New England Pollinator Partnership: Biological Assessment, Opinion, Conference Report, And Partnership Agreement

A Collaboration of the Natural Resources Conservation Service and the U.S. Fish and Wildlife Service

Approved:

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1.0 Introduction

This document explains and describes a collaborative multi-state partnership between the Natural Resources Conservation Service (NRCS) and others, including the United States Fish and Wildlife Service (USFWS). This partnership is specifically intended to benefit the federally-endangered rusty patched bumblebee (*Bombus affinis*) and two additional species: the petitioned yellow banded bumblebee (*Bombus terricola*) and monarch butterfly (*Danus plexippus* var. *plexippus*) (82 FR 10285 – 10286 [February 10, 2017], 81 FR 14058 – 14072 [March 16, 2016], 79 FR 78775 – 78778 [December 31, 2014]). We expect several more bumblebee species will benefit from this collaboration and they are included in the list of "covered species" (Table 1[1]). This effort, designed to be consistent with the Working Lands for Wildlife (WLFW) partnership model and administered through the NRCS's Environmental Quality Incentives Program (EQIP) and Conservation Stewardship Program (CSP), includes other agencies and entities (Xerces Society for Invertebrate Conservation, Maine Association of Conservation Districts, and New Hampshire Association of Conservation Districts and many others), with more details provided in the Proposed Action (Appendix I). The term of the Proposed Action is 25 years. The NRCS activities under the Proposed Action will be applied through technical and financial assistance to eligible landowners[2] using its Agriculture Improvement Act, hereafter refered to as the Farm Bill[3], authorities throughout Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont (Figure 1). The NRCS seeks to enroll 1,182 participating landowners to promote pollinator conservation on 3,108 hectares (ha) (7680 acres (ac)) over the 25-year term of this Partnership Agreement. Over time and with the consensus of the partners, the geographic scope may be expanded to include additional states and more species may be added.

Table 1. Covered Species

Common Name	Scientific Name	Federal Status	Critical Habitat
Rusty patched bumblebee	*Bombus affinis*	E	No
Yellow banded bumblebee	*Bombus terricola*	UR	Not Applicable
Ashton's cuckoo bumblebee	*Bombus bohemicus*	None*	Not Applicable
American bumblebee	*Bombus pensylvanicus*	None*	Not Applicable
Yellow bumblebee	*Bombus fervidus*	None*	Not Applicable
Lemon cuckoo bumblebee	*Bombus citrinus*	None*	Not Applicable
Fernald cuckoo bumblebee	*Bombus flavidus*	None*	Not Applicable
Confusing bumblebee	*Bombus perplexus*	None*	Not Applicable
Indiscriminate cuckoo bumblebee	*Bombus insularis*	None*	Not Applicable
Variable cuckoo bumblebee	*Bombus variabilis*	None*	Not Applicable
Monarch butterfly	*Danaus plexippus* var. *plexippus*	UR	Not Applicable

Legend: E = Endangered Status; UR= Under Review for ESA protections; * - no current Federal legal status

[1] Appendix I – the Proposed Action refers to Target and Non-Target Species; these are collectively described as "covered species" in this document.

[2] The terms "landowner", "client", and "producer" are used interchangeably throughout this document and supporting Appendices and references.

[3] Agriculture Improvement Act of 2018 (H.R. 2; Public Law No: 115 – 334, also known as the 2018 Farm Bill, as amended.

1.1 Overview

The statutory title of "section 7" of the Endangered Species Act (ESA), "*Interagency Cooperation*", § 7(a)(1) directs all Federal agencies to carry out programs for the conservation of threatened and endangered species in consultation with the USFWS. Further, §7(a)(2) directs each Federal agency to insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat.

The USFWS encourages, engages in, and supports all Federal action agencies in the cooperation of §7(a)(1) consultation process and prioritizes those agencies that participate in the cooperative §7(a)(1) consultation process to mazimize conservation efficiency and effectiveness.

The NRCS has developed national and state policies and procedures to address the ESA's §7 (a)(1) and this document has been prepared under the ESA's §7 (a)(2) to consult with the USFWS on the foreseeable, NRCS federal actions that may affect endangered or threatened species or critical habitat.

Additionally, this document has been prepared under the ESA's §7 (a)(4) to voluntarily confer with the USFWS on the foreseeable, NRCS federal actions that 'May Affect' proposed species or proposed critical habitat[4] or candidate species[5]. NRCS has chosen to voluntary confer with the USFWS as a prudent measure to ensure the agency's actions follow the NRCS policy on proposed and candidate species and to be proactively prepared if a proposed or candidate species becomes federally listed. The NRCS would like to utilize the conference procedures available within the ESA's section 7 consultation authorities to initiate conservation actions now for the covered species; thereby, receiving ESA predictability should any of them be listed. Part 2.3.7 provides a detailed explanation on the ESA predictability. More information on the regulatory and conservation status of the covered species in found in Part 3.0.

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)).

[4] Conferencing on proposed species and proposed critical habitat is only required when the action is likely to jeopardize the continued existence of a proposed species or will result in the destruction or adverse modification of proposed critical habitat.

[5] Candidate species are not protected under the ESA and conferencing with the USFWS is optional.

Background on the Working Lands for Wildlife effort

On March 8, 2012, the Secretaries of Agriculture and Interior jointly announced a collaborative partnership between the NRCS and the USFWS. This partnership, called Working Lands for Wildlife (WLFW) [6], coordinates with landowners who are eligible to receive Farm Bill technical and financial assistance to: (A) Restore populations of declining wildlife species; (B) Provide farmers, ranchers, and forest managers with regulatory certainty that conservation investments they make today help sustain their operations over the longterm; and (C) Strengthen and sustain rural economies by restoring and protecting the productive capacity of working lands. The Proposed Action is a specific collaboration consistent with the larger WLFW partnership as described herein.

1.2 Purpose

The purpose of this document is to serve as the formalization and conclusion of a streamlined consultation process using the USFWS' authorities under the section 7 of the ESA, whereby a programmatic biological assessment and programmatic conference report and regulatory effects conclusion are combined ("the document"). Specifically, this document conveyes the Service's Biological Opinion regarding adverse effects to the rusty patched bumblebee and its habitats. Additionally, this document includes a Conference Report for the yellow banded bumblebee, monarch butterfly, and the other covered bumblebees. We expect implementation of the NRCS conservation practices and their associated conservation measures described (Table 2; Appendix IV) will result in a positive population response by the covered species through reduction or elimination of threats resulting from habitat loss. We do anticipate implementing the conservation practice standards and associated conservation measures may also result in short-term adverse effects to individual pollinators, but the conservation measures include actions that will substantially reduce negative impacts to the covered species.

1.3 Authority

The 2018 Farm Bill (see § 2407) directs the Secretaries of Agriculture and the Interior to carry out the Working Lands for Wildlife model of conservation on working landscapes. Furthermore, the 2018 Farm Bill directs the agencies to continue this work in accordance with the national 2016 "Partnership Agreement Between the United States Department of Agriculture Natural Resources Conservation Service and the United States Department of the Interior Fish and Wildlife Service' and the related 2016 USFWS Director's Order No. 217.[7] Those commitments are inextricabley linked with the Working Lands for Wildlife model of conservation delivery and the value placed on regulatory predictability for private landowners and the working landscapes they manage.

This document has been prepared pursuant to and complies with section 7 of the ESA, as amended (16 United States Code [U.S.C.] 1531 *et seq*.) and 50 Code of Federal Regulations [CFR] §402 of the USFWS's interagency regulations governing section 7 of the ESA, as amended. This streamlined interagency consultation is authorized by NRCS' policy under the General Manual 190, Part 410.22 (E)(8) - "*NRCS will, at all organizational levels, explore opportunities to improve efficiencies through*

[6] http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1047545.pdf.
[7] https://www.fws.gov/policy/do217.html

programmatic agreements, interagency training, and other streamlining methods to implement NRCS actions in a more efficient and timely manner".

1.4 Agency Commitments

It is important for the reader to understand that this document is not limited to a compliance process under the ESA; but also this document serves to memorialize a partnership under both NRCS and USFWS authorities to achieve beneficial conservation outcomes in accordance with the WLFW model as described and conditioned herein. As such, NRCS and USFWS have committed to providing both leadership and staff support to the Proposed Action and all associated implementation and execution elements identified herein.

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 authorized under its legislative authorities (1.3), 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 covered species. Other features of the Proposed Action described herein (including but not limited to Parts 2.3.1 thru 2.3.8 and Appendix I) are designed to enhance the conservation practice standards, reduce detrimental effects, accentuate beneficial effects, provide for outcome-based monitoring, and to otherwise support the overall objectives of the Proposed Action. The ESA predictability (described in Part 2.3.7; Appendix V) and expected beneficial conservation outcomes are not tied to a specific NRCS program or effort (e.g., the Proposed Action is program neutral). Instead, the extended ESA incidental take coverage is predicated by following specific elements and requirements described herein while working with eligible landowners in the Action Area to produce a Conservation Plan using the WLFW approach. The Conservation Plan will become the instrument of ESA predictability.

The partnership is using a targeted conservation systems approach to implement specific conservation practice standards and enhancements to improve the conservation status of the covered species by targeting resource concerns and threats while simultaneously ensuring compatibility with the eligible landowners' expectations for their property.

2.1 Scope

The scope of NRCS actions include:

- Creating and maintaining conservation plans with eligible landowner implementing, planning, and carrying out related actions over the duration of the Proposed Action;
- Implementing and maintaining existing Conservation Technical Assistance (CTA) or Financial Assistance (FA) conservation practices produced by NRCS consistent with the requirements outlined herein for eligibility, and
- Implementing and maintaining future Conservation Technical Assistance (CTA) or Financial Assistance (FA) conservation plans designed by NRCS consistent with the requirements outlined herein for eligibility.

The duration of the proposed action is 25-years (2019-2044) with opportunities to revisit the Proposed Action annually and review of outcomes and effects at five-year intervals as described in Part 2.3.8 below.

2.2 Action Area

Pursuant to the the regulations implementing the ESA, 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 Action Area for this Proposed Action includes all of the New England States: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont (Figure 1 below).

Modifications to the initial geographic scope and priority area(s) are expected and anticipated over the 25-year life of the Proposed Action and associated USFWS-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 the long-term goals of the Proposed Action are achieved. This process will occur through collaboration between the NRCS, the USFWS and other invited conservation partners (Part 2.3.8 below).

Note that for Figure 1 below, Priority zones are used by each state NRCS office to independently rank applications within each participating state. That is, applications for all participating states will not be pooled and evaluated across the Action Area. Consequently, an application in Priority Zone 1 in Rhode Island would not be evaluated against a project from Priority Zone 2 in Maine. In Maine, distribution of blueberry production (Yarborough 2009) is overlaid on prioritization zones to illustrate the geographic overlap between wild blueberry production areas and priority areas of covered species conservation actions.

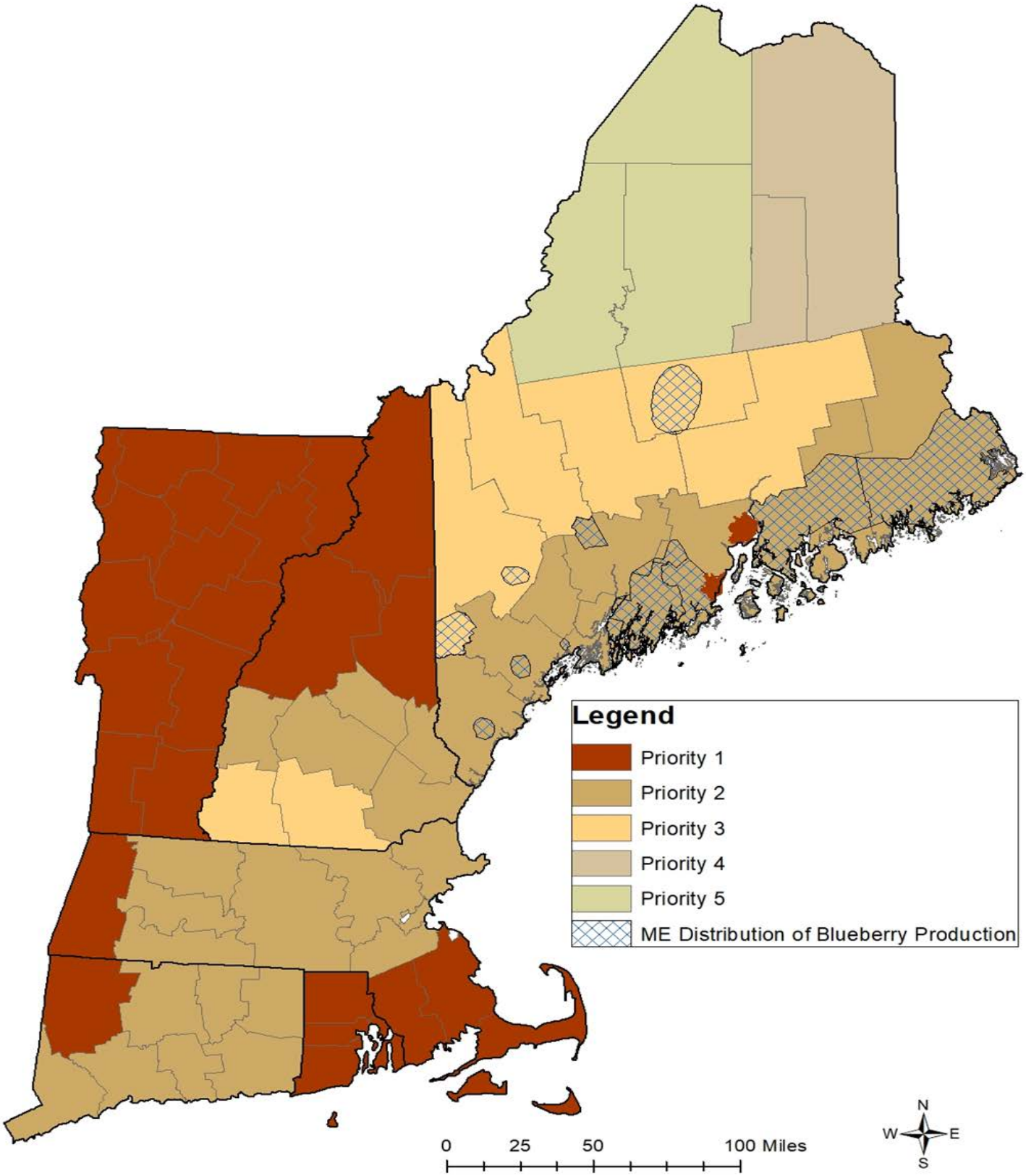


Figure 1. Action Area

2.3 Implementation Elements of the Proposed Action

Implementing the Proposed Action involves:

(1) Targeting of select covered species and landscapes;
(2) Strategic application of NRCS Conservation Practices to those species and landscapes;
(3) Application of the best science to support management of desireable habitat conditions;
(4) Incorporating jointly developed conservation measures to maximize benefits and minimize deleterious activities;
(5) Outcome based monitoring and assessment to measure progress and inform adaptations that improve results;
(6) Staff and partnership training and involvement;
(7) Incentivizing participation by providing ESA predictability to eligible landowners; and
(8) An administrative management element to ensure long-term success and flexibility of this partnership between USFWS and NRCS.

2.3.1 A Landscape and Targeted Focus on Selected Species

The Proposed Action is structured to facilitate landscape-level improvements across the covered species' ranges and recognizes that stressors and conservation opportunities may differ across the Action Area. Close collaboration of many stakeholders, including local, State, and Federal agencies, and NGOs, will ensure that NRCS activities provide benefits to the covered species. Implementing the Proposed Action will be integrated into the daily operations of NRCS' existing and future Farm Bill authorities. 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[8]. The covered species are listed in Table 1.

2.3.1.1 Addressing Other ESA Protected Species

The ESA regulatory effects determinations provided in section 8.0 apply only to the covered species and only for the Proposed Action. There are other ESA protected species that occur in the Action Area and may be affected by the Proposed Action; however, we anticipate there will be limited situations in which implementation will actually result in adverse affects to federally-listed species. This is based on our understanding of the habitat characteristics of the listed species, as summarized in Appendix VII, and the nature of the habitat where we expect the Proposed Action will occur. Specifically, we expect most activities covered conducted as a part of this Proposed Action will occur within existing agricultural dominated habitats (i.e., lands dominated by existing commercial crops) which are not known to be occupied by many of the listed species known to occur in the Action Area. Furthermore, the NRCS will use the Information for Planning and Consultation (iPAC) screening tool or follow existing procedures and NRCS policies to generate species occurrence information for each site-specific conservation plan.[9] In the event an iPAC report identifies a federally-listed species that may occur at the site or a species identified using existing procedures, NRCS will review the species habitat information to determine if project activities may affect the listed species identified in the iPAC report. Each NRCS state office will coordinate and consult with the local USFWS office where necessary if actions analyzed herein may affect any other ESA protected species. See Appendix VII for additional discussion and guidance.

[8]The NRCS' Conservation Planning process is further outlined in Appendix II.
[9] The Information for Planning and Consultation tool is available at: https://ecos.fws.gov/ipac/, accessed February 14, 2019.

2.3.2 Selected Conservation Practices and Enhancement Activities

To ensure that the conservation outcomes (Part 2.4 below) of the Proposed Action are met, NRCS and the USFWS staff worked together to identify the covered conservation practices and associated enhancement activities (Table 2)[10].

Table 2. List of Covered Conservation Practice Standards and Associated Enhancements

Title of Conservation Practice or Enhancement Activity	Code[11]	Category
Forestry Management Plan*	106	Supporting
Integrated Pest Management Plan*	114	Core
Conservation Plan Supporting Organic Transition *	138	Supporting
Pollinator Habitat Enhancement Plan*	146	Core
Fish and Wildlife Habitat Plan*	142	Core
Brush Management	314	Core
Herbicide Weed Treatment Associated Enhancements: Herbaceous weed control for desired plant communities/habitats consistent with the ecological site	315 E315132Z	Core -

[10] The list of enhancement activities and conservation practices 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 and will not necessarily result in triggering a formal amendment to this document.

[11] This is an administrative label unique to each Conservation Practice Standard assigned by NRCS. See: https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849 for additional information.

Title of Conservation Practice or Enhancement Activity	Code[11]	Category
Conservation Cover	327	Core
Associated Enhancements:		
Conservation cover to provide cover and shelter habitat for pollinators and beneficial insects	E327137Z	-
Conservation cover to provide food habitat for pollinators	E327136Z1	-
Establish monarch butterfly habitat	E327136Z2	-
Conservation cover to provide cover and shelter habitat for pollinators	E327137Z	-
Conservation cover to provide habitat continuity for pollinators	E327139Z	-
Conservation Crop Rotation	328	Supporting
Residue and Tillage Management	329	Supporting
Contour Buffer Strips	332	Supporting
Cover Crop	340	Supporting
Windbreak/Shelterbelt Establishment	380	Supporting
Field Border	386	Core
Associated Enhancements:		
Enhanced field borders to increase food for pollinators	E386136Z	-
Enhanced field border to provide wildlife habitat continuity along the edge(s) of a field	E386139Z	-

Title of Conservation Practice or Enhancement Activity	Code[11]	Category
Riparian Forest Buffer	391	Core
Associated Enhancement:		
Increase riparian forest buffer width to enhance wildlife habitat	E391136Z	Supporting
Filter Strip	393	Supporting
Stream Habitat Improvement and Management	395	Supporting
Wildlife Habitat Planting	420	Core
Hedgerow Planting	422	Core
Mulching	484	Associated
Tree/Shrub Site Preparation (490)	490	Associated
Obstruction Removal	500	Associated

Title of Conservation Practice or Enhancement Activity	Code[11]	Category
Forage and Biomass Planting	512[12]	Supporting
Associated Enhancements:		
Establish pollinator and/or beneficial insect habitat	E512136Z1	-
Establish pollinator and/or beneficial insect habitat continuity (space)	E512139Z2	-
Native grass or legumes in forage base to provide wildlife food	E512136Z2	-
Establish wildlife corridors to provide habitat continuity	E512139Z1	-
Native grasses or legumes in forage base	E512140Z	-
Establish monarch butterfly habitat in pastures	E512139Z3	-
Prescribed Grazing	528	Supporting
Associated Enhancement:		
Incorporating wildlife refuge areas in contingency plans for prescribed grazing-cover/shelter	E528137Z2	-
Access Road	560	Associated
Integrated Pest Management	595	Core
Associated Enhancements:		
Reduce risk of pesticides in surface water by utilizing precision pesticide application techniques	E595116X	-
Reduce risk of pesticides in surface water by utilizing IPM PAMS techniques	E595116Z	-

[12] For the purpose of this Proposed Action, Forage and Biomass Planting (512) is a covered practices only when the associated enhancements are included to benefit the covered species.

Title of Conservation Practice or Enhancement Activity	Code[11]	Category
Integrated Pest Management	596	Core
Tree/Shrub Establishment	612	Core
Associated Enhancements:		
Adding food-producing trees and shrubs to existing plantings	E612133X1	-
Tree/shrub planting for wildlife food	E612136Z	-
Tree/shrub planting for wildlife cover	E612137Z	-
Restoration of Rare or Declining Natural Communities	643	Supporting
Upland Wildlife Habitat Management	645	Core
Early Successional Habitat Development/Management	647	Core
Forest Trails and Landings	655	Associated
Wetland Restoration	657	Core
Wetland Enhancement	659	Supporting
Tree/Shrub Pruning	660	Associated
Forest Stand Improvement	666	Supporting

Note: Practices marked with an asterisk (*) are practices which produce a Conservation Activity Plan (CAP). This covered practice has specific meaning and is further profiled in Appendix II.

Implementation of the conservation practices listed in Table 2 are expected to provide a long-term conservation benefit to the covered species. Conservation practices consist of core, supporting and associated practices:

- Core conservation practices generally provide the greatest conservation benefit to the covered species;
- Supporting practices, generally used in association with core conservation practices, have the potential to provide a conservation benefit if they are specifically designed to address a wildlife habitat resource concern
- Associated practices may be needed to ensure the effectiveness of core and supporting practices but have limited or no value to covered species if used on their own.

This nomenclature is important to ensure the individual conservation plans developed for individual landowners align with the overall partnership goals and ensure the consistency in context and outcome for ESA predictability (Part 2.3.7; Appendix V).

Core, supporting and associated practices must be planned to meet the resource concern(s)[13] of Inadequate Habitat for Fish and Wildlife: Food, Cover/Shelter, or Habitat Continuity (space) and be explicitly designed to benefit the covered species. At least one of the following core conservation practices (Table 2) must be included in every landowner's contract:

- Pollinator Habitat Enhancement Plan (146)
- Brush Management (314)
- Herbaceous Weed Treatment (315)
- Conservation Cover (327)
- Field Border (386)
- Riparian Forest Buffer (391)
- Wildlife Habitat Planting (420)
- Hedgerow Planting (422)
- Tree/Shrub Establishment (612)
- Upland Wildlife Habitat Management (645)
- Early Successional Habitat Development and Management (647)
- Wetland Restoration (657)
- Integrated Pest Management Plan (114)
- Integrated Pest Management (595)
- Integrated Pest Management (596)
- Fish and Wildlife Habitat Plan (142)

Some conservation practices listed in Table 2 have associated enhancement activities. Like conservation practices, enhancement activities address an identified resource concern but at a level that exceeds what a conservation practice on its own typically does. As enhancement activities are tied directly to a covered conservation practice, the 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 3 below).

2.3.3 Use of Best Science to Support Creating Desired Habitat Conditions

Prior to selecting conservation practices, planners or partners will complete a Wildlife Habitat Evaluation Guide (WHEG) (see Appendix III for a draft WHEG). The WHEG is a decision support tool

[13] Refer to Appendix II for detailed information on the NRCS Planning Framework.

that steps resource managers through a site-specific evaluation to assess targeted resource needs, stressors, and limiting factors. After completing the WHEG, the planner works with the participant to develop and evaluate management alternatives that restore, enhance or protect the covered species' habitat conditions. Armed with this information, the land manager makes decsions about which conservation practices to apply and includes them in their Conservation Plan.

Use of the WHEG (or other decision support tools concurred upon by USFWS[14]) is mandatory for developing a landowner plan eligible for the ESA predictability and coverage under this Proposed Action, and are included as a nondiscretionary Reasonable and Prudent Measure (see Part 8.9.1). The USFWS, NRCS, and other invited partners will collaborate to develop the WHEGs. The final content and elements of the WHEGs will be accomplished through consensus between NRCS and USFWS staff and applied at the appropriate ecological or geographic scales. Further, modifications to the WHEG or other similar decision support tools are expected and anticipated over the 25-year term of the Proposed Action. This process will be done in collaboration with the USFWS and other invited conservation partners (Part 2.3.8 below) and will not be consideration as triggering a modification to this document as defined in Part 10.0.

2.3.4. Incorporation of Jointly Developed Conservation Measures

Conservation Measures (Table 3) are additional criteria added to the conservation practice standard(s) and enhancement(s) that reduce or eliminate the short-term adverse effects and/or provide benefits to the covered species from practice implementation. Conservation Measures were developed in collaboration with the USFWS, species experts, and are considered mandatory for coverage and obtaining the ESA predictability component described herein. Table 3 provides a direct relationship between the measure, the adverse effects, and the expected benefits.

The intent of the conservation measures is to facilitate site specific (Conservation Plan specific) application of the best available information to conserve the covered species while accounting for site specific conditions, species limiting factors, legacy land uses, and the landowner's management objectives. Broadly, expected benefits of implementation of the conservation measures include:

- Promoting actions that create, restore, enhance, or maintain habitat;
- Providing abundant and diverse floral resources throughout the active seasons for the covered species, while simultaneously controlling invasive and other detrimental plant species;
- Avoiding and minimizing adverse effects during summer foraging, overwintering, and migration;
- Employing a variety of intergrated pest management tools (i.e., technical end decision support tools) to manage exposure and risks associated with the use of agricultural chemicals; and
- Following the WLFW Conservation Planning guidance to ensure consistent implementation for achieving the expected conservation outcomes.

[14] Over the life of the Proposed Action, the WHEGs may be modified to 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/

Table 3. Conservation Measures

Conservation Measure (CM)	Potential Adverse Effects[15],[16]	Expected Benefits
CM1: Ensure coordination at the Partnership 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.	AE1 Temporary soil and vegetation disturbance and/or compaction AE2 Increased risk of establishing invasive plant species. AE3 Exposure of pollinators to pesticides and herbicides.	A. Promoting actions that create, restore, enhance, or maintain habitat; B. Providing abundant and diverse floral resources throughout the active seasons for the covered species, while simultaneously controlling invasive and other detrimental plant species; C. Avoiding and minimizing adverse effects during summer foraging, overwintering, and migration D. Employing a variety of intergrated pest management tools (i.e., technical end decision support tools) to manage exposure and risks associated with the use of agricultural chemicals; E. Following the WLFW Conservation Planning guidance to ensure consistent implementation for achieving the expected conservation outcomes.
CM2: Minimize disruption to existing high quality pollinator plants when bumblebees are active (May through October) and disruptions to/disturbance of existing monarch breeding habitat during peak monarch breeding and migration periods (July to September) while considering the long-term goal of improving habitat for the species and promoting nectar plants.	AE1 Temporary soil and vegetation disturbance and/or compaction AE2 Increased risk of establishing invasive plant species. AE3 Exposure of pollinators to pesticides and herbicides.	A. Promoting actions that create, restore, enhance, or maintain habitat; B. Providing abundant and diverse floral resources throughout the active seasons for the covered species, while simultaneously controlling invasive and other detrimental plant species; C. Avoiding and minimizing adverse effects during summer foraging, overwintering, and migration D. Employing a variety of intergrated pest management tools (i.e., technical end decision support tools) to manage exposure and risks associated with the use of agricultural chemicals; E. Following the WLFW Conservation Planning guidance to ensure consistent implementation for achieving the expected conservation outcomes.
CM3: Use the appropriate sub-region WHEG and other decision tools to identify the	AE1 Temporary soil and vegetation disturbance and/or compaction.	A. Promoting actions that create, restore, enhance, or maintain habitat;

[15] See Part 5.2 below for additional discussion detailing each of the adverse effects.

[16] Although NRCS will promote native pollinator species, some non-native pollinator plant species, like buckwheat, may be used for cover crops. Some non-invasive, non-native pollinator plants may be used for their exceptional value for producing nectar or pollen (e.g., lance leaf coreopsis, clovers, blazing star). Intentional planting of, or management strategies that promote invasive species (e.g., purple loosestrife, glossy buckthorn, big-leaved lupine) will be avoided.

Conservation Measure (CM)	Potential Adverse Effects[15],[16]	Expected Benefits
limiting factors for covered species and develop a Conservation Plan that uses the core practices to address these limiting factors in priority order.	AE2 Increased potential of introduction of invasive species. AE3 Exposure of pollinators to pesticides and herbicides.	B. Providing abundant and diverse floral resources throughout the active seasons for the covered species, while simultaneously controlling invasive and other detrimental plant species; C. Avoiding and minimizing adverse effects during summer foraging, overwintering, and migration D. Employing a variety of intergrated pest management tools (i.e., technical end decision support tools) to manage exposure and risks associated with the use of agricultural chemicals; E. Following the WLFW Conservation Planning guidance to ensure consistent implementation for achieving the expected conservation outcomes.
CM4: Consult with regional partners to ensure that plant lists are comprised by native or non-invasive species, and that any seeds purchased are certified as clean and free of noxious weeds. Check seed package labelling and consult with seed supplier.	AE1 Temporary soil and vegetation disturbance and/or compaction AE2 Increased potential of introduction of invasive species. AE3 Exposure of pollinators to pesticides and herbicides.	A. Promoting actions that create, restore, enhance, or maintain habitat; B. Providing abundant and diverse floral resources throughout the active seasons for the covered species, while simultaneously controlling invasive and other detrimental plant species; C. Avoiding and minimizing adverse effects during summer foraging, overwintering, and migration D. Employing a variety of intergrated pest management tools (i.e., technical end decision support tools) to manage exposure and risks associated with the use of agricultural chemicals; E. Following the WLFW Conservation Planning guidance to ensure consistent implementation for achieving the expected conservation outcomes.

For each of the covered practices and enhancements identified in Tables 2 and 3 above; with more details on the purpose, criteria, and specific application techniques relating to the Proposed Action for each of the covered practices and enhancements appear in Appendix IV.

2.3.5 Monitoring and Assessment

The NRCS and the USFWS will use a coordinated monitoring strategy to quantify activities implemented as part of the Proposed Action. The monitoring strategies will be refined and carried out in coordination with all affected and invited partners, including the respective state agencies (e.g., Maine Department of Inland Fisheries and Wildlife). Because of the broad distribution of the Covered Species, monitoring activities will be adaptable to all habitat types and be used in a rapid assessment approach. Monitoring activities will include tabulations of acreages (Effort 1) and use of a WHEG during practice checkout. Biological monitoring (Efforts 2, 3, and 4) is voluntary and should be carried out contingent upon resources available in participating states.

Effort 1 (mandatory for participating state offices of NRCS): Practice implementation will be tracked by NRCS offices in participating States using the web enabled conservation planning applications (e.g. Toolkit) and/or ProTracts, in the manner described below. To be tallied, practices must be planned to address pollinator resource concerns and will be catagorized as a New England Pollintor Partnership Priority in Toolkit or other NRCS planning software. Metrics (a – h) below should be tallied in the year contracted (planned) and upon practice completion (certified).

a) The number of sites that complete pollinator conservation practices (all practices listed in Table 2).

b) Acreage of pollinator conservation practices (practice footprint) installed/maintained (EQIP practices 314, 315, 327, 328, 329, 332, 340, 386, 391, 393, 395, 420, 422, 528, 612, 643, 645, 647, 657, 659, 666 and all CSP practices in Table 2)

c) Linear feet of hedgerow (EQIP practice 422)

d) Linear feet of windbreak (EQIP practice 380) for pesticide mitigation

e) Acreage of land with Pollinator Habitat Plan CAP (146)

f) Acreage of land with Integrated Pest Management CAP (114)

g) Acreage of land with Fish and Habitat Management Plan CAP (142)

h) Acreage of land under IPM (595 or 596)

i) Area of Effect (AoE) – calculate AoE of Effort 1b. Tally the number of sites that contribute to Effort 1b each year, and multiple by the area of a 0.6 mile radius circle. [So if New Hampshire (NH) has 25 New England Pollinator Partnership contracts that contribute to the Effort 1b acreage tally in 2020, then NH AoE for 2020 is 25 x 723 = 18,075 acres.

Effort 2 (voluntary): Presence/absence surveys of Covered Species. State and partner biologists may sample a subset of established sites for the Covered Species at a minimum of one site visit per year for at least 30 minutes. Site visits conducted in mid-July have the greatest potential for detecting the Covered Species.

Effort 3 (voluntary): Document bumblebee diversity and monarch butterfly abundance. State and regional partners may leverage funds for this effort by prioritizing pollinators in existing grant programs

(e.g., USFWS and USGS Science Support Partnership, USFWS Monarch Initiative, NRCS Conservation Innovation Grants). This effort would measure the effect of implemented practices by quantifying the response of the Covered Species to conservation efforts and inform adaptations to the Proposed Action. Grants should prioritize bumblebee species monitoring at the colony level.

Effort 4 (voluntary): Document flowering plant diversity and abundance at implementation sites. State and regional partners may leverage funds for this by prioritizing pollinator habitat establishment monitoring efforts within existing grant programs (e.g., USFWS Science Support Partnership, USFW Monarch Initiative, NRCS Conservation Innovation Grants).

Biological monitoring efforts (2 and 3 above) that may result in take[17] of federal-listed species (e.g., rusty patched bumblebee) are not provided incidental take coverage in this Biological Opinion. Consequently, biological monitoring activities that may result in the take of listed species (i.e., methodologies utilizing capture techniques in High Potential Zones (HPZs) (see Part 3.1 for a definition of HPZs) will need additional incidental take coverage.

Long-term monitoring efforts for the covered species may also be pursued with partners. These monitoring efforts will provide population and demographic trends of over time.

2.3.6. Training

The agencies have agreed to pursue training on implementation of this document and the Proposed Action, a schedule to be determined during the annual meeting of the partners outlined in the Part 2.3.8 below. NRCS will initiate the request for training on the details included herein within one year of approval by the agencies. By the end of 2019, a coordinated training and certification system should be in place (see Part 8.9; Appendix II). The training may include, but is not limited to, information on the biological needs of the covered species, stressors they are facing, habitat management techniques, and methods for avoiding adverse impacts.

2.3.7. ESA Predictability

The Proposed Action is a collaborative partnership between the USFWS and NRCS that strategically targets technical and financial assistance to improve habitats for the covered species while also offering ESA predictability (up to 25 years) to eligible participants. The ESA predictability provides the participants with long-term clarity that they will be in compliance with the ESA if the included species are 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 identified in the Conservation Plan.

Consistent with an agreement between the USFWS and NRCS, described in an exchange of letters in August, 2012 (Appendix V), the USFWS prepared and accepts this document using its authorities identified in Part 1.3 above. Accordingly, the ESA predictability will exempt any incidental take associated with implementing the specified conservation practices and measures included in each participant's conservation plan in the event that any of the covered species are listed as either threatened or endangered pursuant to the ESA. Further, since the rusty patched bumblebee is currently listed as endangered, the ESA predictability provides programmatic incidental take authority for this species as

[17] Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. See Part 8.4 for an expanded definition of "take."

conditioned and explained herein. This programmatic documents section 7 consultation and incidental take coverage and negates the need for additional review at the individual plan level or further coordination for effects determinations beyond those outlined in Parts 2.3.8, 8.9, and 10.

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 25-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 25 years have already been addressed. The NRCS has developed a protocol to track participation in the Proposed Action and will be providing this information as a component of its yearly report, as described in Part 2.3.8.2. The NRCS will bundle and report ongoing as well as new accomplishments annually to the USFWS (Part 2.3.8, and Part 8.9.3).

The NRCS and USFWS expect that additional conservation actions related to the covered practices and enhancements may be developed over the 25-year life of the Proposed Action. As this occurs, the USFWS and NRCS will collaborate to include any new conservation practices, enhancements, and other supporting actions by amending this document. As part of the process outlined in Parts 2.3.8 and 10.0, this may necessitate the revision and/or development of new conservation measures to ensure consistency with the ESA predictability agreement explained further in Appendix V.

2.3.8 Administrative Elements

To ensure continuity and consistency throughout the 25-year term of the document, NRCS and USFWS have jointly agreed to the following administrative procedures.

2.3.8.1 Annual Meeting

The NRCS, the USFWS, and selected partners will hold an annual meeting to discuss updates, accomplishments, and identify ways to improve the effectiveness of this Partnership. The meeting will be attended by at least one reprentative of the NRCS from each participating state, regional or state USFWS leadership, and relevant NRCS Partner Biologists. Each meeting will also be open to state agency and dedicated partners who wish to present to the group.

Meeting objectives may include, but are not limited to:

a. Revisit agreement and goals to re-evaluate and modify if necessary. This is a dynamic agreement, subject to modification based on past successes, failures, and new research.
b. Enroll or disenroll participating states
c. Evaluate completed research and discuss adaptations for improving outcomes.
d. Discuss NRCS reporting and data collection strategies
e. Present first draft of Yearly Report and solicit feedback
f. Delegate final Yearly Report responsibilities
g. Ensure coordination at the Partnership 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

h. Amend Conservation Measures, Practice List, and other components of effort as necessary.

2.3.8.2 Yearly Report

On an annual basis, the NRCS will provide the USFWS with a summary of updates, modifications, or accomplishments to support the Proposed Action and related partnership activities on February 1st of each year. The first report shall be Februrary 1, 2020. This report will include but is not limited to:

a. Acreage and frequency of each core conservation practice standard/enhancement at the state level;
b. Results from all Monitoring and Assessment actions as described in Part 2.3.5.
c. A summary of changes, if any, in the covered conservation practice standards/enhancements[18] (e.g. changes in covered activities, plans and/or specifications, quality criteria, payment schedules, Job Sheets, etc.);
d. Extent and circumstances of any incidental take event(s);
e. Information as it becomes available on the efficacy of the conservation measures and expected benefits;
f. Follow-up items and tasks identified in Part 8.9 below; and
g. Other germane information mutually agreed upon for implementing this Partnership Agreement and Proposed Action.

2.3.8.3 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) as they become available and approved.

2.3.8.4 Steering Committee

To oversee the administration of the Proposed Action over its expected 25-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. The Steering Committee shall meet periodically to ensure effective implementation of this Partnership Agreement and proposed action (see 2.3.8.1). A primary goal of the Steering Committee is to ensure consistency in application of the components of the Proposed Action across the Action Area. Further, the Steering Committee will govern the effort in accordance with the NRCS and USFWS Partnership Agreement A-3A75-16-937 and the USFWS Director's Order 217.

2.4 Expected Conservation Outcomes

This proposal focuses on the conservation of bumblebees and the monarch butterfly, but the resulting conservation practices would also benefit a much broader community of pollinators. These efforts would

[18] 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.

support pollinators in New England for the benefit of farmers, our natural communities, and the species themselves.

Table 4 outlines the expected outcomes of the Proposed Action.

Table 4. Conservation Outcomes

Goals	Detail
1. Incentivize program participation	Participating landowners receive incentivizes through: Financial assistance to implement the conservation practices through NRCS's cost-share programs; Liability protection from ESA take prohibitions through NRCS's Section 7 Consultation; and Technical assistance to pollinator dependent growers resulting in enhanced pollination services for crops.
2. Engage the agricultural community in pollinator conservation	The partners will work with 1,182 agricultural producers by 2025 to create, restore, or otherwise adopt management practices to promote healthy and robust pollinator populations on farmland; thereby, contributing to the long-term conservation of the covered species.
3. Enhance habitat	Enhance or create 7,680 acres of pollinator habitat by 2025.
4. Protect covered species from pesticides and pathogens	Incentivize pathogen mitigation through ranking methodology. Use IPM practices to reduce pesticide use and mitigate pesticide exposure to pollinators on 366 acres by 2025.
5. Develop Best Management Practices	In collaboration with partners (e.g., USFWS, State DF&G, and Xerces), and using information generated from this effort's monitoring activities, we will develop and distribute BMPs targeting the conservation of Target Species on agricultural and forest lands in New England.
6. Preclude the need to list	By 2025, we hope that our efforts, outreach, and success will help maintain and restore populations of the covered species; thereby, negating the need to list them.

Specifically, each NRCS state office has established the following goals for enhancing habitat:

State	Habitat Target	Number of Producers Participating	Intergrated Pest Management Target
Connecticut	24.3 ha (60 ac)	12	No target specified
Maine	971.2 ha (2,400 ac)	480	121.4 ha (300 ac)
Massachusetts	364.2 ha (900 ac)	60	24.3 ha (60 ac)
New Hampshire	728.4 ha (1,800 ac)	360	No target specified
Rhode Island	48.6 ha (120 ac)	30	No target specified
Vermont	971.2 ha (2,400 ac)	240	2.4 ha (6 ac)
Total	3108 ha (7680 ac)	1182	148 ha (366 ac)

3.0 Status of the Species

The covered species are identified in Table 1. Specific information for each of the covered species appears in this section.

Shared life history traits of the covered bumblebee species.

> Bumblebees, as a whole, are eusocial insects that live in colonies composed of a queen, non-breeding workers, and reproductives (males and new queens). Colonies are annual and only the new, mated queens overwinter. Bumblebees generally are able to fly in cool

temperatures and low light levels, particularly in comparison to other bees, which can extend their daytime foraging times (Corbet *et al.* 1993). Queens emerge from hibernation in the early spring and immediately start foraging for pollen and nectar and begin to search for a nest site. Nests are often located underground in abandoned rodent nests, or above ground in tufts of grass, old bird nests, rock piles, or cavities in dead trees. Initially, the queen does all of the foraging and care for the colony until the first workers emerge and assist with these duties. Bumblebees collect both nectar and pollen of the plants that they pollinate. In general, bumblebees forage from a diversity of plants. However, plant preferences vary for each bumblebee species and are largely due to differences in tongue length that influence foraging efficiency. Bumblebees are well-known to engage in "buzz pollination," a very effective foraging technique in which they sonicate (apply sound energy) flowers to vibrate the pollen loose from the anthers.

3.1 Rusty patched bumblebee

The rusty patched bumblebee (*Bombus affinis)* is listed as endangered, pursuant to the ESA (79 FR 78775 – 78778 [December 31, 2018]). A thourough review of the taxonomy, life history, and ecology of the rusty patched bumblebee is presented in the species status assessment report (USFWS 2016b). No critical habitat has been designated for this species.

The USFWS has identified two High Priority Zones (HPZ) for the rusty-patched bumblebee in the Action Area. One HPZ is located near Pleasant Lake, Massachusetts, where the species was found in 2009. The other HPZ is located at Stockton Springs along the Maine coast, where the rusty patched bumblebee was last observed in 2009. An Uncertain Zone for the species also exists in Rockport, Maine, where it was last seen in 2006. Historical records indicate the species occupied large areas of Midwestern and Eastern United States, including throughout the Action Area, and parts of southern Quebec and Ontario (USFWS 2016b).

In comparision to other bumblebees, rusty patched bumblebees reside in large colonies contain up to 1,000 workers (Macfarlane *et al.* 1994). Rusty patched bumblebees forage on a variety of flowers for nectar and pollen.

The annual life cycle of the the rusty patched bumblebee is lengthy, in comparison to other bumblebee species. It begins in early spring with colony initiation by the queen. The founding queen searches for suitable nest sites and collects nectar and pollen from flowers to provision eggs, which are fertilized by sperm she has stored since mating the previous fall. The colony produces workers throughout the spring and summer. The production of males and new queens occurs from mid-summer to early fall (Macfarlane *et al.* 1994, p.4; Colla and Dumesh 2010; Plath 1922). Reproductive males and females (gynes) disperse from the nest to seek mates. All of the bees that remain, the founding queen, males, and workers die late in the autumn. The dispersing queens must find suitable habitat to begin diapause (a form of hibernation) in order to survive winter.

Rusty patched bumblebees have been observed and collected from a variety of habitats, including prairies, woodlands, marshes, agricultural landscapes, and residential parks and gardens (Colla and Packer 2008; Colla and Dumesh 2010; USFWS *Bombus affinis* unpublished geodatabase 2016). Bumblebees require areas that support sufficient food (nectar and pollen from diverse and abundant flowers), undisturbed nesting sites in proximity to floral resources, and overwintering sites for hibernating queens (Goulson *et al.* 2015), and the rusty patched bumblebee is no exception. Due to the wide variety of plants that the rusty patched bumblebee can obtain nectar and pollen from, we expect

this species may be found feeding and traveling through all terrestrial or wetland habitats in proximity to active nests.

To maintain abundant and healthy colonies, the rusty patched bumblebee requires a diverse supply of flowers that bloom consistently throughout the species' long life cycle, from April through September (MacFarlane *et al.* 1994). Floral resources close to the nest "might be especially important during the establishment phase of a colony, when only few workers are available for foraging" (Herrmann *et al.* 2017). Abundant floral resources later in the season maximize queen production (Bukovinszky *et al.* 2017) and help ensure gynes get the resources they need to overwinter.

The rusty patched bumblebee is a short-tongued species (Medler 1962). Short-tongued bumblebees are generally more efficient at handling flowers with short or no corollas (Harder 1983); however, the rusty-patched bumblebee is a confirmed nectar robber, occasionally cutting longer corollas tubes with their mandibles to access nectar without tripping the flower's reproductive parts. Species experts have identified several plant species that are likely important nectar sources for the rusty patched bumblebee. The nectar from flowers provides carbohydrates and the pollen provides rusty patched bumblebee with protein. The number of queens that a colony can produce is directly related to the amount of pollen that is available (Burns 2004). Bumblebee species typically forage within one km (0.62 miles (mi)) from their nesting sites (Knight *et al*. 2005; Wolf and Moritz 2008; Dramstad 1996; Osborne *et al.* 1999; Rao and Strange 2012). In addition to open habitats, this species utilizes woodland spring ephemerals whose flowering period coincides with their early spring emergence (Colla and Dumesh 2010). The availability of floral resources is dependent on the proper growing conditions to sustain them. Extended periods of drought, for instance, may limit the availability and diversity of flowering plants in a given area. Plant phenology is primarily driven by temperature, precipitation, and the timing of snowmelt in the spring (Inouye and Wielgolaski 2003; Wielgolaski and Inouye 2003; Pyke *et al.* 2016).

Rusty patched bumblebee nests are typically in abandoned rodent nests or similar cavities and located from one to four feet below ground, butoccasionally nests are located above ground in thatch or even compost piles (Plath 1922; Macfarlane *et al*. 1994). Little is known about the overwintering habitats of rusty patched bumblebee queens, but other species of bumblebee typically form a chamber in soft soil, a few centimeters deep and sometimes use compost piles or mole hills to overwinter (Goulson 2010). The species may overwinter in forested habitats or other natural or semi-natural habitats.

Table 5 summarizes ecological requirements at the individual level.

Table 5. The ecological requisites for survival/reproductive success of rusty patched bumblebees.

Life Stage	Winter	Spring	Summer	Autumn
Queen		Diverse and abundant floral resources; suitable nest habitat	Diverse and abundant floral resources; suitable nest habitat	Diverse and abundant floral resources; suitable nest habitat
Worker females		Diverse and abundant floral resources in close proximity to nest	Diverse and abundant floral resources in close proximity to nest	Diverse and abundant floral resources in close proximity to nest
Males			Diverse and abundant floral	Diverse and abundant floral resources; suitable dispersal habitat

			resources; suitable dispersal habitat	
Gynes (mated queens)	Suitable diapause sites		Diverse and abundant floral resources; suitable dispersal habitat	Diverse and abundant floral resources; suitable dispersal habitat

Population Ecology

Healthy rusty patched bumblebee populations are believed to operate within a metapopulation. A metapopulation is an assemblage of interacting subpopulations; a subpopulation of bumblebees is a collection of interacting colonies, each of which is founded by a single queen. Thus, a colony represents one reproductive unit. The size of a rusty patched bumblebee subpopulation, therefore, may be described as the number of nests or colonies whose members interact.

Demographic and environmental stochasticity can influence populations of bumblebees. The number of colonies necessary to ensure long-term persistence of a rusty patched bumblebee population is unknown and likely varies for each occupied landscape. Small populations are inherently more vulnerable to extirpation due to environmental and demographic stochasticity (Goulson *et al.* 2008). Therefore, the larger the population, the higher the likelihood of persistence over time (Hanski 1999). The number of colonies comprising a population is related to the number of foundress queens that survive winter, which is, in turn, related to the number of gynes that are produced by each nest and that mate before the following winter (see Table 5). The number of mated gynes and their overwinter survival is influenced by the quality, density, and diversity of floral resources and their proximity to nesting and overwintering habitats. This is particularly true for rusty patched bumblebee colonies, which are large relative to most bumblebee species and may contain up to one thousand individuals or more (Macfarlane *et al*. 1994).

In addition to habitat availability, the number of mated gynes, and hence the number of colonies, is also influenced by the number of fertile males and whether the landscape matrix is conducive to dispersal of reproductives. Rusty patched bumblebees typically disperse over 1 km (0.62 miles (mi)) distances, but the landscape must be permeable and free of hazards in order for unrelated gynes and males to successfully find and mate with each other. Thus, habitat connectivity within a subpopulation is also essential for successful recruitment of next year's queens, and therefore, is influential in determining population size.

Population size also affects population viability through effects to genetic health and the rusty patched bumblebee is especially vulnerable to the effects of inbreeding and small population sizes. Small populations have lower levels of genetic diversity (heterozygosity), which reduces the capacity of a population to respond to environmental change and may lead to reduced fitness due to inbreeding depression (Darvill *et al*. 2006). Populations of monandrous social species (colonies headed by a single queen that mated with a single male), such as the rusty patched bumblebee, are especially vulnerable to the effects of genetic drift – genetic changes that are random and not driven by adaptive natural selection (Goulson *et al.* 2008; Darvill *et al*. 2006).

The way in which the sex of bees is determined makes their populations even more sensitive to reductions in genetic diversity (Zayed and Packer 2005; Zayed 2009). The sex of bees is determined by the number of chromosomes and by the form of the gene (allele) at a single region of a chromosome (locus). Females develop from fertilized eggs that have different alleles of the sex-determining gene on

each chromosome (i.e., they are diploid). In comparison, unfertilized eggs carry only a single copy of the sex-determining gene and develop into males (i.e., they are haploid). This genetically based sex determination mechanism is known as haplodiploidy. In matched matings, where females mate with males that carry the same allele at the sex-determination locus (e.g., sibling matings), half of the resulting progeny will develop into diploid males instead of females. This imposes a cost to the colony by decreasing the number of workers (females), because diploid males do not foragefor pollen and nectar (Ellis *et al*. 2006). Additionally, diploid males are either unviable or effectively sterile, since viable individuals that mate produce diploid sperm that leads to unviable eggs or produces sterile triploid daughters (Zayed 2009 and references within). Matched mating occurs more often when the allelic diversity – the number of alternative forms – of the sex-determining gene is low in a population (Ellis *et al.* 2006; Zayed 2009). Thus, as the number of colonies in a population decreases, there is a concomitant reduction in genetic diversity leading to the increased production of diploid males. This may contribute to further declines and result in a negative, reinforcing downward cycle leading to the extirpation through a procees called the "diploid male vortex" (Zayed and Packer 2005).

Species whose populations fluctuate greatly with environmental conditions, require strong growth rates to avoid extinction. Although their large body size and fuzzy bodies buffer bumblebees, from the direct effects of environmental conditions, they are vulnerable to indirect effects of climatic variation. Pollen and nectar availability, especially in spring and fall when floral resources are scarce, are influenced by environmental conditions (Holm 1966). Areas that contain a high diversity of habitats (spatial heterogeneity) helps to ensure floral resources are available throughout the season and year-to-year despite variations in climatic variables, such as temperature and precipitation. Similarly, spatial heterogeneity increases the likelihood of asynchrony among colonies, which is necessary for long-term persistence of metapopulations (Hanski 1999).

Population Trends

The most recent evaluation of population distribution and trend information for the rusty patched bumblebee was compiled within the USFWS' Species Status Assessment (USFWS 2016b). It concluded that:

> All measures of its historical biological condition indicate that *B. affinis* was abundant and widely distributed; it was the fourth ranked *Bombus* species in our relative abundance analysis prior to the late 1990s, with an expansive geographical range covering most of the Midwestern and eastern U.S. and areas of Quebec and Ontario, representing 15 ecoregions. Since the late 1990s, however, *B. affinis* distribution and abundance has declined. Five percent of the historical locations (grids[19]) are currently (the last two decades) occupied by *B. affinis*, and the relative abundance of *B. affinis* declined from 8 percent historically to 1 percent currently.

Conservation

[19] To evaluate trends in the status and distribution of the rusty patched bumblebee, the USFWS overlaid a 10 kilometer (km) x 10 km (24,710 acres (ac)) grid across the species' range (USFWS 2016b). All rusty patched bumblebee occurrences falling within a grid and within the same decade were tallied as a single grid occurrence. There were 845 rusty patched bumblebee grid occurrences reported from the historical period of 1900-1999 (a total of 894 grid occurrences reported from 1900-2015).

The USFWS recently published a Recovery Outline, which provides an Interim Recovery Strategy for the long-term survival of the rusty patched bumblebee by controlling or reducing threats to the extent the species no longer needs the protections of the ESA (USFWS 2018b). Although subject to change, the Recovery Outline provides that full recovery of the rusty patched bumblebee will require establishing viable populations throughout the species' range through management and protection, while also ameliorating threats. The highest priority preliminary recovery actions identified in the Recovery Outline include:

- Identify, plan and take action to reduce stressors and improve habitat at priority locations.
- Implement research to better understand the activities that lead to adequate resiliency, redundancy and representation for the species.
- Assess under-surveyed areas to identify areas occupied by the species.
- Conduct outreach to support conservation.
- Refine and standardize survey protols.
- Modify and maintain a spatial database to track relevant biological and conservation information.

3.2 Yellow Banded Bumblebee

The Service received a petition to list the yellow banded bumblebee (*Bombus terricola)* from the Defenders of Wildlife on September 15, 2015. As required by the ESA, the Service published a 90-day finding indicating the petitioned action maybe warranted (81 FR 14058 – 14072 [March 16, 2016]). A 12-month finding to determine if the petitioned action is warranted, or not, is expected in 2019.

Information on the conservation status of yellow banded bumblebee appearing below was summarized from Hatfield (2015c) and associated references cited therein.

> This species has a large range including Newfoundland and the Eastern Temperate and Boreal forest regions, south along higher elevations of the Appalachians, west through North Dakota and the Canadian Great Plains, to the Tundra and Taiga of Canada and the Mountain West, especially in British Columbia.
>
> The yellow banded bumblebee inhabits a wide variety of habitats, including woodlands, farmlands, urban areas, meadows, grasslands, wetlands and other areas. Queens overwinter in loose ground or rotting logs, and colonies nest underground in vacant rodent burrows.
>
> It is a known host to the Ashton's cuckoo bumblebee, *Bombus bohemicus* (=*B. ashtoni*), and a probable host to Suckley cuckoo bumblebee (*B. suckleyi)* and the indiscriminate cuckoo bumblebee (*B. insularis*).
>
> This North American species has declined over 30 percent in both range and persistence across its entire range, with particularly high (>80 percent; average ~50 percent) decline in relative abundance between recent (2002-2014) and historic (1805-2001) time periods (Hatfield *et al.* 2015c). Moreover, examination of long-term trends reveals that the species' relative abundance in the current decade is lower than any other decade, and the relative abundance change from the mean relative abundance has been greater than 66 percent in the past decade.

3.3 American bumblebee

Information on the conservation status of American bumblebee (*Bombus pensylvanicus*) appearing below was summarized from Hartfield *et al*. (2015a) and associated references cited therein.

The American bumblebee is widespread in the Eastern Temperate Forest and Great Plains regions throughout the eastern and central U.S. and extreme southern Canada, absent from much of the Mountain West, but found in the Desert West and adjacent areas of California and Oregon. This species also occurs in Mexico. Historically among the broadest ranging bumblebees in North and Central America, the species has experienced significant declines in both abundance and range in recent years. Range declines have been most severe in northern areas, which have been well sampled, although abundance in those northern areas was probably low historically. The relative abundance trend has been slowly moving downward until recently, when the downward trend became noticeably sharper. By 2011, status estimates concluded the species had experienced an estimated 23 percent reduction in range, a 50 percent drop in persistence, and 88.56 percent drop in relative abundance.

Based on the species' morphology, the American bumblebee is included among the long-tongued species and is capable of feeding on flowers with deeper corollas. American bumblebees emerge in late April –early May. Colonies remain active until September, with mate-seeking males active on flowers until later in the fall. Known food plant associations for this species include plant species in Asteraceae, Cornaceae, Fabaceae, and Solanaceae.

The American bumblebee occurs in open farmland and fields throughout its range, and was common in urban areas throughout the central Midwest (MO, KS, AR, IL, etc.) during the 1980s and early 1990s. It nests mostly on the surface of the ground, among long grass, but occasionally underground. It is one of the more aggressive bumblebee species, which is probably as an adaptation to protect the more exposed aboveground nests. Males congregate outside nest entrances in search of mates. This species is host to the variable cuckoo bumblebee (*Bombus variabilis*).

3.4 Yellow bumblebee

Information on the conservation status of yellow bumblebee (*Bombus fervidus*) appearing below was summarized from Hatfield *et al*. (2015b) and associated references cited therein.

The yellow bumblebee is a widespread species across much of the mid-latitudes of the continent, from the Canadian Maritimes and eastern United States in the Eastern Temperate Forest and Boreal Forest regions, west through the central Great Plains of the United States and southern Canada to the Mountain West, Pacific Coast and Western Desert of California. This species is not abundant in the Boreal region. This species is also present in Mexico.

A number of studies have demonstrated abundance and persistence declines in this North American species. Consistent with these studies, analysis shows decline in relative abundance, as well as long-term steady decline. If this species' relative abundance continues to decline at the same rate, it is projected that the species will go extinct in the next 70 to 80 years.

The yellow bumblebee is a long-tongued, later emerging species. It inhabitas open farmland, fields, urban parks, and gardens throughout its range and nests mostly on the surface of the ground, among long grass or in deserted mouse nests, but does occasionally nest underground. This is one of the more aggressive bumblebee species, probably as an adaptation to protect more exposed above-ground nests. Males congregate outside nest entrances in search of mates. This species is a known parasite to the indiscriminate (*Bombus insularis*) and probable host of the Suckley's (*B. suckleyi*) cuckoo bumblebees.

3.5 Confusing bumblebee

Information on the conservation status of confusing bumblebee *(Bombus perplexus)* appearing below was summarized from Hartfield *et al.* (2014b) and associated references cited therein.

The confusing bumblebee can be found in the Eastern Temperate Forest and Boreal Forest regions of the Canadian Maritimes and eastern United States, south through the Appalachian Mountains, west through the Canadian Great Plains, and up into in the Tundra/Taiga regions of Canada and Alaska.

Population and trend assessments suggest that this species is relatively stable.

The confusing bumblebee emerges early in the spring. It is a generalist species, visiting a variety of flowering plants within wooded areas, urban parks, gardens, and wetlands. It usually nests underground, but can also establish colonies in hollow logs, in trees, or on the ground surface. Males patrol circuits in search of mates. It generally finishes its colony cycle by mid-summer. This species is likely a host to the Fernald cuckoo bumblebee (*Bombus flavidus*).

3.6 Ashton's cuckoo bumblebee

Information on the conservation status of Ashton's cuckoo bumblebee (*B. bohemicus*) appearing below was summarized from Hatfield *et al*. (2016b) and associated references cited therein.

The Ashton's cuckoo bumblebee was formely considered a monospecific taxa (*Bombus ashtoni*); however, the species is now conspecific (same species) with *B. bohemicus*. Consequently, *B. ashtoni* is subsumed into *B. bohemicus*, which has a panarctic distribution.

In North America, the Ashton's cuckoo bumblebee is found in eastern and midwestern United States and Canada in Eastern Temperate Forest and Boreal Forest regions, south in a narrow band at higher elevations along the Appalachian Mountains and extending northwest through the Canadian Great Plains, Mountain West, and Tundra/Taiga to Alaska. In Europe, this species is widespread from the north of Spain, the south of Italy and the Balkans in the south to beyond the Arctic Circle. It extends eastwards to the Far East of Asia and south into China. The Ashton's cuckoo bumblebee is one of the most common cuckoo bumblebees of Europe (Rasmont *et al.* 2014). However, in North America the species has been lost from over 90 percent of its range, and has experienced a greater than 90 percent drop in relative abundance.

The Ashton's cuckoo bumblebee is a species of cuckoo bumblebee, belonging to a specialized lineage (subgenus *Psithyrus*) that lacks the pollen-gathering structures characteristic of other *Bombus*. These

cleptoparasitic bees do not found their own nests, but instead, usurp the colonies and pollen-gathering worker forces of other bumblebee species. To do this, a mated female enters the nest of another bumblebee species, kills or subdues the queen of that colony, and forcibly (using pheromones and/or physical attacks) "enslaves" the workers of that colony to feed her and her developing young. Since all of the resulting cuckoo bee offspring are reproductive (not workers), they leave the colony to mate, and then they hibernate. The next year, after emerging from hibernation, the mated females seek out other nests to attack. Males of this species patrol circuits in search of mates. Before finding and invading a host colony, females feed directly from flowers. This species has a wide variety of nectar plant associations, including species in Asteraceae, Ericaceae, Fabaceae, and Rosaceae (Williams *et al.* 2014).

This bee is a social parasite, and thus is found in association with its host species. Cuckoo bees often attack a broad range of host species, but some specialize in attacking the members of just one species or subgenus. In North America, known hosts include the rusty patched and yellow banded bumblebees, and potentially the western bumblebee (*B.* occidentalis) and *B. cryptarum*. Mated queens of cuckoo bumblebee species typically emerge a few weeks after host species, then forage on nectar plants for a few days while their ovaries develop (Goulson, 2010).

In North America, this species is declining rapidly, currently occurring in only approximately seven known sites. Its population reduction in North America is suspected to have been greater than 80 percent in the past decade based on a 97.18-percent decline in relative abundance between recent (2002-2012) and historic (1805-2001) time periods and a 96.28-percent decline in extent of occurrence has been observed between recent and historical time periods. However, in Europe, this species is common to abundant over most of its range, and population seems to be stable.

The Ashton's cuckoo bumblebee is dependent on its host species throughout its large range in North America (most of Canada, northern US), some of which are now in decline (e.g. *Bombus affinis, B. occidentalis, B. terricola).* Although there are still areas where the host species remain detectable, this species increased in rarity over more than a decade. This suggests hosts are declining in abundance to a level that does not support healthy populations of *B. bohemicus* in North America. In the past few years, the only specimens collected have been from Alaska.

3.7 Lemon cuckoo bumblebee

Information on the conservation status of Lemon cuckoo bumblebee (*Bombus citrinus)* appearing below was summarized from Hatfield *et al*. (2014a) and associated references cited therein.

The lemon cuckoo bumblebee is found in the Eastern Temperate and Boreal Forest regions of the Canadian Maritimes and eastern United States, south through the Appalachian Mountains, and west to the margin of the Great Plains.

The lemon cuckoo bumblebee has not declined in distribution or relative abundance in the past decade with several assessments finding high persistence of this species in historically occupied areas, and no significant declines in relative abundance over the time periods examined. Relative changes in status are variable across the range. For example, significant declines have been documented in southern Ontario but its range has not declined in Illinois or across its eastern North American range as a whole (2012 data). Note that the abundance and distribution in this

species likely depend on abundance and distribution of host species, which remain common. The population trend is considered stable.

The lemon cuckoo bumblebee shares life history characteristics with other members of the subgenus *Psithyrus* (see discussion of *Psithyrus* life history under Ashton's cuckoo bumblebee).

The lemon cuckoo bumblebee is a parasite of two-spotted (*Bombus bimaculatus*), common eastern (*B. impatiens*), and half-black (*B. vagans*) bumblebee colonies.

While this species is noted as emerging late in the spring in Illinois and Eastern Canada, it was reported to be active in early spring in Ontario. It is active close to or within wooded areas until late fall.

3.8 Fernald cuckoo bumblebee

Information on the conservation status of Fernald cuckoo bumblebee (*Bombus flavidus*) appearing below was summarized from Hatfield *et al.* (2016c) and associated references cited therein. The Fernald cuckoo bumblebee is conspecific with *Bombus fernaldae*; consequently, the range includes North America and Europe.

In North America, the distribution of this species is widely scattered across the continent, from the northeastern United States and adjacent areas of Canada, south along the Appalachian Mountains, the northern Great Plains of Canada, the Mountain West south to Colorado toNew Mexico, and on to the Pacific Coast, from California north to Alaska. The Fernald cuckoo bumblebee inhabits Boreal and Eastern Temperate Forests, as well as Tundra and Taiga habitats.

In North America, this species has not experienced serious declines in relative abundance, persistence, or range in recent years.

The Fernald cuckoo bumblebee shares life history characteristics withother members of the subgenus *Psithyrus* (see discussion under Ashton's cuckoo bumblebee). It is also the most common cuckoo species found in nests of *Pyrobombus* in North America, but surprisingly there are no direct records of it breeding in host colonies of any species from North America. It has also been recorded as present in the nests of the red-belted (*B. rufocinctus*), the western (*B. occidentalis*), and the white shouldered (*B. appositus*) bumblebees.

3.9 Indiscriminate cuckoo bumblebee

Information on the conservation status of indiscriminate cuckoo bumblebee *(Bombus insularis)* appearing below was summarized from Hatfield *et al*. (2014c) and associated references cited therein.

The indiscriminate cuckoo bumblebee occurs throughout the Mountain West from Arizona and New Mexico north to Alaska, across the Tundra/Taiga region to the northeastern United States and eastern Canada.

Declines in abundance or range of this widely distributed North American species have been relatively low, range-wide, with the most recent status assessment concluded that declines averages about 12 percent. Note however, that this species has exhibited noteworthy decline in some parts of its range; in particular, it seems to have disappeared from the northern part of its range in Great Lakes area and southern Ontario.

The indiscriminate cuckoo bumblebee shares life history characteristics withother members of the subgenus *Psithyrus* (see discussion under Ashton's cuckoo bumblebee). The indiscriminate cuckoo bumblebee breeds in the colonies of the white shouldered, yellow, yellow head (*B. flavifrons*), Nevada, (*B. nevadensis*), orange-belted (*B. ternarius*) bumblebees. It has also been recorded as present in the nests of the red-belted, *western*, and yellow banded bumblebees.

Significant declines in two of this species' host species (e.g. the western and yellow banded bumblebees) is likely a stressor in some regions. This species seems to have disappeared from the northern part of its range in Great Lakes area, southern Ontario, where the red-belted and yellow banded bumblebees, presumably important hosts in this region, have also experienced recent range contractions. A study in Colorado suggests that this species may be impacted by factors other than loss of hosts; researchers did not find this species from 2001-2005 at previously known sites in the Boulder, Colorado area, where they did find 12 of 13 other previously documented species of bumblebees, including four species that serve as hosts for the indiscriminate cuckoo bumblebee.

3.10 Variable cuckoo bumblebee

Information on the conservation status of variable cuckoo bumblebee (*Bombus variabilis*) appearing below was summarized from Hatfield *et al.* (2016a) and associated references cited therein.

The variable cuckoo bumblebee may be conspecific with *Bombus intrudens, B. variablis, B. sololensis, B. guatemalensis, and B. mysicus*. Together, the range of these congeners extends from Guatemala north through Mexico and the United States, east of the Rocky Mountains, to Quebec. Despite its relatively large geographic range, the variable cuckoo bumblebee is considered one of the rarest of all North American bumblebee species, having been collected only a few times in the past twenty years, and not at all in the last decade. North of Mexico, this species has exhibited 100 percent decline in relative abundance, extent of occurrence, and persistence between the recent (2002-2012) and historical (1805-2001) time periods.

The vatriable cuckoo bumblebee shares life history characteristics withother members of the subgenus *Psithyrus* (see discussion under Ashton's cuckoo bumblebee). The only known host of the variable cuckoo bumblebee is the American bumblebee.

3.11 Monarch Butterfly

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

The North American monarch butterfly (*Danaus plexippus* var. *plexippus*) migration is one of nature's most spectacular natural phenomena. The North American geographic range of the monarch butterfly includes areas across southern Canada, the lower 48 United States, and Mexico. Each fall, monarchs found east of the Rocky Mountains migrate to forests in the

mountains of central Mexico. In comparison, western monarchs generally migrate to the coast of California. Monarchs utilize a variety of habitats including rangelands, farms, riparian habitats, deserts, prairies, meadows, open forests, woodlands, cities, gardens, and roadsides, where they search for their larval host plant milkweed (*Asclepias* spp.) and a variety of nectar producing flowers.

Migratory North American monarchs progress through several generations each year. The summer generation adults live from two to five weeks. The late generation adults emrging from chrysalis in lete summer early fall migrate to overwintering sites located in central Mexico and California. These overwintering individuals live from seven to nine monthsand do not breed or lay eggs until the following spring, when they migrate northward toward their spring and summer breeding ranges.

Larval monarch caterpillars feed exlclusively on milkweeds. Adult females deposit their eggs singly on milkweed plants and the larvae emerge in three to five days, with shorter development times corresponding to warmer temperatures. The monarch larvae progress through 5 instars (intervals between molts) over a period of 9 to 13 days. Once fifth instar larvae are fully developed, they leave their milkweed host plant to search for an elevated and usually well-hidden pupation site. They remain in these locations until metamorphosis is complete, which usually takes from 9 to 15 days, and the adult butterfly emerges.

Population Ecology

Research to understand the factors influencing the monarch's population dynamics and ecology is underway. Climate, mortality rates, host plant, nectar resource availability and quality, and parasites arediscussed below.

Climatic elements (e.g., temperature & moisture) at local and regional scales over annual and longer term periods is known to affect both survival rates (at all life stages) and reproductive fitness of adult 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. The ecological model predicted monarch breeding in the Midwest would exhibit spatial-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 areas. 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 western monarch populations, concluding that variation in moisture availability, as measured by Palmer's drought severity index (PDSI)[20], across the western region predicted monarch abundance.

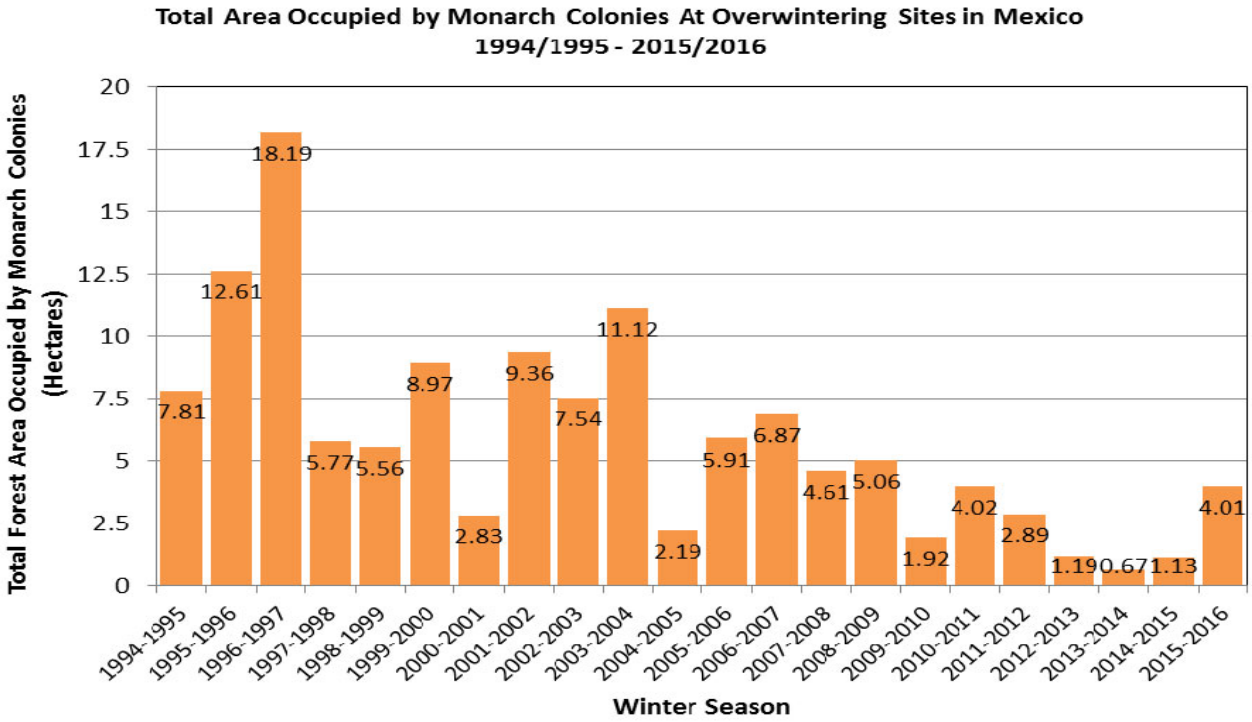
Population Trends

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

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 of monarchs is the number of individuals at the overwintering sites in Mexico. 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).

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 ac) of habitat). Recent 2016 wintering data is available, presented in Figure 2, 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 ha (9.91 ac) (CONANP 2016).

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.

4.0 Environmental Baseline

Regulations implementing the ESA (50 CFR 402.02) define the environmental baseline as the past and present impacts of all federal, state, or private actions and other human activities in the Action Area. Also included in the environmental baseline are the anticipated and/or ongoing impacts of all proposed federal projects in the Action Area that have undergone section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation in progress.

4.1 Status of the Species in the Action Area

Population level estimates are not available for the covered species in the Action Area. Similarly, trend data and abundance of the covered species is generally derived from a combination of citizen science observations, historical record comparisons of range distribution and individual collections over time, and limited peer review science on recent distributional and life history evaluations typically conducted over 1 year. Status information for the covered bumblebees is summarized from available sources for each state in the Action Area. The status of the monarch butterfly is provided separately (see part 4.1.7.).

4.1.1 Maine

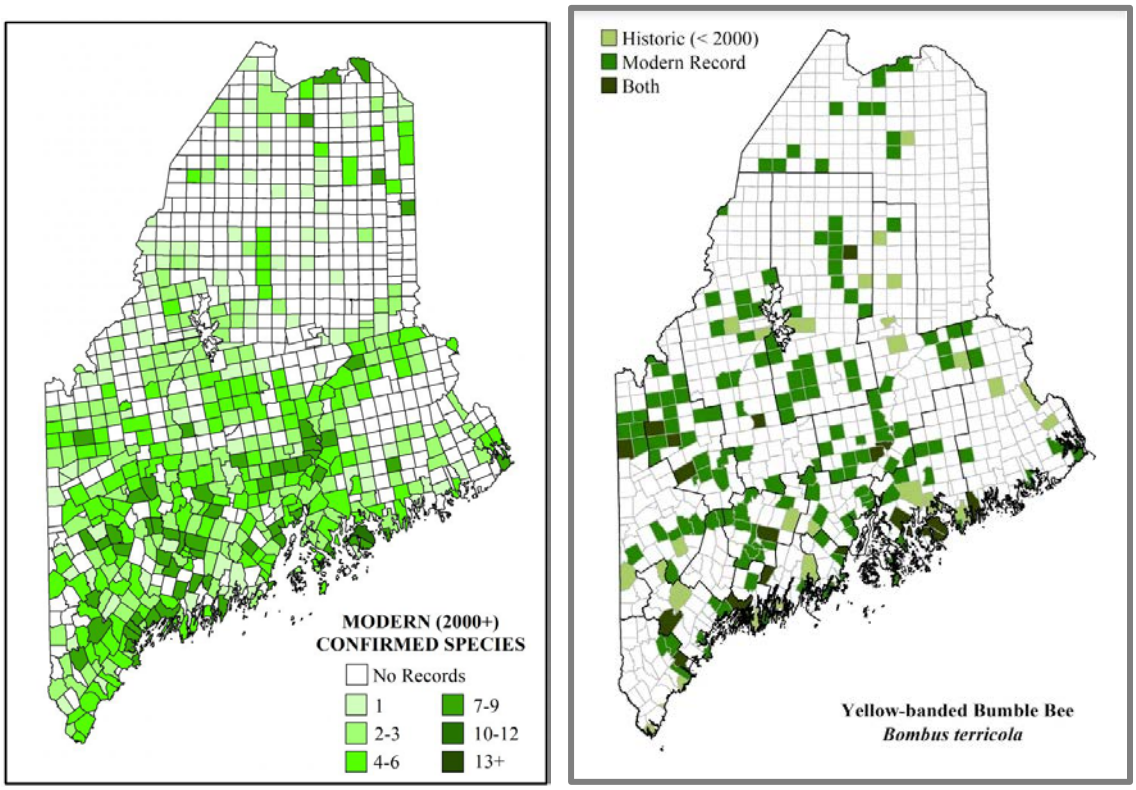
The Maine Department of Inland Fisheries and Wildlife initiated the Maine Bumblebee Atlas[21] in 2015. In its first three years, this citizen science effort has greatly increased knowledge about the status and distribution of bumblebees in Maine. As of the time of this writing, the Maine Bumblebee Atlas listed seventeen species documented from historical records for the state. Survey work conducted as part of the Atlas generated over 30,000 new occurrence records from over 500 townships from the first two years (MDIFW unpublished data; Bickerman *et al.* 2017). Based on date collected during the Atlas some species of bumblebees are still common, but many have declined and some may be extirpated from the state. Population sizes are unknown. Results to date are summarized below and in Figure 3:

- Rusty-patched bumblebee (*B. affinus*) – Despite extensive survey effort in the area where the species was last observed (2005 and 2009) in western Penobscot Bay, the rusty patched bumblebees have not been observed since.
- Yellow banded bumblebee (*B. terricola*) - Rare; few individuals found at locations where it occurs, but widely distributed and found in many towns statewide.
- Ashton's cuckoo bumblebee (*B. ashtoni*) – Historical (pre-2000) records primarily in central and southern Maine; no recent records; host is rusty patched bumblebee which may explain rarity.
- American bumblebee (*B. pensylvanicus*) – There is one historical (pre-2000) record and no recent records.
- Yellow bumblebee (*B. fervidus*) –Seven historical records and a similar number of recent records; found statewide.
- Lemon cuckoo bumblebee (*B. citrinus*) – There are 10 historical (pre-2000) records and a similar number of recent records; found statewide except for heavily-forested northwest portion of state.
- Fernald cuckoo bumblebee (*B. flavidus*) – There are 3 historical (pre-2000) records and about 12 current records; statewide.
- Confusing bumblebee (*B. perplexis*) – There are 13 historical (pre-2000) and several dozen recent records, found statewide.
- Indiscriminate bumblebee (*B. insularis*) – Two historical (pre-2000) records and no recent records; coastal and western Maine.

[21] Link to the home page for the Maine Bumblebee Atlas: https://mainebumblebeeatlas.umf.maine.edu/, accessed February 11, 2019

- Variable cuckoo bumblebee (*B. variabilis*) – No records for Maine.

Figure 3. Bee distribution in Maine



Caption: Left: Statewide survey effort and bumblebee diversity from the Maine Bumblebee Atlas in 2015 and 2016. Right: Historical and recent records of the yellow banded bumblebee (Figures downloaded from the Maine Bumblebee Atlas website).

4.1.2. Vermont

Within the State of Vermont; historically, the rusty patched bumblebee appears to have been a common species; with regional data suggesting that it was probably found throughout the entire state. However, despite multiple survey efforts throughout the early 2000s and again in 2012 and 2013, no rusty patched bumblebees have been observed in the state since 1999 (Data above summarized from McFarland and Richardson 2013; USFWS 2016b).

Historically, the yellow banded bumblebee appears to have been a common species; with regional data suggesting that it was probably found throughout the entire state. Biologists noted severe population declines in 2000 with few observations of the species until 2007 when perhaps a slight recovery began. The Vermont Bumblebee Survey found just 26 yellow banded bumblebees out of 5,053 specimens (0.5 percent) and 66 (~1 percent) of more than 5,000 specimens in 2013. It was found at just 73 out of over 1,500 survey sites during the two-year survey. The yellow banded bumblebee was encountered rarely in southern Vermont, in widely scattered locations in the Champlain Valley and central Vermont, and more widespread in the Northeast Kingdom region (Data above summarized from McFarland *et al.* 2014).

The State of Vermont provided a recent summary of the conservation status[22] of 19 native bees in the state (Vermont Natural Heritage Inventory, Vermont Fish & Wildlife Department (VHNI/VFWD) 2017). Results available for the covered species are depicted in Table 6 below.

Table 6. Bumble Status in Vermont (modified from VNHI/VFWD 2017)

Scientific Name	Common Name	State Rank	State Status
Bombus affinis	Rusty-patched Bumblebee	SH	E
Bombus bohemicus	Ashton Cuckoo Bumblebee	SH	E
Bombus citrinus	Lemon Cuckoo Bumblebee	S2S3	
Bombus flavidus	Fernald Cuckoo Bumblebee	SU	
Bombus fervidus	Yellow Bumblebee	S1S2	
Bombus insularis	Indiscriminate Cuckoo Bumblebee	SNA	
Bombus pensylvanicus	American Bumblebee	SH	
Bombus perplexus	Confusing Bumblebee	S4S5	
Bombus terricola	Yellow-banded Bumblebee	S2S3	T
Bombus variabilis	Variable Cuckoo Bumblebee	SNA	

Legend:
State Rank - The rarity (abundance) or endangerment of a native taxon within Vermont's geographic boundary or throughout its range, respectively. Ranks are as follows:
1- Very rare (Critically imperiled): At very high risk of extinction or extirpation due to extreme rarity (often 5 or fewer populations or occurrences), very steep declines, or other factors
2- Rare (Imperiled): At high risk of extinction or extirpation due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors
3- Uncommon (Vulnerable): Moderate risk of extinction\extirpation due to restricted range, relatively few populations or occurrences (often 80 or fewer), recent and widespread declines, or other factors
4- Common to uncommon (Apparently secure): locally common or widely scattered to uncommon, but not rare; some cause for long-term concern due to declines or other factors; or stable over many decades and not threatened but of restricted distribution or other factors
5- Common (Secure): widespread and abundant
H - Possibly extinct/extirpated: Missing; known from only historical occurrences but hope of rediscovery
U - Unrankable: Currently unrankable due to lack of information or conflicting information about status or trends
State Status - Legal protection under Vermont Endangered Species Law (10 V.S.A. Chap. 123) or informational category (not established by law)
E = Endangered: in immediate danger of becoming extirpated in the state
T = Threatened: with high possibility of becoming endangered in the near future

4.1.3 Connecticut

In 2014, the Connecticut Agricultural Experiment Station produced the Connecticut Bumblebee Guide (Zarrillo 2014), which providesstatus and trend information for the State's bee fauna. Sixteen species of *Bombus*, including eight of our covered species, have been recorded as occurring in Connecticut since the early 1900's. Table 7 depicts the population status for each of the covered species in the Connecticut, as well as the first and last documented record up through 2014. Status information for the other covered species was not found.

[22] No explicit trend/abundance information was available; information presented is based upon the natureserv ranking criteria and definitions available at: http://www.natureserve.org/conservation-tools/conservation-status-assessment

Table 7. Status of covered *Bombus* spp. in the state of Connecticut (modified from Zarrillo 2014).

Species	Common Name	Status in the	First and Last CT Record
B. bohemicus	Ashton's Cuckoo	Presumed extirpated	1905-1992
B. affinis	Rusty patched	Presumed extirpated	1904-1997
B. terricola	Yellow banded	Declining	1904-2009
B. pensylvanicus	American	Declining	1902-2006
B. fervidus	Yellow	Declining	1902-2012
B. flavidus	Fernald	Too Few to Tell	1911-2011
B. citrinus	Lemon Cuckoo	Increasing	1913-2013
B. perplexus	Confusing	Increasing	1913-2013

4.1.4 New Hampshire

In New Hampshire, Jacobson *et al.* (2017) summarized population status and trend data and found evidence of drastic decline for the rusty patched, yellow, and yellow banded bumblebees. Specifically, the rusty patched bumblebee is thought to be locally extinct in New Hampshire, as it was last collected in 1993. Among the State's other species of greatest conservation need, the yellow bumblebee has declined by 96 percent over the past 150 years, and the yellow banded bumblebee has declined by 71 percent. Additionally, the analysis found a severe constriction of the geographic range of the yellow banded bumblebee to high elevation regions in the latter half of the 20th century. Status information for the other species was not available.

4.1.5 Massachusetts

Data on the abundance and distribution of the covered species is generally lacking for the State of Massachusetts. However, Hahn (2017) reported bee species diversity and composition during the years 1990-1991, 2007-2009, and 2016 for the same cranberry bog location in Massachusetts. Trend information for abundance for the rusty patched bumblebee was clearly downward; with Hahn (2017) reporting 34 found in 1990-1991, and one found in 2009. Status information for the other species was not available.

4.1.6 Rhode Island

Gregg (*pers. comm.* 2018) indicated that Rhode Island is in the process of updating the state information for the rusty patched and yellow banded bumblebee. Further, some distribution and abundance information is available for the American, yellow, and lemon cuckoo bumblebees. However, this information is not yet available in a compiled format.

Ginsberg (*pers. comm.* 2018) provided some additional information:

"Records of *Bombus* collections exist in Rhode Island from several time periods: early-mid 1900's in the University of Rhode Island (URI) insect collection, collections on Block Island from the 1970's and from 2010, and recent collections from highbush blueberry farms (Scott *et al.* 2016); and from Napatree Point and other sites in southern Rhode Island (Rothwell and Ginsberg 2017). The URI's collections from the early-mid 1900's include *B. affinis* from Block Island (1970's), but the species has not been presentin later collections. *Bombus terricola* was present in the URI collection (early-mid 1900's) but not in later samples. I am aware of one *B. terricola* collected in the last decade or so from Rhode Island…. In terms of the other covered species B. *pensylvanicus* was collected in the 1970's from Block Island. *Bombus fervidus, B. perplexus*, and *B. citrinus* have been collected in both old and recent samples. I have no records of *B. ashtoni, B. insularis, B. variabilis, or B. flavidus* from Rhode Island."

4.1.7 Monarch Butterfly Distribution and Abundance in the Action Area

The monarch butterfly's distribution has remained approximately the same in North America; however, systematic annual surveys conducted in the species wintering habitat indicates the species has undergone a long-term decline in numbers (see Part 3.11 for more information on the monarch butterfly). We are unaware of systematic sampling to determine the monarch butterfly's distribution or abundance within the Action Area. For the purpose of this document, we assume monarch butterflies can be found breeding, feeding, or migrating throughout the Action Area during the summer and early fall. Secondly, we predict abundance across the Action Area follows the patterns observed throughout North American. That is, when the species is abundant throughout the North American breeding grounds, they are also abundant throughout the Action Area. However, we do expect the species abundance varies across the Action Area with monarch butterflies being most abundant where milkweed and nectar resources are also abundant (e.g., abandonded agricultural fields in southern New England). In contrast, we expect monarchs are less abundant in areas where resources are limited, such as in the spruce and fir dominated forests of northern Maine.

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

Below we focus on three exogenous stressors (stressors originating outside an organism or system), including pathogens, pesticides, habitat loss and degradation, and one endogenous stressor (stressor originating from inside an organism or system), small population dynamics. The USFWS and NRCS believe this respresents the range of conservation issues facing the covered species in the Action Area. Below we describe each of these four risk factors and our rationale and available evidence of how they may be affecting the covered species. Note that most of the information below is based upon available information focuses on knowledge of the rusty patched bumblebee and the monarch butterfly. We assume that effects are manifested at similar scales and intensities for the other covered species; therefore, the analysis presented represents a collective and compiled factors for all of the covered species.

4.2.1 Pathogens

Natural pathogen loads in bumblebee species

A large number of pathogens, including parasites, are known to attack and infect bumblebees. For the most part, bumblebee species have co-evolved with these pathogens and do not exhibit effects at the

colony or population level. Pathogens and parasites are widespread generalists in the host genus, but affect species differentially according to host susceptibility and tolerance to infection (Kissinger *et al.* 2011, Malfi and Roulston 2014). The host species' life history plays a role in the virulence of a given pathogen; for instance, parasites may have relatively smaller effects on species with shorter colony life cycles and smaller colony sizes (Rutrecht and Brown 2008).

Pathogens as a bumblebee population stressor

The precipitous decline of certain bumblebee species from the mid-1990s to present – particularly species in the subgenus *B. sensu stricto*, which includes the rusty patched bumblebee – was contemporaneous with the collapse of commercially bred *B. occidentalis*, which were raised primarily to pollinate greenhouse crops beginning in the late 1980s (Szabo *et al.* 2012). This collapse was attributed to the microsporidium *Nosema bombi*. Around the same time, several North American wild bumblebee species, including the rusty patched bumblebee, *B. franklini*, *B. occidentalis*, *B. terricola*, and *B. pensylvanicus* (of these, only *B. pensylvanicus* is not in the subgenus *sensu stricto*), also began to decline rapidly (Szabo *et al.* 2012). The temporal congruence and speed of these declines led to the suggestion that they were caused by spillover, or spillback, of *N. bombi* from the commercial colonies to wild populations.

N. bombi can have large effects on individual bees and transmission most likely occurs when spores are fed to larvae (Eijnde and Vette 1993; Rutrecht *et al.* 2007, as cited in Meeus *et al.* 2011). Infected animals may have crippled wings or, in queens, distended abdomens and an inability to mate (Otti and Schmid-Hempel 2007). Murray *et al.* (2013, citing Rutrecht *et al.* 2007) noted that *N. bombi* spreads slowly through novel populations. Transmission primarily occurs via contaminated pollen or nectar fed to the larvae and subsequent inter-colony infections occur through "drift of infected adults into non-natal colonies" and shared use of flowers with infected bees (Murray *et al.* 2013). Brown (2011) cited two possible interpretations of the contemporaneous collapse of native bumblebees with commercial breeding of *B. occidentalis*: (1) a high parasite prevalence represents the moving edge of a wave of infections, indicating that these bumblebee populations are on the verge of extinction, or (2) the high prevalence may simply indicate that the declining species naturally support high populations of the parasite. A recent study suggests a possible interaction between prevalence of *N. bombi*, fungicide use, and bumblebee declines (McArt et al. 2017).

Notwithstanding earlier studies postulating *N. bombi* spillover around commercial greenhouses (e.g., Colla *et al.* 2006), as well as the timing of commercialization and bumblebee declines, Szabo *et al.* (2012) found that pathogen spillover in this form cannot fully account for these declines. Further, Cameron *et al.* (2016) conclusively show that there is no evidence for the importation of an exotic *N. bombi* strain; the strain previously thought to be European was present and widespread in North America before the importation of European bumblebees in the 1990s. These authors do conclude that *N. bombi* prevalence has increased since the 1990s, particularly in declining species such as the rusty patched bumblebee. Overall, although results of recent work show both a higher prevalence of *N. bombi* in rapidly declining North American bumblebee species than in stable species (Cameron *et al.* 2011b; Cordes *et al.* 2012) and a high infection intensity (*i.e.*, number of spores per bee) in declining species, it remains debatable as to whether pathogen spillover of *N. bombi* is driving bumblebee declines. It is also worth noting that evidence of pathogen spillover is lacking in European bumblebee despite widespread commercial production and transport of hives since early the 1980s.

Nosema bombi has been found to be part of the natural pathogen load in North American bumblebee populations. For instance, it has been reported in Canada since the 1940s (Cordes *et al.* 2012) and appears to have a broad host range in North America (Kissinger *et al.* 2011). It is thus not clear if its recent prevalence is indicative of natural trends or of the rapid spread of an invasive strain (Brown 2011; Cameron *et al.* 2011b; Meeus *et al.* 2011). Although Cordes *et al.* (2012) found a new allele in *N. bombi*, the recent study by Cameron *et al.* (2016) found no evidence of an exotic *N. bombi* strain. Malfi and Roulston (2014) found that N. bombi infections are more frequent and more severe in rare species (albeit the rusty patched bumblebee was not included in the sample) and that the species with the highest percentage of infected individuals were rare species. They concluded that the evidence linking *N. bombi* to the bumblebee decline is correlative but does suggest species undergoing range reductions are more susceptible to *N. bombi* infections, while noting that it is nonetheless possible that elevated levels of *N. bombi* are natural in the host species.

Patterns of observed bumblebee declines may not be explained completely by exposure to *N. bombi*, but a recent study suggests an interaction between prevalence of the pathogen, fungicide use, and bumblebee declines (McArt *et al.* 2017). The evidence for chronic pathogen spillover from commercial bumblebees as a main cause of decline remains debatable (see various arguments in Colla *et al.* 2006; Otterstatter and Thomson 2008; Szabo *et al.* 2012; Manley *et al.* 2015).

Szabo *et al.* (2012) noted that other pathogens may be involved in the ongoing decline of the rusty patched bumblebee. For example, some viruses can be transmitted from honeybees (*Apis mellifera*) to bumblebees, as shown in Singh *et al.* (2010). Virological research has focused primarily on honeybees, but many of the 24 viruses isolated in them have a broad host range, which includesbumblebees (Manley *et al.* 2015).

In addition to fungi such as *N. bombi* and viruses such as DWV, other viruses, bacteria, and parasites are being investigated for their effects on bumblebees in North America. Those potentially of greatest concern for the rusty patched bumblebee are described briefly in USFWS' Rusty Patched Bumblebee Species Status Assessment (USFWS 2016b).

Higher pathogen prevalence and reduced genetic diversity are reasonable as predictors of the patterns of decline observed in North American bumblebees, although cause and effect remain uncertain (Cameron *et al.* 2011b). Szabo *et al.* (2012) found no evidence that pathogen spillover caused the near disappearance of the previously widespread rusty patched bumblebee despite the temporal association between its decline and the onset of commercial bumblebee use.

Pathogens of Monarchs

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). Gowler *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.

4.2.2 Pesticides

Effects on Bees

Bumblebees may be exposed to multiple pesticides throughout their lives, from development to adults (Sanchez-Bayo and Goka 2014; Goulson *et al.* 2015). For example, an analysis of bees collected from a research area in northeastern Colorado in both grasslands and wheat fields identified 19 pesticides among 54 samples; the neonicotinoid insecticide, thiamethoxam, was the most frequently detected pesticide (present in 46 percent of the samples, Hladik *et al.* 2016). Bumblebees are exposed to pesticides when they consume contaminated nectar or gather contaminated pollen. They can also absorb toxins directly through their exoskeletons. The USFWS (2016b) compiled the available literature and summarized the the pathways of effects from pesticides (lethal and usb-lethal effects) on bumblebees as follows:

A. Direct contact mortality from such componds as imidacloprid, clothianidin, clyhalothrin, acetamiprid, deltamethrin, spinosad, thiacloprid, or thiamethoxam.
B. Reduction in or elimination of the production of males.
C. Reduction in or elimination of egg hatch.
D. Reduction in queen production.
E. Reduced queen longevity.
F. Reduced colony weight gain.
G. Reduced brood size.
H. Reduced feeding rates and overall consumption of food
I. Impaired ovary development for queens
J. Increased number of foragers or foraging trips/duration (risky behavior)
K. Changes in worker size

4.2.3 Neonicotinoids

Effects on Bees

Neonicotinoids are systemic insecticides that act as an insect neurotoxin, affecting the central nervous system of insects. Laboratory data indicates that neonicotinoids kill insects by interfering with receptors of the insect's nervous system, causing overstimulation, paralysis, and death. The neonicotinoid family includes acetamiprid, clothianidin, imidacloprid, nitenpyram, nithiazine, thiacloprid and thiamethoxam. The typical neonicotinoid application methods include: foliar spray, granular, seed coating, soil furrow, and drench or drip irrigation.

Neonicotinoids have been strongly implicated in the decline of bees (Colla and Packer 2008; European Food Safety Authority 2015; Pisa *et al.* 2015; Goulson 2013). Neonicotinoids persist and accumulate in soils, and owing to their systemic property, are found in nectar and pollen of treated crops and landscapes (Goulson 2013) and in guttation droplets (drops of xylem sap on the tip or edges of leaves) (Girolami *et al.* 2009). Reported levels of neonicotinoids in soils, waterways, field margins, and floral resources overlap substantially with concentrations that are sufficient to control pests in crops, and commonly exceed the LC50 (the concentration that kills 50 percent of individuals) for non-target insects (Goulson 2013). Similarly, neonicotinoids are present at toxic levels in guttation droplets (Girolami *et al.* 2009). A more comprehensive review of the available literature on the relationships between neonicotinoid use patterns and the decline of the rusty patched bumblebee is outlined in the USFWS' species status assessment (USFWS 2016b).

4.2.4 Pesticide Additives

Effects on Bees

Pesticide formulations typically contain less than 50 percent active ingredients with the remainder being surfactants (surface active agent that reduces the surface tension of water) and solvents (collectively, referred to as adjuvants). As bees forage, they are exposed to many adjuvants as well as active ingredients (Mullin *et al.* 2015). Adjuvants, however, are not typically included in risk assessments that are required for pesticide registration (Mullin *et al.* 2015), and are therefore, less studied, but can be as or more toxic to bees as the active ingredients (Mullin *et al.* 2015). Goodwind and McBrydie (2000) found that four of 11 commercially available spray adjuvants were toxic to honeybees at field rates. Furthermore, active ingredients and inert ingredients may interact synergistically, causing impacts that would not occur by exposure to the active ingredients alone (Mullin *et al.* 2015).

4.2.5 Herbicide Effects

Effects on Bees

The wide-spread use of herbicides in agricultural, urban, and even natural landscapes has led to decreases in flowering plants (Potts *et al.* 2010). For example, the increasing, widespread use of the herbicide glyphosate in conjunction with increasing use of crops that are genetically modified to be resistant to glyphosate, has reduced the flowering plants in agricultural areas (Pleasants and Oberhauser 2013). Because of drift from agricultural plots, loss of flowering plants and reductions in floral diversity occur in surrounding natural areas as well (Potts *et al.* 2010).

4.2.6 Synergistic Effects of Pesticides and Fungicides on Bees

Bees are exposed to a number of significant and interacting stressors (Goulson *et al.* 2015), which can compound the effects of pesticides. For example, a recent study found that increased use of the fungicide chlorothalonil "was the best predictor of range contractions of four declining bumblebee species (e.g., *B. terricola* and *B. affinis*) and that clorothalonil in particular was associated with high levels of infection by the microsporidian pathogen (*N. bombi*; McArt *et al.* 2017). Further, *N. bombi* infection rates are about 20 times higher in declining versus stable bumblebees (McArt *et al.* 2017). Exposure to the same chemical, chlorothalonil, among common eastern bumblebees (*Bombus impatiens*) led to fewer and smaller bees and reduced colony success (Bernauer et al. 2015).

In addition, exposure to fungicides greatly increased the toxicity of insecticides in honeybees (Schmuck *et al.* 2003; Iwasa *et al.* 2004; Piling and Jepsen 1993; Mullin *et al.* 2015 citing Zhu *et al.* 2015). Similarly, honeybees exposed to fungicides had reduced colony nutrition and higher virus levels to fungicides (DeGrandi-Hoffman *et al.* 2015). Pettis *et al.* (2012), for example, found increased probability of *Nosema* infection in honeybees feeding on pollen with high fungicide loads. Several studies found exposure to insecticides reduced resistance to diseases (Fauser-Misslin *et al.* 2014; Pettis *et al.* 2013), and exposure to dietary related stresses (e.g., short-term starvation) reduced the ability of bees to cope with toxins (Brown *et al.* 2000; Tyler *et al.* 2006; Moret and Hempel 2000). Piiroinen and Goulson (2016) found that exposure to *N. caranae* reduced learning in honeybees and bumblebees, but both species reacted differently to the combination of pathogen plus pesticide exposure. Bartlewicz-Martens *et al.* (2016) document negative impacts of fungicides on microflora, particularly yeasts, in nectar, that could affect pollinator gut microbiota. A review of research into the combined effects of pesticides on honeybees found ergosterol inhibiting fungicides significantly contribute to the spread and abundance of honeybee pathogens and parasites (Sanchez-Bayo *et al*. 2016). The authors also stated that these same concerns are likely to exist for bumblebees and many other wild insects.

A growing body of research demonstrates that some fungicides (e.g., multi-site contact activity fungicides like captan, mancozeb, and chlorothalonil; and the ergosterol inhibiting fungicides, e.g., tebuconazole) - can harm bees, including bumblebees, in a variety of ways. Some fungicides synergize the toxicity of certain insecticides when applied in concert while others pose risks to bee foraging, reproduction, and pathogen infection when used independent of other chemistries.

A field study in New York apple orchards found that pre-bloom fungicide sprays had strong negative effects on wild bee communities in the orchards, indicating a real-world impact of these chemicals at the farm scale. Dietary exposure to fungicides in contaminated pollen and nectar can have a variety of sublethal effects on adult bees and larvae, which may have significant impacts on the ability of these insects to forage and reproduce. Sprayberry *et al*. (2013) determined that the presence of the fungicide product Manzate (active ingredient mancozeb) decreased bumblebees' ability to locate food within a maze. Pyraclostrobin and boscalid can also reduce brood production and increase pathogen levels in honeybee colonies.

Laboratory evidence suggests that certain fungicides may interact with other pesticides, in some cases synergistically increasing toxicity to bees. For example, a blend of pyraclostrobin and boscalid increases the toxicity of fluvalinate, a pyrethroid acaricide used to control Varroa mites, to honeybees. The DeMethylation Inhibitor (DMI) fungicides, which include the triazoles (e.g. fenbuconazole, metconazole, propiconazole) and imidazoles (e.g. prochloraz, triflumizole), may increase toxicity of

pyrethroids and some neonicotinoids by blocking the enzyme pathway bees use to detoxify these insecticides. Field reports and honeybee incidents have also raised concern over the potential effects of DMI fungicide mixes, which are commonly detected in beebread (pollen stored in honeycombs for food) from honeybee colonies in agricultural areas. Additional research is needed to determine the potential synergistic, chronic, or delayed effects of specific fungicides and their impacts on honeybees and native bees in the field.

Determining the extent bee fatality caused by pesticides is difficult due to the myriad of other potential stressors (e.g., pathogens, parasitoids, and diseases) and possible synergistic effects of these sources (summarized in Sancho-Bayo *et al.* 2016 and USFWS 2016b). There are known instances where neonicotinoids, such as clothianidin, have had adverse effects to bees through suppressed immunity and proliferation of viral pathogens (e.g., Di Prisco *et al.* 2013). The interruption or disruption of endocrine functions is related to the immune systems of animals and the application of neonicotinoids that may potentiate the increase of pathogens. However, it is the end result of these interactions that are the crux of the decline observed in bees. It is a very important point as to which factors are having the effects, but it is also known that the corrective measures leading to recovery of species will have to address potential pathways for each of these agents and the declines are cumulative impacts of these agents.

4.2.7 Effects of Insecticides, Herbicides and Associated Compounds on the Monarch Butterfly

Monarchs can be exposed to insecticides via various pathways throughout different parts of their lifecycle, including through direct contact and through their diet. Based on these exposure pathways, monarchs are exposed to insecticides used in agricultural systems (e.g., using foliar spray applications, and use of insecticide-neonicotinoid-treated seeds) and in non-agricultural systems (e.g., private or residential lawns/gardens). While insecticides can be used in a wide variety of other scenarios, these primary uses are considered to represent the vast majority of the scenarios in which monarchs may be exposed.

Three major classes of insecticides are registered for use within these systems: pyrethroids, organophosphates, and neonicotinoids. There are other classes of insecticides (e.g., carbamates) that were not included but are may be important; however, lepidopteran toxicity data are not available for these classes to evaluate the potential magnitude of effects if exposure occurred. The three classes of insecticides that we focus on here are used throughout the monarch's range (U.S. Geological Survey National Water-Quality Assessment 2017) and are likely influencing its status.

Use of pyrethroids and neonicotinoids has increased within the monarch's breeding habitat in North America, while the use of most organophosphates has decreased since 2001 (U.S. Geological Survey National Water-Quality Assessment 2017; Amweg *et al.* 2005; Goulson 2013). In the eastern United States, insecticides are widely used within the monarch migration route (Douglas and Tooker 2015). However, it is unknown if there is a causative link between insecticide usage and the decline of the monarch, or whether observed negative correlations represents a proxy for other environmental factors associated with intensive agriculture practices.

Scientific data documenting insecticide effects to Lepidoptera are largely limited to: (1) laboratory dosing studies on larva to investigate the toxicity of an insecticide with various endpoints measured, (2) modeling studies predicting the extent of insecticide threat to populations, and (3) field-based studies that investigate insecticide concentrations in plant tissues to extrapolate "real-world" exposure and

effects to larvae and adults. All three types of studies have their limitations. For example, standardized methods of laboratory toxicity testing have not yet been adopted for Lepidopteran species, resulting in inconsistencies in exposure regimes (e.g., duration, contact vs ingestion, lifestage) and reporting of toxicity values (e.g., units of measurement). Lack of accepted testing protocols confound the ability to make comparisons across studies and species. Given such variability, this section presents a brief summary of select information from published literature on the effects and toxicity of the three widely-used classes of insecticides to monarchs or other Lepidoptera species: organophosphates, pyrethroids, and neonicotinoids. Conclusions are noted where possible. Other classes of insecticides and other types of pesticides can be similarly investigated.

Organophosphates and Pyrethroids

A number of laboratory studies have examined the toxicity of select organophosphates and pyrethroids to nontarget lepidopteran species within the families Nymphalidae, Lycaenidae, Papilionidae, Hesperiidae, and Pieridae (Salvato 2001, Hoang *et al.* 2011, Eliazar and Emmel 1991, Hoang and Rand 2015, Bargar 2012, Davis *et al.* 1991). Most studies measured the acute toxicity (ie., LD50[23]) of insecticides to various species of lepidopterans exposed via dietary or contact exposure pathways. Methods varied across studies in relation to length of exposure, lifestage, chemical form (active ingredient vs formulated product), and exposure regime. In general, while toxicity was exhibited across all species and chemicals, no consistent patterns emerged either within or across studies that demonstrated sensitivity was related to species (or species group), lifestage, or size of adults, though inconsistency in testing regimes may limit the ability to detect patterns that exist. Of the organophosphates tested (dichlorvos, malathion, naled, and dimethoate) species tended to exhibit the greatest sensitivity to naled and the least to malathion, though these results were not always consistent across species and methods. For pyrethroids, toxicity values were reported for two insecticides, permethrin and resmethrin. However, resmethrin testing was performed in formulation with piperonyl butoxide, a synergist that is combined with pesticides to enhance toxicity and comparisons cannot be made between relative toxicity of these two insecticides. Based on the available data from these insecticide studies, there is no evidence to imply that a particular species or family of Lepidopterans is expected to exhibit more or less sensitivity to a particular organophosphate or pyrethroid than others, including targeted pest species.

Oberhauser *et al.* (2006) investigated sublethal effects of low permethrin treatments to monarchs. The studies found that larvae that consumed milkweed leaves treated with permethrin in dilutions of field operable solutions (dilutions 0.5 and 0.1 percent) had significantly lower rates of survival than those that consumed leaves that served as controls (with either an oil solution or untreated leaves); survival rates were lower for first instar larvae compared to later instar larvae. Of the 60 larvae exposed in the two treatment groups (dilutes of 0.5 and 0.1 percent), 37 died (33 as larvae and 4 as pupae) and larval stage development time was significantly delayed in the two treatment groups compared to the two controls. In the same study, Oberhauser *et al.* (2006) tested if permethrin residues on milkweed leaves influence female oviposition choice, the number of eggs laid, and survival 1, 8, and 15 days after the initial spray event. Females were placed in enclosures that contained milkweeds exposed across three treatment groups: (1) milkweed plants sprayed with operational solutions of permethrin, (2) milkweed sprayed with operational solutions of permethrin, treated with oil solution, and untreated, and (3)

[23] LD50 is the amount of a toxic agent (as a poison, virus, or radiation) that is sufficient to kill 50 percent of a population of animals usually within a certain time — called also median lethal dose.

milkweed plants that were untreated. Overall female survival was low for the two permethrin treatments (8 – 16 percent) compared to 92 percent survival for the untreated treatment; with the lowest survival rate 1 day after the initial spray event. In addition, the studies found that ovipositing females did not discriminate amongst treatment groups, but fewer eggs were laid on permethrin treated plants 1 day after initial spray date compared to treated plants 8 and 15 days earlier.

Oberhauser *et al.* (2009) also exposed adults and larvae to ULV applications of resmethrin (as the formulated product Scourge, which contains resmethrin plus the synergist piperonyl butoxide) to evaluate the effects of mosquito control on monarchs. Three experiments examined impacts to survival in adults and larvae subject to direct spray at varying locations upwind and downwind, and in larvae consuming previously exposed milkweed. Monarch mortality varied with conditions of experimental design, but significant increases over controls were found at distances up to 120 m downwind from the application site over the three experiments. Milkweed plants sprayed one day prior to monarch exposure resulted in significant mortality to larvae as compared to controls. In one of three experiments, adult mass was negatively affected by exposure to resmethrin. One experiment exposed house fly (*Musca domestica*) and milkweed bug (*Oncopeltus fasciatus*) larvae to resmethrin under conditions that caused monarch mortality and found no effects to survival of either species.

Neonicotinoids

There are few published studies examining the toxicity of neonicotinoids to monarchs (described herein). A summation of toxicity values of neonicotinoids across taxa (insects, birds, fish, molluscs, mammals, annelids) found insects to be the most sensitive taxa when exposed via contact or the dietary/ingestion pathway (Goulson 2013). Lethal dose values to 50 percent of the tested insect population (LD50) ranged from 0.82 to 88 ng of neonicotinoid insecticides. The variation in LD50 values is attributed to size of the insect, with the most sensitive insect being the brown planthopper (*Nilaparvata lugens*; a native species) weighing 1mg, and the least sensitive insect being the Colorado potato beetle (*Leptinotarsa decemlineata*; a crop pest and non-native species) weighing 130 mg.

Assessing the risk of neonicotinoids specifically to the monarch butterfly, Pecenka and Lundgren (2015) attempted to mimic a pulsed exposure in the field by feeding swamp milkweed leaves dosed with clothianidin to larvae for 36 hours during the first stadium, and then observing effects up to the third instar. Each larva was fed a single 1 cm milkweed disk with an aqueous solution of clothianidin on agarose gel on the leaf. Once that disk was consumed, the larvae were then fed clean milkweed leaves until the end of the experiment in the third instar. Increasing mortality was observed with increasing dose, measured in µg/L (ppb) clothianidin in the 10 µL of solution applied to each leaf disk: the LC10, LC20, LC50, and LC90 concentrations were found to be 7.72, 9.89, 15.63, and 30.70 ppb, respectively. Significant effects to development time, body length, and weight for newly eclosed second instars were observed at doses as low as 0.5 ppb. This study reveals effects to monarchs at seemingly low environmental concentrations of clothianidin; however, concentrations as reported (ug/L of solution per leaf disk) are not easily extrapolated to typical concentration units for a dietary testing exposure scenario (gram per leaf or ng/g ww of leaf). Therefore, it is difficult to make a direct comparison to concentrations expected to be found on milkweed leaves in the environment.
The authors also detected and measured clothianidin in common milkweed leaves from plants adjacent to corn fields in South Dakota, though due to uncertainties in the methodologies and reporting methods it is not clear how to relate these concentrations to the doses causing effects on growth or direct

mortality. Unexpectedly, concentrations were greater in July than in June, so the 36-hour exposure may have significantly underestimated exposure duration and thus sensitivity.

Krischik *et al.* (2015) found that the neonicotinoid imidacloprid, when applied to soil, was taken up by the roots of the Mexican milkweed (*Ascelpias curassavica*) and accumulated in the flowers. The more imidacloprid applied to the soil, the more that was found in the flower. Adult monarch and painted lady butterflies either exposed to or force-fed imidacloprid in solution showed no effects in survival, fecundity, or egg hatch at either labeled rates or double that concentration. However, the survival of monarch larvae feeding upon imidacloprid treated plants experienced reduced survival, with few surviving past seven days. The authors hypothesized that adult butterflies may not metabolize the insecticide and, instead, excrete it unchanged.

4.2.8 Habitat Loss and Degradation

Bee diversity is strongly linked to floral diversity and abundance over their entire active season (Hines and Hendrix 2005). Thus, the greatest impact of habitat loss on bees is the loss of floral resources necessary for food and nectar. Conversion of natural habitat that is rich in flowers to farmlands, urban and suburban areas, and other uses is the primary cause of bumblebee habitat loss (Goulson *et al.* 2015).

Persson and Smith (2013) found reduced bumblebee abundance and diversity of in simple versus complex agricultural landscapes in Sweden and ascribed this primarily to a lack of mid- to late season wildflower resources in simple landscapes. Landscape complexity was positively related to colony growth in the buff-tailed bumblebee (*Bombus terrestris*), a close relative of the rusty patched bumblebee that is common in Europe (Bukovinszky *et al.* 2017).

Plants in the milkweed family (*Asclepias spp.*) 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 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 to the increased use of the genetically modified herbicide-resistant crops, especially in the agricultural Midwest region of the USA. Researchers have attempted the complex task of enumerating of the loss of milkweeds. For example, Pleasants (2016) estimated that almost a billion milkweed plants have been lost since 1999 from both the agricultural landscapes of the Midwest and the lower Great Plains Region due, primarily, to development and the conversion of grasslands to cultivated lands. Pleasants (2016) 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 Pleasants (2016) is that female monarchs, because of their inability to locate remaining milkweed plants, will cumulatively lay fewer eggs (over their lifetime).

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 United States, 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 United States. 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.

4.2.9 Synthesis of Factors Affecting the Baseline

Habitat loss for bumblebees in the Action Area is unlikely to have been the primary cause of recent population declines, but is likely interacting with other factors to further stress populations (Goulson *et al.* 2008; Williams and Osborne 2009), (Szabo *et al.* 2012; Colla and Packer 2008; Cameron *et al.* 2011b). Bee species examined in studies by Colla and Packer (2008) and Cameron *et al.* (2011b) were recently common in both rural and urbanized regions, indicating they persisted in some areas despite historical habitat loss. Further reductions in habitat quantity and quality, which is primarily due to the reduction in the extent and diversity of floral resources, is likely to reduce resiliency of populations to the stressors summarized above. For example, nutritional stress may decrease the ability to survive parasite infection (Brown *et al.* 2000) or cope with pesticides (Goulson *et al.* 2015). Furthermore, bumblebees may be more vulnerable to extinction than other animals because their colonies have long cycles, where reproductive individuals are primarily produced near the end of those cycles. Thus, even slight changes in resource availability could have significant cumulative effects on colony development and productivity (Colla and Packer 2008).

It is likely that several of these risk factors are acting additively and synergistically on bumblebee species (Goulson *et al.* 2015) and the combination of multiple stressors is likely more harmful than a stressor acting alone (Gill *et al.* 2012; Coors and DeMeester 2008; Sih *et al.* 2004). There is recent evidence that the interactive effects of pesticides and pathogens could be particularly harmful for bumblebees (Fauser-Misslin *et al.* 2014; Baron *et al.* 2014) and other bees (Alaux *et al.* 2010; Pettis *et al.* 2012; Vidau *et al.* 2011; Aufauvre *et al.* 2012). Nutritional stress may compromise the ability of bumblebees to survive parasitic infections as evidenced by a significant difference in mortality in bumblebees on a restricted diet than well fed bees infected with *Crithidia bombi* (Brown *et al.* 2000). Bumblebees with activated immunity may have metabolic costs, such as increased food consumption (Tyler *et al.* 2006; Moret and Schmid-Hempel 2000). Furthermore, exposure to pesticides may increase with increased food consumption in infected bees (Goulson *et al.* 2015). There is evidence that activating immunity impairs learning in bumblebees (Riddell and Mallon 2006; Alghamdi *et al.* 2008). Impaired learning is thought to reduce the ability of bees to locate floral resources and extract nectar and pollen, which exacerbates nutritional stresses (Goulson *et al.* 2015).

Habitat losses for the monarch butterfly, particularly in the wintering and spring migratory areas, are likely affecting abundance of monarchs in the Action Area. However, as with the bees explained above, risk factors are acting additively and synergistically on the status of the monarch butterfly. Extreme weather events in the over-wintering areas in Mexico and immediate effects of weather changes (precipitation, temperature), and climate change affect yearly and seasonal abundance and survival of the monarch butterfly (literature summarized in recent ESA Section 7 Conference Report for the NRCS Monarch Butterfly Working Lands for Wildlife Initiative (USFWS 2016a)).

5.0 Effects of the Action

Direct effects are the direct or immediate effects of the project on the species, its habitat, or designated/proposed critical habitat. Indirect effects are defined as those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (50 CFR 402.02). An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. Direct and indirect effects of the proposed action along with the effects of interrelated/interdependent activities are all considered together as the "effects of the action."

5.1 Effects Introduction

The NRCS and USFWS have evaluated the identified conservation practices and enhancements to determine how each practice may produce beneficial and adverse effects to covered species and their habitats. The NRCS collaborated with USFWS to develop specific conservation measures. The NRCS and USFWS have determined that the overall effect of the conservation measures will result in a positive benefit to the covered species by ameliorating, minimizing, or eliminating many of the potential adverse effects. Nevertheless, even with the associated conservation measures, some remaining adverse effects may occur to the covered species and their habitats, 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 by increasing habitat guality and quantity through active management while ameliorating existing threats.

Planning and execution of the NRCS assistance programs to private landowners depends upon the completion of a Conservation Plan for each eligible participant. The Conservation Plan is developed within the NRCS' planning framework (Appendix II) and supplemented with the requirements of satisfying the WLFW conservation model of delivery. Consequently, the agencies recognize that each conservation practice and enhancement 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. The selection of the covered practices/enhancement for each Conservation Plan will depend upon legacy land use, the limiting factors identified (as identified by the WHEG), and the integration of the covered species' habitat needs within the economic/management expectations for that landowner.

With the Action Area, NRCS expects to provide technical and financial assistance to (subject to the Farm Bill eligibility requirements) to private non-industrial forest landowners, commercial blueberries and cranberries producers, other agricultural producers, and landowners generally interested in incorporated pollinator conservation within their operations or ownerships. Appendix VI provides additional details and insights into the operational implementation of the covered practices and

enhancements for typical situations and landowners that NRCS will encounter as part of the Proposed Action.

5.2 Potential Adverse Effects (AE) from the Proposed Action

The USFWS and NRCS identified the following potential adverse effects that may result from implementation of the Proposed Action on the covered species. A key assumption is that these potential adverse effects apply to all of the covered species. Although peer review information is generally lacking for species specific effects, the USFWS and NRCS believe that a common and equivalent narrative is appropriate in evaluating effects from implementation of the covered conservation practice standards and enhancements. To address the adverse effects identified, the NRCS and USFWS developed specific conservation measures for minimizing, avoiding, or eliminating these adverse effects (summarized in Table 3 earlier).

5.2.1 (AE1) Temporary disturbance of soil and vegetation

The NRCS will provide cost-share assistance and technical assistance for various management prescriptions that may cause temporary soil and/or vegetative disturbances; including habitat creation, habitat enhancements, habitat restoration actions, mowing actions to manage vegetative succession, and other types of activities associated with growing commercial crops such as timber, blueberries, or cranberries and other agricultural products. Temporary soil disturbance and vegetation removal are expected from the implementation of most of the conservation practice standards and enhancements. Sources of the disturbance include the use of machinery (e.g., planters, backhoes, tractors, mowers, etc.) that is expected to be associated with actions implementing the vegetation management through the Selected Conservation Paratices (e.g. Brush Management (314), Conservation Cover (327), Tree/Shrub eSite Preparation (490), etc.).

Adverse affects to bumblebees is expected to occur as a result of the activities associated with the Proposed Action. Disturbance and compaction of vegetation may result in short-term loss of foraging habitat and removal of cover for ground nesting colonies, which may increase predation or losses from weather related events (e.g., excessive sun exposure leading to desiccation). Soil disturbance includes scraping, compacting, plowing, tilling, excavating, and any similar activity that would likely kill or harm any bumblebees that are overwintering or in nests in the affected areas. Indirect effects may include cumulative changes that alter the ability of the site to support desired plant communities, such as alterations resulting in invasion of the site by invasive plant species (discussed in Part 5.2.2 below).

For monarchs, we anticipate direct effects from the covered practices may include localized losses of milkweed, loss of floral resources for feeding adults, or reduced availability of resting habitat. The specific literature on the effects of mechanical habitat manipulations (such as mowing or brush management actions) 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 (i.e., through machinery stikes or removal of forage) 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 than 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 to maximize benefits to monarchs.

Recently, the Monarch Joint Venture (2015) provided best practices for mowing to limit mortality to monarchs and other pollinators. The guidance provided management windows separated primarily by latitude, to avoid primary breeding activities and peak migratory activity. For the Action Area, the guidelines recommend mowing during the period October 1 to April 30, and when absolutely required, the period June 20 to July 10. Further, the guidance included additional considerations, such as: (1) avoid complete mowing of an entire habitat patch; (2) avoid mowing sites when monarchs are present; (3) avoid mowing while preferred forbs and milkweeds are blooming or before they have dispersed seed; (4) limit mowing to twice per year, and even less if possible; (5) use a flush bar and cut at reduced speeds to allow wildlife to escape; (6) use a minimum cutting height of 8 inches; and (7) avoiding nighttime mowing, to reduce the chance of injuring or killing inactive insects.

Recently, the USFWS (2018a) completed a set of conservation guidelines that included recommendations for mowing for the rusty patched bumblebee[24]. These are expected to guide the implementation of the conservation measures as it translates to specific site prescriptions for individual Conservation Plans.

Within the Action Area, the availability of floral resources (and milkweeds for monarchs) is essential to maintaining the fitness of the covered species. NRCS and USFWS have selectively identified the covered practices and enhancements as resulting in long-term benefits to the species. Research demonstrates that specific habitat improvements envisioned within the core/supporting practices and enhancement increase bumblebee abundance (Morandin and Kremen 2013, Wood *et al.* 2015, Venturini *et al.* 2017b) and increase pollination by wild bees in crop fields (Morandin and Kremen 2013, Blaauw and Isaacs 2014, Williams *et al.* 2015, Isaacs *et al.* 2017, Venturini *et al.* 2017a, Venturini *et al.* 2017b). Even small patches of wildflower habitat can provide over 33percent of the pollen collected by bumblebees in resource poor landscapes (Venturini *et al.* 2017a). 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 to enhance nectar resources for the covered species (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, which includes periodic vegetative management suitable for that particular parcel of land. All bumblebees need flowers consistently throughout the activie portions of their life cycles, from April through September (MacFarlane *et al.* 1994). Habitat manipulations and other supporting actions implemented by the Proposed Action at the individual and landscape scales are expected to generate more areas of suitable habitat with these floristic resources for the covered species.

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, minimizing the intensity and duration of any localized adverse responses from temporary loss of supporting vegetative structure, as well as ensure long-term conservation benefits accrue to the covered species.

[24] https://www.fws.gov/midwest/endangered/insects/rpbb/landmanager.html

5.2.2 (AE2) Increased risk of establishing invasive plant species.

Several of NRCS' selected conservation practice standards and enhancements for the Proposed Action involve mechanized equipment or the use of seed mixtures associated with enhancement, restoration, or management of areas subject to soil disturbance and/or habitat manipulations. Within the action area, such disturbances or actions have the potential to increase the presence and extent of invasive plant species.

Within many of the covered conservation practice standards and enhancements, NRCS already has explicit requirements for evaluating, assessing, and monitoring sites to reduce 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

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. Again, the net result of the Proposed Action will be increased habitat quantitiy and quality to the benefit of the covered species.

5.2.3 (AE3) Exposure of pollinators to pesticides and herbicides

The Proposed Action includes the use of herbicides to treat woody plant species and inhibit succession, control and eliminate invasive species, and to accelerate restoration and management objectives.

The Conservation Practices in the Proposed Action include Brush Management (314), Hebaceous Weed Treatment (315) and Integrated Pest Management (595 and 596) (see part 2.3.2 and Appendix VI). The Conservation Practice Standard for Integrated Pest Management (595 and 596)[25] is a site-specific combination of strategies to prevent, avoid, monitor, and suppress pests.

Use of the Intergrated Pest Management practice (595 and 596) by NRCS and enrollees will reduce pesticide use, and mitigate the risks of pesticides to pollinators and their habitats. Management strategies employed under the IPM standard are intended to prevent or mitigate pest management risks for identified natural resource concerns such as bumblebees and monarch butterflies. To create each landowners property specific IPM plan (this is a "sub-plan" within the Landowners' Conservation Plan), NRCS will consider landowner objectives, local resource information, ecological site conditions, and each species' habitat needs. Further, this conservation practice standard will incorporate a combination of management techniques to avoid or minimize pesticide exposure to pollinators and their habitats. For example, planners may use Agronomy Technical Note 5 and 9, in the 595 practice standard, and in Win-PST. The IPM techniques may include avoiding the use of pesticides, establishment of physical barriers to prevent drift (e.g., planting a windbreak), altering timing of applications, use of spot application techniques to reduce non-target exposure, use of biological or mechanical controls, threshold monitoring to determine when unintended impacts may occur, and other similar measures. These tools, which

[25] Use of Practice Standard 596 will also be considered a part of the covered practices once national NRCS review and approval is obtained.

depend upon the proper application of the techniques and structural conservation practice standards/enhancements, will be critical to provide benefits for bumblebees and butterflies within an IPM plan.

As described in section 2.3.4, Conservation Measures were developed through collaboration between the NRCS, the USFWS, and species experts. They are mandatory for obtaining the ESA predictability component described herein. Furthermore, the applied conservation measures will ensure coordination with the local conservation partners to determine overall practice applicability, location, extent, configuration, and timing. The NRCS Practices used for pollinator conservation under this agreement, and which utilized agrochemicals for site preparation, to eliminate invasive species, or to revert an area back to native vegetation will rely upon herbicides, not fungicides and insecticides. Fungicides and insecticides contain many chemistries that are highly toxic to bees. The application of this local knowledge is expected to further minimize or eliminate risks to the covered species from applications of these compounds. Coupled with the relatively small area where chemical treatments are necessary, the USFWS believes that the exposures of bumblebees and monarch butterflies to these compounds will be adequately managed and will not produce adverse effects in the form of population decline or contribute to the permanent loss of habitat. Lastly, using the applicable WHEG(s), each site-specific application will be designed to address the factors limiting the covered species throughout the Action Area (both collectively and cumulatively). As a result, the overall long-term benefits of the proposed action area is expected to result in a tremendous net benefit that will greatly exceed any temporary adverse effects to the covered species.

5.3 Beneficial Effects

The central feature of the Proposed Action is working with eligible landowners to improve the availability and quality of pollinator habitat while incorporating measures that reduce adverse affects to bumblebees and monarch butterflies. Further, it is a larger narrative about ensuring participating landowners generate land management plans and actions compatible with the needs of the species. One expected significant benefit of this work includes the planting of milkweed and other nectar rich flowers along field borders, in buffers along waterways and around wetlands, in marginal agricultural lands currently dominated by grasses, in pastures, and in other suitable locations. We expect the management actions associated with the Proposed Action will improve nesting, foraging and overwintering habitats for bumblebees while also improving breeding and migration habitats for the monarch butterfly.

The accessed scientific literature strongly supports the Proposed Action's restoration and enhancement actions as mitigating the effects of habitat loss on the covered species (Tonietto *et al.* 2018; Blaauw and Isaacs 2014) and improving abundance and diversity of pollinator services for commercial crops, such as blueberries (McKechnie *et al.* 2017). Restoration and planting actions are also expected to enhance reproductive success 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.

Oberhauser *et al.* (2017) 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.

Farhat *et al.* (2014) found that butterfly biodiversity increased with restoration actions that increased planting diversity for both habitat generalists and specialized species of 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, which includes the intrinsic value they provide as as corridors and stepping stones for migration and dispersal (Farhat *et al.* 2014; Panzer *et al.* 2010; Dover and Settele 2009).

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, which is driven by voluntary participation of eligible landowners, we expect that the advantages and benefits provided to both the monarch and other pollinators will accrue at similar rates. That is, cooperating landowners will restore and enhance both linear and block patches of plant communities within their management systems; thereby, providing compatible and equitable management actions benefiting the full compliment of covered species.

6.0 Cumulative Effects

"Cumulative effects" are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. This is the first ESA analysis of effects on the covered species in the Action Area. The contribution of non-federal activities to the current condition of the covered species is mentioned in the Environment Baseline and Status chapters of this document. Among those activities were agriculture, forest management, mining, road construction, urbanization, pesticide use, uses of commercial bee species. Those actions were driven by a combination of economic conditions that characterized traditional

natural resource-based industries and general resource demands associated with settlement of local and regional population centers.

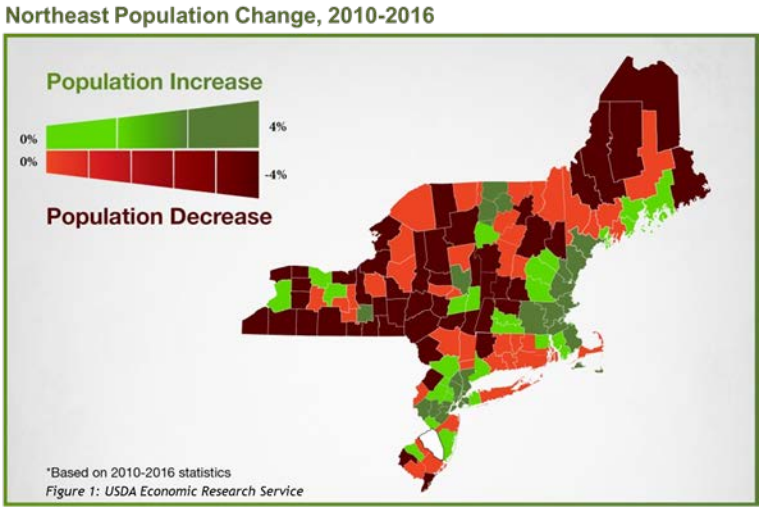
Population growth is a good proxy for multiple, dispersed activities and provides the best estimate of general resource demands because as local human populations grow, so does the overall consumption of local and regional natural resources. The USFWS and NRCS assume that future private, state, and Federal actions will continue within the Action Area, increasing as population numbers rise.

Additionally, trends in changes in land use and demographic information are important, as these features of the landscape also can provide a proxy measurement of low density residential and development trends not generally detectable by absolute number change in human population.

Trends in Human Population

Within the New England States[26], emerging population settlement and growth patterns indicate a preference toward moving to large cities/metropolitan areas, with rural areas experiencing a net loss in population (Figure 4). In general, rural counties across the region have lost population, while most states (with the exception of Connecticut) have grown in overall population. This shows a trend of net migration from rural to urban and suburban communities, as well as the tendency of those coming from outside the Northeast to settle in metro counties rather than rural areas. Furthermore, non-metro counties where population increased during that period tended to be in counties with "resort" amenities, such as coastal areas. Predominantly rural, agricultural counties generally have seen greater declines.

Figure 4. Population Change 2010-2016[27]



Trends in Agricultural & Forest Land Uses

[26] For purposes of application of available information, this includes the states of states within the Action Area plus the states of New York and New Jersey as depicted in Figure X.
[27] Information adapted from "Rural Areas Show Overall Population Decline and Shifting Regional Patterns of Population Change", John Cromartie, USDA Economic Research Service, September 5, 2017.

On May 2, 2014, the United States Department of Agriculture's National Agricultural Statistics Service (USDA-NASS) released the 2012 Census of Agriculture[28]. The Census of Agriculture (COA) is the most comprehensive source of data portraying our nation's agriculture over time. The COA data indicates that agricultural land uses are stable in the region between 2002 and 2012 (Table 8).

Table 8. Changes in Farmland and Forest Cover in the Action Area (2002-2012)

State	Farms in 2012 (No.)	Land in Farms (Acres)	Land in Farms (2002 to 2012) Percent Change	Land in Forests (Million Acres)
Connecticut	5,977	436,539	22.2	1.5
Maine	7,755	1,454,104	1.0	16.9
Massachusetts	8,173	523,517	6.2	2.3
New Hampshire	4,391	474,065	6.6	4.5
Rhode Island	1,243	69,589	13.7	0.3
Vermont	7,338	1,251,713	0.6	4.5

In evaluating the COA data, Lopez *et al.* (2016) noted that the number of mid-sized farms is declining (defined as operations between 180 and 999 acres) while the number of small and large farms is increasing. In fact, four of the six states in the Action Area were included are among the 16 states nationally where the total number of farms increased between 2007 and 2012. This may have implications to participating in the conservation actions envisioned by the Proposed Action, since smaller farms are typically owned by groups "targeted"[29] by NRCS and USDA programs, with Nickerson and Hand (2009) reporting these groups appear less likely to participate in NRCS conservation programs relative to their prevalence in the farmer population as a whole.

Throughout the northeastern United States, which includes all the Action Area, a one hundred fifty-year trend of forest expansion that took the region from approximately 40 percent to 80 percent forest cover has recently reverse and the region again is losing forest-cover (Thompson *et al.* 2017). Mirroring population growth information presented above, the authors found that a significant trend in forest loss within and in proxity to cities. The age of owners and operators may accelerate the trend toward continued loss of working lands. A 2006 survey of New England's aging forestland owners revealed that 43,000 owners of 1.75 million acres planned to sell some or all of their land in the next five years, and that a group of 2,000 owners managing another 500,000 acres planned to subdivide their land over the same period (Butler 2008).

When considered together, these cumulative effects are likely to have a continued negative effect on covered species and their supporting habitats and continued existence in working rural landscapes throughout the Action Area.

7.0 Synthesis of Effects

Although the long-term effects of the Proposed Action will result in conservation benefits for the covered species, short-term adverse effects could occur in association with habitat restoration,

[28] https://www.agcensus.usda.gov/
[29] USDA targeted groups are: Beginning, Limited-Resource, and Socially Disadvantaged Operators

enhancement, management and the other envisioned activities on the eligible properties. Soil and vegetative disturbance may result in localized adverse impacts and may temporarily decrease species abundance and distribution. Limited and strategic applications of pesticides and herbicides conducted using the IPM approach will result in similar scales of adverse impacts.

Winfree *et al.* (2009) evaluated the impact of human disturbance by reviewing 130 effect sizes[30] from 54 published studies which recorded bee abundance and/or species richness in respons to human disturbances. The synthesis accessed the effect on wild, unmanaged bees resulting from human disturbances such as tillage, grazing, fire, agriculture logging, pesticide use and habitat. The below salient points are summarized from Winfree *et al.* (2009):

- Both bee abundance and species richness declined with human disturbance.
- Several disturbance types including tillage and agriculture, showed a positive effect on bee abundance and species richness.
- The magnitude of the effects were not "strong" based upon effect size[31].
- The only disturbance type showing a significant negative effect, habitat loss and fragmentation, was statistically significant only in systems experiencing extreme habitat loss and where very little natural habitat remains.
- For study systems with only moderate habitat loss, there was no significant effect on either bee abundance or species richness, although the trends are negative.
- Social bees, such as bumblebees, are more sensitive to disturbance than are solitary bees.

Acknowledging the limits of statistical power and limited sample size of the Winfree *et al.* (2009) meta-analyis, NRCS and USFWS believe that the observed range of adverse and beneficial effects on the covered species is best interpreted at the site scale. Furthermore, most of the activities implemented through the Proposed Action will be implemented at sites with relatively abundant natural vegetation. As a result, we do not anticipate disturbances generated by the Proposed Action will have measurable adverse impact on the abundance or richness of the covered species within the Action Area. The design and implementation of the conservation measures for the Proposed Action accentuates this conclusion by recognizing the role and value of designing Conservation Plans considering site-specific conditions, as determined through the WHEG, and structured within broader conservation objectives.

Although many of the threats facing the species (e.g., drought, climate change, continued habitat loss, parasites, and loss of monarch winter habitat) are outside of the control of NRCS' program authorities, opportunities will exist to restore, create, or otherwise improve the covered species' habitat and conservation status over the long-term. Agricultural-based working lands potentially benefiting from NRCS programs and the proposed action are relatively stable in the Action Area; however, factors such as rising land values, human population growth, and conversion of rural working landscapes to other

[30] Hedge's unbiased standardized mean difference (Hedge's *d*) was used as the metric of effect size for the meta-analyses. The effect size, *d*, can be interpreted as the inverse variance weighted difference in abundance or richness of bees between natural and disturbed conditions, measured in units of standard deviations. Large differences and low variability generate the largest effect sizes (Hedges and Olkin 1985, Rosenberg et al. 2000, Gurevitch and Hedges 2001). Positive values of the effect size (*d*) imply positive effects of anthropogenic disturbance on bee abundance or richness whereas negative *d* values imply negative effects.

[31] Weighted-mean effect size = -0.32 for abundance and -0.37 for species richness (using a ruleof thumb whereby effect sizes -0.2 are considered 'small' 'and those -0.5 are ''medium'' after Cohen 1969))

land uses is ongoing and expected to continue. The USFWS and NRCS agree that working landscapes offer many benefits to the covered species and that the presence of the covered species offers benefits to agricultural operations in the form of pollinator services, and other economic benefits. The Proposed Action offers opportunities to provide both technical and financial assistance to sustain these working landscapes while benefitting the covered species (and vice-versa).

The scope of each type of activity that could be authorized under the Proposed Action is narrowly prescribed, and is further limited by the 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 core 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.

We expect the long-term conservation outcomes will be more areas managed for the covered species, while meeting the operational objectives of participating landowners. Although we expect the covered species will benefit, we cannot quantify the extent to which their abundance or distribution will change. In part, this is due to difference in ech species' response, which is dependent on sites specific conditions and influences operating at temporal and landscape scales(Brower and Fink 2015; Buri *et al.* 2014, Kämper *et al.* 2017; Herbertsson *et al.* 2016; Carrié *et al.* 2017, Senapathi, *et al.* 2017).

While it is important to establish suitable controls, the actions of the Proposed Action designed for restoration, maintenance or enhancement of habitat suitable for the covered species is an emerging area of conservation science. Site specific applications and treatment strategies as illustrated by the conservation measures, within an accepted framework of Adaptive Management are key features of the partnership, and provide the best possible path in addressing the complex life history and conservation challenges for the covered species over its 25-year life span (Part 9 below).

Landowners participating in the Proposed Action agree to implement their Working Lands for Wildlife based conservation plan and contract, as designed, to improve habitat for the covered species on their land. They will follow the conservation practice standards, specifications and Conservation Measures as outlined in their conservation plan and conservation practices to further reduce mortality and improve habitat for covered species.

The USFWS believes the individual and cumulative application of the Proposed Action as designed, which includes measures to reduce adverse effects, will lead to the creation of a sustained management systems supporting the life history and requirements of the covered species. These systems will be applied at both the field, farm, and landscape levels and are compatible with working rangelands, farmlands, and forests.

8.0 Effects Determinations

The USFWS expects that the majority of incidental take will be in the form of death of the immature stages (i.e., eggs, lavae, chrysalis) or harassment of adult monarchs during installation and operation conservation practice. Similarly, we expect the majority of incidental take of the rusty patched and other covered bumblebees will be in the form of death due to ground disturbances or temporary harassment of adults during installation and operation of the conservation practices and enhancements.

With the exception of rusty patched bumblebee, all of the other covered species are not protected under the ESA and incidental take is not provided for them.

Nevertheless, as species currently or potentially under review for protection of the ESA, and in light of the long-term ESA predictability element within the Proposed Action, the USFWS can provide a Jeopardy Determination for the other covered species as explained below. For the rusty patched bumblebee, however, take is anticipated. The sections below provide the approach, rationale, and basis for determining the extent of incidental take as a result of the proposed action.

8.1 Analytical Framework for the Jeopardy and Adverse Modification Determinations Jeopardy Determination

Section 7(a)(2) of the ESA requires that Federal agencies ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat.

"Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). The following analysis relies on 4 components: (1) Status of the Species, (2) Environmental Baseline, (3) Effects of the Action, and (4) Cumulative Effects. The jeopardy analysis in this Opinion emphasizes the rangewide survival and recovery needs of the listed species and the role of the Action Area in providing for those needs. It is within this context that we evaluate the significance of the proposed federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

In accordance with policy and regulation, the jeopardy analysis relies on four components: 1) the Status of the Species, which evaluates species' range-wide condition, the factors responsible for that condition, and its survival and recovery needs; 2) the Environmental Baseline, which evaluates the condition of listed species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of listed species; 3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on listed species; and 4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the listed species current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of listed species in the wild.

The jeopardy analysis places an emphasis on consideration of the range-wide survival and recovery needs of each of the Covered Species and the role of the action area in the survival and recovery of each of the Covered Species as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

8.2 Adverse Modification Determination

The final rule revising the regulatory definition of "destruction or adverse modification of critical habitat" became effective on March 14, 2016 (81 FR 7214). The revised definition states: "Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features."

None of the covered species has designated critical habitat. Therefore, the USFWS will not be evaluating the effects of the Proposed Action on this feature of the species' conservation needs or providing regulatory effects determination under section 7 of the ESA.

8.3 Jeopardy/No-Jeopardy Determination

Impacts to Individuals – As previously described, the NRCS will utilize the agencies' legislative authorities to work with eligible landowners within the Action Area and produce site-specific Conservation Plans using the WLFW approach described herein. Through this effort, the NRCS strives to apply selected conservation practice standards and enhancements in cooperation with 1,182 participating landowners to promote pollinator conservation on 3,108 hectares (ha) (7680 acres (ac)) over the 25-year term of this Partnership Agreement. As discussed in the Effects of the Action section, we expect some individuals could will be killed during the implementation of some of the conservation practices or enhancements identified in section 2.3.2. For example, digging of holes for planting of trees to establish a windbreak (see Windbreak/Shelterbelt Establishment, Code 380) may inadvertently occur in a nest site or in the presence of overwintering gynes. In the limited instances where this could occur, we expect all nesting or overwintering individuals will be killed by crushing caused by machinery used to place trees or dig holes for planting. In contrast, we expect some Conservation Practices will have no adverse impacts and will be wholly beneficial. For example, the development of a Forest Management Plan (Code 106) involves the writing of a site-specific management plan designed to improve habitat conditions and is unlikely to result in take of bumblebees.

We expect adverse effects will be short-term and confined to the time period when the practice is installed. Conversely, we expect the long-term benefits will provide benefits to individuals. For example, in the example above we described how the planting of trees to establish a windbreak may result in some individuals being killed. The long-term affect of establishing the windbreak is expected to, overtime, benefit far more individuals by providing protective cover that enhances survival of overwintering gynes or reducing drift of agrochemicals into high quality pollinator habitat where they may be exposed.

In summary, we acknowledge the potential for some short-term adverse affects during the implementation of some Conservation Practices. In the long-term, we expect implementation of the conservation practices will be beneficial.

Impacts to Populations – As we have concluded that individuals are likely to experience impacts in their annual survival, we need to assess the aggregated consequences of the anticipated impacts on the population to which these individuals belong.

The overall affect of the proposed action should be an increase in the reproductive capacity of the covered species. For the covered bumble species, this will be realized through improvements to nesting habitat that are expected to increase reproductive output and abundances of those species in the action area. For the monarch butterfly, conservation practices are expected to improve the management of sites occupied by milkweed through appropriately timed management actions that are intended to maintain persistence of this important host plant and avoid inappropriate timing of management, such as mowing when monarchs are activily breeding at the site. As a result, we expect the monarch reproduction will be enhanced, and enrolled sites will produce more monarchs than they would without site-specific management actions. In addition to increases in reproductive output of the covered species resulting from improved nesting and breeding habitat, the proposed action will increase pollen and nectar resources by increasing the spatial extent of areas covered with wild flowers and improvements in diversity of floral resources. The improvements in the spatial and temporal adundance of nectar and pollen resources are expected to result in increased numbers of the covered species. Additionally, targeted IPM activities and buffer practices between floral resources and crop fields are anticipated to significantly reduce the likelihood of target species take through inadvertent pesticide exposure.

Of the covered species, the rusty patched bumblebee is the species with the greatest potential for a negative population response to the proposed action. This is a consequence of the limited distribution of this species within the Action Area, which is confined to two HPZs (see Section 8.3 for more information). To reduce the chance that incidental take will have negative population level effects to the rusty patched bumblebee, this Partnership Agreement incorporates an annual upper limit of disturbance to 25 percent of the area covered by each HPZ.

Large scale applications of pesticides, herbicides, and related compounds are not included in the Proposed Action; rather these elements are associated with site specific restoration and management objectives or implemented within the context of an integrated pest management approach. The result is that strategies for reducing exposure and associated risks to the covered species will be incorporated into site-specific plans and provide conservation benefits to the species.

Impacts to Species –

The long-term cumulative outcome of the Proposed Action is to create, enhance, or restore habitats supporting the covered species' life history requirements on enrolled private lands. The long-term benefits of the applied conservation actions are expected to exceed the low level of short-term temporary adverse effects we anticipate will occur. As we have concluded that populations of the Covered Species are unlikely to experience reductions in in fitness, there will be no harmful effects on the species as a whole. Instead, we expect populations of covered species will become more resilient on the enrolled properties.

CONCLUSION

We considered the current overall status of the covered species and the forecasted improving condition of the covered species within the Action Area (environmental baseline). We then assessed the effects of the proposed action and the potential for cumulative effects in the Action Area on individuals, populations, and each species as a whole. As stated in the Jeopardy Analysis, we anticipate increases in the reproduction, number, and distribution of the covered species. It is the Service's Opinion that the

implementation of the conservation actions associated with the New England Wildlife Pollinator Partnership, as proposed, is not likely to jeopardize the continued existence of the rusty patched bumblebee.

After reviewing the current status of the covered species, 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 rusty patched, yellow banded, yellow, American, confusing, Ashton's cuckoo, lemon cuckoo, Fernald cuckoo, Indiscriminate cuckoo, or variable cuckoo bumblebees or the monarch butterfly.

8.4 Incidental Take Statement for *B. affinis*

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is defined by the USFWS as an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Harass is defined by the USFWS as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (Part 8.6).

8.5 Key Assumptions

- The NRCS achieve the goal of enrolling 7,680 acres of eligible private lands under the Proposed Action by 2025.

- Currently, the rusty patched bumblebee is known to occur only within the designated HPZs and is presumed absent outside them. In the event a rusty patched bumblebee is discovered outside a HPZ in the future and take occurs, the take has coverage under this agreement and a new HPZ zone will be formed in the area where the bee was found. Consequently, incidental take coverage is only necessary within the HPZs.

- For actions within HPZ locations, the likelihood of an adverse event to the rusty patched bumblebee is equivalent throughout the analysis period.

- Within each HPZ, we assume the rusty patched bumblebee is evenly distributed within and individuals have an equal probability of being exposed to the adverse effects.

- The metrics analyzed are appropriate and the most accurate measures to assess effects.

- Actions within each HPZ will be effectively managed; monitoring and assessment of cumulative impacts will be ongoing using the administrative elements identified herein.

- Incidental take is not expected to occur with Conservation Plans outside the HPZs.

- The critical timing prohibitions, local planning emphasis, other conservation measures, and intricate and deliberate protective measures inherent in the NRCS planning and design processes will, cumulatively result in a significant reduction in the frequency, extent, and intensity of any incidental take event.

8.6 Amount or Extent of Take Anticipated

To provide a basis for assessing effects of actions on the rusty patched bumblebee, we can start with a description of broad habitat categories and the services that they provide (Table 9). Within the broad habitat categories shown in the Table 9, the capacity of any specific area to function as habitat for the rusty patched bumblebee would rely on factors such as native plant species diversity, presence of invasive plant species, land management, and size of habitat patches. Habitat quality for the species can be evaluated by using the The Rusty Patched Bumblebee Habitat Assessment Form and Guide.[32] Please note: Biological monitoring efforts, as described in Part 2.3.5, are not provided incidental take coverage in this Biological Opinion. Consequently, biological monitoring activities that may result in the take of listed species (i.e., methodologies utilizing capture techniques in HPZs) will need additional incidental take coverage.

Table 9. Rusty Patched Bumblebee Habitat Categories

Habitat Type	Nesting	Over-wintering	Potential Foraging Habitat			Examples	Supporting Literature
			Spring	Summer	Fall		
Montane scrub/shrub	X	X	X	X	X	Mountains at southern extent of range (historical); Laurentian Mountains	Colla and Packer 2008; ECCC 2016
Hardwood forest	X	X	X			Maple-Basswood Forest; Oak-Hickory	Colla and Packer 2008; Colla and Dumesh 2010; ECCC 2016;
Forest with partially open canopy	X	X	X	X	X	Oak Savannah, thinned, old growth	Lee et al. 1998; Pindar 2013
Wetlands	?	?	X	X	X	wet meadows; fens; bogs; marshes; wet grasslands	Colla and Packer 2008; ECCC 2016;
Forested wetland	?	?	X	X	X	Black spruce bogs	Judd 1966; Colla and Dumesh 2010
Riparian	X	?	X	X	X	Vegetated floodplains, scrub/shrub banks, Silver Maple Floodplain Forest	Macior 1970

[32] The Rusty Patched Bubmblebee Habitat Assessment Form and Guide are available at https://www.fws.gov/midwest/endangered/insects/rpbb/pdf/HabitatAssessmentFormGuideByXercesForRPBB.pdf, accessed November 2, 2018.

Suburban, Urban habitats	X	X	X	X	X	Gardens, landscaped yards, waste places, city parks	Colla and Dumesh 2010; ECCC 2016
Perennial Agricultural Fields	X	X	X			Blueberry, apple, small fruit, cranberry bogs, grazing lands*	Boulanger *et al.* 1967; Mackenzie and Averill 1995; Notestine 2010;
Annual Agricultural Fields				X	X	Conventional, Organic, mixed veg, mass-flowering	No research indicates *B. affinis* use of annual systems. But see Todd et al. 2016; Thom et al. 2017; Venturini et al. 2017b
Open fields	X	X	X	X	X	Maintained through human-mediated disturbance.	Colla and Dumesh 2010; ECCC 2016; Macior 1968
Sand Dune	X	X	X	X	X	Martha's vineyard, coastal islands	Reed 1993; Goldstein and Ascher 2016; ECCC 2016
Early Successional Habitat	X	X	X	X	X	Powerline corridors, ROW, recently cut forest, managed as	Whitney 1984, also see Wagner et al. 2014, Milam et al. 2018

Note: *Grazing lands may provide poor nesting and overwintering habitat, as heavy animal traffic can impact soils either crushing nests or making the soil profile unsuitable for nest construction (Kimoto 2010)

Effects to Rusty Patched Bumblebee Nests

There are no estimates for the density of rusty patched bumblebee nest that can be used to assess the effects of the Proposed Action. Therefore, we reviewed scientific literature to find nest density estimates for other bumblebee species to determine if surrogate information was available. The buff-tailed bumblebee is a close relative of the rusty patched bumblebee that is common in Europe (Bukovinszky *et al.* 2017). Nest densities for the buff-tailed bumblebee range from 14/km^2 (3,460 ac) and up across a variety of landscapes (Chapman *et al.* 2003 (as cited in Charman *et al.*. 2010); Darvill *et al.* 2004; Dreier *et al.* 2014; Knight *et al.* 2005; Kraus *et al.* 2009; Wolf *et al.* 2012; Dreier *et al.* 2014; Wood *et al.* 2015). Although the buff-tailed bumblebee is common and abundant compared to the rusty patched bumblebee, we use 14/km^2 (3,460 ac) to estimate a conservatively high nest density for the rusty patched bumblebee for the following reasons:

- the mean of the ten nest density estimates made for the buff-tailed bumblebee in a variety of landscapes was 34/km^2 (8,401.6 ac), with a high of 88/km^2 (21, 745 ac); and
- it is lower than the nest density (19/ km^2 (4,695 ac)) found for the precipitously declining great yellow bumblebee, whose nests "remain thinly distributed even in current strongholds" (Charman *et al.* 2010). Like the rusty patched bumblebee, this species relies "on the continued presence of flower-rich, unimproved grassland that provides floral resources throughout the colony cycle (June to September) and contains, or is close to, suitable sites for nesting, mating and hibernation." (Charman *et al.* 2010);
- and the rusty patched bumblebee has not been recorded in any of the cooperating states for 10 or more years so it's nest density, if any nests exist, is almost certainly lower.

Based on the assumption that rusty patched bumblebee nests occur at a density of no more than 14/ km^2 (3,460 ac), or one nest for every 0.071/km^2 (18 ac) in nesting habitat, soil disturbance that affects more than 0.36 ha (0.89 ac) of nesting habitat within an HPZ would be likely to adversely affect the species.

Effects to Wintering Queens

A single account exists on the number of gynes produced by a rusty patched bumblebee colony. In 1922, O.E. Plath excavated a rusty patched bumblebee nest in September, during the season of peak gyne production, and counted 19 "young queens." From this sole existing account, with the intent to conservatively over-estimate the possible density of overwintering gynes, we estimate that each colony will produce 19 gynes, and thus the density of overwintering gynes in the landscape will be no higher than 19 times the density of rusty patched bumblebee colonies, which is 266/km^2 (1.1/ acre).

Take of Rusty Patched Bumblebees resulting from Soil Disturbance

Soil disturbance includes scraping, compacting, plowing, tilling, excavating, and any similar activity that would likely kill any gynes that are overwintering or individuals in nests within the HPZs. To evaluate the likelihood that an action would destroy one or more nests, we assume that nests and gynes are randomly distributed within suitable habitat. In reality, nests may actually be denser in some parts of suitable nesting habitat, but we believe that this is a reasonable assumption to facilitate analyses

While helpful in establishing specific mathematical estimates for potential adverse effects, estimates of the level of take must consider the spatial extent of disturbance within each HPZ. By combining a quantitative estimate focused at the individual species level and a habitat surrogate approach, we can obtain a clearer picture of the plausible cumulative effects on the species. Therefore, in order to establish an acceptable incidental take at the programmatic level, while simultaneously acknowledging both the expected net conservation benefit outcomes and need for operational efficiency, we believe the best approach is to consider the past historical NRCS planning actions (Conservation Plans) within each existing HPZ, project forward that acreage extent of planning over the 25-year duration of the Proposed Action, and establish an upper threshold of earth disturbance within the HPZs .

Based upon records of past contracting and planning work performed by NRCS with the two known HPZs within the Action Area in Maine and Massachusetts and a projection of future work during the 25-year scope of the Proposed Action, we can estimate how much land within the HPZ may be affected by potential adverse effects under the Proposed Action. This approach also facilitates an upper threshold of permissible incidental take within both existing and any future HPZs (zones established around new occurrence records) so as to balance expected adverse effects against expected conservation benefits in the context of the section 7(a)(2) standard. This pathway also provides the most reasonable method for projecting incidental take coverage for *B. affinis* (Table 10). Therefore, with each HPZ, the extent of incidental take shall be all life history stages of *B. affinis* occurring within the maximum area of adverse effects as conditioned by the conservation measures.

Table 10. *Bombus affinis* incidental take

State	Size of the HPZ[33]	Historical NRCS Planning effort /year (2013 – 2018)	Allowable Maximum Area of Adverse Effect per year
Maine	4.78 km^2 (1182.82 a)	0.12 km^2 (30 a)	1.19 km^2 (295 a)
Massachusetts	5.43 km^2 (1343.18 a)	0/0	1.36 km^2 (336 a)
"New HPZ"	To be determined at the time upon discovery of a new extant occurence	To be determined at the time upon discovery of a new extant occurence	Not more than 25 percent of the total area of the HPZ.

This upper limit of 25 percent annual permissible disturbance extent is not a statistical measure; rather it represents a considered decision and a sensible conclusion based on available information. Further, the established limits acknowledge the conservation measures as applied will significantly reduce the frequency extent and duration of the take events thus we are providing benefits to the covered species as a result of the Proposed Action.

Conservation Practices as designed herein and implemented within the HPZ are expected to provide a net conservation benefit to the rusty patched bumblebee. However, as previously described, some risk to the covered species exists despite the use of the conservation measures. We will monitor and assess specific and cumulative actions within each HPZ through annual reporting and other administrative features (see Parts 8.9 and 2.3.8).

8.7 Important Considerations Regarding this stated Incidental Take Authorization

We recognize that the aforementioned assumptions will likely lead to an overestimate of potential effects to the species rather than an underestimate of effects. Also, regarding the probability of overestimating the impact - this provides a cautious and reasonable "worst case" analysis for species conservation and recovery purposes. If the likely overestimate is still compatible with survival and recovery, then we can be satisfied that the actual impacts are compatible. We know of no more reasonable method for arriving at an estimate to ensure any adverse effects do not breach the ESA's §7(a)2 threshold[34]. The net outcome of the Proposed Action is beneficial based upon our analysis and conclusions provided herein. Even though we have reviewed that estimate relative to the current condition of the rusty patched bumblebee, as we evaluate the extent of take estimated above in the future, the status of species across the Action Area (and more precisely within the HPZs) should be improving; thereby, reducing the overall effect of that take to the species as a whole. In other words, this authorized level of incidental take is not expected to nullify or exceed the conservation benefits anticipated to accrue through the Proposed Action.

[33] https://www.fws.gov/midwest/endangered/insects/rpbb/rpbbmap.html

[34] ….any action authorized, funded, or carried out by NRCS is not likely to jeopardize endangered or threatened species or to result in adverse modification of their critical habitat [16 U.S.C. § 1536(a)(2)].

The extent of incidental take of rusty patched bumblebee is provided to NRCS. In turn, NRCS may convey this incidental take coverage to participating landowners within the Action Area and in accordance to the requirements identified herein and in the Proposed Action. Monitoring of take levels is described and NRCS will ensure that take levels are not exceeded.

However, it is the intent of the USFWS and NRCS that the Proposed Action and associated take statement will be modified over time, if the rusty patched bumblebee's status and distribution improve or new occurences outside existing HPZs are identified. Measuring the expected efficacy of the conservation measures, identifying the expected conservation benefits, and monitoring the incidental take levels identified above will be continually assessed and evaluated over time. Lastly, modifications and improvements to the design, approach, monitoring, and incidental take authorized may occur over the 25-year life of this collaboration.

Although we cannot predict where and when incidental take will occur within each existing or newly created HPZs, we can more comfortably conclude that adverse circumstances will occur, albeit rarely and in a very limited set of conditions and situations. A programmatic approach to take is warranted as the scope of each type of activity that could be authorized under the proposed restoration program 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. Actions envisioned are predictable and well understood, despite existing uncertainties about where they may be applied within the Action Area. Administrative controls (e.g., use of the core practices, use of the WHEG, NRCS planning policies, contracting requirements, etc.) are in place to ensure operations limit direct lethal effects primarily associated with earth disturbances, which are an intergral part of the Proposed Action and necessary for achieving the habitat restoration and enhancement objective envisioned herein.

We anticipate incidental take of individuals of the covered species will be difficult to detect for several reasons. First, there is a low likelihood of finding injured or dead individuals due to one or more of the following factors: subterannean life history strategies for bumblebees, relatively low population density, secretive behavior, small size, and sporadic distribution. We also expect harm to individuals exposed to herbicides and pesticides will be sublethal and difficult to detect. Finally, we expect indivduals that are killed will be scavenged or decompose rapidly after death. For these reasons, we have used the amount of habitat destroyed or degraded as a surrogate for estimating the anticipated amount of incidental take in the form of harm or harass. However, the metrics we will monitor will provide an accurate assessment of our efforts to conserve the species and otherwise achieve the statutory mandates of the ESA.

8.8 Effect of the Take

As provided in the earlier sections of this Opinion, the USFWS determined that the level of anticipated take is not likely to result in jeopardy to the rusty patched bumblebee.

8.9 Reasonable and Prudent Measures/Term and Conditions

"Reasonable and prudent measures" are nondiscretionary measures to minimize the amount or extent of incidental take (50 CFR 402.02). In order to be exempt from the prohibitions of section 9 of the ESA, NRCS and any other party involved in creating and implementing eligible landowner conservation plans and contracts must comply with the following terms and conditions, which implement the reasonable

and prudent measures, described below. The measures/terms and conditions described below are non-discretionary, and must be undertaken by the NRCS and be incorporated into WLFW Conservation Plans and contracts so that they become binding conditions, as appropriate, for the exemption in section 7(o)(2) to apply. The NRCS has a continuing duty to regulate the activities covered by this incidental take statement. If NRCS: 1) fail to assume and implement the terms and conditions or 2) fails to require partners, via its planning and contracting instruments, to adhere to the terms and conditions of the incidental take statement through enforceable terms, the protective coverage of section 7(o)(2) may lapse.

In order to monitor the impact of incidental take, NRCS must report the progress of the action and its impact on the species to the USFWS as specified in the incidental take statement [50 CFR 402.14(i)(3)] and outlined herein. Only incidental take that meets the terms and conditions of this incidental take statement will be exempt from the taking prohibition.

8.9.1 Reasonable and Prudent Measure/Term and Condition 1.

The NRCS shall work with the USFWS and other invited experts to design an implementation strategy for the stepping-down addition guidance and information to apply Conservation Measures as described in Table 3 at the appropriate geographic scale (e.g., state, habitat/land use, etc.). This implementation strategy will be developed using a consensus process.

Further, NRCS shall work collaboratively with the USFWS and other invited entities to develop and deliver a WLFW training and certification program to ensure local NRCS and affected USFWS offices have the appropriate level of awareness and understanding of this document and its required actions. This training program will be developed using a consensus process.

Lastly, NRCS shall work collaboratively with the USFWS and other invited entities to create the necessary decision support tools (WHEGs or other processes) discussed in Part 2.3.3. The content and execution details will be developed using a consensus process.

By the end of 2019, all of the above components will be complete and operational.

8.9.2 Reasonable and Prudent Measure/ Term and Condition 2.

NRCS shall ensure that participating landowner conservation plans and contracts contain explicit instructions and guidance for those site specific prescriptions and conservation measures necessary to include the required elements of the Proposed Action, the additional requirements of the WLFW planning method, as well as obtain and maintain the ESA predictability (2.3.7; Appendix II; Appendix V).

8.9.3 Reasonable and Prudent Measure/Term and Condition 3.

The NRCS shall monitor and assess, on an annual basis, the extent, assumptions, and conclusions supporting the level of take of the rusty patched bumblebee and any other covered species that may be listed in the future. This information shall be reported and discussed by the partners as described in the

Monitoring and Assessment (section 2.3.5) and Administrative Elements (section 2.3.8) sections. . Additionally, the following information shall be provided by NRCS annually for each HPZ[35]:

(1) Acreage/frequency of each of selected Covered Conservation Practice Standards/CSP Enhancements;
(2) Information and details on the applied Consevation Measures;
(3) Information on species responses or other beneficial conservation outcomes;
(4) Any observed incidental take events; and
(5) Any other information agreed upon by the partnership.

9.0 Conservation Recommendations

As previously described in section 1.0 above, 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. Conservation recommendations are suggestions of the USFWS and are not intended to carry any binding legal force [50 CFR Part §402.14 (j)]. However, it is NRCS's national and state commitment that conservation recommendations, as identified through the consultation process, must be incorporated to the maximum extent practicable (NRCS, GM-190-410.22 (E)). To advance the purposes of the Proposed Action, the USFWS and NRCS agree to the following actions:

1. 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.
2. 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.
3. Work with USFWS and other invited experts to improve the conservation actions, related decision support tools, and guidance documents such as Agronomy Notes 5 and 9 as new scientific information becomes available on bumblebee and monarch needs.
4. Develop appropriate landscape level evaluation and assessment tools which guide conservation planning and financial assistance to maximize the benefits of the Proposed Action.
5. Support additional research to to understand and mitigate the effects of pesticides on pollinators, 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.
6. Work together to improve the knowledge of the status, trends, and distribution of the covered species. The voluntary Monitoring and Assessment measures provided at Part 2.3.5 will help futher our understanding.

10.0 Reinitiation-Closing Statement

This concludes formal consultation on the Proposed Action. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is

[35] Without compromising the landowner confidentially mandate in the Farm Bill (e.g., Section 1619) unless by consent of that landowner.

exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Biological Opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Biological Opinion; or 4) a new species, including unlisted covered species, is listed or critical habitat designated that may be affected by the action.

In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. In the event that reinitiation of consultation is required for an individual project, the NRCS and/or the landowner must coordinate with the Service to resolve the issue consistent with the original agreement in order to retain regulatory assurances.

If monitoring and reporting are not done in accordance with the description of the proposed action, the NRCS needs to reinitiate formal consultation in accordance with the requirements of 402.16(c). Failure to adequately monitor and report constitutes a change in the proposed action that may facilitate effects to listed species or critical habitat that were not considered herein. To reinitiate consultation, NRCS will contact: Anthony (Tony) Tur, Regional At-Risk Species Coordinator, 300 Westgate Center, Hadley, Massachusetts, 01035(Phone: (603) 227 – 6416; email: Anthony_Tur@fws.gov).

Further, this concludes the Conference Report for the potential effects of the Proposed Action. If the yellow banded *(Bombus terricola)*, the American *(B. pensylvanicus)*, the yellow (*B. fevidus*), the confusing (*B perplexus)*, the Ashton's cuckoo (*B. bohemicus*), the lemon cuckoo (*B. citrinus*), the Fernald cuckoo (*B. flavidus*), the indiscriminate cuckoo (*B. insularis*), or the variable cuckoo (*B. variabilis*) bumblebee or the monarch buttefly (*Danaus plexippus* var. *plexippus*) is (are) proposed to be listed under the ESA, the agencies will consider development of a conference opinion. Additionally, the NRCS may request the USFWS to prepare a Biological Opinion if any of the aforementioned speciesare listed. Requests for either a conference opinion or biological opinion 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 information evaluation initially, the USFWS will modify this Conference Report in response to NRCS' request and no further section 7 consultation under the ESA will be necessary for those affected species.

11.0 Appendix I – Proposed Action

New England for Wildlife Pollinator Partnership

State: Maine

Primary Point of Contact (State Lead): Tony Jenkins, Maine State Resource Conservationist, USDA-NRCS

Other States participating and their appropriate state lead (if applicable):
Don Keirstead, New Hampshire State Resource Conservationist, USDA-NRCS
Christopher Modisette, Rhode Island State Resource Conservationists, USDA-NRCS
Nancy Ferlow, Connecticut State Resource Conservationist, USDA-NRCS
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Priority Landscape (include detailed map): Priority landscapes have been identified in all five participating states (ME, NH, VT, MA, CT, and RI; Map 1). Prioritization Zones are based upon USFWS identified High Priority Zones, current and historical occurrences of the rusty-patched bumblebee, target species, non-target species, and major agricultural areas associated with covered species. Most prioritization boundaries are drawn along county lines to coincide with NRCS Field Office service areas. Refer to Map 1 (Appendix A) for the full New England prioritization map.

TARGET SPECIES: Rusty-patched bumblebee (*Bombus affinis*), yellow-banded bumblebee (*Bombus terricola*), monarch butterfly (*Danaus plexippus plexippus*)

On March 21, 2017 the USFWS listed the rusty-patched bumblebee as a federally endangered species under the ESA. Studies have noted a collapse of the species over the past 10 years (Colla and Packer 2008, Cameron *et. al.* 2011a). The biological condition of the species was forecast using risk scenarios that considered major stressors: habitat loss and degradation, pathogens, pesticides, and small population dynamics (USFWS 2016b).

The USFWS has identified two High Priority Zones for the rusty-patched bumblebee in the five-state area. The bumblebee was observed near Pleasant Lake, MA in 2009 and the area is considered a USFW High Priority Zone for the species. It was observed in Stockton Springs, along the Maine coast in 2009, and the area is considered a High Priority Zone for the species. An Uncertain Zone for the species also exists in Rockport, ME where it was last seen in 2006. Historical records indicate the species occupied large areas of Midwestern and Eastern U.S., and parts of southern Quebec and Ontario (USFWS 2016b). It was one of the most common species of bumblebees until the latter half of the 1900's (Plath 1934, Boulanger *et al.* 1967, NRC 2007) and was historically present in all five participating states.

Based upon a status review by Evans *et. al.* (2009), on September 15, 2015 the Defenders of Wildlife submitted a petition to the USFWS to list the yellow-banded bumblebee (*Bombus terricola*) as a federally listed species under the ESA and to designate critical habitat. After reviewing the petition, the USFWS made a positive 12 month finding on March 15, 2016. The USFWS anticipates making a proposed warranted or not warranted listing decision before September 30, 2018. As stated in the petition, threats to the species include disease, pesticides, the degradation, fragmentation, and loss of habitat, population dynamics, and climate change. The species is widely distributed from the eastern United States to the Midwest, to the northern states east of the Rockies and into southern Ontario and Quebec, Canada, and extends west into Manitoba, Saskatchewan, Alberta, and British Columbia, Canada (Laverty and Harder 1988, Colla and Packer 2008), although information is less available concerning the populations in these areas. The yellow-banded bumblebee is identified in the International Union for Conservation of Nature (IUCN) Red List as vulnerable, and multiple studies have noted its decline (Colla and Packer 2008, Cameron *et. al.* 2011a, Bushmann and Drummond 2015, Jacobson *et. al.* 2017).

Although the range of the monarch butterfly (*Danaus plexippus plexippus*) has remained approximately the same in North America, it has experienced substantial reductions in population size. Over the last 20 years, the abundance of monarchs east of the Rocky Mountains has declined by over 90% and in 2013 and 2014 the winter count was lower than ever before (CBD *et. al.* 2014). The species decline is the result of 1) habitat loss, especially but not limited to the increased use of glyphosate herbicides which reduces the availability of its host plant milkweed (*Asclepias* spp.) across large swaths of the Midwest, 2) overutilization of the species, especially mass rearing and release, 3) disease and predation, 4) inadequate protections, and 5) insecticides (CBD *et. al.* 2014). The monarch butterfly is being reviewed for potential listing under the ESA. A listing decision will be made in June of 2019. In an effort to conserve the species, The NRCS and the USFWS initiated a Monarch Butterfly Habitat Development Project in the Midwestern states in 2014 and in 2016 NRCS added the Monarch as a Working Lands for Wildlife national species target.

NON-TARGET SPECIES: Ashton's cuckoo bumblebee (*Bombus ashtoni*), American bumblebee (*Bombus pensylvanicus*), yellow bumblebee (*Bombus fervidus),* lemon cuckoo bumblebee (*Bombus citrinus),* Fernald's

cuckoo bumblebee (*Bombus flavidus*), confusing bumblebee (*Bombus perplexus*), indiscriminate cuckoo bumblebee (*Bombus insularis*), variable cuckoo bumblebee (*Bombus variabilis*)

The American Bumblebee (*Bombus pensylvanicus*) is a very large species with an extensive range across North and Central America. In recent years, it has declined sharply, especially in the northern parts of the range (Cameron *et. al.* 2011a). Like the rusty-patched and the yellow-banded bumblebees, this species has high infection levels of the pathogen *Nosema bombi*, and this pathogen is linked to its decline. Causation however, is not certain (Cameron *et. al.* 2011a). The IUCN Red List lists the species as Vulnerable (Hatfield *et. al.* 2015a). The species has not been found in recent surveys in New England, and may be locally extinct in some New England states (Drummond *et. al.* unpublished data, Richardson *et. al.* unpublished data, Giles and Ascher 2006, Colla and Packer 2008). Colla *et. al.* 2012 found that this species is the most sharply declining species in North America. The yellow bumblebee is considered in decline and vulnerable by the IUCN Red List (Hatfield *et. al.* 2015b). Studies indicate that the species has high levels of *Nosema bombi* infection (Gillespie 2010). It is associated with open, vegetated spaces like old hayfields and, like the American bumblebee, frequently nests above ground under thatch (Williams *et. al.* 2014).

Several additional species of bumblebees in decline in the Northeast may benefit from the conservation activities outlined in this proposal. These species are not listed, nor are being considered for listing at this time; they are included here in light of their declining status, the benefits these practices would confer upon them, and the possibility that the USFWS may consider these species in the future. See the full list above under, "Non-Target Species." Some of these species are social parasites. Social parasites have no worker caste, and take over the nests of the host bumblebees, utilizing the workers of the host species to rear their own offspring. Ashton's cuckoo bumblebee (*Bombus ashtoni*), Fernald cuckoo bumblebee (*Bombus flavidus*), indiscriminate cuckoo bumblebee (*Bombus insularis*), and variable cuckoo bumblebee (*Bombus variabilis*) are all socially parasitic bumblebee species, noted as in decline, that would benefit from more robust populations of their host species (Colla and Packer 2008, Colla *et. al.* 2012).

Including these pollinators as Target and Non-Target Species in an NRCS effort consistent with the Working Lands for Wildlife model will incentivize EQIP, and CSP voluntary conservation practices and enhancements on agricultural lands. The voluntary conservation practices will minimize stressors contributing to the species decline, specifically habitat loss and degradation, and exposure to pesticides. Additionally, monitoring activities will contribute to the recovery of the Target Species. This project would also foster stakeholder involvement to conserve both bumblebee species and other native pollinators.

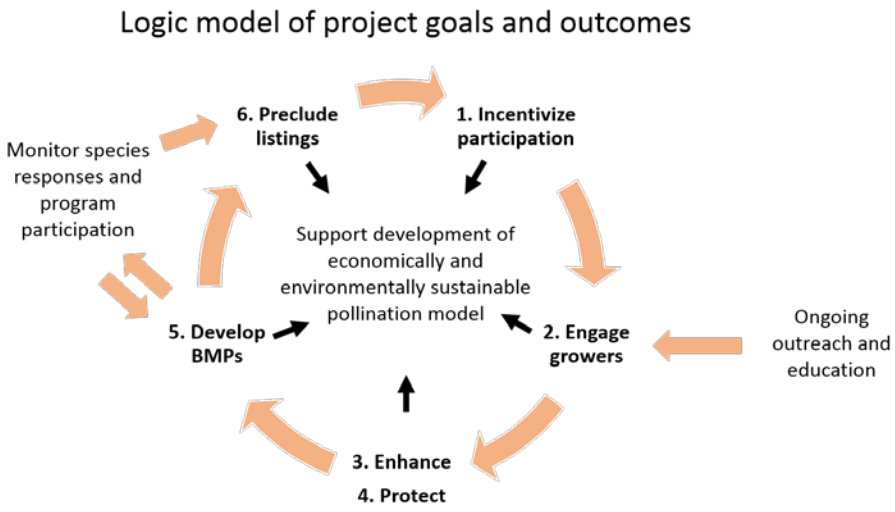
Trust and Credibility: *Explain your approach to deliver quality technical assistance. Include WLFW planner requirements and associated trainings for each new project.*

NRCS, USFWS, and state biologists have a track record of working cooperatively with private landowners to implement conservation for the bog turtle, golden winged warbler, Canada lynx, Atlantic salmon, and New England cottontail in the Northeast. Similarly, The Xerces Society Pollinator Program has facilitated the creation or enhancement of almost 680,000 acres of pollinator habitat across the country since 2008 and helped to make bumblebee conservation a priority on over 80 million acres in the Western U.S.A (Xerces 2018).

State Biologists, NRCS-Partner Pollinator Biologists, and other qualified biologists will be involved in WLFW project planning. These qualified personnel will work directly with NRCS Field Office Staff or Partner Biologists on each application for one-on-one training. NRCS Field Office Staff become qualified to independently plan New England Pollinator Partnership projects in one of two ways:

1. NRCS Field Office Conservation Planners have successfully completed 2 New England Pollinator Partnership contracts in cooperation with qualified WLFW planners and fulfilled all other necessary NRCS conservation planner requirements
2. NRCS Field Office Staff have successfully completed 1 New England Pollinator Partnership contract in cooperation with qualified WLFW planners and satisfactorily completed one in-person WLFW training on led by qualified WLFW planners.

Shared Vision: *Clearly define the win-win for both agriculture and wildlife and list the conservation practices needed to achieve success.*



Logic Model illustrating how all components (goals, outcomes, monitoring, and education) will work together to conserve the species and support producers.

Pollinators are keystone species both ecologically and agriculturally. Insects, primarily bees, are required for the reproduction of 67% of the world's flowering plants (Tepedino 1979), pollinate 70% of crops grown for human consumption (Klein 2007), and contribute an estimated $217 billion dollars to global agricultural production each year (Morse and Calderone 2000). New England crops of blueberries, apples, peaches, raspberries, strawberries, blackberries, cranberries, squash, pumpkins, and more, all rely on pollination.

Bumblebees, including the Target Species, perform buzz pollination which makes them exceptionally valuable. The production of ericaceous family crops like cranberry and blueberry, as well as tomato, pepper, eggplant are all facilitated by buzz pollination. The rusty-patched bumblebee is one of the earliest bees to emerge in the spring, and the yellow-banded bumblebee emerges shortly thereafter (Plath 1934), making them especially important for spring blooming crops in New England. Bumblebees work flowers in cooler, wetter weather than honeybees, and where robust communities of native pollinators are not present, growers are at greater risk of pollination-related crop failure in cold, wet springs.

This proposal focuses on the conservation of the covered species, but the conservation practices will benefit a broader suite of beneficial insects. Our efforts will support pollinators for farmers, natural communities, and the species themselves.

This agreement focuses on six goals:

1. **Incentivize** program participation
2. **Engage** the agricultural community in pollinator conservation
3. **Enhance** habitat
4. **Protect** from pesticides and pathogens
5. **Develop** Best Management Practices
6. **Preclude** the need to list

State	Habitat Acres	No. of Producers	IPM Acres
ME	2,400	480	300
VT	2,400	240	6
CT	60	12	-
MA	900	60	60
RI	120	30	-
Total →	**7680**	**1182**	**366**

State commitments by 2025 toward stated program goals.

To meet the goals outlined above, practices will establish or maintain nectar and pollen resources, and protect the Target Species from exposure to pesticides. At least one of the core EQIP practices must be included in every contract (Attachment B). These core practices must be planned to meet the resource concern of Inadequate Habitat for Fish and Wildlife: Food, Cover/Shelter, or Habitat Continuity (space) – and target pollinators. Research demonstrates that habitat improvements increase bumblebee abundance (Morandin and Kremen 2013, Wood *et. al.* 2015, Venturini *et. al.* 2017b) and increase pollination by wild bees in crop fields (Morandin and Kremen 2013, Blaauw and Isaacs 2014, Williams *et. al.* 2015, Isaacs *et. al.* 2017, Venturini *et. al.* 2017a, Venturini *et. al.* 2017b). Even small wildflower plantings can provide over 33% of the pollen collected by

bumblebees in resource poor landscapes (Venturini *et. al.* 2017a). Integrated Pest Management, Windbreak/Shelterbelt Establishment, and Filter Strips when implemented alongside pollinator habitat practices, can protect bumblebees and other pollinators from pesticides and pesticide related mortality (Hladik *et. al.* 2017, Kovacs-Hostyanszki *et. al.* 2017). Early Successional Habitat Development/Management can be used to prevent the transition of high quality pollinator habitat to forest, to improve existing ES habitat, or to create patches of high quality pollinator habitat within forest. Wetland Restoration can be used to transition grass dominated agricultural habitats to natural plant communities.

Prior to selecting conservation practices, planners or partners will use an NRCS approved pollinator Habitat Evaluation Guide (HEG) similar to Xerces' rusty-patched bumblebee HEG (Xerces 2017) to assess existing habitat and inform planning decisions. The HEG identifies species resource needs, stressors, and limiting factors at each site. It ensures conservation practices and enhancements are appropriate and the goals of each conservation plan is most effectively achieved. Participating states are free to use or amend Maine's HEG, to create their own, or adopt another.

Strategic Approach: *Describe the prioritization methods used to ensure the resources are targeted where the species return is the highest (e.g. priority areas for conservation)*

Applications will be prioritized in accordance to the following site information during ranking (Attachment E).

1. **Location.** Zones based on USFWS High Priority Zones for endangered rusty-patched bumblebee, historical range and occurrence of rusty-patched bumblebee, present and historical range of yellow-banded bumblebee, and present and historic range of non-target species. See Map 1 for full delineation of geographic prioritization.
2. **Benefit to producers.** Applications that support pollinators in pollinator dependent cropping systems.
3. **Predicted change in available forage.** Practices that significantly improve the availability, abundance, and diversity of forage plants for Target Species as assessed by the HEG.
4. **Pesticide mitigation.** Practices that protect pollinators from pesticides.
5. **Target Species' superfoods.** Practices that include plants that are highly preferred or required by Target Species.

Conservation efforts in New England prioritize not only the current and historic ranges of the Target Species, but also pollinator dependent cropping systems that rely on bee pollination to turn flowers into fruit. In Maine, approximately 44,000 acres of wild blueberries are grown along the Downeast coast to southwestern Maine (Yarborough 2009) and production areas in overlap with the extant and historic range of the rusty-patched bumblebee (Map 1, priority zones 1-3). Cranberries are another pollinator dependent crop produced in New England, but especially in Massachusetts, where cranberries are the third largest agricultural commodity in the state. Cranberry growers own over 60,000 acres in the state, much of which is not cropped (Averill *et. al.* 2008) and represents a significant opportunity for pollinator conservation. Bumblebees are major pollinators in these crops, but also in squash (3,436 acres in New England), pumpkin (5,248 acres in NE), highbush blueberries (2,259 acres in NE), orchards (15,563 acres in NE), field tomatoes (2,414 acres in NE) and bramble fruits (742 acres in NE) (NASS 2012) – all of which rely on pollination and are grown throughout New England. Practices to conserve Target Species on pollinator dependent agricultural land simultaneously increase pollination security, increase pollination by native bees, and by shifting pollination from rented honeybees to native bees, can reduce honeybee rental fees for producers.

Accountability: *Explain your approach to quantifying the biological outcomes of your project and the funding commitment to complete them. Resulting outcomes must be measured to quantify benefits (i.e., population response, threat reduction, etc.) of New England Pollinator Partnership project and ultimately articulated as performance metrics.*

Leverage: *List the required partners, their role, and commitments to the state/multi-state New England Pollinator Parternship conservation effort (financial and/or in-kind).*

The USFWS, the NRCS, and the Xerces Society for Invertebrate Conservation are partners in leadership and in authoring this proposal. Six NRCS State Offices (ME, NH, VT, CT, RI, and MA) will prioritize pollinator

conservation to meet the pollinator habitat acreage goals listed above. Each state's State Resource Conservationist will serve on the regional planning committee, and lead the NRCS in their state to successfully achieve stated goals. The Maine Field Office of the USFWS is central in the development of this project. U.S. Fish and Wildlife Service, in collaboration with the NRCS, will continue to develop conservation measure for NRCS practices to ensure practical and meaningful ESA consultations for WLFW pollinator habitat projects in New England. At the national level, the USFWS has provided organizational and leadership capacity, technical assistance on protection, restoration and enhancement needs, assistance with developing conservation measures for conservation practices, and is authoring a Conference Report. These roles are primarily filled by the NRCS-FWS Liaison, Richard Gooch. The Xerces Society for Invertebrate Conservation is the lead author on this proposal and in organizing this effort. Xerces will continue to move this project to successful implementation, and provides key pollinator expertise to inform conservation actions in New England. Xerces will continue to coordinate this partnership, develop new partnerships, and lead the effort to achieve stated goals across New England.

We have identified a diverse and growing list of 26 potential partners that includes NGOs, commodity groups, government entities, and others. Their possible roles, as stated by these possible partners, are described briefly below:

SWCDs - The Maine Association of Conservation Districts will assist with outreach. Select Maine SWCDs at the county level will seek research funds for monitoring efforts, provide IPM staffing or training, provide a platform for disseminating the program to the public, and coordinate county wide resource assessments. The NH Association of Conservation Districts are interested in being a partner in outreach.

State Agencies – the Maine Natural Areas Program can contribute expertise on vegetation monitoring, and possibly collaborate through a recently funded proposal to manage xeric habitats for pollinators. CT DEEP is interested in exploring avenues for regional partnerships to help the effort. The Maine DOT is interested in helping the effort achieve acreage goals through roadside plantings.

Academic institutions – including but not limited to University of ME researchers and labs (Dr. Amanda Roth, Dr. Jessica Leahy, Dr. Julia McGuire), University of MA Amherst researchers and labs (Dr. Anne Averill), Bates College researchers (Dr. Sam Boss and Dr. Carla Essenberg), University of RI research lab (Dr. Steve Alm), and College of the Atlantic (Dr. Kourtney Collum). All have agreed to seek research funds for monitoring or in some cases, contribute through outreach.

Research Cooperatives – Patuxent Wildlife Research Center RI (Dr. Howie Ginsburg) to seek funds for research and monitoring. Maine Cooperative Fish and Wildlife Research Unit (Dr. Cythia Loftin) to seek funds to research and monitoring. The Wildlife Management Institute will help to create the capacity to deliver the conservation through communications, outreach, and technical and financial assistance. The Northeast IPM Center will fund pollinator grant proposals that pass their review.

Private Groups/Entities – The Portland Pollinator Partnership will assist with publicity, website promotion, and hosting speakers. Bee Pride of Lebanon Maine may seek funding for a demo project and provide an outreach platform. Working Dogs for Conservation and Environmental Canine Services will seek grant funds to use scent detection dogs to quantify the effects of conservation actions on bumblebees. MA Northeast Organic Farmers' Association (MA NOFA) will assist with outreach through social media, workshops, conferences, and publicity in MA NOFAs newsletter. They may also pursue grants to monitor conservation success. CT Northeast Organic Farmers' Association (CT NOFA) will provide a platform for outreach to CT growers.

Cooperative Extension – Kim Stoner of UConn Cooperative Extension will participate in outreach efforts and provide a platform to reach CT growers. UMass Cooperative Extension will integrate outreach material into existing programming and link MA growers to the New England Pollinator Partnerhsip efforts.

NGO's – The Downeast Lakes Land Trust has agreed to help through collaborative outreach.

Commodity Groups/Growers – The Maine Pomological Society has agreed to provide an outreach platform to growers at annual meetings. The Maine Wild Blueberry Commission will provide the New England Pollinator Partnership a platform to reach this target group. Wyman's of Maine has agreed to be a partner in outreach.

Regulatory Predictability: *Explain whether Endangered Species Act Predictability is needed and for what species. Identify the practices and the conservation measures to maximize benefits and minimize unintended consequences.*

To receive ESA predictability, the NRCS will consult with the USFWS on NRCS Environmental Quality Incentives Program (EQIP) and Conservation Stewardship Program (CSP) practices for pollinators to document the benefits and possible adverse effects for listed and petitioned species. The USFWS will develop a programmatic biological opinion and conference report that analyzes the anticipated effects of pollinator practices, identifies terms and conditions and reasonable and prudent measures to avoid and minimize take (conservation measures), and provides incidental take coverage for any unavoidable take indefinitely into the future. The conservation measures proposed for the biological opinion and conference report are shown in Attachment F. Thus, NRCS will be assured of streamlined, predictable review of pollinator projects. Landowners will be assured that incidental take of federal-listed species will be permitted. Incidental take coverage will be extended to petitioned species should they be federally-listed in the future.

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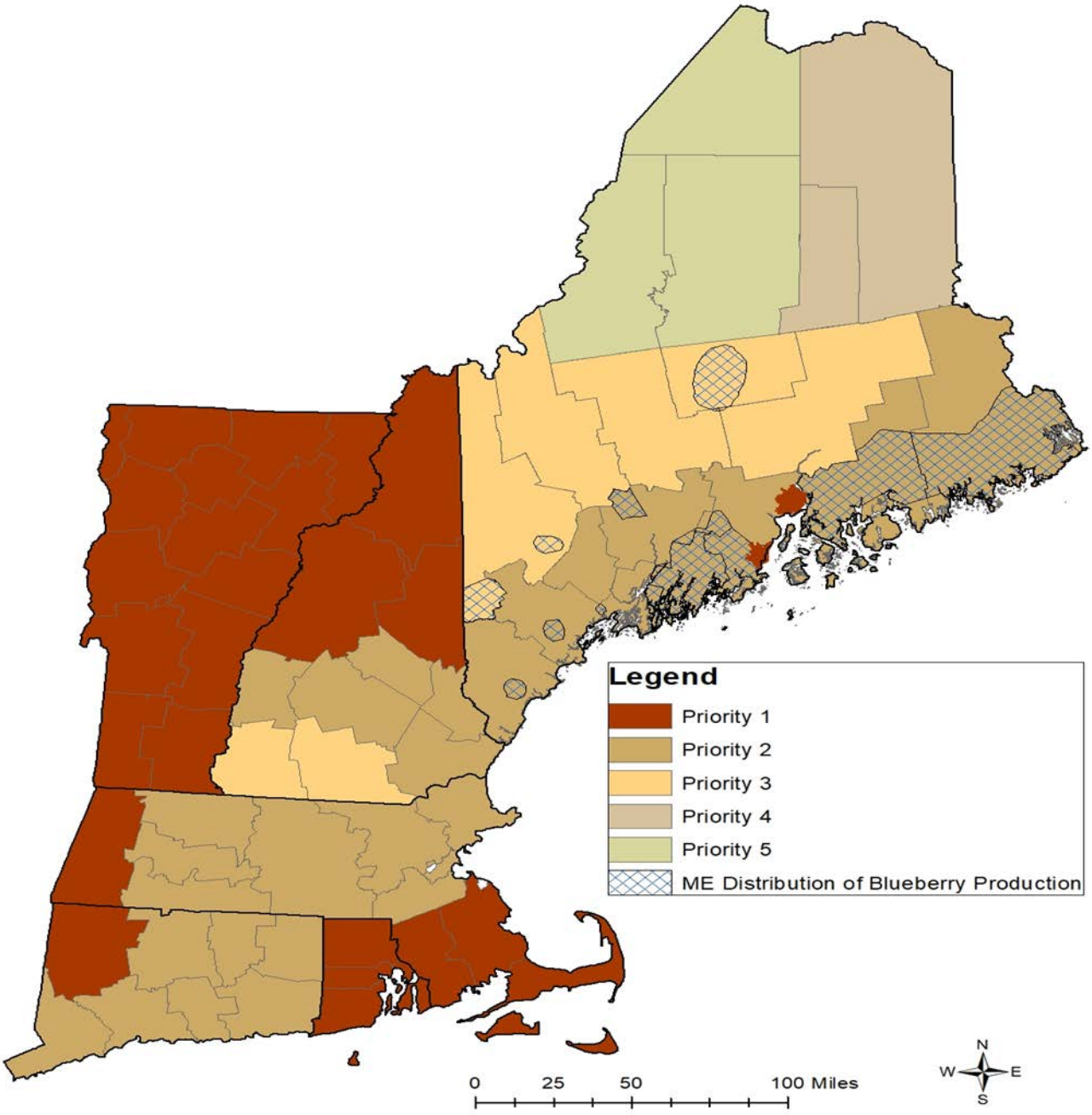
Attachment A. Priority Landscapes. Priority zones are used to rank applications independently within each state; Priority Zone 1 in, for example, Rhode Island, is not a higher priority for funding than Priority Zone 2 in Maine. In Maine, distribution of blueberry production (Yarborough, 2009) is overlaid on prioritization zones to illustrate the geographic overlap between wild blueberry production areas and priority areas for Target Species conservation.



Attachment B. List of potential NRCS EQIP Conservation Practices to Benefit the Species. In column headings Y refers to the yellow-banded bumblebee. R refers to the rusty-patched bumblebee. If the practice is marked with an X, the practice is expected to benefit the Target Species.

NRCS Conservation Practice and Scenarios to Benefit the Species	Y	R	Comments
CORE PRACTICES: AT LEAST ONE CORE PRACTICE MUST BE INCLUDED IN A CONTRACT TO FALL UNDER WFLW.			
Conservation Cover (327)	X	X	A standard for establishing permanent herbaceous wildflower plantings for pollinators.
Tree/Shrub Establishment (612)	X	X	Selected trees and shrub species are long-term pollen and nectar resources that can target bloom gaps (e.g. early spring), and provide nesting habitat.
Early Successional Habitat Development/Management (647)	X	X	To maintain through management existing habitat, or to create flower-rich forest openings.
Hedgerow Planting (422)	X	X	Long-lived linear plantings of woody shrubs that can include herbaceous perennial flowers that provides nectar, pollen, and nesting habitat.
Field Border (386)	X	X	Can be used to establish flowering pollen and nectar rich plants on field edges.
Brush Management (314)	X	X	Can reduce invasive or undesirable vegetation, allowing them to be replaced with plants of greater value to pollinators.
Herbaceous Weed Treatment (315)	X	X	Can reduce invasive or undesirable vegetation, allowing them to be replaced with plants of greater value to pollinators.
Upland Wildlife Habitat Management (645)	X	X	Used to release flowering trees increasing floral resources.
Pollinator Habitat Enhancement Plan (146)	X	X	Not a requirement of this agreement, or for contracted practices. Provides participants in-depth assessment of site and tenable enhancement strategies.
Fish and Wildlife Habitat Plan (142)	X	X	Not a requirement of this agreement, or for contracted practices. Provides participants alternatives and strategies to manage fish and wildlife habitat.
Wetland Restoration (657)	X	X	If enhancement increases abundance and diversity of flowering plants, and transitions area into a semi-permanent undisturbed habitat.
Riparian Forest Buffer (391)	X	X	Can be used to establish flowering pollen and nectar rich plants along riparian areas.
Wildlife Habitat Planting (420)	X	X	Practice under development. May become new standard for pollinator habitat.
Integrated Pest Management Plan (114)	X	X	Provides measures to avoid and minimize pesticide exposure to pollinators.
SUPPORTING PRACTICES: ANY OF THE FOLLOWING MAY BE INCLUDED IN NEW ENGLAND POLLINATOR PARTNERSHIP CONTRACTS			
Forestry Management Plan (106)	X	X	Required Conservation Activity Plan for forestry practices.
Filter Strip (393)	X	X	A water quality practice to mitigate pesticides by protecting pollinator habitat (planted, existing, or weedy edges) downslope of areas treated with pesticides, fertilizer, etc.
Integrated Pest Management (595)	X	X	Extremely important to prevent pesticide exposure to pollinators. Should be used in conjunction with habitat creation on sprayed farmland.
Integrated Pest Management (596)	X	X	Extremely important to prevent pesticide exposure to pollinators. Should be used in conjunction with habitat creation on sprayed farmland.
Windbreak/Shelterbelt Establishment (380)	X	X	To benefit pollinators, this practice should be used to prevent pesticide drift into pollinator habit.
Conservation Crop Rotation (328)	X	X	This short-term practice can be an effective part of farmscape pollinator habitat management for enhancing nectar and pollen resources.
Contour Buffer Strips (332)	X	X	Typically used on tilled, annual cropping systems to control erosion and runoff. Plants may be pollen and nectar rich and address pollinator habitat as a secondary resource concern.
Cover Crop (340)	X	X	Used in annual cropping systems to improve soil condition. If allowed to flower, may be an effective part of farmscape pollinator habitat management.
Residue and Tillage Management (329)	X	X	Decreases soil disturbance, increasing available nesting and overwintering habitat for bumblebees.
Wetland Enhancement (659)	X	X	If restoration increases abundance and diversity of flowering plants, and transitions area into a semi-permanent undisturbed habitat, food and nesting habitat for bumblebees is increased.
Conservation Plan Supporting Organic Transition (138)	X	X	Transition from conventional to organic operation reduces incidence of lethal and sub-lethal pesticide exposure to bumblebees. May increase tillage, thereby negatively affecting nesting and overwintering habitat.
Stream Habitat Improvement and Management (395)	X	X	Revegetation/reforestation of riparian areas with flowering plants to enhance nectar, pollen, and nesting resources.
Forest Stand Improvement (666)	X	X	When increasing floral resources for pollinators.

Restoration of Rare or Declining Natural Communities (643)	X	X	Used to create nesting habitat.
Forage and Biomass Planting (512)	X	X	Primarily used to create foraging habitat, but may provide nesting habitat under some conditions (e.g., establishing native perennial forage).

Attachment C. List of NRCS Conservation Practices commonly used with practices above (Attachment B). Practices should be included in USFWS consultations to determine possible adverse effects on Target Species. In column headings Y denotes yellow-banded bumblebee. R denotes rusty-patched bumblebee. If practice is marked AE, it may adversely affect the Target Species.

NRCS Practices commonly used with pollinator habitat practices	Y	R	Comments
Obstruction Removal (500)	A E	A E	Practice used to remove structures, trees or other impediments to the installation of another Conservation Practice. Decreases habitat heterogeneity, may destroy nesting/overwintering sites.
Tree/Shrub Site Preparation (490)	A E	A E	Disturbance of soil, especially in edge habitats, may disrupt nesting or overwintering bumblebees. Supporting practice used with 612.
Mulching (484)			Supporting practice commonly used with 612 and 500.
Access Road (560)	A E	A E	Supporting practice commonly used with 647.
Forest Trails and Landings (655)	A E	A E	Supporting practice commonly used with 647.
Tree/Shrub Pruning (660)	A E	A E	Supporting practice used with 500 in blueberry fields.

Attachment D. CSP Enhancements. In column headings Y refers to the yellow-banded bumblebee. R refers to the rusty-patched bumblebee. If the practice is marked with an X, the practice is expected to benefit the Target Species.

NRCS CSP Practices to Benefit the Species	Y	R	Comments
E315132Z	X	X	Herbaceous weed controls for desired plant communities/habitats consistent with the ecological site
E327137Z	X	X	Conservation cover to provide cover and shelter habitat for pollinators and beneficial insects
E327136Z1	X	X	Conservation cover to provide food habitat for pollinators
E327136Z2	X	X	Establish monarch butterfly habitat
E512136Z1	X	X	Establish pollinator and/or beneficial insect habitat
E327137Z	X	X	Conservation cover to provide cover and shelter habitat for pollinators
E327139Z	X	X	Conservation cover to provide habitat continuity for pollinators
E512139Z2	X	X	Establish pollinator and/or beneficial insect habitat continuity (space)
E386136Z	X	X	Enhanced field borders to increase food for pollinators
E386139Z	X	X	Enhanced field border to provide wildlife habitat continuity along the edge(s) of a field
E391136Z	X	X	Increase riparian forest buffer width to enhance wildlife habitat
E512136Z2	X	X	Native grass or legumes in forage base to provide wildlife food
E512139Z1	X	X	Establish wildlife corridors to provide habitat continuity
E512140Z	X	X	Native grasses or legumes in forage base
E512139Z3	X	X	Establish monarch butterfly habitat in pastures
E528137Z2	X	X	Incorporating wildlife refuge areas in contingency plans for prescribed grazing-cover/shelter
E595116X	X	X	Reduce risk of pesticides in surface water by utilizing precision pesticide application techniques
E595116Z	X	X	Reduce risk of pesticides in surface water by utilizing IPM PAMS techniques
E612133X1	X	X	Adding food-producing trees and shrubs to existing plantings
E612136Z	X	X	Tree/shrub planting for wildlife food
E612137Z	X	X	Tree/shrub planting for wildlife cover

Attachment E: Ranking tool used to prioritize applications for pollinator conservation practices

Natural Resources Conservation Service
New England Pollinator Partnership

Program:	**Ranking Date:**	**Application Number:**
Ranking Tool: New England Pollinator Partnership		**Applicant:**
Final Ranking Score:		**Address:**
Planner:		**Telephone:**
Farm Location:		

National Priorities Addressed – only consider National Questions 1 and 6 for the Pollinator Initiative fund pool ranking.

Issue **Questions**	**Responses**
If the application is for development of a Conservation Activity Plan (CAP), the agency will assign significant ranking priority and conservation benefit by answering "Yes" to the following question. Answering "Yes" to question 1a will result in the application being awarded the maximum amount of points that can be earned for the national priority category.	
1. a. Is the program application to support the development of a Conservation Activity Plan (CAP)? If answer is "Yes", do not answer any other national level questions. If answer is "No", proceed with evaluation to address the remaining questions in this section.	Yes O or No O
Water Quality Degradation – Will the proposed project improve water quality by: (select all that apply)	
2. a. ~~Implementing the practices in a Comprehensive Nutrient Management Plan (CNMP)?~~	~~Yes~~ O or No O
2. b. ~~Implementing the practices in a Nutrient Management Plan (NMP)?~~	~~Yes~~ O or No O
2. c. ~~Reducing impacts from sediment, nutrients, salinity, or pesticides on land adjoining a designated "impaired water body" (TMDL, 303d listed waterbody, or other State designation)?~~	~~Yes~~ O or No O
2. d. ~~Reducing the impacts from sediment, nutrients, salinity, or pesticides in a "non-impaired water body"?~~	~~Yes~~ O or No O
2. e. ~~Implementing practices that improve water quality through animal mortality and carcass management?~~	~~Yes~~ O or No O
Water Conservation – Will the proposed project conserve water by: (select all that apply)	
3. a. ~~Implementing irrigation practices that reduce aquifer overdraft.~~	~~Yes~~ O or No O
3. b. ~~Implementing irrigation practices that reduce on-farm water use?~~	~~Yes~~ O or No O
3. c. ~~Implementing practices in an area where the applicant participates in a geographically established or watershed-wide project?~~	~~Yes~~ O or No O
3. d. ~~Implementing practices that reduce on-farm water use as a result of changing to crops with lower water consumptive use, the rotation of crops, or the modification of cultural operations?~~	~~Yes~~ O or No O
Air Quality - Will the proposed project improve air quality by: (select all that apply)	
4. a. ~~Meeting on-farm regulatory requirements relating to air quality or proactively avoid the need for regulatory measures?~~	~~Yes~~ O or No O
4. b. ~~Implementing practices that reduce on-farm emissions of particulate matter (PM2.5, PM10)?~~	~~Yes~~ O or No O
4. c. ~~Implementing practices that reduce on-farm generated greenhouse gases such as carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O)?~~	~~Yes~~ O or No O
4. d. ~~Implementing practices that increase on-farm carbon sequestration?~~	~~Yes~~ O or No O
Soil Health:– Will the proposed project improve soil health by: (select all that apply)	

5. a. ~~Reduce erosion to tolerable limits (Soil "T")?~~	~~Yes~~ O or No O
5. b. ~~Increasing organic matter and carbon content, and improving soil tilth and structure?~~	~~Yes~~ O or No O
Wildlife Habitat – Will the proposed project improve wildlife habitat by: (select all that apply)	
6. a. Implementing practices benefitting threatened and endangered, at-risk, candidate, or species of concern.	Yes O or No O
~~6. b. Implementing practices that retain wildlife and plant habitat on land exiting the Conservation~~	~~Yes~~ O or No O
~~Reserve Program (CRP) or other set-aside program?~~	
6. c. Implementing practices benefitting honeybee populations or other pollinators?	Yes O or No O
6. d. ~~Implementing land-based practices that improve habitat for aquatic wildlife?~~	~~Yes~~ O or No O
Plant and Animal Communities: Will the proposed project improve plant and animal communities by: (select all that apply)	
7. a. Implementing practices that result in the management control of noxious or invasive plant species on non-cropland?	Yes O or No O
7. b. Implementing practice in an Integrated Pest Management Plan (IPM)?	Yes O or No O
Energy Conservation– Will the proposed project reduce energy use by: (select all that apply)	
8. a. ~~Reducing on-farm energy consumption?~~	~~Yes~~ O or No O
8. b. ~~Implementing practice(s) identified in an approved AgEMP or energy audit, which meet ASABE S612 criteria?~~	~~Yes~~ O or No O
Business Lines – Will the practices to be scheduled in the "EQIP Plan of Operations" result in:	
9. a. ~~Enhancement of existing conservation practice(s) or conservation systems already in place at the time the application is received?~~	~~Yes~~ O or No O

State Issues Addressed

Issue **Questions**	**Responses**
IF APPLICABLE: Answer only ONE of the following. If multiple practices are planned, then the largest planned practice by area should be used to answer question 1.	
1. a. Is the landscape within a ½ mile radius of the center point of the proposed practice location >90% forest or other habitat types[36] largely devoid of bee forage plants? If yes, 90 points.	Yes O or No O
1. b. Is the landscape within a ½ mile radius of the center point of the proposed practice location 75-90% forest or other habitat types[1] largely devoid of bee forage plants? If yes, 70 points.	Yes O or No O
1. c. Is the landscape within a ½ mile radius of the center point of the proposed practice location <75% forest and <50% wetlands, pasture, hayfield, residential, or other open field habitat? If yes, 50 points.	Yes O or No O
1. d. Is the landscape within ½ mile radius of the center point of the proposed practice location <75% forest and >50% wetlands, pasture, hayfield, residential, or other open field habitat? If yes, 1 point.	Yes O or No O
For crops in the application footprint and adjacent land units under the ownership or control of the applicant:	
2. Is Integrated Pest Management part of the Conservation Plan? If yes, 50 points	Yes O or No O

[36] Other low quality habitat types include, tilled crop systems, open water, paved areas, turf grass, and built-up industrial areas.

3. If sprayed with insecticides (organic or conventional) does a minimum 30-foot buffer exist between treated crops and flowering plants (including planned practices)? OR if the applicant reports using neonicotinoids at least once per year, does the applicant maintain a 100-foot buffer OR a 30-foot buffer with a windbreak for protecting flowering plants (including planned practices) from pesticide drift?[37] If yes, 100 points, OR if no insecticides used in areas as described above, award 60 points.	Yes O or No O
4. Are commercial bumblebee colonies stocked, and are NOT used in a completely enclosed space and then disposed of? If Yes, SUBTRACT 25 points.	Yes O or No O
5. IF APPLICABLE: Is the footprint of the following proposed conservation practice(s) equal to or greater than 5% of the active agricultural land on the applicant's property? Consider only property that is under the ownership or control of the applicant and which is within ½ mile of the conservation practice location: Conservation Cover (327), Tree/Shrub Establishment (612), Early Successional Habitat Development/Management (647), Hedgerow Planting (422), or Field Border (386)? For example, if the practice is located adjacent to a 100-acre crop field, is the footprint of proposed conservation practice(s) equal or greater than 5 acres in size? If yes, 100 points	Yes O or No O
Use the NRCS-approved Target Bumblebees HEG to answer the following. Answer only ONE:	
6. a. Is the Anticipated Benefit Score of proposed practices ≥ 50? If yes, 100 points	Yes O or No O
6. b. Is the Anticipated Benefit Score of proposed practices between 40 and 49? If yes, 90 points	Yes O or No O
6. c. Is the Anticipated Benefit Score of proposed practices between 30 and 39? If yes, 70 points	Yes O or No O
6. d. Is the Anticipated Benefit Score of proposed practices between 20 and 29? If yes, 30 points	Yes O or No O
6. e. Is the Anticipated Benefit Score of proposed practices between 10 and 19? If yes, 10 points	Yes O or No O

Local Issues Addressed

Issue Questions	Responses
Refer to the Bumblebee Prioritization Zones Map to answer questions 1 and 2.	
1. a. Are 1 or more of the planned conservation practices in a bumblebee Priority 1 Zone?[38] If "Yes," award 250 points and do not answer any other local level questions. If "No," proceed.	Yes O or No O
QUESTION 2: Answer only one of the following questions	
2. a. Are the planned conservation practices in a bumblebee Priority 2 Zone? If yes, 100 points	Yes O or No O

[37] A buffer is a pesticide-free area between crops and flowering plants. For guidance on the use of windbreaks for protecting pollinators from pesticides refer to USDA-NRCS Agronomy Technical Note 9, Preventing or mitigating potential negative impacts of pesticides on pollinators using Integrated Pest Management and other conservation practices. https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=34828.wba

[38] https://www.fws.gov/midwest/endangered/insects/rpbb/guidance.html#map Use this link for an interactive map of USFWS high and low potential zones. There is only 1 high and 1 low potential zone in Maine. The high potential zone is centered around Stockton Springs. The low potential zone is centered around Rockport.

2. b. Are the planned conservation practices in a bumblebee Priority 3 Zone? If yes, 75 points.	Yes O or No O
2. c. Are the planned conservation practices in a bumblebee Priority 4 Zone? If yes, 50 points.	Yes O or No O
2. d. Are the planned conservation practices in a bumblebee Priority 5 Zone? If yes, 25 points.	Yes O or No O
3. Within the applicant's property, is at least one Bumblebee Core Practice within 200 feet of commercially produced pollinator dependent[39] crops? If yes, 100 points.	Yes O or No O
4. Is at least one Bumblebee Core Practice within 2 miles of a commercial blueberry field? If yes, 50 points.	Yes O or No O

Land Use:

Resource Concerns	Practices

Ranking Score

Efficiency:
Local Issues:
State Issues:
National Issues:
Final Ranking Score:

This ranking report is for your information. It does not in any way guarantee funding. When funding becomes available, you will be notified if your application is selected for funding. Some changes to the application may be required before a final contract is awarded.
Notes:

NRCS Representative: **Signature Date:**	**Applicant Signature Not Required on this report for Contract Development unless required by State policy:** **Signature Date:**

[39] Crops that benefit from animal-mediated exchange of pollen (includes but is not limited to): tomato, blueberries, apple, squash, pumpkin, cucumbers, peppers, melons, orchard fruits, berries, buckwheat seed production). Refer to McGregor 1976; Klein, A-M., B.E. Vaissière, J.H. Cane, I. Steffan-Dewenter, S.A. Cunningham, C. Kremen, and T. Tscharntke. 2007. Importance of pollinators in changing landscapes for world crops. Proc. Royal Soc. B, 274(1608): 303-313.

Attachment F: Adverse effects and associated conservation measures for Target and Non-Target species. For more specific recommended USFWS conservation measures for the rusty-patched bumblebee, refer to the rusty-patched bumblebee section 7 consultation guidance (www.fws.gov/midwest/endangered/insects/rpbb/ProjectProponent.html) and Conservation Management Guidelines for the Rusty-Patched Bumblebee (*Bombus affinis*) (https://www.fws.gov/midwest/endangered/insects/rpbb/pdf/ConservationGuidanceRPBBv1_27Feb2018.pdf).

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/brush hogging, tree cutting/grinding invasive plant control, and grazing. AE2 Increased potential of introduction of invasive species.[40] AE3 Permanent removal of desired vegetation. AE4 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 existing high quality pollinator plants when bumblebees are active (May through October) and disruptions to/disturbance of existing monarch breeding habitat during peak monarch breeding and migration periods (July to September) while considering the long-term goal of improving habitat for the species and promoting nectar plants. CM3: Use the appropriate sub-region WHEG and other decision tools to identify the limiting factors for RPBB and monarch and develop a Conservation Plan that uses the umbrella/core practices to address these limiting factors in priority order. CM4: Consult with regional partners to ensure that conservation plantings are comprised of native or non-invasive species, and that any seeds purchased are clean and free of noxious weeds. Check seed package labelling and consult with seed supplier.

[40] Although NRCS will promote native pollinator species, some non-native pollinator plant species, like buckwheat, may be used for cover crops. Some noninvasive, nonnative pollinator plants may be used for their exceptional value for producing nectar or pollen (e.g., lance leaf coreopsis, clovers, blazing star). Intentional planting of, or management strategies that promote invasive species (e.g., purple loosestrife, glossy buckthorn, big-leaved lupin) will be avoided.

12.0 Appendix II. 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[41]. NRCS conservationists prepare conservation plans in consultation with private participants in order to address Resource Concerns[42] 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[43] (FOTG). The expected impacts of those effects are then used to help develop and evaluate management alternatives.

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

[42] 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.

[43] 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 targeted species. 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 for inclusion in the Proposed Action/ESA Predictability

- Developed by a NRCS Planner (Level 1 or 2) and signed by a Level 2 Project Planner.
- The habitat evaluation tool (e.g., a WHEG or other method approved by USFWS) must be completed and incorporated into the planning process for every conservation plan.
- Each conservation plan must include at least one core practice from Tables 3.
- Each conservation plan must remove or reduce at least the target species limiting factors(s) in their order of significance, as indicated by the results of the above mentioned habitat evaluation tool.
- 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).
- he 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. This "Operation and Maintenance" is defined within the NRCS Job Sheets of each practice.

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[44].

Standards in the NRCS' National Handbook of Conservation Practices[45] (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 covered species.

Special Topic: Practices which produce a Conservation Activity Plan (CAP).
As noted in Table 3, several of the covered conservation practces are practices which Farm Bill legislation provides NRCS the authority to use financial assistance through the Environmental Quality Incentives Program (EQIP) to develop plans appropriate for the eligible land of a program participant. The Farm Bill specifically authorizes EQIP to be used for comprehensive nutrient management plans and other plans that further the purposes of the program. The conservation practice associated with plan development under this authority is known as a Conservation Activity Plan or CAP. CAPs are focused and address specific resource needs as supplements to the broader Conservation Plan. Eligible

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

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

producers may apply at their local NRCS office and if approved, EQIP payments are made directly to program participants for development of a CAP once an approved plan is developed.

The process begins when an NRCS conservation planner develops a Conservation Plan that identifies a CAP as an alternative that will address an identified natural resource concern. If the participant chooses to apply for and receives funding under EQIP for a CAP, they will receive financial reimbursement following the development and approval by NRCS of the identified CAP. To ensure technical adequacy, CAP plans may only be developed by an NRCS-certified Technical Service Provider (TSP). There is no requirement that activities identified within the CAP be implemented, however, producers can apply for financial assistance to implement the conservation practices as they are required to meet NRCS standards. NRCS planning policy requires completion of an Environmental Evaluation for all planning activities including CAPs. This evaluation is documented on form NRCS-CPA-52 Environmental Evaluation Worksheet. More information on CAPs is found at: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/eqip/?cid=nrcseprd1354058

13.0 Appendix III – WHEG - example

Pollinator Wildlife Habitat Evaluation Guide (WHEG)

This Wildlife Habitat Evaluation Guide (WHEG) is used to help Conservation Planners assess current pollinator habitat conditions, assist with developing habitat enhancement alternatives based on current conditions, and to objectively assess (score) improvements to pollinator habitat from Conservation Practices and Enhancements. The final score of the WHEG will be used by Conservation Planners when ranking applications. This WHEG is only effective if scoring is consistent among sites. It is based on the habitats, resources, and threats to pollinators in Northern New England. This guide can be applied in natural areas and agricultural settings.

Participant:	**Field Office:**
NRCS Planner:	**Size of Land Unit** (acres):
Area cropped within Land Unit (acres):	**Crop(s) grown**:
Date of Assessment (when "before score" and anticipated "after score" are determined):	**Date of Final Assessment** (when post implementation score determined, if applicable):
Notes:	

Instructions:
The evaluation below should be conducted on site and with the aid of aerial imagery. Map-based evaluation (Section 1) should consider habitat within a ½ mile radius from the planned conservation practice. For each section below enter a "Before Score". The "Before Score" represents the current state (or previous 12 months) of pollinator habitat or land management activities before implementing a planned conservation practice. Next, enter an "Anticipated After Score". The "Anticipated After Score" is the expected score after a conservation practice has been successfully implemented. After entering scores, subtract the "Anticipated After Score"

from the "Before Score" to determine the anticipated benefit of proposed practices. A final assessment may be done to document on-the-ground changes to pollinator habitat.

SECTION 1. LANDSCAPE: Availability of forage within ½ mile radius of proposed practice(s). Max score of 9.

1. Proportion of land area with a high abundance of **spring blooming** plants (including crops). Bogs, fens, scrub/shrub wetlands, apple orchards, blueberry barrens, and riparian zones are examples of habitats with a high abundance of spring blooming plants.

Select One:	Value	Before	Anticipated After	Post-implementation monitoring[46]
a) >50%	3			
b) 25-50%	2			
c) 5-25%	1			
d) 0-5%	0			

2. Proportion of land area with a high abundance of **summer blooming** plants (including flowering crops). Meadows, hayfields, abandoned lots, forest openings, early successional habitat, and squash fields are examples of habitats with a high abundance of summer blooming plants.

Select One:	Value	Before	Anticipated After	Post-implementation monitoring[1]
a) >50%	3			
b) 25-50%	2			
c) 5-25%	1			
d) 0-5%	0			

3. Proportion of land area with a high abundance of **late-season blooming** plants (including crops). Meadows, hayfields, abandoned lots, forest openings, and early successional habitat are examples of habitats with a high abundance of late-season blooming plants.

Select One:	Value	Before	Anticipated After	Post-implementation monitoring[1]
- >50%	3			
- 25-50%	2			
- 5-25%	1			
- 0-5%	0			

[46] Post Implementation Monitoring Score – This column may be utilized for post implementation monitoring by partner agencies or other entities and is not required to be completed by NRCS personnel unless otherwise specified.

For sections 2 – 5 only consider land units under the ownership or control of the applicant

SECTION 2. PRESENCE OF KEY FORAGE PLANTS: Refer to the checklist of plants below to answer the following questions. Check off categories of plants seen in the land unit during a site visit. Note: there is no need to conduct an exhaustive survey of the entire land unit. Max score of 20.

Herbaceous Plants:

- Asters (*Sympiotrichum* spp.)
- Boneset (*Eupatorium perfoliatum*)
- Butter-and-eggs (*Linaria vulgaris*)
- Common milkweed (*Asclepias syriaca*)
- Coneflowers (*Echinacea* spp.)
- Fireweed (*Chamaenerion angustifolium*)
- Wild bergamot (*Monarda fistulosa*)
- Goldenrods (*Solidago* spp.)
- Hyssop (*Agastache* spp.)
- Jewelweed (*Impatiens capensis*)
- Joe pye weeds (*Eutrochium* spp.)
- Meadowsweet (*Spiraea alba*)
- Milkweeds (*Asclepias incarnata, A. tuberosa*)
- Mountain mint (*Pycanthemum* spp.)
- Native thistles (*Cirsium muticum, C. discolor*.)
- Northern blazing star (*Liatris novae-angliae*)
- Penstemon (*Penstemon* spp.)
- Red clover (*Trifolium pratense*)
- Steeplebush (*Spiraea tomentosa*)
- Sweet clover (*Melilotus* spp.)
- Vetch (*Vicia* spp.)
- White turtlehead (*Chelone glabra*)
- Wild lupin (*Lupinus perennis*)
- Wild sunflower (*Helianthus annuus*)

Trees and Shrubs:

1. American basswood (*Tilia americana*)
2. Apple (*Malus* spp.)
3. Blackberries (*Rubus allegheniensis*)
4. Blueberries and other vacciniums (*Vaccinium* spp.)
5. Buttonbush (*Cephalanthus occidentalis*)
6. Gooseberry (*Ribes* spp.)
7. Native rhodendrons (*Rhododenron* spp.)
8. New Jersey Tea (*Ceanothus americanus*)
9. Northern bush honeysuckle (*Diervilla lonicera*)
10. Plums and cherries (*Prunus* spp.)
11. Raspberries (*Rubus* spp.)
12. Serviceberry (*Amelanchier* spp.)
13. Sumac (*Rhus* spp.)
14. Summersweet (*Clethra alnifolia*)
15. Wild native roses (*Rosa* spp.)
16. Willows (*Salix* spp.)

4. How many species/species groups are checked off under Section 2 heading above? Count the number of checked boxes, not the number of species (even if multiple species are represented for a given checkbox).

Select One:	Value	Before	Anticipated After	Post-implementation monitoring[1]
1. 20+ 2. 12-19 3. 6-11 4. 0-5	20 15 10 0			

SECTION 3. NESTING HABITAT: Score all options that apply. Max score 10.

5. Bumblebees require uncultivated ground to raise a colony and produce reproductive individuals. To answer the following questions, consider only land within the Land Unit(s) included in the application.

Score all that apply:	Total Possible	Before	Anticipated After	Post-implementation monitoring[1]
1. Award 1 point up to 5 for every 20% area of untilled ground. No till is awarded 5 points. 2. Areas of site with woody cover, or other sheltered areas where bumblebees could build nests or overwinter (downed wood, rock walls, brush piles, forest duff layer, etc…)	5 >20% = 5 ~20% = 3 5-19% = 2 <5% = 1			

SECTION 4. LAND MANAGEMENT PRACTICES: Score all options that apply. Max score 21.

6. The following questions pertain to ongoing site management, not site preparation. Use N/A if management practice(s) are not applicable on the site. If N/A, do not tally as part of total possible points.

Score all that apply (M = Management matches description, S = Somewhat matches, N = No match, N/A = Does not apply	Value	Before	Anticipated After	Post-implementation monitoring[1]

1. If mowing or haying occurs, then entire disturbed area is limited to 1/3 of habitat per year. Haying or mowing done at a high mower height (12-16"), and delayed until after the first hard frost in the fall.	M = 7 S = 4 N = 0 N/A			
2. If site is grazed, then a conservation grazing plan is in place and includes prescribed grazing practices that encourage wildflower diversity/abundance, such as short duration grazing with long recovery periods	M = 7 S = 4 N = 0 N/A			
3. Managed bees (honeybees and commercial bumblebees) compete with native bumblebees, and can transmit diseases to wild bumblebees. **Score as follows:** No managed bees, or managed bees only in high tunnels or greenhouses = M; <0.5 honeybee hives per acre OR honeybees present less than 4 weeks per year = S; >0.5 honeybee hives per acre and/or commercial bumblebees present = N	M = 7 S = 4 N= 0			

SECTION 5. PESTICIDE PRACTICES. Max score 40.

7. Pesticides is an inclusive term and includes but is not limited to organically approved OR conventionally applied insecticides, fungicides, herbicides, and miticides. If no pesticides used, answer 7a only.

Score all options that apply	Total Possible	Before	Anticipated After	Post-implementation monitoring[1]
1. No use of pesticides (including organic-approved products). **If no pesticides are used, skip remaining questions**	40			
IF PESTICIDES ARE USED, SCORE THE FOLLOWING				
1. Most pest issues are addressed by non-chemical methods (e.g., use of row-covers, plant collars, pheromone traps, hand-picking, etc...). If IPM is used to mitigate pesticide risks to pollinators, award 8 of the 10 total possible points.	10			

2. Min. 125’ buffer from any neonicotinoid use on and/or adjacent to site (including seed treatment) OR 100’ buffer and suitable non-flowering windbreak[47]. If no neonicotinoids used, 7 points.	7			
3. Min. 30’ buffer between applications and habitat areas OR suitable non-flowering windbreak[2]	6			
4. Pesticide applications only occur outside of crop bloom period	5			
5. Mowing is used to reduce bloom in habitats affected by sprays prior to applications	5			

TOTAL SCORES (DO NOT INCLUDE N/A MARKED QUESTIONS IN BEFORE OR AFTER TOTALS)

BEFORE (Total Possible. Do not include N/A marked questions in Total Possible) 100 – N/A marked points:	**ANTICIPATED AFTER SCORE** (Tally all points awarded in After column):	**POST-IMPLEMENTATION SCORE** (This column may be utilized for post implementation monitoring by partner agencies or other entities and is not required to be completed by NRCS personnel unless otherwise specified.)

ANTICIPATED BENEFIT OF PROPOSED PRACTICES Anticipated After Score MINUS Before Score. This will always be a positive number. Use this value for ranking.	

ACTUAL BENEFIT OF PROPOSED PRACTICES Post-Implementation Score MINUS Before Score. This should always be a positive number. This is optional for post implementation monitoring.	

[47] A buffer is a pesticide-free area between crops and flowering plants. For guidance on the use of windbreaks for protecting pollinators from pesticides refer to USDA-NRCS Agronomy Technical Note 9, *Preventing or mitigating potential negative impacts of pesticides on pollinators using Integrated Pest Management and other conservation practices.*

14.0 Appendix IV - Detailed Explanation of Each Conservation Practice Standard/CSP Enhancements

14.1 Forestry Management Plan (Code 106)

Definition: A forest management plan is a site-specific plan developed for a client to address one or more resource concerns on nonindustrial private forestland where forestry-related conservation activities or practices will be planned and applied. These criteria were developed to implement section 1240 (A) of the Food, Conservation and Energy Act of 2008, which allows for the development of forest management plans as one of the purposes of the Environmental Quality Incentives Program (EQIP).

Purpose: To meet NRCS quality criteria for the identified resource concern(s), comply with Federal, State, Tribal, and local laws, regulations, and permit requirements, and to meet the client's objectives. Forestry Management Plans are a required pre-requisite to contracting forestry practices including Early Successional Habitat Development/Management (647).

Additional information: Plans can address management of Tree/Shrub species that offer significant benefits to invertebrate species of concern by providing pollen, nectar, and nesting sites. Providing forage throughout the growing season is a critical goal.

NRCS Conservation Practice Effects Network Diagram: Not available. FY 18 Conservation Activity Plans (CAP) Plan Development Criteria and Templates can be found at: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/technical/tsp/?cid=nrcseprd1360853

14.2 Integrated Pest Management Plan (Code 114)

Definition: An Integrated Pest Management (IPM) plan is a Conservation Activity Plan documenting decisions by producer/growers who agree to implement an ecosystem-based strategy that is a sustainable approach to manage pests using a combination of conservation practices and IPM techniques that are characterized as chemical applications, biological control, and habitat manipulation, modification of cultural practices and use of resistant varieties. Methods of chemical applications are selected in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment.

Purpose: The "Integrated Pest Management activity plan" will meet NRCS quality criteria for soil erosion, water quality, air quality, and plant quality; comply with federal, state, tribal, and local laws, regulations and permit requirements; address operator's objectives. Producers can implement an Integrated Pest Management Plan for several reasons, including to mitigate the risk of pesticide impacts on pollinators.

Additional Information: For direct contact pesticide risks to pollinators and other beneficial species in the application area, apply at least two IPM mitigation techniques from the Pesticide Direct Contact section of Agronomy Technical Note 4 - Pest Management in the Conservation Planning Process.

NRCS Conservation Practice Effects Network Diagram: Not available. FY 18 Conservation Activity Plans (CAP) Plan Development Criteria and Templates can be found at:

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/technical/tsp/?cid=nrcseprd1360853

14.3 Conservation Plan Supporting Organic Transition (Code 138)
Definition: The CAP 138 is an NRCS Conservation Activity Plan that helps farmers who are interested in transitioning from conventional farming practices to organic production by addressing the natural resource concerns on their operation. To receive financial and technical assistance from NRCS for the completion of a CAP, it must be prepared by NRCS-certified TSPs. CAPs must meet the technical planning requirements established by the agency and are used by NRCS employees to draft a final certified conservation plan, if requested by the producer.

Purpose: This practice can help to reduce pesticide use on farmland by supporting transition to organic systems, thus reducing the risk of pesticide exposure to pollinators.

Additional Information: To increase biodiversity, incorporate conservation plants, habitat for birds, pollinators, bats, beneficial insects, natural areas restored or protected, wildlife friendly farm practices

NRCS Conservation Practice Effects Network Diagram: Not available. FY 18 Conservation Activity Plans (CAP) Plan Development Criteria and Templates can be found at: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/technical/tsp/?cid=nrcseprd1360853

14.4 Fish and Wildlife Habitat Plan (Code 142)
Definition: A Fish and Wildlife Habitat Plan is a site-specific plan developed with a client who is planning to implement conservation activities or practices with consideration for fish and wildlife habitat. A Fish and Wildlife Habitat Management Plan shall be developed by TSPs. In accordance with section 1240 (A), the EQIP program provides funding support through contracts with eligible producers to obtain services of certified TSPs for development of Fish and Wildlife Habitat Plans.

Purpose: This practice allows producers to contract fish and wildlife experts to identify opportunities to improve, protect, restore, enhance, or expand habitat for pollinators on their property.

Additional Information: To increase biodiversity, habitat for birds, pollinators, bats, beneficial insects, natural areas restored or protected, and encourage wildlife friendly farm practices.

NRCS Conservation Practice Effects Network Diagram: Not available. FY 18 Conservation Activity Plans (CAP) Plan Development Criteria and Templates can be found at: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/technical/tsp/?cid=nrcseprd1360853

14.5 Pollinator Habitat Enhancement Plan (Code 146)
Definition: A pollinator habitat enhancement plan is a site-specific plan developed for a client that addresses the improvement, protection, restoration, enhancement, or expansion of flower-rich habitat that supports native and/or managed pollinators. A Pollinator Habitat Enhancement Plan shall be developed by TSPs. In accordance with section 1240 (A), the EQIP program provides

funding support through contracts with eligible producers to obtain services of certified TSPs for development of Pollinator Habitat Enhancement Plans.

Purpose: This practice allows producers to contract pollinator experts to identify opportunities to improve, protect, restore, enhance, or expand habitat for pollinators on their property.

Additional Information: Ensure that the plant species composition benefits a diverse pollinator community (i.e., at least 12 species of flowering plants, three of which are in bloom at any one time during the early, mid, and late periods of the growing season). Ensure minimal weed competition, but the inclusion, where appropriate, of beneficial "weeds" (e.g., milkweed as Monarch butterfly host plants). Large areas of undisturbed pollinator habitat are available: No tillage in areas appropriate for ground-nesting bees. Overgrown bunch grasses for bumblebee nest sites Host plants for butterflies Tree cavities, standing dead trees, exfoliating bark (e.g., in riparian or adjacent land) for wood-nesting bees.

NRCS Conservation Practice Effects Network Diagram: Not available. FY 18 Conservation Activity Plans (CAP) Plan Development Criteria and Templates can be found at: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/technical/tsp/?cid=nrcseprd1360853

14.6 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, including pollinator 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

14.7 Herbaceous Weed Treatment (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. Herbaceous weed treatment can be used to prepare weedy sites for the implementation of other practices.

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

14.8 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. Under the pollinator and monarch scenarios, it can be used to create high quality pollen and nectar rich habitat for pollinators.

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

14.9 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

14.10 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 CO2 losses from the soil. (5) Reduce energy use. (6) Increase plant-available moisture. (7) Provide food and escape cover for wildlife. In highly intensive cultivated agricultural landscape, this practice can increase the availability of nesting habitat for soil nesting pollinators, including declining, threatened, and endangered species of bees.

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

14.11 Contour Buffer Strips (Code 332)
Definition: Narrow strips of permanent, herbaceous vegetative cover established around the hill slope, and alternated down the slope with wider cropped strips that are farmed on the contour.

Purpose: This practice is applied to support one or more of the following purposes: (1) Reduce sheet and rill erosion; (2) Reduce water quality degradation from the transport of sediment and other water-borne contaminants downslope; (3) Improve soil moisture management through

increased water infiltration; and (4) Reduce water quality degradation from the transport of nutrients downslope.

Additional Information: Add native forbs to the seeding mixture to increase habitat diversity or to provide pollen and nectar for beneficial insects. Mow the buffer strips every other year or every third year depending upon geographical location. The standing cover provides early and late season nesting and escape cover for many species of wildlife displaced from adjacent disturbed areas. Delay mowing until after the nesting period of ground-nesting species, but mow early enough to allow for regrowth before the growing season ends.

NRCS Conservation Practice Effects Network Diagram:
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/cp/ncps/?cid=nrcs143_026849

14.12 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

14.13 Windbreak/Shelterbelt Establishment (Code 380)
Definition: Windbreaks or shelterbelts are single or multiple rows of trees or shrubs in linear configurations.

Purposes: (1) Reduce soil erosion from wind; (2) Protect plants from wind related damage; (3) Alter the microenvironment for enhancing plant growth; (4) Manage snow deposition; (5) Provide shelter for structures, animals, and people; (6) Enhance wildlife habitat; (7)Provide noise screens; (8) Provide visual screens; (9) Improve air quality by reducing and intercepting air borne particulate matter, chemicals and odors; (10) Delineate property and field boundaries; (11) Improve irrigation efficiency; (12) Increase carbon storage in biomass and soils; and (13) Reduce energy use

Additional Information: Wildlife and pollinator needs should be considered when selecting tree or shrub species to add or remove. If this practice is sited where agricultural sprays may drift into the planting, do not include plant species that may attract pollinators or other beneficial insects.

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

14.14 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

14.15 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

14.16 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

14.17 Stream Habitat Improvement and Management (Code 395)
Definition: Maintain, improve or restore physical, chemical and biological functions of a stream, and its associated riparian zone, necessary for meeting the life history requirements of desired aquatic species.

Purpose: (1) Provide suitable habitat for desired fish and other aquatic species and (2) Provide stream channel and associated riparian conditions that maintain stream corridor ecological processes and hydrological connections of diverse stream habitat types important to aquatic species.

Additional Information: If this practice is planned to include re-vegetation of stream banks, choose plant species which provide forage and nesting sites for pollinators.

NRCS Conservation Practice Effects Network Diagram:
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/cp/ncps/?cid=nrcs143_026849

14.18 Wildlife Habitat Planting (Code 420)
Definition: Establishing herbaceous vegetation or shrubs to provide biological requirements for wildlife.

Purpose: This practice is used to accomplish one or more of the following purposes:

- Improve degraded wildlife habitat by establishing habitat that addresses an identified limiting factor of the target wildlife species or guild.
- Establish habitat that resembles the historic/desired/reference native plant community.

Additional Information:
This practice applies to all lands where a plant community inventory or wildlife habitat evaluation indicates a benefit in altering the current vegetative conditions (species diversity, richness, structure, and pattern) by establishing herbaceous plants or shrubs. The use of annuals that persist over the life of the practice, and annuals that serve as a nurse crop to support the establishment of the persistent vegetative species are appropriate under this conservation practice.

NRCS Conservation Practice Effects Network Diagram:
https://www.nrcs.usda.gov/.../download?cid=nrcseprd1415435&ext=pdf

14.19 Hedgerow Planting (Code 422)
Definition: Establishment of dense vegetation in a linear design to achieve a natural resource conservation purpose.

Purpose: Providing at least one of the following conservation functions: habitat, including food, cover, and corridors for terrestrial wildlife; to enhance pollen, nectar, and nesting habitat for pollinators; food, cover, and shade for aquatic organisms that live in adjacent streams or watercourses; to provide substrate for predaceous and beneficial invertebrates as a component of integrated pest management; to intercept airborne particulate matter; to reduce chemical drift and odor movement; screens and barriers to noise and dust; to increase carbon storage in biomass and soils; living fences; boundary delineation and contour guidelines.

Additional Information: Hedgerow planting could be used to directly support habitat improvement by providing pollen, nectar and nesting and overwintering habitat for pollinators and beneficial insects. In addition, this practice can be used to connect desirable habitats as well as provide protection from chemical drift from pesticides/herbicides.

NRCS Conservation Practice Effects Network Diagram:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253101.pdf

14.20 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

14.21 Tree/Shrub Site Preparation (Code 490)
Definition: Treatment of areas to improve site conditions for establishing trees and/or shrubs.

Purpose: Encourage natural regeneration of desirable woody plants; permit artificial establishment of woody plants.

Additional Information: Practice may be used to create site conditions for desirable natural regeneration or to prepare site for planting of pollinator friendly shrubs and trees.

NRCS Conservation Practice Effects Network Diagram:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253229.pdf

14.22 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

14.23 Forage and Biomass Planting (Code 512)
Definition: Establishing adapted and/or compatible species, varieties, or cultivars of herbaceous species suitable for pasture, hay, or biomass production.

Purpose: This practice may be applied as part of a conservation management system to accomplish one or more of the following purposes.

- Improve yield and plant longevity by providing guidance for selection and establishment of adapted and compatible plant varieties, species, and cultivars.
- Improve or maintain livestock nutrition and/or health.
- Provide or increase forage supply during periods of low forage production.
- Reduce soil erosion.
- Improve soil and water quality.
- Produce feedstock for biofuel or energy production.

Practice Information: This practice applies to all lands where grazing and/or browsing animals are managed.

NRCS Conservation Practice Effects Network Diagram:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_026153.pdf

14.24 Prescribed Grazing (Code 528)
Definition: Managing vegetation with grazing and/or browsing animals with the intent to achieve specific ecological, economic, and management objectives.
Purpose: This practice is applied as a part of a conservation management system to achieve one or more of the following:

- Improve or maintain desired species composition, structure and/or vigor of plant communities.
- Improve or maintain quantity and/or quality of forage for grazing and browsing animals' health and productivity.
- Improve or maintain surface and/or subsurface water quality and/or quantity.
- Improve or maintain riparian and/or watershed function.
- Reduce soil erosion, and maintain or improve soil health.
- Improve or maintain the quantity, quality, or connectivity of food and/or cover available for wildlife.
- Manage fine fuel loads to achieve desired conditions.

Practice Information: This practice applies to all lands where grazing and/or browsing animals are managed.

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

14.25 Access Road (Code 560)
Definition: An access road is an established route for equipment and vehicles.

Purpose: An access road is used to provide a fixed route for vehicular travel for resource activities involving the management of timber, livestock, agriculture, wildlife habitat, and other conservation enterprises.

Additional Information: The practice would facilitate other conservation practice implementation such as managing desirable habitats.

NRCS Conservation Practice Effects Network Diagram:
https://efotg.sc.egov.usda.gov/references/public/TN/AccessRoad_560_NetworkDiagram_Sep2014.pdf

14.26 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: (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[48], 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

[48] http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=34828.wba

Pest Management and Other Conservation Practices[49]. 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

14.27 Integrated Pest Management (Code 596)
Definition: A site-specific combination of pest prevention, pest avoidance, pest monitoring, and pest suppression strategies.

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

Additional Information: May be used to prevent or reduce risks to pollinators from pesticide use.

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

14.28 Tree/Shrub Establishment (Code 612)
Definition: Establishing woody plants by planting seedlings or cuttings, by direct seeding, and/or through natural regeneration.

Purpose: Establish woody plants to: maintain or improve desirable plant diversity, productivity, and health by establishing woody plants; create or improve habitat for desired wildlife species compatible with ecological characteristics of the site; control erosion; improve water quality; reduce excess nutrients and other pollutants in runoff and groundwater; sequester and store carbon; restore or maintain native plant communities; develop renewable energy systems; conserve energy; provide for beneficial organisms and pollinators.

Additional Information: May be used to contribute to natural community and habitat restoration as well as provide food, cover and nesting sites for pollinators.

NRCS Conservation Practice Effects Network Diagram:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253229.pdf

[49] https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1043138.pdf

14.29 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

14.30 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

14.31 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

14.32 Forest Trails and Landings (Code 655)
Definition: A temporary or infrequently used route, path, or cleared area.

Purpose: Provide routes for temporary or infrequent travel by people or equipment for management activities; provide periodic access for removal and collection of forest products.

Additional Information: Can be used as a facilitating practice to provide suitable access to implement forest based habitat or forestry practices to benefit pollinators and to address erosion and water quality concerns on existing trails in poor shape.

NRCS Conservation Practice Effects Network Diagram:
https://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1253092&ext=pdf

14.33 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.

Additional Information: Manage for plant species which offer significant forage or nesting site benefits to pollinators. Manage invasive plants, especially Black swallowwort and Pale swallowwort, which can have negative consequences for Monarch butterfly reproduction.

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

14.34 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

14.35 Tree/Shrub Pruning (Code 660)
Definition: The removal of all or parts of selected branches, leaders, or roots from trees and shrubs.

Purpose: This practice is applied to support one or more of the following purposes: maintain or improve plant productivity, health and vigor, and/or reduce excessive plant pest pressure; develop desired plant structure, foliage or branching density, or rooting length; improve the composition and vigor of understory plants; maintain or improve soil quality and organic matter content; reduce wildfire and/or safety hazards; reduce energy use during field operations.

Additional Information: May be used to enhance flowering/fruit production or improve health of desirable shrubs and trees.

NRCS Conservation Practice Effects Network Diagram:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253230.pdf

14.36 Forest Stand Improvement (Code 666)
Definition: Forest stand improvement involves the manipulation of species composition, stand structure, or stand density by cutting or killing selected trees or understory vegetation to achieve desired forest conditions or obtain ecosystem services.

Purpose: The goal of forest stand improvement is to: improve and sustain forest health and productivity; reduce damage from pests and moisture stress; initiate forest stand regeneration; restore or maintain natural plan communities; improve wildlife and pollinator habitat; alter quantity, quality, and timing of water yield; and increase or maintain carbon storage.

Additional Information: This practice is applied on forest land where competing vegetation hinders development and stocking of preferred tree and understory species. The practice can be an important tool for maintaining open and sunny habitat for pollinators.

NRCS Conservation Practice Effects Network Diagram:
https://efotg.sc.egov.usda.gov/references/public/ME/Forest_Stand_Improvement_666_Network_Diagram.pdf

14.37 CSP Enhancement E315132Z (Herbaceous weed control that helps create desired plant communities and habitats consistent with the ecological site)

Description: Mechanical, chemical, or biological, herbaceous weed control will be employed to control targeted, herbaceous weeds so as to create, release, or restore desired plant communities that are consistent with achievable, ecological site, steady state descriptions.

Criteria: Herbaceous weed control will be applied to achieve the recorded desired level of control of the target species and protect the recorded desired species within the plant community. NRCS will not develop biological or chemical recommendations except biological control by grazing animals. Ecological site description (ESD), state and transition models will be employed in development of treatment specifications that are ecologically sound and defensible. If an ESD is not available, base specifications on the best approximation of the desired plant community composition, structure, and function. If needed, herbaceous weed control will include post treatment measures. Treatment periods will accommodate reproduction and other life-cycle requirements of target recorded wildlife and pollinator species. All treatments will be conducted when target weed species are most vulnerable. When herbicides are used, environmental hazards and site-specific application criteria listed on the pesticide label must be followed. Additional criteria may be required by an NRCS State Office.

Additional Information: Herbaceous weed control can be used in combination with other practices for weed abatement prior to planting floral resources. Site specific NRCS job sheet will be completed with target plant species and desired level of control and target wildlife or pollinator species.

14.38 CSP Enhancement E327137Z (Conservation cover to provide cover and shelter habitat for pollinators and beneficial insects)
Description: Seed or plug nectar and pollen producing plants in non-cropped areas such as field borders, vegetative barriers, contour buffer strips, grassed waterways, shelterbelts, hedgerows, windbreaks, conservation cover, and riparian forest and herbaceous buffers.

Criteria: Habitat areas must be at least 0.5 acres for each 40 acres of the selected land use. Where the selected land use is less than 40 acres, the required amount of habitat will be reduced according to the ratio of 0.5 acres to 40 acres. Where the selected land use is greater than 40 acres, the 0.5-acre habitat areas(s) may be a single site or interspersed sites in the larger land use areas as agreed to by the NRCS State Biologist. For pollinators, a list of suitable plants will be developed by NRCS at the state level and will include a minimum of three early, three mid, and three late flowering species. For beneficial insects, the planning effort shall involve: 1) identifying pest species and associated beneficial insects targeted for control; 2) inventory existing conditions on the farm to determine habitat needs of selected beneficial insects including permanent insectary sites, augmentation of field borders, hedgerows or other areas adjacent to fields, an trap crop areas; 3) Plant selection should be matched to attract identified beneficial insects; 4) Beneficial insect habitat may include either annual or perennial cover; and 5) a list of suitable plants will be developed by NRCS at the state level for beneficial insects. If beneficial insect habitat includes annual cover, the annual must be replanted each year during the life of the contract. Planting criteria shall consider site selection and associated weed pressure, site preparation, avoidance of insecticides, and appropriate use of herbicides. Any maintenance activities such as mowing, haying, or grazing will be conducted outside the bloom season. Maintenance will be done on less than 1/3 of the acreage during any given year, except the first year post-planting. Insecticides must not occur in the planting area. If insecticides are used in adjacent crop areas create 25-foot insecticide free buffers,

use applications that minimize drift, and apply active ingredients in the evening. Additional criteria may be required by an NRCS State Office.

Additional Information: Permanent plantings can include diverse native and nonnative forbs to increase plant diversity and ensure flowers are in bloom for as long as possible, providing nectar and pollen throughout the growing season. A list of pollinator and beneficial species planted along with a list of management/maintenance activities carried out to manage the habitat.

14.39 CSP Enhancement E327136Z1 (Conservation cover to provide food habitat for pollinators and beneficial insects)
Description: Seed or plug nectar and pollen producing plants in non-cropped areas such as field borders, vegetative barriers, contour buffer strips, grassed waterways, shelterbelts, hedgerows, windbreaks, conservation cover, and riparian forest and herbaceous buffers.

Criteria: Habitat areas must be at least 0.5 acres for each 40 acres of the selected land use. Where the selected land use is less than 40 acres, the required amount of habitat will be reduced according to the ratio of 0.5 acres to 40 acres. Where the selected land use is greater than 40 acres, the 0.5-acre habitat areas(s) may be a single site or interspersed sites in the larger land use areas as agreed to by the NRCS State Biologist. For pollinators, a list of suitable plants will be developed by NRCS at the state level and will include a minimum of three early, three mid, and three late flowering species. For beneficial insects, the planning effort shall involve: 1) identifying pest species and associated beneficial insects targeted for control; 2) inventory existing conditions on the farm to determine habitat needs of selected beneficial insects including permanent insectary sites, augmentation of field borders, hedgerows or other areas adjacent to fields, an trap crop areas; 3) Plant selection should be matched to attract identified beneficial insects; 4) Beneficial insect habitat may include either annual or perennial cover; and 5) a list of suitable plants will be developed by NRCS at the state level for beneficial insects. If beneficial insect habitat includes annual cover, the annual must be replanted each year during the life of the contract. Planting criteria shall consider site selection and associated weed pressure, site preparation, avoidance of insecticides, and appropriate use of herbicides. Any maintenance activities such as mowing, haying, or grazing will be conducted outside the bloom season. Maintenance will be done on less than 1/3 of the acreage during any given year, except the first year post-planting. Insecticides must not occur in the planting area. If insecticides are used in adjacent crop areas create 25-foot insecticide free buffers, use applications that minimize drift, and apply active ingredients in the evening. Additional criteria may be required by an NRCS State Office.

Additional Information: Permanent plantings can include diverse native and nonnative forbs to increase plant diversity and ensure flowers are in bloom for as long as possible, providing nectar and pollen throughout the growing season. A list of pollinator and beneficial species planted along with a list of management/maintenance activities carried out to manage the habitat.

14.40 CSP Enhancement E327136Z2 (Establish Monarch butterfly habitat)
Description: Seed or plug milkweed (*Asclepias spp.*), the Monarch butterfly larval hostplant, and high-value monarch butterfly nectar plants in non-cropped areas such as field borders, contour buffer strips, and associated grasslands.

Criteria: The habitat areas must be at least 0.5 acres. At least 60% of the seeds in the mix must be from the monarch specific list that's provided in the NRCS state technical guides. The habitat

planting will include at least one species of milkweed (*Asclepias spp*.) that is native to the area where the habitat is planted. When commercial sources of *Asclepias* species is limited, the NRCS state conservationist may apply for a waiver, and only require that plantings include monarch nectaring species. If such a waiver is granted, the mix will result in at least 80% of the seed being from the state's monarch nectaring plant list. Ideally, at least three nectar plants will be sown for each season when monarchs are present. Planting criteria shall consider site selection and associated weed pressure with the appropriate use of herbicide, follow state's specifications for Conservation Cover (327), establish at least 500 milkweed plants per acre and at least two targeted nectar plants per bloom period when monarchs are present, and avoid insecticide use or potential drift within the habitat planting area. Maintenance will be done on less than 1/3 of the acreage during any given year, except the first year post-planting. Insecticides must not occur in the planting area. If insecticides are used in adjacent crop areas create 30-foot insecticide free buffers, and use applications that minimize drift. Additional criteria may be required by an NRCS State Office.

Additional Information: Permanent plantings can include diverse native and nonnative forbs to increase plant diversity and ensure flowers are in bloom for as long as possible, providing nectar and pollen throughout the growing season. A list the planting mix including percentage of each species and rates along with a list of management/maintenance activities carried out to manage the habitat.

14.41 CSP Enhancement E512136Z1 (Establish pollinator and/or beneficial insect food habitat)
Description: Establishing adapted and/or compatible species, varieties, or cultivars of herbaceous species that can provide nectar for pollinators and forage and other habitat values for wildlife and livestock, particularly at times when targeted nectar, forage supply and quality, cover, and shelter are not available in other pastures.

Criteria: Select native, perennial plant species and their cultivars based on climatic conditions, soil condition, landscape position and resistance to disease and insects, that meet the nectar needs of specified, pollinating insects at times when they will be present and foraging. These plants need to also provide forage or other habitat values for wildlife and livestock. Plants will be selected that help meet nectar requirements for specified pollinators during times that normal farm/ranch forage production is inadequate. Plant selection will help to increase scores on the state's approved NRCS habitat evaluation procedure for pollinators. No plants on the Federal or state noxious weeds list shall be established. Additional criteria may be required by an NRCS State Office.

Additional Information: This enhancement can include diverse legumes (e.g., alfalfa or various clovers) or other forbs that, when in bloom, provide pollen and nectar for pollinators. A WHEG evaluation score must be .75 or greater. Retain all documentation of purchased seed, amendments, or fertilizers.

14.42 CSP Enhancement E327137Z (Conservation cover to provide cover and shelter habitat for pollinators and beneficial insects)
Description: Seed or plug nectar and pollen producing plants in non-cropped areas such as field borders, vegetative barriers, contour buffer strips, grassed waterways, shelterbelts, hedgerows, windbreaks, conservation cover, and riparian forest and herbaceous buffers.

Criteria: Habitat areas must be at least 0.5 acres for each 40 acres of the selected land use. Where the selected land use is less than 40 acres, the required amount of habitat will be reduced according to the ratio of 0.5 acres to 40 acres. Where the selected land use is greater than 40 acres, the 0.5-acre habitat areas(s) may be a single site or interspersed sites in the larger land use areas as agreed to by the NRCS State Biologist. For pollinators, a list of suitable plants will be developed by NRCS at the state level and will include a minimum of three early, three mid, and three late flowering species. For beneficial insects, the planning effort shall involve: 1) identifying pest species and associated beneficial insects targeted for control; 2) inventory existing conditions on the farm to determine habitat needs of selected beneficial insects; 3) Plant selection should be matched to attract identified beneficial insects; 4) Beneficial insect habitat may include either annual or perennial cover; and 5) a list of suitable plants will be developed by NRCS at the state level for beneficial insects. If beneficial insect habitat includes annual cover, the annual must be replanted each year during the life of the contract. Planting criteria shall consider site selection and associated weed pressure, site preparation, avoidance of insecticides, and appropriate use of herbicides. Any maintenance activities such as mowing, haying, or grazing will be conducted outside the bloom season. Maintenance will be done on less than 1/3 of the acreage during any given year, except the first year post-planting. Insecticides must not occur in the planting area. If insecticides are used in adjacent crop areas create 25-foot insecticide free buffers, use applications that minimize drift, and apply active ingredients in the evening. Additional criteria may be required by an NRCS State Office.

Additional Information: Permanent plantings can include diverse native and nonnative forbs to increase plant diversity and ensure flowers are in bloom for as long as possible, providing nectar and pollen throughout the growing season. A list of pollinator and beneficial species planted along with a list of management/maintenance activities carried out to manage the habitat.

14.43 CSP Enhancement E327139Z (Conservation cover to provide habitat continuity for pollinators and beneficial insects)
Description: Seed or plug nectar and pollen producing plants in non-cropped areas such as field borders, vegetative barriers, contour buffer strips, grassed waterways, shelterbelts, hedgerows, windbreaks, conservation cover, and riparian forest and herbaceous buffers.

Criteria: Habitat areas must be at least 0.5 acres for each 40 acres of the selected land use. Where the selected land use is less than 40 acres, the required amount of habitat will be reduced according to the ratio of 0.5 acres to 40 acres. Where the selected land use is greater than 40 acres, the 0.5-acre habitat areas(s) may be a single site or interspersed sites in the larger land use areas as agreed to by the NRCS State Biologist. For pollinators, a list of suitable plants will be developed by NRCS at the state level and will include a minimum of three early, three mid, and three late flowering species. For beneficial insects, the planning effort shall involve: 1) identifying pest species and associated beneficial insects targeted for control; 2) inventory existing conditions on the farm to determine habitat needs of selected beneficial insects; 3) Plant selection should be matched to attract identified beneficial insects; 4) Beneficial insect habitat may include either annual or perennial cover; and 5) a list of suitable plants will be developed by NRCS at the state level for beneficial insects. If beneficial insect habitat includes annual cover, the annual must be replanted each year during the life of the contract. Planting criteria shall consider site selection and associated weed pressure, site preparation, avoidance of insecticides, and appropriate use of herbicides. Any maintenance activities such as mowing, haying, or grazing will be conducted outside the bloom season. Maintenance will be done on less than 1/3 of the acreage during any

given year, except the first-year post-planting. Insecticides must not occur in the planting area. If insecticides are used in adjacent crop areas create 25-foot insecticide free buffers, use applications that minimize drift, and apply active ingredients in the evening. Additional criteria may be required by an NRCS State Office.

Additional Information: Permanent plantings can include diverse native and nonnative forbs to increase plant diversity and ensure flowers are in bloom for as long as possible, providing nectar and pollen throughout the growing season. A list of pollinator and beneficial species planted along with a list of management/maintenance activities carried out to manage the habitat.

14.44 CSP Enhancement E512139Z2 (Establish pollinator and/or beneficial insect habitat continuity (space))
Description: Establishing adapted and/or compatible species, varieties, or cultivars of herbaceous species that can provide nectar for pollinators and forage and other habitat values for wildlife and livestock, particularly at times when targeted nectar, forage supply and quality, cover, and shelter are not available in other pastures.

Criteria: Select native, perennial plant species and their cultivars based on climatic conditions, soil condition, landscape position and resistance to disease and insects, that meet the nectar needs of specified, pollinating insects at times when they will be present and foraging. These plants need to also provide forage or other habitat values for wildlife and livestock. Plants will be selected that help meet nectar requirements for specified pollinators during times that normal farm/ranch forage production is inadequate. Plant selection will help to increase scores on the state's approved NRCS habitat evaluation procedure for pollinators. No plants on the Federal or state noxious weeds list shall be established. Additional criteria may be required by an NRCS State Office.

Additional Information: This enhancement can include diverse legumes (e.g., alfalfa or various clovers) or other forbs that, when in bloom, provide pollen and nectar for pollinators. A WHEG evaluation score must be .75 or greater. Retain all documentation of purchased seed, amendments, or fertilizers.

14.45 CSP Enhancement E386136Z (Enhanced field border to provide wildlife food for pollinators along the edge(s) of a field)
Description: Enhance existing field borders to a width of at least 40 feet and establish a mixture of species that provide food for pollinators along the edge(s) of the field.

Criteria: Field borders must be established along selected field edges at a width of at least 40 feet. An established field border will contain a mixture of permanent grass, forbs, and/or shrubs that accomplish the design objective. Plants suitable for pollinator habitat will be developed at the NRCS State Office. Plants selected for field borders will have the physical characteristics necessary to produce pollen during multiple seasons. No plants on the Federal or state noxious weeds list shall be established in the field border. Any ephemeral gullies and rills in the planned area will be removed as part of seedbed preparation. Some of the operation and maintenance requirements will involve: 1) Repairing storm damage; 2) Removing accumulated sediment if it either alters the function of the field border or threatens the degradation of planted species; 3) Shut off sprayers and raise tillage equipment to avoid damage to field borders; 4) If damage occurs, shape and reseed border areas; 5) Avoiding the use of field borders as a hay yard or machinery parking lot; 6) Scheduling mowing, harvesting, weed control or other management activities to

accommodate target reproduction and other life cycle requirements of target wildlife species; 7) Maintain desired vegetative communities and plant vigor by liming, fertilizing, mowing, disking, or burning and controlling noxious and invasive weeds to sustain effectiveness of the border; 8) Repair and reseed ephemeral gullies and rills that develop in the border; 9)Avoid vehicle traffic when soil moisture conditions are saturated; and 10) Maintain records of the field border maintenance as needed by the land user. Note: Additional criteria may be required by an NRCS State Office.

Additional Information: Field borders can provide diverse legumes or other forbs that provide pollen and nectar for pollinators. Specifications for this practice shall be prepared for each site.

14.46 CSP Enhancement E386139Z (Enhanced field border to provide wildlife habitat continuity along the edge(s) of a field)
Description: Enhance existing field borders to a width of at least 40 feet and establish a mixture of species that provide wildlife habitat continuity along the edge(s) of the field.

Criteria: Field borders must be established along selected field edges at a width of at least 40 feet. An established field border will contain a mixture of permanent grass, forbs, and/or shrubs that accomplish the design objective. Any ephemeral gullies and rills in the planned area will be removed as part of seedbed preparation. Some of the operation and maintenance requirements will involve: (1) Repairing storm damage; (2) Removing accumulated sediment if it either alters the function of the field border or threatens the degradation of planted species; (3)Shut off sprayers and raise tillage equipment to avoid damage to field borders; (4) If damage occurs, shape and reseed border areas; (5) Avoiding the use of field borders as a hay yard or machinery parking lot; (6) Scheduling mowing, harvesting, weed control or other management activities to accommodate target reproduction and other life cycle requirements of target wildlife species; (7) Maintain desired vegetative communities and plant vigor by liming, fertilizing, mowing, disking, or burning and controlling noxious and invasive weeds to sustain effectiveness of the border; (8) Repair and reseed ephemeral gullies and rills that develop in the border; (9) Avoid vehicle traffic when soil moisture conditions are saturated; and (10) Maintain records of the field border maintenance as needed by the land user. Note that additional criteria may be required by an NRCS State Office.

Additional Information: Field borders can provide diverse legumes or other forbs that provide pollen and nectar for pollinators. Specifications for this practice shall be prepared for each site.

14.47 CSP Enhancement E391136Z (Increase riparian forest buffer width to enhance wildlife habitat)
Description: Where an existing riparian forest buffer is located along a river, stream, pond, lake, or other waterbody, increase the diversity of native species, control invasive species, install fencing and relocate equipment operations, trails, and livestock to increase the functional width of the buffer.

Criteria: An existing forest buffer width shall be at least 35 feet or the minimum State buffer width requirement, whichever is greater. A buffer width shall be increased to 60 feet and may be extended up to 180 feet or the State-allowed maximum width, but no greater than the width of the geomorphic floodplain. The wildlife plan shall consider habitat and wildlife objectives. The forest buffer should establish plant communities that address aquatic and terrestrial wildlife and pollinator needs and have multiple values such as habitat enhancement and nutrient uptake. Only use trees

and shrubs that are native and non-invasive. Trees and shrubs should favor multiple values such as those suited for timber, nuts, fruit, florals, browse, nesting, and aesthetics. Periodic removal of some forest products such as high value trees, medicinal herbs, nuts, and fruits is permitted provided the buffer area is not compromised by the loss of vegetation or harvesting disturbance. Ensure the design of the forest buffer has an expected life of at least 15 years. Additional criteria may be required by an NRCS State Office.

Additional Information: Riparian forest buffers can include trees, shrubs, and forbs especially chosen to provide pollen and nectar for pollinators. These areas can be especially important in mid-summer if drought reduces the availability of pollen and nectar sources in upland sites. This practice also can help reduce drift of pesticides onto areas of pollinator habitat. Specifications for this practice shall be prepared for each site. Specification shall be recorded using approved specifications sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

14.48 CSP Enhancement E512136Z2 (Native grass or legumes in forage base to provide wildlife food)
Description: The establishment of perennial herbaceous species, varieties, and cultivars that can provide the structure and composition needed to enhance livestock and wildlife habitat, particularly when targeted forage supply and quality, cover, and shelter are not available in other pastures.

Criteria: Use native perennial species and their cultivars based on climatic conditions, soil condition, landscape position and resistance to disease and insects. Plants will be selected that help meet livestock forage demand during times that normal farm/ranch forage production is inadequate. Forage species selected will meet the desired level of nutrition for the kind and class of the livestock to be fed. No plants on the Federal or state noxious weeds list, or plants known to be aggressive in the local area, shall be planted. Additional criteria may be required by an NRCS State Office.

Additional Information: This enhancement can include diverse legumes (e.g., alfalfa or various clovers) or other forbs that, when in bloom, provide pollen and nectar for pollinators. A WHEG evaluation score must be .75 or greater. A forage balance sheet must be completed for farm and grazing records. Retain all documentation of purchased seed, amendments, or fertilizers.

14.49 CSP Enhancement E512139Z1 (Establish wildlife corridors to provide habitat continuity)
Description: The establishment of perennial herbaceous species, varieties, and cultivars that can provide cover needed for wildlife to move from food/cover/water sources to other food/cover/water sources as needed for their life cycles. This enhancement can also be used to increase the utility of underused wildlife habitat areas.

Criteria: Use native perennial species and their cultivars based on climatic conditions, soil condition, landscape position and resistance to disease and insects. Protection from grazing or other plant defoliation/biomass loss will be provided as needed to assure adequate corridor cover. No plants on the Federal or state noxious weeds list, or plants known to be aggressive in the local area, shall be planted. Additional criteria may be required by an NRCS State Office.

Additional Information: This enhancement can include diverse legumes (e.g., alfalfa or various clovers) or other forbs that, when in bloom, provide pollen and nectar for pollinators. A WHEG

evaluation score must be .75 or greater. Retain all documentation of purchased seed, amendments, or fertilizers.

14.50 CSP Enhancement E512140Z (Native grasses or legumes in forage base)
Description: The establishment of perennial herbaceous species, varieties, and cultivars that can provide the structure and composition needed to enhance livestock and wildlife habitat, particularly when targeted forage supply and quality, cover, and shelter are not available in other pastures.

Criteria: Use native perennial species and their cultivars based on climatic conditions, soil condition, landscape position and resistance to disease and insects. Plants will be selected that help meet livestock forage demand during times that normal farm/ranch forage production is inadequate. No plants on the Federal or state noxious weeds list, or plants known to be aggressive in the local area, shall be planted. Additional criteria may be required by an NRCS State Office.

Additional Information: This enhancement can include diverse legumes (e.g., alfalfa or various clovers) or other forbs that, when in bloom, provide pollen and nectar for pollinators. A WHEG evaluation score must be .75 or greater. A forage balance sheet must be completed for farm and grazing records. Retain all documentation of purchased seed, amendments, or fertilizers.

14.51 CSP Enhancement E512139Z3 (Establish Monarch butterfly habitat in pastures)
Description: The establishment of herbaceous species that can provide nectar for pollinators and forage and other habitat values for wildlife and livestock, particularly at times when targeted nectar, forage supply and quality, cover, and shelter are not available in other pastures.

Criteria: The enhancement is used for cropland or degraded pastureland sites that require Forage and Biomass Planting (512) in order to stabilize the site to address a resource concern. Select native, perennial, grass/forb/legume plant species that will meet the nectar needs of Monarch butterflies at times when they will be present and foraging. These plants need to also provide forage or other habitat values for wildlife and livestock. No plants on the Federal or state noxious weeds list, or plants known to be aggressive in the local area, shall be planted. Additional criteria may be required by an NRCS State Office.

Additional Information: This enhancement can include diverse legumes (e.g., alfalfa or various clovers) or other forbs that, when in bloom, provide pollen and nectar for pollinators. A WHEG evaluation score must be .75 or greater.

14.52 CSP Enhancement E528137Z2 (Incorporating wildlife refuge areas in contingency plans for prescribed grazing where pastureland is the predominant land use, for wildlife cover and shelter)
Description: A prescribed grazing plan that includes 18-month (or longer) deferment of a pasture that consists of native grasses and/or legumes and/or perennial forbs for the purpose of meeting the needs for drought/disaster contingency plans that will also provide wildlife habitat for a period of time.

Criteria: A prescribed grazing plan must be written and followed that matches the forage quantity and quality produced with the grazing and/or browsing demand by livestock and wildlife. The enhancement will increase diversity of rangeland plants to optimize delivery of nutrients to the animals by incorporating the intensity, frequency, timing and duration of grazing and/or browsing

needed as determined by a planning process that includes – 1) Clear objectives; 2) A resource inventory with ecological site description or reference sheet and structural improvements and existing resource conditions; 3) Grazing plan; and 4) A contingency plan. Within the grazing plan, identify species of concern in the objectives. An area that constitutes at least 15% of the enrolled acreage (or a minimum of ten acres, whichever is larger) that is predominantly native grasses and/or legumes and/or perennial forbs will be deferred from any and all harvest or prescribed burning for a period of 18 months or longer. The deferment area must be a pasture (or located in a pasture) that scores a minimum of 0.5 on the state NRCS Wildlife Habitat Evaluation Guide (WHEG). Additional criteria may be required by an NRCS State Office.

Additional Information: Grazing can be used to maintain open, forb-dominated plant communities that support a diversity of pollinator insects. A prescribed grazing plan with livestock herd management records for the contract period must be provided. A WHEG evaluation score must be .5 or greater.

14.53 CSP Enhancement E595116X (Reduce risk of pesticides in surface water by utilizing precision pesticide application techniques)
Description: The use of precision application techniques to reduce risk of pesticides in surface water by reducing total amount of chemical applied and reducing the potential for delivery of chemicals into water bodies.

Criteria: The CSP enhancement will apply general criteria from the Integrated Pest Management (595) conservation practice standard. Documentation of producer's records meeting all general IPM conservation practice standards is required. The use of GPS is required to document application and site-specific compliance with all label requirements for controlling non-target application. Utilize one or more of the following techniques to reduce the total amount of chemical applied and reduce the potential for delivery of chemicals into water bodies – 1) Precision guidance system which reduces ground or aerial spray overlap to less than 12 inches; 2) Variable rate technology (VRT) which allows rate of pesticide application to dynamically change for site specific applications; and 3) "Smart sprayer" technology which utilizes automatic sensors and computer controlled nozzles to turn individual nozzles on and off. Additional criteria may be required by an NRCS State Office.

Additional Information: With the use of precision guidance systems and/or advanced technology this CSP enhancement prevents or mitigates exposure of pesticides to pollinators and associated habitat.

14.54 CSP Enhancement E595116Z (Reduce risk of pesticides in surface water by utilizing IPM PAMS techniques)
Description: Utilize integrated pest management (IPM) prevent, avoidance, monitoring, and suppression (PAMS) techniques to reduce risk of pesticides in surface water and reducing the potential for delivery of chemicals into water bodies.

Criteria: The CSP enhancement will apply general criteria from the Integrated Pest Management (595) conservation practice standard. Documentation of producer's records meeting all general IPM conservation practice standards is required. Participants must utilize at least one activity from each of the following techniques – 1) Prevention activities include cleaning equipment and gear when leaving an infested area, using pest-free seeds and transplants, and irrigation scheduling to

limit situations that are conducive to disease development; 2) Avoidance activities include maintaining healthy and diverse plant communities, using pest resistant varieties, crop rotation, and refuge management; 3) Monitoring activities include pest scouting, degree-day modeling, and weather forecasting to help target suppression strategies and avoid routine preventative treatments; and 4) Suppression activities include judicious use of cultural, mechanical, biological and chemical control methods that reduce or eliminate a pest population or its impacts while minimizing risks to non-target organisms. Additional criteria may be required by an NRCS State Office.

Additional Information: This CSP enhancement uses a combination of IPM techniques and other conservation practices to prevent or mitigate exposure of pesticides to pollinators and associated habitat.

14.55 CSP Enhancement E612133X1 (Adding food-producing trees and shrubs to existing plantings)
Description: Add food-producing trees and shrubs to existing agroforestry plantings within windbreaks, alley cropping, multi-story cropping, silvopasture systems, and/or riparian forest buffers.

Criteria: The CSP enhancement will apply general criteria from Tree/Shrub Establishment (612) conservation practice standard. Apply at least one of the following activities – 1) Add at least one edible, food producing row to existing linear plantings; 2) Add clusters of food-producing plants to existing plantings, so that food plants occupy at least 10% of the total area established in an agroforestry practice; or 3) Add food-producing plants to occupy idle areas of the operation, such as field corners adjacent to existing plantings. Plant a variety of tree, shrub and bramble species (3 or more, using native species whenever possible) with varying flowering times to favor pollinator species. Trees and shrubs will be planted on selected areas within any land use that contains an agroforestry installation. No plants on the Federal or state noxious weeds list, or plants known to be aggressive in the local area, shall be planted. Only viable, high-quality and adapted planting stock or seed should be used. Additional criteria may be required by an NRCS State Office.

Additional Information: This practice is applicable on any area of land where woody plants are suited. Tree/shrub plantings can include trees, shrubs, and vines especially chosen to provide pollen and nectar for pollinators. Each site should be evaluated if mulching, supplemental water or other treatments (e.g., tree protection devices) will be needed to assure adequate survival and growth.

14.56 CSP Enhancement E612136Z (Tree/shrub planting for wildlife food)
Description: Tree and shrub planting for wildlife food is used to enhance habitat for native wildlife.

Criteria: The CSP enhancement will apply general criteria from Tree/Shrub Establishment (612) conservation practice standard. Trees and shrubs should be selected for their importance in providing food for wildlife, and their adaptability to site conditions. A minimum of five species of trees and shrubs, with at least one tree species and one shrub species shall be used. Trees and shrubs will be planted on selected areas within any land use. Groupings of trees and shrubs will be designed for best growth, visual appeal, proximity to areas of wildlife use, or other locations depending on landowner objectives. No plants on the Federal or state noxious weeds list, or plants known to be aggressive in the local area, shall be planted. Only viable, high-quality and adapted planting stock or seed should be used. Additional criteria may be required by an NRCS State Office.

Additional Information: This practice is applicable on any area of land where woody plants are suited. Tree/shrub plantings can include trees, shrubs, and vines especially chosen to provide pollen and nectar for pollinators. Each site should be evaluated if mulching, supplemental water or other treatments (e.g., tree protection devices) will be needed to assure adequate survival and growth.

14.57 CSP Enhancement E612137Z (Tree/shrub planting for wildlife cover)
Description: Tree and shrub planting for wildlife cover is used to enhance habitat for native wildlife.

Criteria: The CSP enhancement will apply general criteria from Tree/Shrub Establishment (612) conservation practice standard. Trees and shrubs should be selected for their importance in providing cover for wildlife, and their adaptability to site conditions. A minimum of five species of trees and shrubs, with at least one tree species and one shrub species shall be used. Trees and shrubs will be planted on selected areas within any land use. Groupings of trees and shrubs will be designed for best growth, visual appeal, proximity to areas of wildlife use, or other locations depending on landowner objectives. No plants on the Federal or state noxious weeds list, or plants known to be aggressive in the local area, shall be planted. Only viable, high-quality and adapted planting stock or seed should be used. Additional criteria may be required by an NRCS State Office.

Additional Information: This practice is applicable on any area of land where woody plants are suited. Tree/shrub plantings can include trees, shrubs, and vines especially chosen to provide pollen and nectar for pollinators. Each site should be evaluated if mulching, supplemental water or other treatments (e.g., tree protection devices) will be needed to assure adequate survival and growth.

15.0 Appendix V – 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

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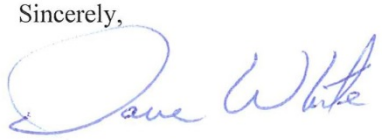
exempt through a biological opinion incidental take that is anticipated to occur to listed species from implementing conservation practices in the future. Confirmation that USFWS is willing to take this step, should any of the candidate species become listed, would provide important predictability as 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
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

Dear ~~Mr. White~~ Dave:

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

16. 0 Appendix VI – Scenarios

[1] Vermont
A typical Vermont project scenario would be addressing a variety of early successional wildlife species habitat (including pollinators), invasive plant control, forest stand improvement, and apple tree/hawthorn release. Generally, the customers we work within this scenario would be forest landowners.

Generally invasive plants are found on many parcels and can be found in old fields, orchards, hedgerows, wetlands, riparian areas and forest land. **Brush Management 314** is commonly used to control invasive shrubs such as barberry, bush honeysuckles, buckthorn, oriental bittersweet and multi-floral rose. Control is generally specified to be completed in the landowner's forest management plan prior to implementation of a timber harvest or conservation practice. Control is completed by certified pesticide applicator through foliar spot spraying of herbicide (aquatic safe in or around wetlands) with some cut stump treatments for larger woody stems generally in summer and fall. Some control is through mechanical or manual techniques such as pulling plants from the ground. Conservation measures would require not applying herbicide when target plants are in bloom.

Herbaceous Weed Treatment 315 is also used on old fields, orchards, hedgerows, wetlands and riparian areas but typically less commonly used than Brush Mgt. 314. Invasive plants typically targeted include garlic mustard, yellow iris, Phragmites, and Japanese knotweed. Reed canary grass is also treated on restoration sites (especially old agricultural land) to allow tree and shrub plantings to establish. Control is generally completed through foliar spot spraying of herbicide (aquatic safe in or around wetlands) with limited cut and drip applications. Some control is through mechanical or manual techniques such as pulling plants from the ground. Conservation measures would require not applying herbicide when target forbs are in bloom.

Forest Stand Improvement 666 is generally implemented in years following invasive plant control. Typical treatments involve thinning fully stocked pole sized northern hardwood and hardwood-mixedwood stands (Mean Stand Diameter 3-9"). Canopy cover is reduced generally increasing forb and shrub growth on forest floor. Valuable pollinator trees are often released (maple, cherry, birch, ash, basswood, shadbush, etc.) from competition. Release allows tree canopy to expand, increase growth rate and increase flowering/mast production. Tree tops and woody debris are retained on the forest floor. Conservation measures would require limited heavy equipment (reduce compaction), avoid growing season harvests that may damage understory forbs.

- Area wide thinning to the B line or higher on the applicable stocking guide. Regularly across the stand Unacceptable Growing Stock (UGS) is removed (cut or girdled) to release desirable trees from competition.

- Crop and Mast Tree Release focuses thinning on desirable trees irregularly found throughout the stand. Targeted crop/mast trees will receive a 2-4 sided crown release from competing trees by cutting/girdling. Canopy cover is reduced near crop trees.

- Forest Bird (Crop Tree-Canopy Gap, Group Selection, Irregular Shelterwood) treatment has a variety of potential thinning treatments with greater potential for understory development in the gap treatments.

Early Successional Habitat Management 647 is implemented across a variety of land cover settings to improve habitat for a variety of early successional habitat specialists including pollinators.

- Grassland/hayland includes lands dominated by grasses 50-75% that are regularly mowed/harvested. Forbs generally include planted legumes such as alfalfa, clover and birdsfoot trefoil but also other occurring species such as vetch, milkweed, dandelion, knapweed, etc. Generally, the primary activity is to delay mowing dates to avoid disturbing grassland nesting birds. This habitat requires frequent disturbance to maintain the grass/legume dominated vegetative community important to grassland wildlife. It is expected that bumblebees will not find high quality nest sites due to lack of thatch and frequent disturbance but should find quality floral resources. Typical treatment involves adjustment of mowing date from during the breeding season (late may-early July) to August. In some cases treatment may involve an early mowing in late May

followed by a delayed 2nd cut generally in early August. Hay is removed. Frequent disturbance is necessary to maintain grass dominated habitat. Conservation Measure – ensure suitable un-mowed open fields within 0.6 miles.

- Old Field-Shrublands includes a wide range in habitat and cover. Old fields generally will have less grass and more forbs than mowed haylands due to low intensity of management. Depending upon time of last management or abandonment, woody species may be a small component of the field (5%) or a dominant cover. Old fields with a good assortment of forbs early flowering shrubs (e.g. shadbush, cherry and willow) and matted grass/thatch will provide both feeding and nesting habitat for bees. Treatment is generally focused on delayed (after August 1) rotational mowing of multiple fields (over different years) or mosaic mowing that will leave undisturbed portions of the field to develop woody cover and provide undisturbed grass/forbs as well. These treatments are sometimes followed by Brush Mgt. 314 to treat and reduce the amount of invasive exotic shrubs. Conservation Measure – brush hogging will only be implemented on half the old field to be managed in any given year. In some cases, to maintain the desired vegetation, mid-season mowing may be needed (e.g. to encourage milkweed but will only occur on a portion of the management area.

- Young Forest includes areas dominated by usually 0-15-year-old seedlings and saplings. They may be first growth forests from abandoned agricultural lands or result of timber harvests. These areas can have 10,000 or more stems per acre. In Vermont, areas targeted for management are degraded or low quality hardwood or mixedwood forests. They may also be old abandoned fields or orchards that have been overtopped with trees. Areas with cherry, birch, alder and aspen are most desirable. Treatment involves primarily cutting or grinding trees with some girdling to remove most overstory trees to encourage young thick woody cover. At least four snags and large woody material as well as wildlife trees (cavities, nest trees, etc.) are maintained on site. Conservation Measure – cutting/grinding will be implemented between November 1 and April 1.

[2] Maine

NRCS works with blueberry producers to address air quality impacts, soil and water quality degradation, and inadequate fish and wildlife habitat. Provided below is a list of EQIP practices that are used to address these resource concerns:

Air quality impacts –

Pruning lowbush blueberries every two years increases crop production. Blueberry producers in Maine have traditionally used burning methods with oil burners to prune blueberry crops. However, burning lowbush blueberry crops results in poor air quality. To address air quality impacts, NRCS recommends the Tree/Shrub Pruning (660) practice. In Maine, this practice is used in conjunction with Obstruction Removal (500) which involves removing large boulders in blueberry fields. The process of removing large boulders requires the use of a hydraulic excavator. The excavator carefully removes any boulders that are exposed 2 inches above the soil that would prevent a flail mower from pruning blueberry crops. If very large boulders are not practical to remove, they are left in place. After removing the boulders, uprooted blueberry crops are laid down over the boulder cavity. Mulch or surrounding soil may be used to fill in a boulder cavity to allow pruning activities to occur. After the boulders have been removed from a blueberry field, boulders are stockpiled along the edge of blueberry fields or utilized offsite for other projects. Small rocks are also removed by hand and stockpiled along the edge of blueberry fields. Next, the Tree/Shrub Pruning practice is completed prior to the non-bearing season, either in the fall (after the first killing frost) or early spring before plants break dormancy. A flail mower is used to mow blueberry crops to a height of approximately 2 inches. The crop residue is left in place to provide organic matter to the soil. The average blueberry field is approximately 10 acres in size.

It is reasonable to assume that the target bumblebees may use natural holes and cavities surrounding boulders or small mammal burrows in blueberry fields as nesting and overwintering habitat. When large excavators are used, nests and overwintering sites may be damaged or destroyed. The use of heavy machinery may also compact soils preventing temporary use of blueberry fields as nesting and overwintering sites.

Flail mowing activities may also impact the target species. Although flail mowing activities occur during the inactive season for the target species, blueberry crops that provide pollen and nectar resources to blueberries are removed after mowing activities. The loss of floral resources may reduce the nutritional needs of the target species and require a greater energy expenditure to search for other floral resources.

To protect the target bumblebees and their associated habitat, NRCS will provide blueberry producers voluntary management guidance as described in the Conservation Management Guidelines for the Rusty Patched Bumblebee (*Bumbus affins*). The voluntary guidance may involve establishing nectar and pollen resources using existing EQIP practices (e.g. 327, 386, 422, and 612), avoid compacting and disturbing 20% of the blueberry producer's land, treating noxious weeds, and maintaining wooded areas to enhance overwintering habitat.

Soil and Water Quality Degradation –

Mulching (484) is used to control erosion, to reduce insect and weed pressure, conserve soil moisture, reduce soil temperature, improve soil health and help establish blueberry plants. Frequently mulching is used after large boulders have been removed from blueberry fields, resulting in exposed soil. In other circumstances mulch is applied to encourage the growth of the blueberry rhizomes. Mulching materials are typically organic materials such as bark mulch, peat moss mixed with sand, wood chips, cedar shingle hair or other suitable materials. Bare areas are mulched at a minimum thickness of two inches. If not by hand, a rake may be used spread mulching material. For areas 100 square feet or larger, the thickness of the mulch is a minimum of 3 to 4 inches. This will encourage blueberry plants to encroach these areas. The mulching practice is maintained for a period of one year. Additional mulch is added as needed.

It is anticipated that the mulching practice will benefit the target species. The mulch will improve soil health, reduce weed pressure, and control any erosion from rock removal activities. Any potential nesting and overwintering areas will be enhanced by the use of mulch. Additionally, mulch will increase crop production resulting in additional floral resources for the target species.

Integrated Pest Management (IPM) (595) addresses soil and water quality degradation by preventing or minimizing off-site pesticide risks. The IPM system is also used to avoid and minimize pesticide exposure to pollinators. In blueberry fields agricultural producers may use both cultural control and chemical control options to treat weeds, disease, and insect pests. Cultural control methods involve the repeated use of mowers or hand tools to control weeds, burning techniques to reduce insect pests, and cleaning equipment (mowers, winnowers, boxes) before moving to another field. Chemical pesticides are applied using ground operating equipment or occasionally by aerial application. Equipment used for chemical control practices are Spray-Coupe style sprayers with wide overhead booms, shorter tractor mounted spray arms, ATV mounted sprayers, and backpack sprayers. To assist blueberry producers with chemical control activities the University of Maine Cooperative Extension provides Insect, disease, and weed control guides. These guides list the pests or problems, pesticides, rate/acre of pesticides, and notes on applying pesticides. The pesticides listed have low, medium, and high bee toxicity. The pesticides listed also have different residual life spans. In general, insecticides have the greatest impact on pollinators. Herbicides can reduce floral resources, but their direct toxicity to bees is thought to be low. Provided below is a table from the University of Maine Cooperative Extension that ranks bee susceptibility to many of the most common pesticides used on Maine blueberries.

Table 1. Ranking of bee susceptibility to common fungicides, herbicides, and insecticides*.

FUNGICIDE	RANK	HERBICIDE	RANK	INSECTICIDE	RANK
Bravo, chlorathalonil	N	2,4,-D	N	Asana (XLR), esfenvalerate	H (M)
Captan	N	Diuron, Karmex	N	Guthion, Sniper, azinphos-methyl	H
Orbit,propiconazole	N	Fusilade DX, fluazifop-P butyl	L	Bt formulations	N
		Poast, sexthoxydim	N	Botanigard or Mycotrol, Beauveria bassiana	N-L
		Roundup, glyphosate	N	Confirm, tebufenozide	N-L
		Sulfosate	N	Cythion, malthion	H
		Terbacil, Sinbar	N	Imidan, phosmet	H
		Velpar, Pronone hexazinone	N	malathion (ULV)	M (H)
				Sevin (XLR), carbaryl	H (M)
				Spintor, spinosad	M (L)

*Key:
H = highly toxic…should only be applied to plants NOT in bloom
M = moderately toxic…only applied in evening when bees have stopped foraging
L = low toxicity…only applied in evening to early morning before bees forage
N = none to minor levels of toxicity

To address degradation to soil and water quality, direct toxicity to target species, and detrimental effects to foraging, nesting and overwintering habitat NRCS will follow Agronomy Technical Note No. 5, Agronomy Technical Note No. 9, and guidance provided by the University of Maine Cooperative Extension. These resources will provide tools for developing a conservation plan and assist in identifying ways to avoid and minimize impacts to the target species. NRCS will also provide blueberry producers voluntary management guidance as described in the Conservation Management Guidelines for the Rusty Patched Bumblebee (*Bumbus affins*).

Inadequate Fish and Wildlife Habitat –

Surrounding landscapes around blueberry fields may lack the floral resources to support healthy pollinators. To address the lack of pollen and nectar resources within and adjacent to blueberry crops NRCS recommends the following EQIP practices:

Conservation Cover (327)

Field Border (386)

Hedgerow Planting (422)

Tree/Shrub Establishment (612)

Early Successional Habitat Development/Management (647)

All of these practices except for Early Successional Habitat Development/Management involve the establishment of floral resources by individual plants or by seed. For establishing floral resources by seed (i.e. 327 and 386) blueberry producers follow steps-by-step procedures to remove competing vegetation and noxious weeds. After competing vegetation is removed, blueberry producers broadcast native seed. Provided below is a table showing the steps that are commonly used to prep a site prior to seeding. Instructions on broadcast seeding is also provided below.

General site preparation guidelines for EQIP practices 327 and 386.

Step	When	Description
Step 1: Soil Test	As soon as possible	Check pH and fertility. Follow soil test recommendations to achieve pH of 5.5-6.0. Typically 2,000 lbs of lime per acre to raise pH one digit.
Step 2: Mow down or scape existing vegetation and debris	Fall or spring	Use tractor to scrape soil, remove plant material, rocks, and logs, to create a more even seed bed.
Step 3: Herbicide	Spring to Fall	Repeat applications of a non-selective, non-persistent herbicide. Re-apply each time weeds re-appear (about once/month). Do not use herbicides with pre-emergent components. Use herbicide with low residuals, and ensure that seeding date is well beyond residual of the last application.
Step 4: Remove thatch	Fall	Use rake or similar tractor implement to remove dead plant material from plot. Do not disturb the soil.
Step 5: Seeding	October/November (after first hard frost)	Broadcast wildflower mix. See additional information below.
Step 6: Rolling	Same day as Step 5 above	Roll site the same day it was seeded. Use a weighted lawn roller or cultipacker. Roll over entire seeded area to press seed into the soil.
Step 7: Grass selective herbicide	Next Spring and/or Summer	As necessary, use grass selective herbicide to kill grasses without killing wildflowers.
Step 8: Annual maintenance	Annually in October/November	Mow or brush hog 1/3 of conservation cover area each year for as long as the planting persists.

Broadcast Seeding Instructions:

Seed must meet certification standards for purity, germination, weed seed, and noxious weed seed.

1. Following the first hard frost in the fall (typically October/November), when the field is workable, lightly harrow or rake any plant residue from soil surface to create a clean, smooth seedbed (do not till at this point). If no plant residue is on the surface, this step is not necessary.
2. Combine wildflower seed with an inert carrier (e.g., play sand, cracked corn, kitty litter) to ensure even flow and distribution. Wildflower seed should be combined with the carrier at about 1-part wildflower seed to 6 or more parts carrier by volume.
3. Divide seed into small amounts, fill seeder with flow gate closed, adjust opening as needed.
4. Broadcast seed in several passes in different directions.
5. Ensure seed-soil contact by rolling seed with a cultipacker or turf roller after seeding. Good seed-soil contact is essential for germination.
6. As necessary, use grass selective herbicide to control weedy grasses until wildflowers establish.

Hedgerow Planting and Tree/Shrub Establishment generally do not require the extensive site preparation. However, mechanical control of noxious weeds may occur with the use of a tractor or mower. Similarly, blueberry producers may

use herbicides prior to planting to control weeds. Once plants are established (plug or potted plant) mulch in the form of straw, hay, or woodchips may be used to suppress weeds and conserve soil moisture. Tree shelter tubes may also be used to protect shrubs or seedling transplants from deer browse. Most of this work involves the use of hand tools such as shovels and rakes. The areas planned for these practices is generally along the edges of blueberry fields, but not within blueberry fields.

Early Successional Habitat Development/Management is recommended when forest management activities can be used to increase existing floral resources that are suppressed by forested habitat. A Forest Management Plant (106) must be written by a TSP or someone equivalent to a TSP prior to implementing Early Successional Habitat Development/Management. Heavy equipment that is used may include a brush hog, flail shredder, hydro axe, skid steer loaders, hydraulic excavators, mulchers, and timber mats. When implemented, forested habitat is cleared and allowed to regenerate to early successional habitat. Areas planned for Early Successional Habitat Development/Management are adjacent to existing blueberry fields. The typical size is generally < 5 acres in size. Forestry activities typically occur during the inactive season.

The NRCS practices used to address inadequate fish and wildlife habitat may result in temporary impacts to the target species and their associated habitats. Implementing site preparation activities to establish floral resources in these areas may damage or destroy these sensitive resources and compact soils. Forestry activities may also remove spring ephemeral flowers that are important to the target species early in the active season. To protect the target species and their associated habitat, NRCS will provide blueberry producers voluntary management guidance as described in the Conservation Management Guidelines for the Rusty Patched Bumblebee (*Bumbus affins*). Also, the practices will provide an overall benefit to the target species by establishing long-lasting native perennial floral resource.

17.0 Appendix VII – Addressing Species Other than the Covered Species

Other species that occur within the Action Area are presented below (Table 12).

Table 11. ESA Protected Species in the Action Area

For additional guidance contact local USFWS Field Office: https://www.fws.gov/northeast/offices.html

Common Name	Scientific Name	Federal Status	Has Critical Habitat been Designated in the Action Area?	States with Known Occurrences	Species Distribution and Habitat
Canada Lynx	*Lynx canadensis*	Threatened	Yes in ME No in NH or VT	ME, NH,VT	Distributed throughout northern ME. Occurrences in NH and VT. Primary habitat is young, dense stands of spruce and fir trees.
Indiana Bat	*Myotis sodalis*	Endangered	No	CT,VT	Species range in southern CT and western VT. Hibernate primarily in caves. Maternity sites generally in tree cavities. Foraging habitat includes riparian areas, upland forest, and fields.
Northern Long-eared Bat	*Myotis septentrionalis*	Threatened with 4(d) rule	No	CT, MA, ME, NH, RI, VT	Species range throughout New England. Hibernate primarily in caves. Generally associated with late-successional forests and forest edges for breeding, roosting, and foraging.

Piping Plover	*Charadrius melodus*	Threatened	No	CT, MA, ME, NH, RI	Distributed along coasts of New England. Habitat includes sandy upper beaches or sandflats with scattered grass tufts and sparse vegetation.
Red Knot	*Calidris canutus* var. *rufa*	Threatened	No	CT, MA, ME, NH, RI	Distributed along coasts of New England during migration. Migration habitat typically includes muddy/sandy coastal areas such as mouth of bays and tidal flats.
Roseate Tern	*Sterna dougallii* var, *dougallii*	Endangered	No	CT, MA, ME, NH, RI	Distributed along coasts on islands of New England. Breeds along the Atlantic coast and prefers tidal flats and/or sand dune habitats.
Bog Turtle	*Clemmys muhlenbergii*	Threatened	No	CT, MA	Found in western MA and CT. Preferred habitat is wet, shallow, muck-bottomed bogs, marshy tussock meadows, spring seeps, cow pastures, and shrub swamps.
Massachusetts Northern Red-bellied Cooter (formerly Plymouth Redbelly Turtle)	*Pseudemys rubriventris*	Endangered	Yes	MA	Narrowly distributed in southeastern MA. MA population found only in ponds and within 100 yards of ponds. Prefers soft-bottom with plentiful aquatic vegetation.

Atlantic Salmon (Gulf of Maine DPS)	*Salmo salar*	Endangered	Yes	ME	Habitat throughout two-thirds of Maine. Habitat is rocky-run and pools of small to large rivers. Spawn in gravelly streams and rear in rocky streams with holding pools.
Shortnose Sturgeon	*Acipenser brevirostrum*	NOAA - Endangered	No	CT, ME	Distributed off coast and in coastal rivers of ME and CT. Inhabit rivers and estuaries medium to large in size. Prefer deep pools with soft substrates and vegetated bottoms.
Dwarf Wedge Mussel	*Alasmidonta heterodon*	Endangered	No	CT, MA, NH, VT	Found in river systems in central MA, CT and along VT/NH border. Lives in freshwater systems of medium to high current on muddy sand, sand, or gravel bottom streams.
Puritan Tiger Beetle	*Cicindela puritana*	Threatened	No	CT	Distributed along two short stretches of Connecticut River. Found on upper portions of sandy beaches or sandy/clay cliffs with little vegetation.
Northeastern Beach Tiger Beetle	*Cicindela dorsalis* var. *dorsalis*	Threatened	No	MA	Distributed to two eastern MA beaches. Found on long, wide sandy beaches with little anthropogenic disturbance. Prefer medium coarse sand with low organics.

Karner Blue Butterfly	*Lycaeides melissa* var. *samuelis*	Endangered	No	NH	Historical range of MA and NH, but more recently concentrated in limited areas around Concord, NH. Habitat is patchwork of scrub oak and pine scattered among open grassland. Dependent on wild lupine as host plant.
American Burying Beetle	*Nicrophorus americanus*	Endangered	No	RI, MA	Limited distribution in southern RI, Block Island, RI and on Nantucket Island, MA. Broad vegetation tolerances, from fields to mature forests.
Eastern Prairie Fringed Orchid	*Platanthera leucophaea*	Threatened	No	ME	Found in one location in northern ME. Found in variety of habitats from mesic prairies to wetlands such as salt meadows, marsh edges, and bogs. Requires full sun and limited woody encroachment.
Furbish Lousewort	*Pedicularis furbishiae*	Endangered	No	ME	Distributed along St. John River in northern ME. Habitat is riverbanks between open river cobble and boreal forest. Requires ice scour for seasonal plant growth.
Jesup's Milk-vetch	*Astragalus robbinsii* var. *jesupi*	Endangered	No	NH, VT	Limited distribution in three locations in NH/VT along Connecticut River. Grows in rocky crevices after flooding and ice have receded from river banks.

Northeastern Bulrush	*Scripus ancistrochaetus*	Endangered	No	MA, NH, VT	Limited distribution in northern MA, and along the southern border of NH/VT. Found in open, tall, herb-dominated wetlands. Often grows near water's edge.
Sandplain Gerardia	*Agalinis acuta*	Endangered	No	CT, MA, RI	One small population found in each CT, MA, RI. Found in dry, sandy, short-grass plains, roadsides, and openings in oak scrub. Dependent on periodic disturbances for open habitat.
Small Whorled Pogonia	*Isotria medeoloides*	Threatened	No	CT, MA, ME, NH, RI	Scattered populations throughout Northeast. Acidic soils of dry to mesic second-growth, deciduous or deciduous-coniferous forests. Soils typically covered with light to moderate leaf litter.

As the Proposed Action and associated ESA regulatory determinations only apply to the covered species, NRCS will use the internal planning and regulatory compliance processes outlined in Appendix II to conduct its required responsibilities under the ESA. In several instances noted herein, NRCS and USFWS have created supplemental and complementary section 7 consultation documents to guide the determination of effects in those situations where an occurrence of these other species is found co-extant with actions proposed for the covered species. Further, USFWS has provided guidance in this section to NRCS to further clarity the role of the supplemental/ complementary section 7 consultation documents for each of the affected species. Where guidance is not presented herein, the NRCS will consult with the USFWS on establishing potential adverse effects and the necessity of an incidental take statement on a project-by-project basis.

17.1 Atlantic Salmon

Conservation practices to benefit pollinator species that occur within the Gulf of Maine Distinct Population Segment (GOMDPS) of Atlantic salmon may affect this federally-listed species or designated as "critical habitat." Most pollinator practices to benefit bumblebees and monarch butterflies will occur in upland settings and are not likely to adversely affect salmon or their critical habitat. Adverse effects could occur if the activities are located adjacent to a stream or pond that is salmon habitat. For example, some pollinator projects may require stream crossing or work in the riparian zone that may affect salmon in adjacent streams, rivers, or coastal areas.

The Atlantic salmon GOMDPS only occurs within the state of Maine. The NRCS in Maine developed a practice effects matrix in consultation with the USFWS titled *NRCS Conservation Practice Effect Determinations for the Federally Endangered Atlantic Salmon (Salmo salar) and Designated Critical Habitat*. The matrix involves a table of NRCS conservation practices with potential effects determinations for each.

NRCS District Conservationists and Planners will use the table as a guide to help make an objective and defensible effects determination for all pollinator projects. The table is based on the application of conservation practices under common planning scenarios encountered in Maine. NRCS planners will use this table and their knowledge of the "action area" and pollinator practices to make decisions regarding "effects of an action" on protected species and habitats. In rare instances, NRCS pollinator practices may have short-term insignificant or discountable effects ("direct" or "indirect") when the practice is installed. In many instances adverse effects, especially take of salmon or destruction of critical habitat, may be avoided. In rare instances, cases, adverse effects may not be avoidable, and formal consultation may be needed. For example, crossings of streams with Atlantic salmon or containing salmon critical habitat may be needed to implement some pollinator projects. Formal consultation may be needed in these circumstances, particularly if salmon are present in the stream. An existing programmatic biological opinion with the NRCS guides these formal consultations.

At least one of the following 16 core EQIP practices must be included in every pollinator contract Conservation Cover 327, Tree/Shrub Establishment 612, Early Successional Habitat Development/Management 647, Hedgerow Planting 422, Field Border 386, Brush Management 314, Hebaceous Weed Treatment 315, Upland Wildlife Habitat Management 345, Pollinator Habitat Enhancement Plan 146, Wetland Restoration 657, Riparian Forest Buffer 391, , Integrated Pest Management Plan 114, Fish and Wildlife Habitat Plan 142 or Wildlife Habitat Planting 420,. The Atlantic salmon effects matrix indicates that some of these practices will have no effect on this species (Table below), but NRCS will consult with the USFWS on projects that may affect salmon or their critical habitat.

Practice name and code	Practice effects designation for salmon and sturgeon
Conservation Cover 327	No effect
Tree/Shrub Establishment 612	Will not affect Atlantic salmon, sturgeon, or designated critical habitat when natural regeneration is used to establish woody cover, and when expanding the width of an existing riparian buffer, or interplanting by hand within an existing riparian buffer. Practice is NLAA Atlantic salmon or sturgeon or designated critical habitat when planned for existing "cropland", "hayland", "pastureland", "forestland" and additional conservation measures are implemented (refer to NRCS effects determination document)
Early Successional Habitat Development/Management 647	Practice is NLAA Atlantic salmon or sturgeon or designated critical habitat when planned for existing "cropland", "hayland", "pastureland", "forestland" and additional conservation measures are implemented (refer to NRCS effects determination document)
Hedgerow Planting 422	No effect
Field Border 386	No effect
Brush Management 314	Practice is NLAA Atlantic salmon or sturgeon or designated critical habitat when planned for existing "cropland", "hayland", "pastureland", "forestland", and additional conservation measures are implemented (refer to NRCS effects determination document). Practice is NLAA A for salmon, sturgeon, and critical habitat when pesticides are used and the WINPST Pesticides data report indicates a low or very low toxicity rating for fish. Note: Initiate consultation with the appropriate agency (either USFWS or NMFS) when a chemical's rating for fish toxicity is intermediate, high or very high.
Herbaceous Weed Treatment 315	Practice is NLAA Atlantic salmon or sturgeon or designated critical habitat when planned for existing "cropland", "hayland", "pastureland", "forestland", and additional conservation measures are implemented (refer to NRCS effects determination document). Practice is NLAA for A. salmon, sturgeon, and critical habitat when pesticides are used and the WINPST Pesticides data report indicates a low or very low toxicity rating for fish. Note: Initiate consultation with the appropriate agency (either USFWS or NMFS) when a chemical's rating for fish toxicity is intermediate, high or very high.

Upland Wildlife Habitat Management 345	This practice will not affect A. salmon, sturgeon, or designated critical habitat when nest boxes and perches, brush piles, snag trees are established, and un-harvested grain on cropland is left standing. Practice is NLAA Atlantic salmon or sturgeon or designated critical habitat when planned for existing "cropland", "hayland", "pastureland", "forestland", and additional conservation measures are implemented (refer to NRCS effects determination document).
Pollinator Habitat Enhancement Plan 146	**Not covered in the Maine NRCS effects matrix**
Wetland Restoration 657	Practice is NLAA Atlantic salmon or sturgeon or designated critical habitat when planned for existing "cropland", "hayland", "pastureland", "forestland" and additional conservation measures are implemented (refer to NRCS effects determination document). Practice is NLAA salmon, sturgeon, and critical habitat only if: 1) in all cases the wetland is not connected to a perennial salmon stream or connected pond or lake, 2) site specific hydrology and watershed hydrological processes are being restored, or 3) wetland enhancement or management does not impound more water, in existing man-made or natural wetlands, than existed prior to listing of the species or critical habitat under the ESA. **If required conservation measures cannot be implemented contact the USFWS or NMFS, as appropriate, to determine if informal or formal ESA section 7 consultation is needed for the project.**
Riparian Forest Buffer 391	Will not affect Atlantic salmon, sturgeon, or designated critical habitat when natural regeneration is used to establish woody cover, and when expanding the width of an existing riparian buffer, or interplanting by hand within an existing riparian buffer. Practice is NLAA Atlantic salmon or sturgeon or designated critical habitat when planned for existing "cropland", "hayland", "pastureland", "forestland" and additional conservation measures are implemented (refer to NRCS effects determination document)
Wildlife Habitat Planting 420	**Not covered in the Maine NRCS effects matrix**
Integrated Pest Management Plan 114	**Not covered in the Maine NRCS effects matrix**
Integrated Pest Management 595	**No effect**
Integrated Pest Management 596	**Not covered in the Maine NRCS effects matrix**
Fish and Wildlife Habitat Plan 142	**Not covered in the Maine NRCS effects matrix**

Five core practices, Wildlife Habitat Planting 420, Pollinator Habitat Enhancement Plan 146, Integrated Pest Management (595 and 596), and Fish and Wildlife Habitat Plan (142) are not addressed in the *NRCS Conservation Practice Effect Determinations for the Federally Endangered Atlantic Salmon (Salmo salar) and Designated Critical Habitat*. They will likely be incorporated in future revisions to this document. NRCS will review pollinator projects and consult with the USFWS and/or NMFS if they determine any of these practices may affect listed species.

In addition, pollinator projects may incorporate 13 secondary and 4 auxiliary practices (Table 3) (but will always include one of the aforementioned core practices). Most of these practices have no effect on Atlantic salmon, but some may affect Atlantic salmon and sturgeon or have an adverse effect depending on where the project is located, whether salmon are present, how they are implemented, and the conservation measures used. These secondary practices are Forestry Management Plan 106, Filter Strip 393, Windbreak/ shelterbelt Establishment 380, Conservation Crops Rotation 328, Contour Buffer Strips 332, Cover Crops 340, Residue and Tillage Management 329, Wetland Enhancement 659, Conservation Plan Supporting Organic Transition 138, Stream Habitat Improvement and Management 395, Forest Stand Improvement 666, Prescribed Grazing (528) and Restoration of Rare or Declining Natural Communities 643. Auxiliary practices commonly used with the aforementioned practices include Obstruction Removal 500, Tree/Shrub Site Preparation 490, Mulching 484, Access Road 560, Forest Trails and Walkways 655, and Tree/shrub Pruning 660. Several of these practices are not addressed in the NRCS matrix for Atlantic salmon. Some of these practices have no effect on Atlantic salmon and their critical habitat whereas others may affect Atlantic salmon and their critical habitat. The NRCS will consult with the USFWS and NMFS if they determine any of the aforementioned secondary and auxiliary practices may affect listed species.

Finally, pollinator projects may incorporate any of 21 CSP Enhancements (Table 2). These practices expand on or enhance any of the aforementioned practices and will always be used in combination with core, secondary, or auxiliary practices mentioned above. Effects of the CSP Enhancements are not evaluated in the *NRCS Conservation Practice Effect Determinations for the Federally Endangered Atlantic Salmon (Salmo salar) and Designated Critical Habitat*. NRCS will review pollinator projects and consult with the USFWS if they determine any of these 21 practices may affect Atlantic salmon or their critical habitat. For example, CSP practice E315132Z enhances or allows additional activities under Core Practice Herbaceous Weed Treatment 315 for herbaceous weed controls for desired plant communities/habitats. Herbaceous Weed Treatment 315 is a core practice that may affect Atlantic salmon. The *NRCS Conservation Practice Effect Determinations for the Federally Endangered Atlantic Salmon (Salmo salar) and Designated Critical Habitat* provides guidance for how NRCS and the USFWS will consult on this practice.

In summary, most pollinator practices will occur in upland settings and are not expected to affect Atlantic salmon or their critical habitat unless they are located adjacent to a stream or pond. The NRCS, and USFWS have programmatic agreements in place to complete section 7 consultation for Atlantic salmon and their critical habitat under the Endangered Species Act. These processes identify practices that may affect Atlantic salmon and their critical habitat and implements conservation measures to avoid and minimize effects. Federal agencies will collaborate and implement conservation measures to minimize adverse effects to Atlantic salmon and their critical habitat.

17.2 Northern Long-eared Bats

NRCS has a national policy directive[50] for guiding state NRCS offices on compliance with the USFWS' northern long-eared bat 4(d) rule. It follows the implemendation guidance of the USFWS[51].

17.3 Other species

Many of the practices implemented through the Proposed Action will have little or no effect on the remaining species – some practices may infact provide benefits. Some of the species with overlapping ranges do not occur in the same habitats used by the covered species, and, therefore, there is no effect on these species (Table 11 above).

Further consultation may be needed with the local USFWS field office in counties where a specific project site may have occurences of currently protected species. In most cases, the USFWS will be able to provide NRCS and the landowner with site-specific recommendations that will ensure the activities are not likely to adversely affect those species.

[50] https://directives.sc.egov.usda.gov/viewerFS.aspx?hid=39211

[51] http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/FRnlebFinal4dRule14Jan2016.pdf.

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