency, and its role in farm and range management issues is largely advisory at the invitation of individual clients. Technical advice and planning alone do not constitute a federal nexus, as the NRCS has no control over the conservation plan and the client is the decision maker for the conservation plan. However, beginning with the 2002 Farm Bill clients can now obtain financial assistance directly from NRCS to implement their conservation plan, establishing a federal nexus for the agency. Most financial assistance programs consist of a term contract between a client and the NRCS where the client agrees to install and maintain a suite of conservation practices to improve natural resource management, and receive a reimbursement of a portion of the cost as an incentive for completing each practice to NRCS standards and specifications. When the term of the contract expires, the federal nexus for NRCS also expires, as this is the end of the action authorized, funded, or carried out by NRCS. However, the contract recipient agrees to maintain the conservation practices for their expected lifespan.

NRCS Planning Overview and Summary

NRCS, in accordance with agency regulation and policy, implements a 9-step conservation planning process, as outlined in the NRCS National Planning Procedures Handbook[15]. NRCS conservationists prepare conservation plans in consultation with private participants in order to address Resource Concerns[16] primarily on private, non-Federal, and tribal lands. NRCS conservationists help individuals and communities take a comprehensive approach to planning the proper use and protection of natural resources on these lands. The expected physical effects of conservation systems and practices are assessed in the context of ecological, economic, and social considerations as documented locally in the Field Office Technical Guide[17] (FOTG). The expected impacts of those effects are then used to help develop and evaluate management alternatives.

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[15] See: http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=37225.wba.

[16] A Resource Concern is an expected degradation of the soil, water, air, plant, or animal resource base to an extent that the sustainability or intended use of the resource is impaired. Because NRCS quantifies or describes resource concerns as part of a comprehensive conservation planning process that includes client objectives, human and energy resources are considered components of the resource base. The NRCS conducts an inventory of the planning area to determine the current condition of the Resource Concerns as the basis for developing the conservation plan.

[17] See: http: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg/

NRCS also integrates its compliance with other environmental laws within this planning framework, including the ESA.

The NRCS planner strives to help the client balance natural resource issues with economic and social needs through the development of a Resource Management System (RMS)**.** An RMS is a combination of Conservation Practices that treat all Resource Concerns to a condition that meets or exceeds Quality Criteria for sustainable land use. Quality Criteria establishes the desired condition for a Resource Concern. An evaluation method (indicator) is chosen to evaluate each Resource Concern, and a target value (Quality Criteria) is established based on the evaluation method. Quality criteria for RMS's (see National Planning Procedures Handbook (NPPH), Subpart D, Section 600.43) are located in the Field Office Technical Guide (FOTG), Section III- **http://efotg.nrcs.usda.gov/treemenuFS.aspx**.

A Resource Problem is identified when a Resource Concern does not meet Quality Criteria**.** The client determines which resource problems they are ready, willing and able to treat using Conservation Practices to reach Quality Criteria.

A Conservation System is the implementation of a variety of conservation practices that together address multiple resource concerns. A Conservation Practice is a discrete set of technology used to address a resource problem. A conservation practice may be a structural or vegetative measure, or a management activity used to protect or reduce the degradation of soil, water, air, plant or animal resources. Some practices are stand-alone in that they can be implemented to meet a desired condition and not be associated with other practices, such as Prescribed Grazing (NRCS code 328). If the client has the ability to manage livestock in a matter to meet quality criteria, they can simply implement Prescribed Grazing through managing duration and numbers of livestock grazing on a given area. Other practices, such as Fence (NRCS code 382) are supporting practices, in that they cannot stand alone to treat resource problems; rather they are installed to facilitate other conservation practices. A fence by itself does not do anything for conservation; when installed to facilitate Prescribe Grazing, it facilitates the manager's ability to manipulate livestock to achieve the goals of Prescribed Grazing.

The NRCS planner works with the client to develop and evaluate alternatives that would allow the user to manage the land to meet or exceed quality criteria for each resource concern. The client chooses the alternative consisting of a suite of Conservation Practices best suited to their needs and ability to implement. The suite of practices chosen becomes their Conservation Plan, a record of the client's decisions for the treatment of resource problems. Therefore, it is the client's plan and not the NRCS' plan. The Conservation Plan identifies the conservation practices and a planned schedule for installing or applying the practices.

The NRCS works with land users to plan and implement Resource Management Systems that will maintain or improve the condition and health of the soil, water, air, plant and animal resources for long term sustainability of a quality environment. The NRCS helps the land user understand the potential of the land, determine the current health and condition, and identify existing and potential resource problems.

The Conservation Plan (or Plan) produced by NRCS is a written record of landowners' selected management decisions and the conservation practices and systems he/she plans to use, develop, and

maintain the farm, field, ranch or forest. The Conservation Plan also becomes the vehicle upon which Financial Assistance (contracts) with NRCS can be obtained to implement the Plan using Conservation Practices.

All NRCS conservation programs are voluntary and offer technical assistance and may offer financial incentives for implementing conservation systems.

Additional Proposed Action Conservation Planning Requirements

In addition to the process outlined above, the Proposed Action has additional requirements for planning and execution, as described below.

Planners Requirements

Proposed Action planners are resource professionals who work with interested participants to develop and implement conservation plans designed to explicitly benefit the monarch butterfly. These affected planners are trained to understand the species' needs and the principles to address any limiting factors or threats by working under ESA section 7 consultations. Planners may be NRCS, Service, Partner Biologists or other partner organization field staff (e.g., State wildlife agency, conservation nonprofits, and consultants).

Supplemental Conservation Planning Process Requirements

In addition to NRCS' comprehensive approach to planning using a nine-step planning process described in the National Planning Procedures Handbook, Conservation Plans eligible for coverage under the Conference Report must use habitat evaluation tools (including the Wildlife Habitat Evaluation Guide, applicable Ecological Site Description(s) (ESD), and/or Threats Checklist) concurred upon by the USFWS. These tools will be used to assess the initial habitat conditions, limiting habitat factors, and the restoration potential for a site. Based on the results of these evaluation tools, the planner works with the participant to develop and evaluate alternatives to address the identified limiting habitat factors (in order of identified priority) on sites determined to have restoration potential. The resulting conservation plan will include at least one core conservation practice and all conservation practices must follow the conservation measures of this document.

Overview of Plan Requirements for eligibility within the Conference Report

- Developed by a NRCS Planner (Level 1 or 2) and signed by a Level 2 Project Planner.
- The habitat evaluation tools (WHEG, ESD, and Threats Checklist) must be completed and incorporated into the planning process for every conservation plan.
- Each conservation plan must include at least one umbrella practice and at least one supporting practice from Table 1. Corresponding CSP Enhancements will also be identified.
- Each conservation plan must remove or reduce at least monarch butterfly limiting factors(s) in their order of significance, as indicated by the results of the above mentioned habitat evaluation tools.
- Every practice & enhancement planned, designed, and installed in accordance with the Conservation plan or contract must adhere to the conservation measures and conditions identified herein and are included on the affected job sheet(s).
- The conservation plan and associated job sheets will clearly detail what is required to "maintain" the covered conservation practices and enhancements at a suitable habitat level. Suitable habitat is defined

using the WHEG/ESD/Threats Checklist. It is generally considered the minimum habitat requirements for the species (a WHEG score ≥0.5).

Overview of NRCS Conservation Practices, Standards and Specifications

As mentioned earlier, NRCS provides technical and financial assistance through the Farm Bill to implement conservation plans based on NRCS conservation practice standards and specifications. These conservation practices are developed through a multi-disciplinary science-based process to maximize the success and minimize the risk of failure of the conservation practice. NRCS conservation practice standards are established at the national level and identify the minimum level of planning, designing, installation, operation, and maintenance required. Each conservation practice standard includes a definition and purpose, identifies conditions in which the conservation practice applies, and includes criteria to support each purpose.

Knowing the Resource Concerns that are addressed enables NRCS to predict and recommend which conservation practices are likely to be used and the types of effects (beneficial, benign, or negative) that are likely to occur. NRCS has developed network effects diagrams to illustrate the chain of expected direct, indirect, and cumulative effects of applying each conservation practice according to the standard for the land use on which it is intended to be applied and the other practices that are used in association/conjunction with that practice. Copies of the Network Effects Diagrams are available on the NRCS Web site[18].

Standards in the NRCS' National Handbook of Conservation Practices[19] (NRCS 2012) are used and implemented by States, as needed, and may be modified to include additional requirements to meet State or local needs because of wide variations in soils, climate, and topography. Conservation practice standards are routinely reviewed and approved by State Technical Committees to ensure that appropriate criteria are included to cover State-specific interests. State laws and local ordinances or regulations may also dictate more stringent criteria; however, in no case are the requirements of the national conservation practice standard to be reduced.

NRCS conservation practices incorporated into conservation plans and implemented by NRCS clients create the circumstances by which potential adverse and/or beneficial effects to the species listed under the ESA can be assessed. Therefore, the evaluation and conditioning of the conservation practice(s) as they address the identified resource concern(s) is (are) essential to provide ESA regulatory determinations on effects to the monarch butterfly.

[18]Practice Network Effects Diagrams can be found at: http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849

[19]The NHCP is available at: http://directives.sc.egov.usda.gov/viewerFS.aspx?hid=22299

12.0 Appendix II - WHEGS

Wildlife Habitat Evaluation Guide Datasheet for the Monarch Butterfly
Midwest Version 1.1

Background: This Wildlife Habitat Evaluation Guide (WHEG) is based on the habitat requirements of the monarch butterfly (*Danaus plexippus*) in the Midwest region. For more detailed information refer to the instructions entitled, "USDA NRCS MONARCH BUTTERFLY WILDLIFE HABITAT EVALUATION GUIDE AND DECISION SUPPORT TOOL: MIDWEST EDITION."

General Instructions: Each assessment area will be evaluated on a separate datasheet. If a factor is not applicable, do not score that factor. While every factor may not fit every situation, the WHEG should be completed by placing the corresponding score in the "Benchmark" column which most closely represents that factor. Planners should carefully assess each factor prior to assigning a score to a particular situation. This score represents the habitat in its current, untreated state. ***Interpolate*** between values if necessary. All scores are for current year (previous 12 months) unless otherwise stated. The "Planned" column is the expected score when the conservation plan or practice is mature, which will vary in time. If a factor is scored as N/A do not count that factor in the final total. In order to achieve the RMS planning criteria ≥0.50, the "Planned" rating must be good or greater.

Owner/Operator:		Field Office:	
Identification # (farm, tract, field #, etc as required):			
NRCS Planner and/or Consulting Biologist (NRCS or Partner):		Date:	
☐ Check this box if the prescribed belt transect and plots were not used to complete vegetation sampling, and briefly explain reason and method used in the notes section below.			
Assessment Area:	Acres:	Ecological Site Description (if available):	
ROP Label	ROP Location (Latitude)	ROP Location (Longitude)	Compass Bearing:
ROP Label	ROP Location (Latitude)	ROP Location (Longitude)	Compass Bearing:
ROP Label	ROP Location (Latitude)	ROP Location (Longitude)	Compass Bearing:
Notes:			

STEP 2: RAPID SCREENING OF LOW-VALUE PLANT COMMUNITIES
Apply this step to assess sites with obvious, low monarch habitat value. If habitat does not meet one of these plant communities, go to Step 3.

Select Appropriate Monarch Plant Community Type for AA	Benchmark Rating	Selected Alternatives[1] (STEP 4) (Unless selected, label AA as *OUT* on the project map)	Planned Rating	Applied Rating
☐ **Crop**	**Poor**	☐ Decision maker will convert all or a substantial portion of AA to productive monarch breeding habitat using (327), (386) **or** (390). *In addition*, the decision maker will implement a 125-foot wide pesticide-free buffer[1] to benefit the species.	**Meets PC if Good or Excellent**	
☐ **Monotypic Grasses**	**Poor**	☐ Decision maker will convert all or a substantial portion of AA to productive monarch breeding habitat using (327), (386) **or** (390); **and** implement (315), (338) **or** (647), as appropriate. *In addition*, the decision maker will implement a 125-foot wide pesticide-free buffer[1] to benefit the species.		
☐ **Brush**	**Poor**	☐ Decision maker will control brush species by implementing Conservation Practice Standard (314) **and** convert all or a substantial portion of AA to productive monarch breeding habitat using (327), (386) **or** (390). *In addition*, the decision maker will implement a 125-foot wide pesticide-free buffer[1] to benefit the species.		

[1] Decision makers are greatly encouraged to implement Integrated Pest Management (595) or selected elements thereof to prevent or mitigate on- and off-site pesticide risk (i.e., lethal or sub-lethal exposure) to all monarch life stages. Specifically, to reduce or eliminate direct contact, or indirect exposure from ingestion of treated milkweed or nectar plants. In lieu of implementing the 595 standard, the decision maker may opt to implement a *125-foot wide pesticide-free buffer* around the entire AA or area encompassing all implemented practices. *Note: These restrictions do not apply to activities intended to establish or maintain the AA as productive monarch breeding habitat.*

STEP 3: DETERMINE BENCHMARK CONDITIONS FOR OTHER PLANT COMMUNITIES.
Apply this step only to monarch plant community type, *OTHER PRIMARILY HERBACEOUS COMMUNITIES*.

V^{IR}: Insecticide Risk condition[2]	Benchmark Score	Selected Alternatives[1] (STEP 4) (Unless selected, label AA as *OUT* on the project map)	Planned Score	Applied Score
AA is treated with insecticides (**0.00**)		☐ Decision maker will implement a 125-foot wide pesticide-free buffer[1] to benefit the species.		
A portion of the AA is located within 125 feet of areas treated with insecticides (**0.30**)				
Neither of the above (**1.00**)		☐ Decision maker will continue with current management practices.		
V^{WMR}: Weed Management Risk Condition	**Benchmark Score**	**Selected Alternatives[1] (STEP 4) (Unless selected, label AA as *OUT* on the project map)**	**Planned Score**	**Applied Score**
AA is treated with herbicides (**0.10**)		☐ Decision maker will implement a 125-foot wide pesticide-free buffer[1]		
A portion of the AA is located within 125 feet of areas treated with herbicides (**0.30**)				
Neither of the above; however, AA is mowed inconsistent with the Monarch Habitat Management Guidelines (**0.30**)				
None of the above (**1.00**)		☐ Decision maker will continue with current management practices.		

- BENCHMARK, PLANNED OR APPLIED SCORING: *Do not consider Individual Plant Treatments (IPT) for plants deemed undesirable (e.g., spot treatment of brush, noxious weeds, invasive species and other undesirable plant species).*
- PLANNED OR APPLIED SCORING: *Do not consider treatments, such as NCP 314 – Brush Management or 315 - Herbaceous Weed Control, when required for establishment or enhancement of productive monarch breeding habitat.*

[2] V is used for the term "variable". These are variables used to calculate the final score for the assessment area.

STEP 3: DETERMINE BENCHMARK CONDITIONS FOR OTHER PLANT COMMUNITIES.
Apply this step only to monarch plant community type, *OTHER PRIMARILY HERBACEOUS COMMUNITIES*.

Transect Data	ROP label	Number of Stems	ROP label	Number of Stems	ROP label	Number of Stems	Average per Acre

V^{MWD}: Average milkweed stem density per acre	Benchmark Score	Selected Alternatives[3] (STEP 4) (Unless selected, label AA as *OUT* on the project map)	Planned Score	Applied Score
Milkweed absent in belt transects and the AA (**0.10**)		☐ Decision maker willapply Conservation Practice Standard (327) to increase milkweed densities[3].		
Milkweed absent in belt transects; however, individual milkweed stems present in the AA (**0.15**)				
10 – 200 (**0.30**)		☐ If the score is between 0.30– 0.50, the decision maker will implement **one or more** of the following Conservation Practice Standards to *increase milkweed densities* as the targeted condition[3] and with *improving monarch breeding success* as the stated purpose: (315), (327), (338), **and/or** (647).		
201 – 300 (**0.50**)				
301 – 500 (**0.80**)		☐ Decision maker will implement Conservation Practice Standards (338) **and/or** (647) to maintain milkweed densities[3].		
> 500 (**1.00**)				

[3] An adequate abundance of milkweed plants are essential to produce new monarch butterflies because milkweed (*Asclepias*) are the host plants for monarch larvae, while suitable nectar plants are the primary food sources for adult monarchs. Both milkweed and nectar plants should be considered in most circumstances.

STEP 3: DETERMINE BENCHMARK CONDITIONS FOR OTHER PLANT COMMUNITIES.
Apply this step only to monarch plant community type, *OTHER PRIMARILY HERBACEOUS COMMUNITIES*.

Plot Data (forb cover)	ROP			ROP			ROP			AVG
	P 1	P 2	P 3	P 1	P 2	P 3	P 1	P 2	P 3	

V^{FC}: Average monarch nectaring forb cover within the AA	Benchmark Score	Selected Alternatives[4] (STEP 4) (Unless selected, label AA as *OUT* on the project map)	Planned Score	Applied Score
Absent (≤ 2%) (**0.10**)		☐ Decision maker will apply Conservation Practice Standard (327) to increase monarch nectaring forb cover[4].		
Rare (2.1-5.0%) (**0.20**)				
Uncommon (5.1 – 15%) (**0.30**)		☐ If the score is between 0.30 – 0.50, the decision maker will implement **one or more** of the following Conservation Practice Standards *to increase monarch nectaring forb cover, and improve adult-monarch foraging habitat* as the targeted conditions[4] with *monarch breeding and foraging habitat* as the stated purpose: (315) **or** (327) **or** (338) **or** (647).		
Moderately abundant (15.1 – 25%) (**0.60**)		☐ Decision maker willimplement Conservation Practice Standards (338) **and/or** (647) to maintain or enhance current conditions[4].		
Abundant (25.1% – 35.0%) (**0.80**)				
Very Abundant (> 35%) (**1.00**)				

[4] Nectar sources are necessary for adult monarch butterflies; however, suitable breeding habitat would also include milkweed in sufficient densities.

STEP 3: DETERMINE BENCHMARK CONDITIONS FOR OTHER PLANT COMMUNITIES.
Apply this step only to monarch plant community type, *OTHER PRIMARILY HERBACEOUS COMMUNITIES*.

Plot Data (forb richness)	ROP			ROP			ROP			AVG
	P 1	P 2	P 3	P 1	P 2	P 3	P 1	P 2	P 3	

V^{FR}: Average number of monarch nectaring forb-species within the AA.	Benchmark Score	Selected Alternatives[5] (STEP 4) (Unless selected, label AA as *OUT* on the project map)	Planned Score	Applied Score
< 1 (**0.10**)		☐ Decision maker willimplement Conservation Practice Standard (327) to increase monarch nectaring, forb-species richness[5].		
1 -2 (**0.30**)		☐ If the score is between 0.30 – 0.50, the decision maker will implement **one or more** of the following Conservation Practice Standards to *increase monarch nectaring, forb-species richness, and improve adult-monarch foraging habitat* as the targeted conditions[5], with *monarch breeding and foraging habitat* as the stated purpose: (315) **or** (327) **or** (338) **or** (647).		
2.1 – 3.5 (**0.50**)				
> 3.5 (**0.80**)		☐ Decision maker will use Conservation Practice Standards (338) **and/or** (647) to maintain or enhance current conditions[5].		
> 3.5 and two or more species of *Asclepias* represented in V^{MWD} (**1.00**)				

[5] Nectar sources are necessary for adult monarch butterflies; however, suitable breeding habitat would also include milkweed in sufficient densities.

STEP 3: DETERMINE BENCHMARK CONDITIONS FOR OTHER PLANT COMMUNITIES Apply this step only to monarch plant community type, *OTHER PRIMARILY HERBACEOUS COMMUNITIES*.

i. Apply the following formula to determine Monarch Habitat Condition Rating (benchmark, planned, or applied rating).

$$V^{IR}\left[\frac{(V^{WMR}) + 5(V^{MWD}) + (V^{FC}) + (V^{FR})}{8}\right]$$

ii. Determine benchmark monarch habitat condition rating and end the assessment of current conditions.

Monarch Habitat Condition Score Ranges (and Associated Ratings)	Benchmark Rating
0.00 – 0.25 (*poor*)	
0.26 – 0.49 (*fair*)	
0.50 – 0.74 (*good*)	
0.75 – 1.00 (*excellent*)	

STEP 4: EVALUATE ALTERNATIVES AND DETERMINE PLANNED CONDITION

Use the appropriate tables in STEP 3 and scoring table above to complete this step.

PLANNED HABITAT CONDITION RATING	

STEP 5: DOCUMENT DECISIONS IN CLIENT'S CONSERVATION PLAN.

STEP 6: EVALUATE PLAN IMPLEMENTATION (2 to 3 years post-establishment)

Use the appropriate tables in STEP 3 and scoring table above to complete this step after the conservation plan has been established.

APPLIED HABITAT CONDITION RATING		DATE	

Factor(s)	**Conservation Practices for Resource Concerns** *For projects rating fair or poor, consider the following conservation practices* The following practices have been reviewed and approved by the NRCS Monarch Butterfly Habitat Development Project Working Group.
	CORE NATIONAL CONSERVATION PRACTICES 314 – Brush management - The management or removal of woody (non-herbaceous or succulent) plants including those that are invasive and noxious. 327 – Conservation Cover - Establishing and maintaining permanent vegetative cover. 338 – Prescribed Burning - Controlled fire applied to a predetermined area. 386 – Field Border - A strip of permanent vegetation established at the edge or around the perimeter of a field. 390 – Riparian Herbaceous Cover – Restore, improve or maintain desired plant community within the transition zone between upland and aquatic habitats 511 – Forage Harvest Management – The timely cutting and removal of forages to maintain and/or improve wildlife habitat and desired plant communities. 645 – Upland Wildlife Habitat Management - Provide and manage upland habitats and connectivity within the landscape for wildlife. 647 – Early Successional Habitat Management/Development - Manage plant succession to develop and maintain early successional habitat to benefit desired wildlife and/or natural communities. **SUPPORTING NATIONAL CONSERVATION PRACTICES** 315 -- Herbaceous Weed Control - The removal or control of herbaceous weeds including invasive, noxious and prohibited plants. 382 – Fence – To provide a means to control of animals and people including vehicles. 394 – Fire Break – Permanent or temporary strip of vegetation to reduce the spread of wildfire and contain prescribed burns. 595 – Integrated Pest Management - Prevent or mitigate off-site pesticide risks to soil, water, air, plants, animals and humans from drift and volatilization losses. 644 -- Wetland Wildlife Habitat Management -Retaining, developing or managing wetland habitat for wetland wildlife.

Wildlife Habitat Evaluation Guide Datasheet for the Monarch Butterfly: Southern Great Plains

Owner/Operator:			Field Office:
NRCS Planner and/or Consulting Biologist:			Date:
Assessment Area:	Acres:	Ecological Site:	

RAPID APPROACH: HABITAT SCREENING OF LOW VALUE PLANT COMMUNITIES

Select Appropriate Monarch Plant Community Type for AA	Benchmark Rating	Management Alternatives (Unless selected, label AA as *OUT* on the project map)	Planned Rating	Applied Rating
☐ **Crop** *Area is planted annually to produce a crop*	**Poor**	Decision maker will convert all or part* of AA to monarch friendly plants using Conservation Practice(s); Range Planting (550), Conservation Cover (327), Field Boarder (386), Riparian Herbaceous Buffer (390) or Upland Wildlife Habitat (645), with monarch habitat as the target conditions. **-----And -----** If pesticides remain a risk, pesticides will apply in a manner that minimizes negative impacts to monarch butterflies or monarch habitat.	**Good** or **Excellent**	
☐ **Intensively managed hay** *Hayland that is commonly fertilized, mowed, and/or treated with herbicide resulting in low forb richness. Grasses often introduced.*	**Poor**		**Good** or **Excellent**	
☐ **Intensively managed pasture or range** *Grassland that is commonly fertilized, mowed, and/or treated with herbicide resulting in low forb richness. Grasses often introduced.*	**Poor**		**Good** or **Excellent**	
☐ **Brush** *Brush is noxious or problematic and at a density such that monarch habitat is mostly absent.*	**Poor**	Decision maker will control brush species. In addition to implementation of Conservation Practice Brush Management (314), consider planting of monarch habitat (i.e. use of 550 or 327) and/or Prescribed Burning (338).	**Good** or **Excellent**	
☐ **Other Herbaceous Communities** *Passively managed pasture or range, Ungrazed grassland or Unmanaged hayland*	**Proceed to STANDARD APPROACH**: SAMPLE ASSESSMENT AREA AND DETERMINE BENCHMARK MONARCH HABITAT CONDITION RATING.			

STANDARD APPROACH: DETERMINE MONARCH CONDITION RATINGS FOR OTHER HERBACEOUS COMMUNITIES

Apply this step only if Benchmark Condition could not be assessed with the Rapid Approach (i.e., *OTHER HERBACEOUS COMMUNITIES*

V^{IR}: Insecticide Risk condition[1]	**Benchmark Score**	**Management Alternatives** (Unless selected, label AA as *OUT* on the project map)	**Planned Score**	**Applied Score**
AA is treated with insecticides	**0**	Decision maker will consider and/or implement mitigate measures for on-site and offsite insecticide risks to monarch butterflies through direct contact. NCP 595 is an option.	**0**	**0**
AA is at risk of exposure to insecticide by drift.	**0.3**		**0.3**	**0.3**
Neither of the above	**1.0**	Decision maker will continue with current management practices.	**1.0**	**1.0**

- *Consider treatment timing and duration in relation to when monarchs are in the region.*

Chemical(s): _____ *Timing:* _____

V^{HR}: Herbicide Risk Condition	**Benchmark Score**	**Management Alternatives**	**Planned Score**	**Applied Score**
AA is treated with or subject to drift from a broad spectrum herbicides	**0.1**	Decision maker will consider and/or implement mitigate measures for on-site and offsite herbicide risks to monarch habitat. NCP 595 is an option.	**0.1**	**0.1**
AA is treated with or subject to drift from select herbicide that does not affect milkweed.	**0.3**		**0.3**	**0.3**
None of the above	**1.0**	Decision maker will continue with current management practices.	**1.0**	**1.0**

- *Do not consider Individual Plant Treatments (IPT) for plants deemed undesirable (e.g., spot treatment of brush, noxious weeds, or invasive species).*
- *Under the Planned or Applied scores do not consider treatments, such as NCP 314 – Brush Management or 315 - Herbaceous Weed Control, when applied for the purpose of enhancing or establishing milkweed or nectaring habitat.*
- *This question relates to herbicide applications that occur on a regular cycle (annually, biannually, every 5-10 years). Do not consider treated, it the application of herbicides was part of a past weed control program that has been discontinued (no treatment in recent years, or anticipated in the future).*

[1] V is used for the term "variable". These are variables used to calculate the final score for the assessment area.

STANDARD APPROACH: CONTINUED

Vegetative Survey: Locate three Representative Observation Points (ROP) within each Assessment Area (AA), if size allows, and within each stretch a tape 72.6 foot denoting location of starting point and direction below. Tally milkweed stems rooted within 3 feet of each side of the tape along the entire length (72.6' x 6' belt-transect). Within three 6'x6' quadrates placed at the beginning of the 10, 40 and 60 foot marks on the tape, estimate percent cover and numbers of species of preferred monarch nectaring plants (refer to the monarch plant list and/or identification guide for preferred species).

Direction/location:	ROP 1 : Lat:						ROP 2 : Lat:						ROP 3 : Lat:						
	Dir: Long:						Dir: Long:						Dir: Long:						Avg.
no. milkweed stems:	Belt-transect #1						Belt-transect #2						Belt-transect #3						
cover (%):	Q 10		Q 40		Q 60		Q 10		Q 40		Q 60		Q 10		Q 40		Q 60		
richness (no. spp.)																			

V^{MD}: Average milkweed stem density per acre	Benchmark Score	Management Alternatives	Planned Score	Applied Score
No milkweed were tallied within the belt transects or observed in AA	**0.1**	Decision maker can plant milkweed with the use of Conservation Practice(s); Conservation Cover (327), Range Planting (550), Riparian Herbaceous Buffer (390) and/or Field Boarder (387).	**0.1**	**0.1**
No milkweed stems within transects, but, observed in AA	**0.2**		**0.2**	**0.2**
1 – 4 stem average for AA	**0.3**	Decision maker can use Conservation Practice(s); Early Successional Habitat Management (647) and/or Prescribed Burning (338) to improve milkweed densities.	**0.3**	**0.3**
4.1 – 10 stem average for AA	**0.5**		**0.5**	**0.5**
10.1 – 20 stem average for AA	**0.7**	Decision maker can use Conservation Practice(s); Early Successional Habitat Management (647) and/or Prescribed Burning (338) to maintain milkweed densities.	**0.7**	**0.7**
20.1 – 40 stem average for AA	**0.8**		**0.8**	**0.8**
> 40 stem average for AA	**1.0**		**1.0**	**1.0**

STANDARD APPROACH: CONTINUED				
V^{FC}: Average monarch nectaring forb cover within the AA	**Benchmark Score**	**Management Alternatives**	**Planned Score**	**Applied Score**
< 1 % average cover	**0.1**	Decision maker can plant appropriate nectar species with the use of Conservation Cover (327) or Range Planting (550).	**0.1**	**0.1**
1.0 – 4.0 % average cover	**0.2**		**0.2**	**0.2**
4.1 – 7.5 % average cover	**0.6**	Decision maker can use Conservation Practice(s); Early Successional Habitat Manage. (647), Prescribed Burning (338) and/or plantings (327, 550) to improve current conditions.	**0.6**	**0.6**
7.6 – 10.0 % average cover	**0.8**	Use Conservation Practice(s); Early Successional Habitat Manage. (647) or Prescribed Burning (338) to maintain or enhance current conditions.	**0.8**	**0.8**
> 10 % average cover	**1.0**		**1.0**	**1.0**
V^{FR}: Average number of monarch nectaring forb species per transect	**Benchmark Score**	**Management Alternatives**	**Planned Score**	**Applied Score**
< 2 average number of forb species	**0.1**	Decision maker can plant appropriate nectar species with the use of Conservation Cover (327) or Range Planting (550).	**0.1**	**0.1**
2 - 4 average number of forb species	**0.5**	Decision maker may use Conservation Practice(s); Prescribed Burning (338), Early Successional Habitat Manage. (647) and/or plantings to improve current conditions.	**0.5**	**0.5**
> 4 average number of forb species	**1.0**	Use Conservation Practice(s); Early Successional Habitat Manage. (647) or Prescribed Burning (338) to maintain or enhance current conditions.	**1.0**	**1.0**
Notes:				

STANDARD APPROACH: CONTINUED

Apply the following formulas to determine Monarch Habitat Condition Scores (benchmark, planned, applied rating) and rate habitat according to the chart. Scores may be improved by applying management alternatives as outlined in the individual Variable scoring tables above. Planned ratings must be "Good" or "Excellent" to meet planning criteria.

Habitat Condition Ratings

0.00 – 0.25 = *Poor*
0.26 – 0.49 = *Fair*
0.50 – 0.74 = *Good*
0.75 – 1.00 = *Excellent*

Monarch Breeding Habitat Condition Score

Formula	Benchmark Rating	Planned Rating	Applied Rating
$(V^{IR})\frac{V^{HR}+3V^{MD}}{4}$	$(__)\frac{__+3(__)}{4}=$ Rating = _____	$(__)\frac{__+3(__)}{4}=$ Rating = _____	$(__)\frac{__+3(__)}{4}=$ Rating = _____

Monarch Nectaring Habitat Condition Score

Formula	Benchmark Rating	Planned Rating	Applied Rating
$\frac{2V^{IR}+V^{HR}+3V^{FC}+V^{FR}}{7}$	$\frac{2(__)+__+3(__)+__}{7}=$ Rating = _____	$\frac{2(__)+__+3(__)+__}{7}=$ Rating = _____	$\frac{2(__)+__+3(__)+__}{7}=$ Rating = _____

Cumulative Monarch Habitat Condition Score

Formula	Benchmark Rating	Planned Rating	Applied Rating
$\frac{Breeding\ Score + Nectaring\ Score}{2}$	$\frac{__+__}{2}=$ Rating = _____	$\frac{__+__}{2}=$ Rating = _____	$\frac{__+__}{2}=$ Rating = _____

Factor(s)	**Conservation Practices for Resource Concerns** *Habitat score of 0.5 or less, consider the following conservation practices* The following practices have been reviewed and approved by the NRCS Monarch Butterfly Habitat Development Project Working Group.
	CORE NATIONAL CONSERVATION PRACTICES 314 – Brush management - The management or removal of woody (non-herbaceous or succulent) plants including those that are invasive and noxious. 327 – Conservation Cover - Establishing and maintaining permanent vegetative cover. 338 – Prescribed Burning - Controlled fire applied to a predetermined area. 386 – Field Border - A strip of permanent vegetation established at the edge or around the perimeter of a field. 390 – Riparian Herbaceous Cover – Restore, improve or maintain desired plant community within the transition zone between upland and aquatic habitats 511 – Forage Harvest Management – The timely cutting and removal of forages to maintain and/or improve wildlife habitat and desired plant communities. 528 – Prescribed Grazing – Apply grazing to meet a vegetative objective. 550 – Range Planting - Establishing and maintaining permanent vegetative cover to support grazing and wildlife. 645 – Upland Wildlife Habitat Management - Provide and manage upland habitats and connectivity within the landscape for wildlife. 647 – Early Successional Habitat Management/Development - Manage plant succession to develop and maintain early successional habitat to benefit desired wildlife and/or natural communities. **SUPPORTING NATIONAL CONSERVATION PRACTICES** 315 -- Herbaceous Weed Control - The removal or control of herbaceous weeds including invasive, noxious and prohibited plants. 378 – Pond - Provide livestock a source of water to facilitate Prescribed Grazing. 382 – Fence – To provide a means to control of animals and people. 394 – Fire Break – Permanent or temporary strip of vegetation to reduce the spread of wildfire and contain prescribed burns. 516 – Livestock Pipeline - Provide livestock a source of water to facilitate Prescribed Grazing. 533 – Pumping Plant - Provide livestock a source of water to facilitate Prescribed Grazing. 561 – Heavy Use Area Protection – Provide stable, non-eroding surface to protect water source for livestock to facilitate Prescribed Grazing. 595 – Integrated Pest Management - Prevent or mitigate off-site pesticide risks to soil, water, air, plants, animals and humans from drift and volatilization losses. 614 – Watering Facility – Provide livestock a source of water to facilitate Prescribed Grazing. 642 – Water Well – Provide livestock a source of water to facilitate Prescribed Grazing. 644 -- Wetland Wildlife Habitat Management -Retaining, developing or managing wetland habitat for wetland wildlife.

13.0 Appendix III - Detailed Explanation of Each Conservation Practice Standard/CSP Enhancements with Potential Adverse Effects and Associated Conservation Measures

13.1 Brush Management (Code 314)

Definition. Brush management is the management or removal of woody (non-herbaceous or succulent) plants including those that are invasive and noxious.

Purpose. Brush management is used to: create the desired plant community consistent with the ecological site, restore or release desired vegetative cover to protect soils, control erosion, reduce sediment, improve water quality or enhance stream flow, improve forage accessibility, quality, and quantity for livestock and wildlife, enhance fish and wildlife habitat, and/or manage fuel loads to reduce the risk of wildfire.

Additional Information: Brush management is designed to achieve the optimum level of control of the target woody species, and protection of the desired species while meeting fish and wildlife habitat requirements. This is accomplished by mechanical, chemical, biological techniques, or a combination of these techniques. The maintenance of brush management involves monitoring for regrowth, resprouting, or reoccurrence of brush. Spot treatment of individual plants or areas needing retreatment is completed as needed while woody vegetation is small and most vulnerable to desired treatment procedures.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253041.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.2 Conservation Cover (Code 327)

Definition: Conservation cover is establishing and maintaining perennial vegetative cover to protect soil and water resources on lands needing permanent protective cover that will not be used for forage production.

Purpose: Conservation cover reduces soil erosion and sedimentation, enhances wildlife habitat, and improves water quality.

Additional Information: Conservation cover is applied on all lands needing permanent vegetative cover. If wildlife habitat enhancement is a goal, maintenance practices and activities must not disturb cover during the reproductive period for the desired species. To benefit insect food sources for grassland nesting birds, spraying or other control of noxious weeds will be done on a "spot" basis to protect forbs and legumes that benefit native pollinators and other wildlife.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253049.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.3 Cover Crop (Code 340)

Definition: Cover crop is growing a crop of grass, small grain, or legumes primarily for seasonal protection and soil improvement.

Purpose: This practice is used to control erosion, add fertility and organic material to the soil, improve soil tilth, increase infiltration and aeration of the soil, and improve overall soil health. The practice is also used to increase populations of bees for pollination purposes. Cover and green manure crops have beneficial effects on water quantity and quality. Cover crops have a filtering effect on movement of sediment, pathogens, and dissolved and sediment-attached pollutants.

Additional Information: Cover and green manure crops are grown on land where seasonal or long-term benefits of a cover crop are needed. Operation and maintenance of cover crops include: mowing or using other pest management techniques to control weedy and invasive species that degrade monarch and pollinator habitat and managing for the efficient use of soil moisture by selecting water-efficient plant species and terminating the cover crop before excessive transpiration.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253071.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.4 Critical Area Planting (Code 342)

Definition: Critical area planting establishes permanent vegetation on sites that have, or are expected to have, high erosion rates, and on sites that have conditions that prevent the establishment of vegetation with normal practices.

Purpose: Conservation benefits may include, but are not limited to: reduced sheet and rill erosion reduced transport of sediment stabilized slopes, road banks, stream banks, shorelines, sand dunes.

Additional Information: Sites where this practice applies have high erosion rates or physical, chemical or biological conditions that prevent the establishment of vegetation with normal practices. A typical example is areas with high slopes. Erosion control is the primary consideration for plant material selection. However, a broad choice of grass, trees, shrubs, and vines are usually available and adapted for most sites. Wildlife and beautification are additional considerations that influence planning decisions on a site needing this practice.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253056.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.5 Early Successional Habitat Development/Management (Code 647)

Definition: Early successional habitat development/management involves manipulating a stand of plants to create and maintain early successional attributes that benefit desired wildlife and/or natural communities.

Purpose: To provide habitat for species requiring early successional habitat for all or part of their life cycle.

Additional Information: The initial setting is typically pasture, old fields and odd areas (farm edges) where a change to, or maintenance of, an early successional stage of vegetation is desired. Ecological succession is a term used to describe the predictable changes that take place in an ecological community following disturbance. After a site is disturbed the composition of plants and animals changes over time. The habitat associated with the early stages of succession is, by nature, temporary. Vegetation management is generally required to maintain the wildlife and other ecological benefits unique to the early stages of succession. This practice increases plant community diversity and provides habitat for early successional plant and animal species. This is usually accomplished by periodic vegetative disturbance, which may be mechanical, chemical, biological, or a combination of these techniques.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1253080&ext=pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.6 Fence (Code 382)

Definition: A fence is a constructed barrier to livestock, wildlife, or people.

Purpose: This practice may be applied to any area where livestock and/or wildlife control is needed, or where access to people is to be regulated.

Additional Information: A wide variety of fences exist, however, fencing material and construction quality is always designed and installed to assure the fence will meet the intended purpose. The standard fence is constructed of either barbed or smooth wire suspended by posts with support structures. Other types include woven wire for small animals, electric fence, and suspension fences.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1252762&ext=pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.7 Field Border (Code 386)

Definition: Field borders are strips of permanent vegetation (grasses, legumes, forbs, or shrubs) established on one or more sides of a field.

Purpose: Field borders are a multipurpose practice that will serve one or more of the following functions: reduce wind and water erosion; protect soil and water quality; assist in management of harmful insect populations; provide wildlife food and cover; provide tree or shrub products; increase carbon storage in biomass and soils; improve air quality.

Additional Information: The field containing the border is usually, but not necessarily, cropland. The border is generally converted from cropland but may be created by removing vegetation at the edge of the field to create a more desirable transition zone of field border herbaceous and small woody plants.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253099.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.8 Filter Strip (Code 393)

Definition: A filter strip is an area of vegetation established for removing sediment, organic material, and other pollutants from runoff and wastewater.

Purpose: In addition to serving as a buffer, filter strips can provide additional benefits such as: improved fish and wildlife habitat, improved field access, and increased livestock forage.

Additional Information: Filter strips are generally located at the lower edge(s) of a field and are designed to serve as a buffer between a field and environmentally sensitive areas such as streams, lakes, wetlands, and other areas susceptible to damage by sediment and waterborne pollutants. Operate and maintain

filter strips by, mowing, fertilizing, controlling weeds, and reseeding (as needed) to promote dense vegetative growth.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253083.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.9 Fire Break (Code 394)

Definition: A firebreak is a permanent or temporary strip of bare or vegetated ground designed to allow for the removal and management of fuel to prevent the progress of forest fires and provide access to inner areas of the forest to fight such fires.

Purpose: To reduce the spread of wildfire or contain prescribed burns.

Additional Information: This practice is best designed with a qualified/certified forester. It is applied on forest land where protection from fire is needed or prescribed burning is recommended. The vegetation in the firebreak should be fire-resistant and noninvasive. An alternative is to maintain the firebreak as bare ground. Erosion control measures must be incorporated into the design where the firebreaks will be installed on sloping ground.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253084.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.10 Heavy Use Area Protection (Code 561)

Definition: Heavy Use Area Protection (HUAP) is a way to stabilize a ground surface that is frequently and intensively used by people, animals, or vehicles.

Purpose: This practice is installed to protect and improve water quality by providing a stable, non-eroding surface for areas frequently used by animals, people, or vehicles.

Additional Information: Commonly used surface treatments include concrete, bituminous concrete, and gravel. In some places, it may be necessary to provide a roofed structure over the treated surface to achieve the desired resource protection. This practice is often used to provide surface stability in areas where concentration of livestock is causing a resource concern. This includes feeding areas, portable hay rings, watering facilities, feeding troughs, and mineral areas. In these areas, provision must be made for the collection, storage, utilization, and treatment of manure and contaminated runoff.
It can also be used to make recreation areas accessible to people with disabilities.

This practice has a minimum expected life of 10 years. Maintenance requirements for the practice will depend upon the type of surface chosen by the producer and its intended use. Routine maintenance will be needed to ensure that the facility operates as designed.

Heavy Use Area Protection (561) may be installed as a stand-alone practice or may be applied with conservation practices to control surface water such as Diversion (362), Filter Strip (393), or Vegetated Treatment Area (635). It may also be necessary to use Access Control (472) or Fence (382) to modify traffic patterns around the area. Other commonly associated conservation practices include Roofs and Covers (367), Waste Storage Facility (313), Prescribed Grazing (528), and Watering Facility (614).

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1258874.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.11 Herbaceous Weed Control (Code 315)

Definition: Herbaceous weed control is the eradication, reduction, or manipulation of herbaceous weed species, including invasive, noxious, and prohibited plants on grazing lands or forestland.

Purpose: Herbaceous weed control is applied to accomplish one or more of the following: restore native or create desired plant communities, enhance accessibility, quantity, and quality of forage, maintain or enhance wildlife habitat including habitat for threatened and endangered species, reduce fire hazard.

Additional Information: Herbaceous weed control is designed to achieve the desired plant community using Integrated Pest Management (IPM) principles. This is accomplished by mechanical, chemical, biological, or a combination of these techniques. Plans must include post-treatment measures as needed to achieve the management objective.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1267672&ext=pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.12 High Tunnel System (Code 325)

Definition: A High tunnel system is an enclosed polyethylene, polycarbonate, plastic, or fabric covered structure that is used to cover and protect crops from sun, wind, excessive rainfall, or cold, to extend the growing season in an environmentally safe manner.

Purpose: Improve plant health and vigor.

Additional Information: This practice applies to land capable of producing crops. This practice applies where sun or wind intensity may damage crops, or where an extension of the growing season is needed due to climatic conditions. The practice does not apply to crops not grown in the natural soil profile. Raised beds are limited to 12 inches in depth.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=nrcseprd424418&ext=pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.13 Integrated Pest Management (IPM) (Code 595)

Definition: Conservation Practice Standard (595) Integrated Pest Management is a site-specific combination of pest prevention, pest avoidance, pest monitoring, and pest suppression strategies. IPM strategies are employed to prevent or mitigate pest management risks for identified natural resource concerns such as the Monarch Butterfly.

Purpose(s): (1) Prevent or mitigate off-site pesticide risks to water quality from leaching, solution runoff, and adsorbed runoff losses; (2) Prevent or mitigate off-site pesticide risks to soil, water, air, plants, animals, and humans from drift and volatilization losses; (3) Prevent or mitigate on-site pesticide risks to pollinators and other beneficial species through direct contact; and (4) Prevent or mitigate cultural, mechanical, and biological pest suppression risks to soil, water, air, plants, animals, and humans.

In creating an Integrated Pest Management plan within the monarch focus area, NRCS will integrate landowner objectives, local resource inventories, ecological site description information, and habitat needs of the Monarch Butterfly, to plan and design the practice. Further, this conservation practice standard uses a combination of IPM techniques and other conservation practices to prevent or mitigate pesticide drift and/or direct contact to Monarch Butterflies, larvae and their habitat. Planners have tools available to develop IPM plans such as Agronomy Technical Note 5, Pest Management in the Conservation Planning Process[20], which provides IPM techniques and conservation practices for reducing pesticide environmental risk through prevention or mitigation. IPM techniques may include timing of application, spot application, biological or mechanical controls and other. In addition, planners have Agronomy Technical Note No. 9 Preventing or Mitigating Potential Negative Impacts of Pesticides on Pollinators Using Integrated Pest Management and Other Conservation Practices[21]. These tools which depend upon the proper application of the techniques and structural conservation practice standards will be critical to provide benefits for Monarch Butterflies within an IPM plan.

In addition to the purposes above; within the Proposed Action, this conservation practice standard shall only be selected to support the goals and objectives of core Conservation Practice Standard Upland Wildlife Habitat Management (645).

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1255515.pdf

Conservation Measures:

[20] http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=34828.wba
[21] https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1043138.pdf

CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.14 Livestock Pipeline (Code 516)

Definition: A livestock pipeline is a pipeline installed to convey water for livestock or wildlife.

Purpose: The purpose of this practice is to convey water from the source of supply to the point(s) of use. Normally, the objective is to decentralize the location of drinking or water storage facilities.

Additional Information: The practice is applicable where water must be piped to another location(s) for management purposes, to conserve the supply, or for reasons of sanitation. Pipelines installed under this practice are generally for livestock management purposes. A single water source can provide livestock water to several locations and be very effective in improving management of a grazing unit. Livestock pipelines are also used to provide or distribute drinking water facilities for wildlife.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253167.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.15 Pond (Code 378)

Definition: A pond is a water impoundment made by constructing an embankment, by excavating a dugout, or by a combination of both.

Purpose: The purpose of a of pond is to store water for livestock, fish and wildlife, recreation, fire control, erosion control, flow detention, and other uses such as improving water quality.

Additional Information: The Pond may be by embankment or excavation where failure of the embankment and resulting release of water will not result in loss of life, damage to homes, commercial buildings, main highways, railroads, or interruption of public utilities; the product of the storage (acre/feet) times the effective height of the dam is less than 3,000 and the effective height of the dam is 35 feet or less.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1267743&ext=pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.16 Prescribed Burning (Code 338)

Definition: Prescribed burning is applying controlled fire to a predetermined area of land.

Purpose: Control undesirable vegetation; prepare sites for harvesting, planting or seeding; control plant disease; reduce wildfire hazards; improve wildlife habitat; improve plant production quantity and/or quality; remove slash and debris; enhance seed and seedling production; facilitate distribution of grazing and browsing animals and restore and maintain ecological sites.

Additional Information: Application of this highly specialized practice requires intensive training and sufficient support personnel and equipment.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1267744&ext=pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.17 Prescribed Grazing (Code 528)

Definition: Managing the harvest of vegetation with grazing and/or browsing animals.

Purpose: When livestock grazing is present or planned, this practice is applied or maintained annually as a part of a conservation management system to achieve one or more of the following:
(A) Improve or maintain desired species composition and vigor of plant communities. (B) Improve or maintain quantity and quality of forage for grazing and browsing animals' health and productivity. (C) Improve or maintain surface and/or subsurface water quality and quantity. (D) Improve or maintain riparian and watershed function. (E) Reduce accelerated soil erosion, and maintain or improve soil condition. (F) Improve or maintain the quantity and quality of food and/or cover available for wildlife. (G) Manage fine fuel loads to achieve desired conditions. (H) Promote economic stability through grazing land sustainability and continued livestock production.

In addition to the purposes above; within the Proposed Action, this conservation practice standard shall only be selected to support the goals and objectives of core Conservation Practice Standard Upland Wildlife Habitat Management (645). At the individual and landscape scale, the use of this practice standard under the Proposed Action is expected to produce a mosaic of vegetation structure and composition to benefit the monarch by creating areas of greater forb production to provide nectar habitat and creating areas of higher residual cover for monarch larval escape cover.

Additional Information: In creating a prescribed grazing plan, NRCS integrates landowner objectives, local resource inventories; habitat needs assessments of monarch using the WHEG, forage balance sheets, and ecological site description information to plan and design the practice. Further, this conservation practice standard is a management practice and it depends upon the proper application of the facilitative vegetative and structural conservation practice standards. Infrastructure improvements (fencing, pipeline, water facilities, etc.), and the implementation of other vegetative manipulation practices (forage harvest management, herbaceous weed control, prescribed fire, etc.) may be implemented planned by NRCS and implemented by the rancher to support the creation and use of a grazing management system.

Stocking rates of livestock is a fundamental component of developing a prescribed grazing plan. In additional to stocking rates, NRCS provides advice to landowners on other aspects of the management of livestock, including time of use, as well as grazing frequency, location, and duration on the property.

Using this practice standard, NRCS will work with the landowner to beneficially manage vegetation amount, structure, vigor, nutritional quality, and/or desired species composition. Onsite grazing determination needs can address specific habitat targets immediately or as a part of a multi-year grazing system design which addresses long-term goals.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1267745&ext=pdf

Conservation Measures:
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CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.18 Pumping Plant (Code 533)

Definition: A pumping plant is a facility that delivers water at a designed pressure and flow rate to meet a conservation need. Components of the facility include the required pump, associated power unit, plumbing, and necessary appurtenances. It also may include on-site fuel or energy sources and protective structures.

Purpose: A pumping plant may be installed for a wide variety of conservation purposes. This includes, but is not limited to, delivery of water for irrigation or livestock water, maintenance of critical water levels in wetland sites, transfer of wastewater for utilization as part of a waste management system, and facilitation of drainage by removal of surface runoff or groundwater.

Practice Information: The power supply for a pumping plant may come from line power, fossil fuel, photovoltaic panels, windmills, or water-powered pumps (hydraulic rams). To improve air quality, new or replacement pumping plants will use non-combustion power sources or technologies that are more efficient in fuel use or fuel type.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253171.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.19 Range Planting (Code 550)

Definition: Range planting is establishment of adapted perennial vegetation on grazing land.

Purpose: Restore a plant community similar to the Ecological Site Description reference state for the site or the desired plant community; provide or improve forages for livestock; provide or improve forage, browse or cover for wildlife; reduce erosion by wind and/or water; improve water quality and quantity; increase carbon sequestration.

Practice Information: This practice applies where existing stands of desirable vegetation are inadequate for natural reseeding to occur or where the potential for enhancement of the vegetation by grazing management is unsatisfactory. This practice applies to rangeland, native or naturalized pasture, grazed forest, or other suitable land areas where the principle method of vegetation management is grazing. Vegetation types include grasses, legumes, shrubs, forbs, shrubs, and trees.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_026734.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.20 Restoration and Management of Rare and Declining Habitats (Code 643)

Definition: Restoration and management of rare or declining habitats reestablishes and/or renovates unique or diminishing native terrestrial and aquatic ecosystems.

Purpose: Conservation benefits may include, but are not limited to: restoration of land or aquatic habitats degraded by human activity; improved habitat for rare and declining terrestrial and aquatic wildlife species; and increased native plant community diversity.

Practice Information: This practice applies to any landscape that once supported or currently supports the habitat to be restored or managed. Designed structural, vegetative, or management activities will improve habitat for target species.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1252731&ext=pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.21 Riparian Forest Buffer (Code 391)

Definition: A riparian forest buffer is an area of trees and/ or shrubs located adjacent to a body of water. The vegetation extends outward from the water body for a specified distance necessary to provide a minimum level of protection and/or enhancement.

Purpose: The riparian forest buffer is a multipurpose practice designed to accomplish one or more of the following: create shade to lower water temperatures and improve habitat for aquatic animals; provide a source of debris necessary for healthy robust populations of aquatic organisms and wildlife; act as a buffer to filter out sediment, organic material, fertilizer, pesticides, and other pollutants that may adversely impact the water body, including shallow groundwater.

Additional Information: This practice applies to areas adjacent to permanent or intermittent streams, lakes, ponds, wetlands, and areas associated with groundwater recharge.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253200.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.22 Riparian Herbaceous Cover (Code 390)

Definition: Riparian herbaceous cover is establishment and maintenance of grasses, grass-like plants, and forbs that are tolerant of intermittent flooding or saturated soils and that are established or managed in the transitional zone between terrestrial and aquatic habitats.

Purpose: The purposes of this practice include: provision of food, shelter, shading substrate, access to adjacent habitats; nursery habitat and pathways for movement by resident and nonresident aquatic, semiaquatic, and terrestrial organisms; improvement and protection of water quality; stabilization of streambanks and shorelines, and increased net carbon storage in the biomass and soil.

Practice Information: This practice is used on lands along water courses or at the boundary of water bodies or wetlands where the natural or desired plant community is dominated by herbaceous vegetation; the ecosystem has been disturbed and the natural plant community is missing, changed, or

has been converted to agricultural crops, lawns, or other high maintenance vegetation; or invasive species dominate.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253201.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.23 Forage Harvest Management (Code 511)

Definition: Timely cutting and removal of forages and biomass from the field as hay, greenchop, or insilage to optimize yield and quality and/or for other purposes such as to promote vigorous plant re-growth or to manage for the desired species composition.

Purpose: This is a management action to meet the intended forage harvest purpose. A typical purpose is to improve forage quality, accomplished by raising the cutting heights to leave at least a 3-4 inch stubble height for cool season grasses and 6 inch for warm season grasses; in order to increased residual forage and to promote faster plant regrowth.

Additional Information: Where weather conditions make it difficult to harvest the desired quality of forage, the use of mechanical or chemical conditioners, forced air barn curing, and/or ensile may be required. Forage quality tests are submitted to an accredited lab for analysis. Records of forage quality components, cutting heights, moisture content, and harvest schedule are regularly kept to track increased forage quality and improved livestock performance.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253091.pdf

Conservation Measures:

CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.24 Upland Wildlife Habitat Management (Code 645)

Definition: Upland wildlife habitat management offers guidance on establishing and managing upland habitats and connectivity within the landscape for wildlife.

Purpose: Treating upland wildlife habitat concerns identified during the conservation planning process that enable movement, or provide shelter, cover, and food in proper amounts, locations and times to sustain wild animals that inhabit uplands during a portion of their life cycle.

Additional Information: The practices applies where the decision maker has identified an objective for conserving a wild animal species, guild, suite or ecosystem; land within the range of targeted wildlife species and capable of supporting the desired habitat.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253233.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.25 Water Well (Code 642)

Definition: A water well is a hole drilled, dug, driven, bored, jetted, or otherwise constructed into an aquifer to provide access to a groundwater supply.

Purpose: This practice is used to provide water for livestock, wildlife, irrigation, fire control, and other agricultural uses.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253247.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.26 Watering Facility (Code 614)

Definition: A watering facility is a means of providing drinking water to livestock or wildlife.

Purpose: A watering facility is used to provide livestock and/or wildlife with drinking water to meet daily needs. Proper location of the trough will improve animal distribution and vegetation. A watering facility is sometimes installed to keep livestock out of streams and other surface water areas where water quality is a concern.

Practice Information. This practice applies to all land uses where there is a need for a watering facility for livestock and/or wildlife, where there is a source of water that is adequate in quantity and quality, and where soils and topography are suitable for a facility. The water source may be a well, spring, stream, pond, municipal water supply, or other source, including water hauled from off-site, in some situations. A tank can be installed to store water to supply the trough. A watering ramp can be used to provide a controlled access to a pond or stream.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1258876.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.27 Well Decommissioning (Code 351)

Definition: Well decommissioning involves the sealing and permanent closure of inactive, abandoned, or unusable water well or monitoring well.

Purpose: The primary reasons for decommissioning a well are to eliminate hazards to people, animals, and farm machinery and to prevent groundwater contamination from surface water flow. A well can also be decommissioned when it is no longer needed, it cannot be rehabilitated, or it has failed structurally.

Practice Information: As part of the decommissioning process, the well will be cleared of all pumping equipment, pipelines, grease, oil, scum, debris, and other foreign materials. Casings, liners, and screens will be removed, if practical. Use chlorine to disinfect the well, in accordance with applicable laws and regulations. A well is plugged by filling it with alternating layers of fill material and sealing materials that restrict movement of water vertically in the well. Grouting may also be used to fill the hole. If the casing is left in place, grout will be used to seal any spaces around the outside of the casing. The top of the well will be sealed with material that will prevent surface water from entering the wellhead and the soils around the wellhead will be graded to prevent ponding. The location of the decommissioned well must be clearly identified in the records for this practice. Consider installing a metal "target" in the top of the wellhead seal to make it easy to find with a metal detector.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253248.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.28 Wetland Enhancement (Code 659)

Definition: Wetland enhancement is the rehabilitation or reestablishment of a degraded wetland, and/or the modification of an existing wetland to favor specific wetland functions.

Purpose: The purpose of this practice is to provide specific wetland conditions by: hydrologic enhancement (depth duration and season of inundation, and/or duration and season of soil saturation), and/or vegetative enhancement (including the removal of undesired species, and/or seeding or planting of desired species).

Practice Information: This practice applies on any degraded or nondegraded existing wetland where the objective is specifically to enhance selected wetland functions. This practice is not used on degraded wetlands when the soils, hydrology, vegetative community, and biological habitat are returned to original conditions or where a wetland is created on a site that historically was not a wetland.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253261.pdf

Conservation Measures:

CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.28 Wetland Restoration (Code 657)

Definition: Wetland restoration is a way to return a former or degraded wetland to a condition that is a close approximation of its original condition.

Purpose: To restore wetland function, value, habitat, diversity, and capacity to a close approximation of the pre-disturbance conditions by restoring: conditions conducive to hydric soil maintenance; wetland hydrology (dominant water source, hydroperiod, and hydrodynamics); native hydrophytic vegetation (including the removal of undesired species, and/or seeding or planting of desired species); and original fish and wildlife habitats.

Additional Information: The most common reason that a wetland has been lost or degraded is that the hydrology of the site has been changed. This causes the hydrophytic vegetation to disappear. Restoration of the hydrology of the site usually causes a natural return of the hydrophytic plants.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253262.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.29 Wetland Wildlife Habitat Management (Code 644)

Definition: Wetland wildlife habitat management involves developing or managing habitat for wetland wildlife.

Purpose: This practice is used to create or improve habitat for waterfowl, furbearers, or other wildlife.

Additional Information: It can be applied on or adjacent to wetlands, rivers, lakes, and other water bodies where wetland-associated wildlife habitat can be managed.

NRCS Conservation Practice Effects Network Diagram: Located on-line at: http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253263.pdf

Conservation Measures:
CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

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13.30 Diversion (Code 362)

Definition: An earthen channel installed across a slope with a supporting ridge on the downhill side, designed to direct excess water in a new direction for use or safe disposal. Applicable where control of surface runoff water is needed and where soils and topography are such that the diversion can be constructed and a suitable water outlet can be provided. Typical uses are to divert runoff away from farmsteads, agricultural waste systems, gullies, erosion areas, construction areas or other sensitive areas.

Purpose: This practice may be applied to support one or more of the following purposes. (1) Break up concentrations of water on long slopes, on undulating land surfaces, and on land that is generally considered too flat or irregular for terracing. (2) Divert water away from farmsteads, agricultural waste systems, and other improvements. (3) Collect or direct water for storage, water spreading or water-harvesting systems. (4) Protect terrace systems by diverting water from the top terrace where topography, land use, or land ownership prevents terracing the land above. (5) Intercept surface and shallow subsurface flow. (6) Reduce runoff damages from upland runoff. (7) Reduce erosion and runoff on urban or developing areas and at construction or mining sites. (8) Divert water away from active gullies or critically eroding areas. (9) Supplement water management on conservation cropping or strip cropping systems.

Additional Information: A diversion can be parabolic, V-shaped, or trapezoidal in cross-section, with the ridge located on the downhill side. A typical diversion is 1,000 feet long installed on a field slope of 1-3 percent, requiring 1 CY excavation per LF. The diversion is constructed with a large sized excavator, dozer or scraper (70-150 HP) using soil on site; the ridge is built from the soil taken to form the channel (the quantity of excavation and fill is balanced). The diversion is required to outlet into a stable channel such as a Grassed Waterway (412), Grade Stabilization Structure (410), Underground Outlet (620), or a stable water course. The diversion will be vegetated by using Critical Area Planting (342) or it may be farmed. If needed for erosion protection, it may be lined with gravel, concrete, or similar material. Maintenance requirements include regular inspections, removal of sediment, repair and revegetation of eroded areas and outlets, and regrading the diversion to maintain the planned capacity.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253063.pdf

Conservation Measures:

CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

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13.31 Obstruction Removal (Code 500)

Definition: Removal and disposal of buildings, structures and other improvements, vegetation, debris or other materials; to safely remove and dispose of unwanted obstructions in order to apply conservation practices or facilitate the planned land use. On any land where existing obstructions interfere with planned land use development, public safety or infrastructure. This standard is not intended for the removal of obstructions from aquatic environments.

Purpose: To safely remove and dispose of unwanted obstructions in order to apply conservation practices or facilitate the planned land use

Additional Information: The typical applications are provided below. In all applications, the dispose of removed materials is to an approved landfill or recycle center, or addressed on/off site by chipping, land distribution, burial at an approved location or burning. Burning is conducted under Woody Residue Treatment (Code 384). Disposal is planned in a way to not impede subsequent work or cause onsite or offsite damage.

Brush/Tree Removal. The removal of brush and trees by use of equipment (skid steer, dozer, excavator, brush chipper) and hand labor. Revegetate or other protection from erosion disturbed areas is a practice requirement. The typical area treated is 2.0 acres. Practice Critical Area Planting (342) is used for for seedbed preparation, seeding, fertilizing, and mulching requirements.

Fence. The removal and disposal of all parts of an existing fence by demolition, excavation or other means required. On any land where the existing fence interferes with planned land use development, public safety, wildlife movement/habitat, or infrastructure. The typical removal is 2,640 in linear feet. The removal is performed with the use of equipment (skid steer, small tractor) and hand labor.

Rocks/Boulders/Concrete/Steel. The removal and disposal of rock and or boulders by drilling, blasting, demolition, excavation or other means required for removal with the use of heavy equipment (excavators, dump truck) and hand labor. On any lands where obstructions interfere with planned land use development, public safety or infrastructure. The typical area treated is 2.0 acres.

Wood Structures. The removal and disposal of wood structures (including buildings) by demolition, excavation or other means required for removal with the use of heavy equipment (excavator, dump truck) and hand labor. On any lands where obstructions interfere with planned land use development, public safety or infrastructure. The typical area treated is 2,000 sq.ft.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1255519.pdf

Conservation Measures:

CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

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13.32 Subsurface Drain (Code 606)

Definition: Install a conduit, such as corrugated plastic tubing, tile, or pipe, installed beneath the ground surface to collect and/or convey drainage water, to improve the environment for crops, reduce erosion, improve water quality, regulate water tables, collect groundwater for beneficial uses, or to remove salts and other contaminants from the soil profile.

Purpose: This conservation practice standard is used for one or more of the following purposes: (1) Improve the soil environment for vegetative growth, reduce erosion, and improve water quality by: (a) Regulating water table and ground water flows, (b) Intercepting and preventing water movement into a wet area, (c) Relieving artesian pressures, (d) Removing surface runoff, (e) Leaching of saline and sodic soils, (f) Serving as an outlet for other subsurface drains, and (g) Regulating subirrigated areas or waste disposal areas, (2) Collect ground water for beneficial uses, (3) Remove water from heavy use areas, such as around buildings, roads, and play areas; and accomplish other physical improvements related to water removal. (4) Regulate water to control health hazards caused by pests such as flukes, flies, or mosquitoes.

Additional Information: Subsurface drainage (also known as pattern tiling) is used in areas having a high water table. The practice includes a below-ground installation of perforated HDPE (Corrugated Plastic Pipe) pipeline, using a drainage plow (generally >150 HP). The pipe is installed below ground to a minimum depth 5 feet. The pipe can range from 3-inch to 24-inch in diameter, the typical size is 5-inches. The design often includes a main line at the low end of the field with several lateral lines installed perpendicular to the topographic contours. A sand-gravel envelope (typically 12"wide x 12" high) may be installed along the pipeline. Drains may be designed with Structures for Water Control (587) to regulate the outflow.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253223.pdf

Conservation Measures:

CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

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13.33 Underground Outlet (Code 620)

Definition: A conduit installed beneath the surface of the ground to convey runoff to a suitable outlet without causing damage by erosion or flooding.

Purpose: To carry water to a suitable outlet from terraces, water and sediment control basins, diversions, waterways, surface drains, other similar practices or flow concentrations without causing damage by erosion or flooding.

Additional Information: An underground outlet can be installed when surface outlets are impractical because of stability problems, climatic conditions, land use, farmability, or equipment traffic. The outlet conveys excess water from terraces, water and sediment control basins, diversions, waterways, subsurface drains, surface drains or other similar practices. The underground conduit for an outlet can be either solid or perforated pipe (depending the site specific design). A typical design includes 500 feet of 6-24 inch PVC or HDPE pipe. Work is performed by a small dozer and excavator to trench excavate and backfill. Typically the catchment basin is typically 2 feet square or round, 6 inch deep, precast concrete and/or the inlet can be constructed of heavy duty perforated plastic risers with a rodent guard.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253232.pdf

Conservation Measures:

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13.34 Mulching (Code 484)

Definition: Application a protective cover of plant residues or other suitable material not produced on the site, to the soil surface. Mulching is used to help control soil erosion, protect crops, conserve moisture, moderate soil temperature, prevent soil compaction and crusting, reduce runoff, and suppress growth of weeds.

Purpose: This practice supports one or more of the following purposes: • Conserve soil moisture – Resource concern (INSUFFICIENT WATER –Inefficient moisture management). • Reduce energy use associated with irrigation – Resource concern (INEFFICIENT ENERGY USE – Farming/ranching practices and field operations and INSUFFICIENT WATER – Inefficient moisture management). • Provide erosion control – Resource concern (SOIL EROSION– Excessive bank erosion from streams shorelines or water conveyance channels, and/or SOIL EROSION – Concentrated flow erosion, and/or SOIL EROSION - Sheet, rill, & wind erosion). • Facilitate the establishment of vegetative cover – Resource concern (DEGRADED PLANT CONDITION – Undesirable plant productivity and health). • Improve soil health – Resource concern (SOIL QUALITY DEGRADATION –Organic matter depletion). • Reduce airborne particulates – Resource concern (AIR QUALITY IMPACTS - Emissions of Particulate Matter - PM - and PM Precursors).

Additional Information: The practice is used on sites subject to erosion and high runoff rates that need the additional protection from material brought in from off the site. The material may be manufactured and commercially available (i.e., hydromulch) or it may be hay, wood chips, compost or crop residues (i.e., straw) hauled to the site and applied generally with a mulch blower. A biodegradable erosion control blanket may also be used, typically made of coconut coir, wood fiber, straw and is typically covered on both sides with polypropylene netting. Synthetic material may also be used, such as geotextile, biodegradable plastic, polyethylene plastic, or other state approved synthetic mulch. Selection of materials is dependent upon site condition and the availability of materials. This practice is used primarily on construction disturbance sites, following Critical Area Planting (342). However, the practice is also used in production of specialty crops, for fire rehabilitation or Mine Reclamation (543, 542), around new tree plantings etc.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1267673&ext=pdf

Conservation Measures:

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13.35 Nutrient Management (Code 590)

Definition: Managing the amount (rate), source, placement (method of application), and timing of plant nutrients and soil amendments.

Purpose: (1) To budget, supply, and conserve nutrients for plant production. (2) To minimize agricultural nonpoint source pollution of surface and groundwater resources. (3) To properly utilize manure, municipal and industrial bio-solids, and other organic byproducts as plant nutrient sources. (4) To protect air quality by reducing odors, nitrogen emissions (ammonia, oxides of nitrogen), and the formation of atmospheric particulates. (5) To maintain or improve the physical, chemical, and biological condition of soil.

Additional Information: A nutrient management system/plan is developed and implemented with a nutrient management budget based on soil test analysis and land grant university recommendations or crop removal rates. The source of plant nutrients may be from organic wastes, commercial fertilizer, legumes, or crop residue. The amount and timing of nutrients is based on soil testing, planned yield, and growing season of target plants. Post-harvest soil and/or tissue tests (results interpreted by crop consultant) are used to help establish the adequacy of the plan in meeting crop needs while minimizing P application rate and residual N, thus reducing the potential for off-site impacts. Records are maintained. This practice is commonly applied with other practices needed to mitigate soil erosion and nutrient runoff.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1267688&ext=pdf

Conservation Measures:

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13.36 Conservation Crop Rotation (Code 328)

Definition: A planned sequence of crops grown on the same ground over a period of time (i.e. the rotation cycle).

Purpose: This practice is applied to support one or more of the following purposes: (1) Reduce sheet, rill and wind erosion. (2) Maintain or increase soil health and organic matter content. (3) Reduce water quality degradation due to excess nutrients. (4) Improve soil moisture efficiency. (5) Reduce the concentration of salts and other chemicals from saline seeps. (6) Reduce plant pest pressures. (7)

Provide feed and forage for domestic livestock. (8) Provide food and cover habitat for wildlife, including pollinator forage, and nesting.

Additional Information: Growing a planned sequence of various crops on the same piece of land for a variety of conservation purposes, such as, to: reduce erosion; increase soil health; reduce water quality degradation due to excess nutrients; reduce the concentration of salts and other chemicals; reduce plant pest pressures; provide feed and forage for domestic livestock; provide habitat for wildlife, including pollinators.

This is a management practice to acquire the technical knowledge and skills necessary to effectively implement a conservation crop rotation. It may include changing the management system from an irrigated cropping system to dryland farming, or to transition the rotation from a conventional system to an organic system, and/or to include a rotation of specialty crops (fruits and vegetable). The rotational crops include high-residue producing crops such as corn or wheat in rotation with low-residue-producing crops such as vegetables or soybeans. The rotation may also involve growing forage crops in rotation.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1270377&ext=pdf

Conservation Measures:

CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

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13.37 Residue and Tillage Management (Code 329/345)

Definition: Managing the amount, orientation, and distribution of crop and other plant residue on the soil surface year-round while limiting soil-disturbing activities used to grow and harvest crops in systems where the field surface is tilled prior to planting.

Purpose: (1) Reduce sheet/rill erosion. (2) Reduce wind erosion and Particulate matter less than 10 micrometers in diameter - PM 10. (3) Improve soil organic matter content. (4) Reduce CO_2 losses from the soil. (5) Reduce energy use. (6) Increase plant-available moisture. (7) Provide food and escape cover for wildlife.

Additional Information: A cropping practice where crops are planted and grown in narrow slots or tilled strips established in the untilled seedbed of the previous crop. This practice increases organic matter, improves soil tilth, increases productivity, among other benefits.

This practice typically involves conversion from a clean-tilled (conventional tilled) system to no-till or strip-till (conservation tilled) system. The practice involves managing the amount, orientation and distribution of crop and other plant residue on the soil surface year round while limiting soil-disturbing activities used to grow and harvest crops. This practice includes maintaining most of the crop residue on the soil surface throughout the year, commonly referred to as no-till, zero till, slot plant, row till, strip till, or just the generic term, conservation tillage. The common characteristic of this practice is that the only tillage performed is a very narrow strip prepared by coulters, sweeps, or similar devices attached to the front of the planter. The no-till/strip-till system includes chemical weed control (rather than cultivation) and may also include a period of chemical fallow. System is applicable in both irrigated and non-irrigated fields.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1267750&ext=pdf

Conservation Measures:

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13.38 Dike (Code 356)

Definition: A barrier that is constructed of earth, a stable earthen structure, to protect land against flooding or to regulate water in conjunction with floodways, wildlife management or for wetland management. Applicable to any land subject to flooding or inundation or on which retention and management of water is needed.

Purpose: (1) To protect people and property from floods. (2) To control water level in connection with crop production; fish and wildlife management; or wetland maintenance, improvement, restoration, or construction.

Additional Information: The dike is constructed with a large sized excavator or dozer (70-150 HP) using soil available on or near the construction site. However, soil may be hauled in when soil suitable for construction does not occur onsite or when site conditions necessitate it. Placement on the landscape can range from a short, tall dike that serves as a plug within a drainage way to a low profile dike following the contour of the land to create a shallow wetland. The dike foundation is grubbed and leveled as site preparation. Typically, the dike is built from the soil taken a ‘barrow area’ which runs parallel to the dike. The design criteria of dike height, freeboard, top width, and side slopes are designed

specific to the site conditions and dike purpose. However, a typical dike design includes a height of 4 feet (6 ft. is criteria maximum), a top width of 6 feet (8 ft. is criterial maximum), 3:1 side slopes (2:1 is the criteria minimum), and a width of 10-15 feet. If needed for erosion protection, the dike may be lined with rock riprap, sand-gravel, or soil cement. The structure to the control the water is designed under Structure for Water Control (587). The berm will be vegetated in most cases by using Critical Area Planting (342). This practice will require maintenance over the expected life of the practice, including regular inspections, removal of burrowing animals, and repair and re-vegetation of eroded areas.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253062.pdf

Conservation Measures:

CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

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13.39 Water Control Structure (Code 587)

Definition: A structure in a water management system that conveys water, controls the direction or rate of flow, maintains a desired water surface elevation or measures water.

Purpose: The practice may be applied as a management component of a water management system to control the stage, discharge, distribution, delivery or direction of water flow.

Additional Information: Flashboard risers, check dams, division boxes, water measurement devices, and pipe drop inlets are typical examples. Sluices to provide silt management; culverts; inverted siphons; debris screens to keep trash, debris, or weed seeds out of pipelines are examples of other uses of this practice. Implementation often includes Obstruction Removal (500) of the existing structure, and site preparation by clearing and shaping by an excavator, dozer, skidsteer or other. The structure is set, backfilled and compacted.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253222.pdf

Conservation Measures:

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CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

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13.40 Aquatic Organism Passage (Code 396)

Definition: Modification or removal of barriers that restrict or impede movement of aquatic organisms.

Purpose: Improve or provide upstream and downstream passage for fish and other aquatic organisms.

Additional Information: Passage can be provided by a range of actions and structures, including but not limited to culverts (pipe, bottomless, and concrete), low water crossings, bridges, fish ladders, nature-like fishways, and screens at gravity diversions. All require an assessment of adjacent stream characteristics; including channel geometry, slope, sediment texture and composition, and major geomorphic units that govern channel plan, pattern and profile. Channel Bed Stabilization (584) would apply to channels where the removal of barriers to aquatic organism passage would result in destabilization of the channel bed.

Typical scenerios include:

> *CMP Culvert.* A corrugated metal (galvanized steel or aluminum) pipe culvert (CMP) of any shape (round, elliptical, or squash) used at a road-stream crossing. The culvert is sized according to geomorphic analyses, not just an estimate of runoff and streamflow. The culvert is placed on a subexcavated compacted bed, set at a slope that matches the design longitudinal profile, and backfilled with a bed mixture (gravel and rock) that mimics adjacent stream characteristics with special attention to channel pattern. The simulated streambed material is continuous throughout the culvert barrel, and blended with the intact streambed at the culvert inlet and outlet. Concrete headwalls and/or wingwalls may be necessary in shorter installations and/or where fill/roadway cover is limited or the stream alignment is not perpendicular to the road axis. CMPs are installed with an assortment of equipment used for excavation, placing material, and delivering and removing material (backhoe, excavator, skidsteer). Stream dewatering and diversion around the work site is often required. Once the simulated streambed in the culvert barrel is complete, the roadway is replaced and any necessary armoring and revegetating material is placed at the culvert inlet and outlet where it intersects the road fill prism. Other actions include construction staking and signage, soil erosion and pollution control, removal and disposal of the old culvert, and topsoil conservation for site reclamation. Disturbed areas are revegetated with a mix of site-adapted species. This scenario does not include additional measures needed to address channel incision, bank stability, and other factors associated with the presence of the stream crossing.
>
> *Nature-like fishways*, also known as roughened channels, rock ramps, or bypass channels, are constructed features that provide passage around or through an instream barrier. The design is based on mimicking adjacent stream characteristics, using natural materials. They are not as susceptible to debris-related operational issues as other options. When used to bypass an instream barrier, they require a larger footprint than instream structures, and may also require

control structures to regulate flow through the fishway or address tailwater fluctuations affecting the entrance (downstream end). They are constructed with an assortment of equipment used for excavation, placing material, and delivering and removing material (backhoe, excavator, skidsteer). Stream dewatering and diversion around the work site is often required. Construction elements generally include an assortment of rock used to create riffles, cascades, or riffle-pool sequences with between 6 to 12 inches of water surface elevation drop between adjacent structures. Large woody material is used to create channel structural elements in some settings, when available and where approved by oversight agencies. Removed materials are trucked away and disposed or recycled off-site, unless excavated native streambed material can be used in fishway construction. Disturbed areas are revegetated with a mix of site-adapted species, and access control and signage are provided.

Blockage Removal involves removal of aquatic organism passage barriers, including small relict earthen diversions (e.g., splash dams), failing or undersized culverts, and sediment or large woody material from mass wasting or major flood events. Removal is done with an assortment of equipment, including tracked excavators outfitted with buckets with "thumbs", bull dozers, skid steers, front-end loaders, and dump trucks. The channel and adjacent floodplain are restored to pre-blockage conditions to the fullest extent practicable. Dewatering activities are rarely needed, but may be used. Removed materials are trucked away and disposed or recycled off-site, unless native streambed material found in the blockage can be used in site reclamation. Disturbed areas are revegetated with a mix of native or site-adapted species.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253038.pdf

Conservation Measures:

CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

13.41 Access Control (Code 472)

Definition: The temporary or permanent exclusion of animals, people, vehicles, and/or equipment from an area; to achieve and maintain desired resource conditions by monitoring and managing the intensity of use by animals, people, vehicles, and/or equipment.

Purpose: Achieve and maintain desired resource conditions by monitoring and managing the intensity of use by animals, people, vehicles, and/or equipment in coordination with the application schedule of practices, measures and activities specified in the conservation plan.

Additional Information: Controlling access is often used to protect, maintain, or improve the quantity and quality of natural resources. Commonly this includes the exclusion of livestock from a conservation planting (e.g. pollinator plot) or from sensitive areas such as cultural areas, wetlands, spring, riparian and streambank edges. This practice may also be used to protect aesthetic resources or for health and safety reasons (e.g. to prevent illegal dumping). The duration of exclusion depends upon the need. Exclusion may be short-term, such as during plant establishment or during a nesting season; it may be long-term exclusion; or it may be used to control the intensity of access. The conservation plan will specify the need/purpose for access control, the duration/extent, and the method of exclusion.

This practice is for the management of access control, which may include regulating activities such as posting signs, patrolling and permits. When it is necessary to have a physical barrier, then a natural barrier (rock outcrops, downed trees etc.) or an existing barrier (existing fence lines etc.) is used whenever possible. If a barrier needs to be constructed, limited actions such as installing a road gate or limited fencing (typical size being 3,600 feet) may be included in this practice. However, if extensive barriers are necessary, then a NRCS 'facilitative' practice such as Fence (382) is planned. The effects of facilitate practices are addressed under those respective practice descriptions.

NRCS Conservation Practice Effects Network Diagram:
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1258878.pdf

Conservation Measures:

CM1 Ensure coordination at the site specific and/or state specific level(s) with selected conservation partners to determine overall practice applicability, design elements, application rates, seasonality, frequency, location, extent, configuration, and timing of practice implementation.

CM2 Minimize disruption to/disturbance of existing monarch habitat during peak monarch breeding and migration periods while considering the long-term goal of improving habitat for the species and promoting fall nectar plants.

CM3 Use the appropriate sub-region WHEG and other decision support tools to identify the limiting factors for monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order.

14.0 Appendix IV – ESA Predictability

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
Post Office Box 2890
Washington, D.C. 20013

AUG 2 2012

The Honorable Daniel M. Ashe
Director, U.S. Fish and Wildlife Service
Department of the Interior
1849 18th Street, N.W., Room 3356
Washington, D.C. 20240

Dear Director Ashe:

As you are aware, on March 8, 2012, Secretary of Agriculture Thomas J. Vilsack and Secretary of Interior Ken Salazar announced *Working Lands for Wildlife* (WLFW), a new $33 million partnership with farmers, ranchers, and forest landowners to use innovative approaches to restore and protect wildlife habitat, including habitat for seven at-risk species. Our agencies have made significant progress since the announcement, working closely to develop conservation practices that will benefit the at-risk species and their habitats. These practices will enable America's farmers and ranchers to continue working their lands, while voluntarily furthering conservation activities targeted to imperiled species.

The purpose of this letter is to affirm the discussions between our agencies related to providing landowners participating in WLFW with predictability, as it relates to candidate species and the Endangered Species Act (ESA). We understand that the U.S. Fish and Wildlife Service (USFWS) is now completing conference opinions for three of the four candidate species identified in WLFW, including lesser prairie-chicken, gopher tortoise, and New England cottontail. Further, we understand USFWS completed an effective conference report for the greater sage-grouse, a candidate species also targeted by WLFW. Specifically, these documents analyze the effects of conservation practices developed through partnership of our agencies for landowners choosing to participate in these efforts, describing the benefits for the candidate species and their habitats. These documents particularly build on our on-going partnership to conserve two of these candidate species, namely greater sage-grouse and lesser prairie-chicken.

While the benefits from implementing the conservation practices are clear, we understand that some, such as prescribed burning, could have negative incidental impacts in the short run but significant benefits in the long run. An important aspect of this initiative is providing landowners who voluntarily sign up through WLFW with predictability about implications for them, if any, should the candidate species be listed in the future under ESA. We understand that USFWS can, under Section 7 of ESA, carefully analyze the positive and negative effects of conservation practices, much like USFWS is doing through conference reports and opinions, and

exempt through a biological opinion incidental take that is anticipated to occur to listed species from implementing conservation practices in the future. Confirmation that USFWS is willing to take this step, should any of the candidate species become listed, would provide important predictability as we look to sign up interested landowners in fiscal year (FY) 2012 and future fiscal years.

In addition, the program contracts signed by the Natural Resources Conservation Service and landowners under WLFW beginning in FY 2012 will range in duration from one year to 10 years and, in some cases, up to 15 years. While the program contracts have a specific time period, many landowners may voluntarily choose to continue implementing the practices after the contract ends. The actions of these landowners will continue to benefit the species and their habitats, providing the stewardship that furthers the mission of both agencies and the goals of WLFW. Offering landowners predictability under ESA will further encourage the implementation of the conservation practices into the future. I would appreciate your advice on how we might collectively achieve this goal.

Thank you for your partnership in WLFW. Our work together offers another example of the compatibility of working lands and wildlife species conservation. Please contact Jason Weller, Chief of Staff, at (202) 720-6580, if you have any questions.

Sincerely,

Dave White

Dave White
Chief

cc:
Jason Weller, Chief of Staff, NRCS, Washington, D.C.
James Gore, Assistant Chief, NRCS, Washington, D.C.
C. Wayne Honeycutt, Deputy Chief for Science and Technology, NRCS, Washington, D.C.
Terrell Erickson, Director, Ecological Sciences Division, NRCS, Washington, D.C.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington, D.C. 20240

AUG - 3 2012

In Reply Refer To:
FWS/AES/52307

Mr. Dave White
Chief, Natural Resources Conservation Service
1400 Independence Ave., SW, Room 5105-A
Washington, DC 20250

Dave

Dear ~~Mr. White~~:

Thank you for your letter dated August 2, 2012 about the Working Lands for Wildlife (WLFW) partnership, which is successfully leveraging the capabilities and resources of our two agencies. We greatly appreciate the collaboration between the Natural Resources Conservation Service (NRCS) and U.S. Fish and Wildlife Service (Service) staff, and the leadership that you have shown to strategically target funding for working lands and sensitive species. This effort clearly demonstrates that productive working rural lands are compatible with the needs of wildlife and their habitats, achieving the missions of both NRCS and the Service.

The purpose of this letter is to describe the Service's approach to candidate conservation under the Endangered Species Act (ESA) and predictability for landowners who participate in WLFW. As referenced in your letter, the Service has recently completed conference opinions for three of the four candidate species involved in WLFW, including lesser prairie chicken, the eastern portion of the gopher tortoise's range, and New England cottontail. In addition, the Service had previously completed an effective conference report for the greater sage grouse, the fourth candidate species involved in WLFW. In these documents, the Service analyzed the effects to these species from the implementation of specific conservation practices by landowners who choose to participate in WLFW. These conservation practices and associated conservation measures were developed in partnership by our agencies to benefit the species and their habitats and be fully compatible with working lands.

The Service will be determining in the future whether to list each of these candidate species as threatened or endangered under the ESA. In the event that any of the species are listed, the Service is committed to validating the conference report and opinions as biological opinions for NRCS under section 7 of the ESA, and exempting any incidental take as described in the biological opinions associated with implementing the specified conservation practices. As a result, the predictability for landowners is clear. They will know that the conservation practices will continue to benefit wildlife for as long as they are implemented, and that any ESA issues associated with their implementation have been already addressed in full.

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You also asked how we might encourage landowners to continue to implement these beneficial conservation practices beyond the term of their program contract with NRCS. The Service also recognizes the value of landowners voluntarily choosing to continue implementing the conservation practices after each individual program contract with NRCS under WLFW ends. These contracts can extend from one to fifteen years in length, depending on the species involved and the conservation practices employed. Continuing the implementation of the conservation practices beyond this period would advance the longer-term goals of WLFW and both agencies' missions.

Should any of the candidate species in WLFW be listed in the future, the Service intends to exempt through section 7 any incidental take that is anticipated to occur from the implementation of the conservation practices if a landowner with a WLFW program contract voluntarily chooses to continue implementing the practices after the program contract ends. The Service will review the effects of implementing the specified conservation practices to these species over a 30-year period and exempt any incidental take anticipated to occur from their implementation. Each landowner involved in WLFW will have the sole discretion whether or not to continue implementing the conservation practices at the end of the contract with NRCS. If a landowner chooses, however, to continue implementing the conservation practices defined through our WLFW partnership, they will have predictability and the confidence in knowing that any ESA issues associated with their implementation over a 30-year period will have already been addressed in full. By taking this step, the Service hopes to encourage the long-term implementation of the conservation practices and associated conservation measures.

The Service also notes that two other species included in WLFW are already listed under the ESA, the Southwest willow flycatcher and the bog turtle. For these two species, the Service has completed biological opinions and exempted any incidental take anticipated in the biological opinions to occur from implementation of the conservation practices. In addition, the western portion of the gopher tortoise's range is currently listed (the eastern portion of the range is currently a candidate species as noted above), and the Service has completed a biological opinion and exempted any incidental take anticipated in the biological opinion to occur from implementation of the practices in this portion of the range. Furthermore, the golden-winged warbler is also included in WLFW. This species is neither currently listed under the ESA nor a candidate species for listing. Should the species status change in the future and the potential need for listing be considered, the Service intends to follow the same approach to ESA predictability for NRCS and landowners that has been used for the other species in WLFW.

As WLFW moves forward, we will have the opportunity to gauge the success of the conservation practices over time, and potentially gain information that will allow us to refine them and achieve even better results for landowners, NRCS, and the Service. The Service is committed to this approach of learning and adaptive management in partnership with NRCS and the landowners participating in WLFW. Any refinements to the conservation practices would be developed in full collaboration with NRCS, using information gained from on-the-ground implementation of WLFW.

The Service is also committed to developing more tools for landowners. We are particularly interested in pursuing partnerships using Candidate Conservation Agreements with Assurances with landowners, which can provide long term conservation options and regulatory certainty.

Thank you again for your leadership in working lands conservation. If you have any questions, please contact Gary Frazer, Assistant Director for Endangered Species, at (202) 208-4646.

Sincerely,

DIRECTOR

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