

Monarch Conservation Database Web Application User Guide MCD Version 1.3 04/02/2020

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Introduction

Thank you for your interest in the Monarch Conservation Database, or MCD for short. The purpose of the MCD is to help inform the decision whether or not to list the monarch butterfly (*Danaus plexippus*) as threatened or endangered under the Endangered Species Act of 1973, as amended (ESA). More specifically, the MCD will serve as a data repository for information regarding completed (since 2014), ongoing, and planned conservation plans and efforts implemented to benefit monarch butterflies. We will collect this information through the secure MCD web application and add completed and implemented conservation efforts to a baseline amount of habitat established for the year 2014 to calculate the current amount habitat (Thogmartin et al., 2017). We will also assess conservation efforts that have not yet been implemented for sufficient certainty of implementation and use the data to project future habitat. All information provided to the MCD is on a voluntary basis.

The MCD Web Application User Guide walks database users through the process of registering for access to and creating and completing plan and effort data records in the web application. The appendices provide additional resources for web application users, including key database definitions. We will update this user guide as necessary to stay current with the latest version of the MCD.

Background

In August of 2014, the U.S. Fish and Wildlife Service (Service) received a petition to list the monarch butterfly as a federally threatened species with a 4(d) rule. Following the requirements of the ESA, the Service then made an initial 90-day finding that the petition is substantial, meaning that it contains enough information for us to determine that a 12-month status review is appropriate. The positive 90-day finding was published in the Federal Register on December 31, 2014, and initiated a thorough review of the current status of the species. Due to a court ordered settlement agreement and subsequent extension, we will complete our status review on the monarch butterfly in December 2020. The Service is using the Species Status Assessment (SSA) framework to evaluate the current and potential future condition of the species, which will help decision makers determine if monarchs should be protected under the ESA. We will factor information collected through the MCD web application regarding conservation efforts that have been completed or implemented since 2014 into our estimate of the species' current habitat. Information about planned conservation efforts are considered future and we will use those data to project future habitat and inform future scenarios developed through the SSA. The Policy for Evaluating Conservation Efforts (PECE Policy) defines the criteria we will use to determine which future conservation efforts we can include in our projection for future habitat and the evaluation of SSA future scenarios.

Getting Started

Register and request user name and passcode

The first step in being able to provide information about your conservation plans and efforts is to register for access to the MCD web application by sending an email to FW3_monarchconservation@fws.gov and providing your:

1. First and last name
2. Organization (or indicate that you are a private individual)
3. Email address
4. Phone number (which is optional – this just gives us another way to contact you), and

Before providing us with any of your information, you may prefer to read through the disclaimers that describe how we use your information and your privacy rights. The disclaimers are available on the MCD webpage (<https://www.fws.gov/savethemonarch/mcd.html>). Once you have been approved, you will get an email from the Fish and Wildlife Service’s Environmental Conservation Online System (ECOS) Helpdesk with:

1. A link to login to the ECOS public website, and
2. A password

You can complete the registration process by:

1. Logging in to ECOS
2. Officially acknowledging that you have read and understood the disclaimers, and
3. Accessing your profile to change your password.

After you have successfully completed your registration, look for the MCD web application on the ECOS homepage.

What Can You Do as a Registered Web Application User

Data Editor Capabilities

Your default role as a registered MCD web application user is Data Editor. As a Data Editor, you can:

- Create conservation plan database records and conservation effort database records using the single record editor or the batch upload feature¹
- Invite other users to edit the details of plan records they are the owner of (i.e. records that they have created) by assigning them as editors
- Invite other users to edit the details of effort records they are the owner of by assigning them as editors

¹ For simplicity, conservation plan database records are referred to as “plan records,” and conservation effort database records are referred to as “effort records” from this point forward in the document

- Invite other users to view the details of effort records they are the owner of by selecting their organization as a collaborator
- Assign Data Coordinators to approve an effort they are the owner of
- Query among all plan records in the database
- Query among any effort record they are the owner of, or for which they have been identified as an editor, collaborator, or Data Coordinator

Data Coordinator Capabilities

In addition to allowing other registered users to view and/or edit the details of your plan and effort records by identifying them as collaborators or assigning them as editors, you may also assign other registered users as Data Coordinators. The purpose of a Data Coordinator is to “finalize” or approve effort records for which they have been identified as a Data Coordinator by conducting quality assurance and quality control (QA/QC) checks. These checks include, but are not limited to:

- Ensuring that all information provided is accurate
- Ensuring that all required fields are populated
- Ensuring that all optional fields are populated to the best of the user’s ability and knowledge
- Ensuring that all business rule violations are addressed (i.e. that data in a record does not contradict or is somehow in conflict with other information in the same record)
- Ensuring that an effort record is not duplicative

Approval of an effort record by a Data Coordinator is not required at this time; FWS data analysts will use Data Coordinator approval information as an indication of whether or not an effort record has gone through some level of QA/QC.

Ultimately, the expectation is that web application users who are a part of a group or organization will be able to coordinate internally and across other groups and organizations to designate Data Coordinators that can approve effort records such that all effort records in the database are QA/QC’d. Should Data Coordinator approval of effort records become a requirement, users who are private individuals (i.e. do not belong to a group or organization) will have a FWS biologist as their default Data Coordinator. Database users will be notified well in advance if and when Data Coordinator approval is required for completion of effort records.

If you would like to utilize the Data Coordinator feature now, please be sure to coordinate with database users you would like to designate as your Data Coordinator to make sure that they register as a Data Coordinator and they know to finalize your effort records.

Monarch Conservation Database Pages

Homepage

The MCD Homepage (Figure 1) is the first page users will see and provides a brief overview of the purpose of the Monarch Conservation Database. From the Homepage, users can:

- Access the Plans and Conservation Efforts Grid Pages to edit their conservation plans and efforts by clicking on the “Edit my Conservation Plans and Efforts Button”
- Find additional information on the Monarch Conservation Database and Species Status Assessment by clicking on the links at the bottom of the page
- Use the Resources Pane on the right hand side of the screen to:
 - Find and download a user guide and other reference materials, including:
 - The Required Fields Work Flow Document
 - The MCD Quick Reference document
 - Frequently Asked Questions
 - A simplified data model
 - Bulk Upload Templates
 - Introductory and tutorials webinars
 - Contact the Help Desk
 - Query MCD records by clicking on “Effort Report”, “Site Report”, or “Plan Report”

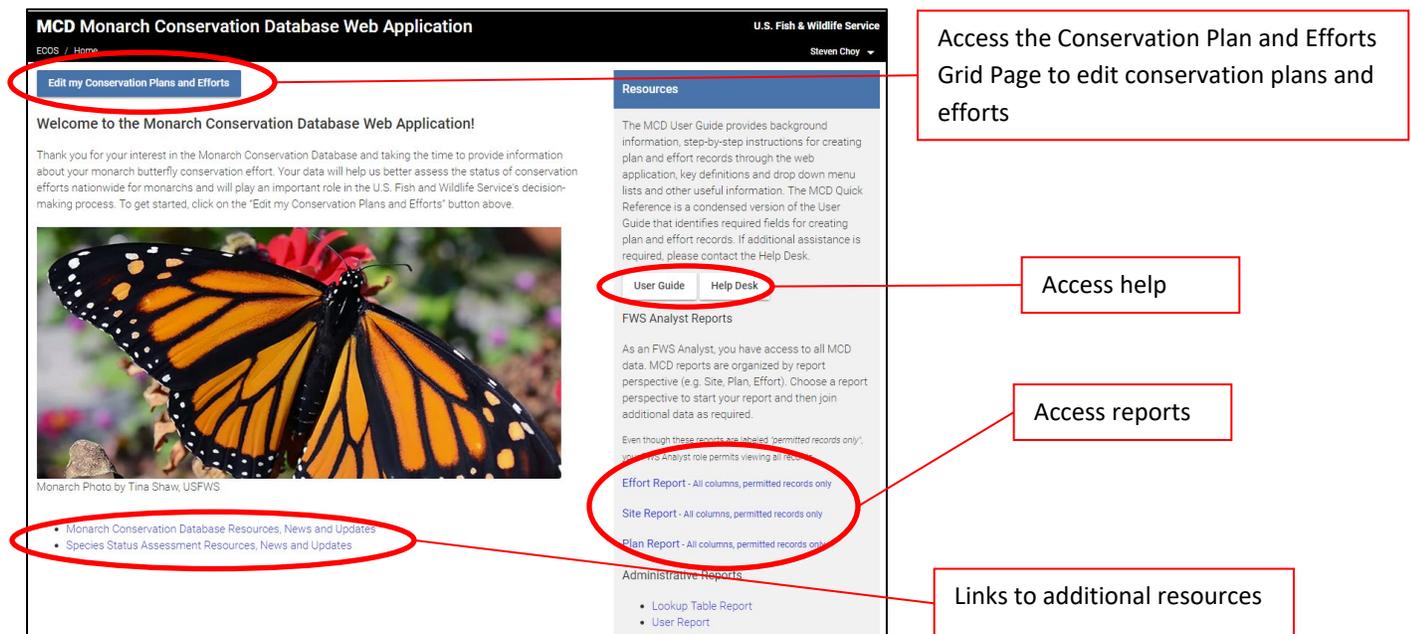


Figure 1. Monarch Conservation Database Homepage.

Conservation Plans and Efforts Grid Page

The Conservation Plans and Efforts Grid Page presents users with grid views of all of the conservation plans and efforts they are associated with (i.e. the owner of, an editor on, a collaborator with, or a Data Coordinator for). Users can toggle between the conservation plan and effort grids by clicking on either the “Plans” or “Conservation Efforts” tabs at the top of the window. **Note that in the context of database records, site and activity information are combined into what is referred as an “effort record.”** Thus when reference is made to an effort record in this document, this includes information about a site and specific on-the-ground activities implemented at the site. From the Plans Grid Page (Figure 2), web application users can:

- View basic information about plans and sort by:
 - Plan name
 - The number of conservation efforts associated with the plan
 - The organization identified as the author of the plan
 - The general location the plan applies to
 - The date details of the plan were last updated
- Filter for plans that have incomplete records or other business rule violations by clicking on the “Has quality errors” check box
 - Plan records with data quality errors will also have a red octagon with a white exclamation point next to the plan name
- Filter for plans that the user created (i.e. is the owner of), can edit, and can view (but not edit)
- Filter for plans authored by specific organizations
- Search for specific plans using the search box
- Initiate the process of creating a new plan record by clicking the “New Plan” button

The screenshot shows the 'MCD Monarch Conservation Database Web Application' interface. The 'Plans' tab is selected in the navigation bar. A '+ New Plan' button is visible in the top right. Below the navigation bar, there is a search bar and a 'Has quality errors' checkbox. A table of conservation plans is displayed with columns for Plan, Number of Conservation Efforts, Author, Location, and Last Updated. A red callout box points to the 'Toggle between Plans Grid and Conservation Efforts Grid' button. Another callout box points to the '+ New Plan' button. A third callout box points to the search and filter options. A fourth callout box points to the 'Sort' dropdown. A fifth callout box points to the link for 'View plan details' for the 'Matador Wildlife Management Area 10-year Management Plan (State (Non-regulatory/Volunteer))'.

Plan	Number of Conservation Efforts	Author	Location	Last Updated
Matador Wildlife Management Area 10-year Management Plan (State (Non-regulatory/Volunteer))	1	Texas Parks and Wildlife Department	TX	2018-10-24
NFWF Plan (Other (Please Describe in Notes))	1	United States Forest Service	CA	2018-10-23
Iowa Monarch Conservation Strategy	421			2018-10-23
SDGFP Land Mgmt Plans 2014-2018 (State (Non-regulatory/Volunteer))	33	South Dakota Game, Fish and Parks	SD	2018-10-17
SDGFP Private Lands Habitat Plan 2014-2018 (State (Non-regulatory/Volunteer))	0	South Dakota Game, Fish and Parks	SD	2018-10-16
Arkansas Monarch and Pollinator Conservation Plan (State (Non-regulatory/Volunteer))	1	Arkansas Game and Fish Commission	AR	2018-10-09
Missouri Monarch and Pollinator Conservation Plan (State (Non-regulatory/Volunteer))	0	Pheasants Forever	MO	2018-10-09
Outdoor Recreation Act of 1975 (Minn. Stat. 86A.05 Subd. 2c) (State (Regulatory))	3	Minnesota Department of Natural Resources	MN	2018-10-05

Figure 2. Plan Homepage screen shot.

Conservation Efforts Homepage

From the Conservation Efforts Grid Page (Figure 3), web application users can:

- View basic information about efforts and sort by:
 - Conservation effort site name
 - The conservation activity(ies) implemented at the site
 - The organization implementing the effort
 - The general location of the site
 - The date details of the effort were last updated

- Filter for efforts that have incomplete records or other business rule violations by clicking on the “Has quality errors” check box
 - Effort records with data quality errors will also have a red octagon with a white exclamation point next to the site name
- Filter for efforts that the user created (i.e. is the owner of), can edit, and can view (but not edit)
- Filter for efforts implemented by specific organizations
- Search for specific effort records that the user owns, can view, or can edit using the search box
- Initiate the process of creating a single new effort record by clicking the “New Conservation Effort” button
- Initiate the process of creating new effort records in bulk by clicking the “Bulk Upload” button

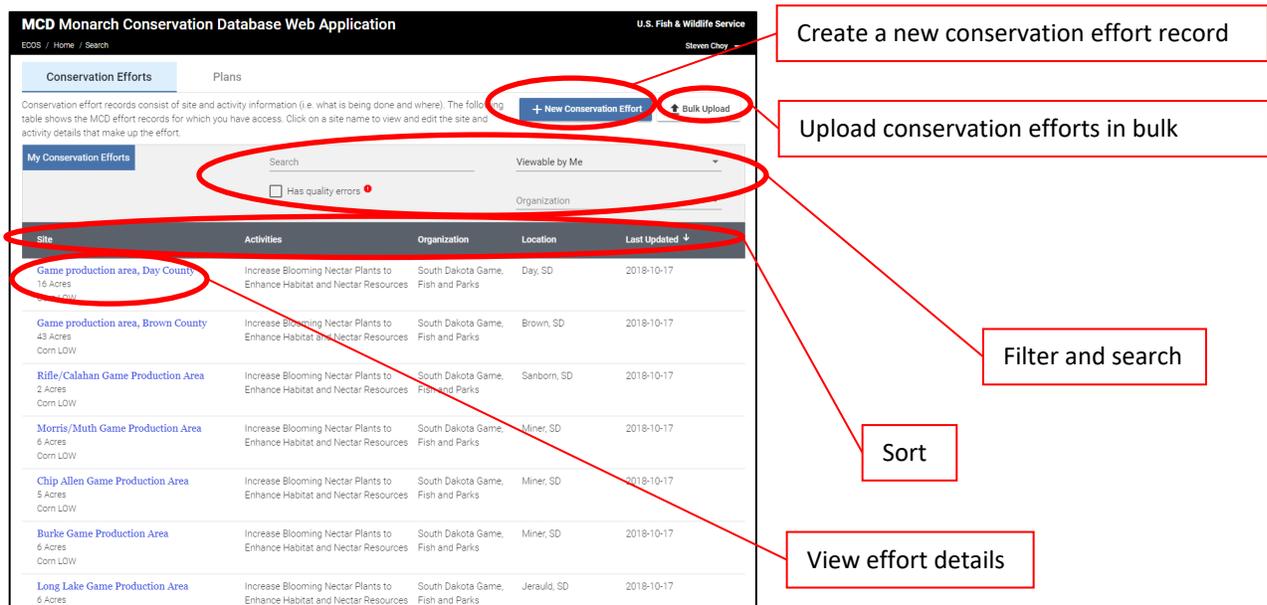


Figure 3. Conservation Efforts Homepage screen shot.

Plan View

The Plan View (Figure 4) is displayed when a web application user clicks on a plan record on the Plans Grid Page (Figure 2) and shows specific details about that plan including:

- Plan Details
 - The name of the plan
 - The name of the organization responsible for authoring the plan
 - The date on which the plan became/will become effective and the date on which the plan expired/will expire
 - The type of plan
 - If the plan has been finalized by a federal agency, state or local government, tribal government, business, organization or individual
 - If the efforts associated with the plan have been completed or implemented
 - The county(ies) and state(s) that the plan applies to

- Basic information about conservation efforts associated with the plan
 - Conservation effort information is presented in the same grid format as the Conservation Efforts Grid Page (Figure 3)
 - Only conservation efforts associated with your account will be accessible

From the Plan Grid Page, owners and editors of the record may:

- Edit plan details by clicking the “Edit” button to the right of the Plan Details section heading
- View the details of an effort record associated with the plan by clicking on the site name of an effort record in the Plan Conservation Efforts grid
 - This is the same grid view as described in the Conservation Efforts Grid Page (Figure 3) section above
 - Clicking on a Site Name will take the user to the Conservation Effort View (Figure 5) for that effort record
 - Only conservation efforts associated with the user will be displayed in the Plan Conservation Efforts window of the Plan View Page
- Delete the plan record by clicking “Delete” in the Operations Box
- Identify any missing fields or business rules for the plan record through the Data Quality Check box
- Allow other web application users to edit the details of the plan by clicking “Add users as Editors” in the Plan users box
 - In order to add an editor for a plan, they have to be a registered user; other users can be found by typing in all or part of their email address or name in the search box

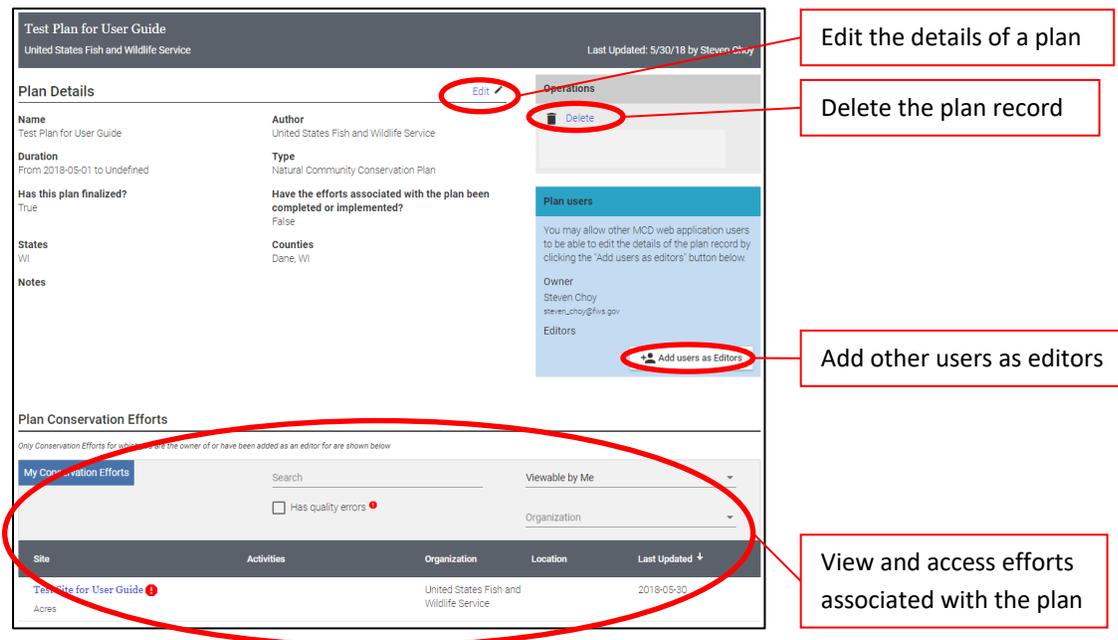


Figure 4. Plan View screen shot.

Conservation Effort View

The Conservation Effort View (Figure 5) is displayed when a web application user clicks on a site name on the Conservation Efforts Grid Page (Figure 3) or the Plan View (Figure 4) page and shows specific information about the conservation effort. Recall that an effort record is composed of site and activity information. Information displayed on the Conservation Effort view includes:

- Site Details
 - The site name
 - The name of the organization leading the conservation effort
 - The name of any organization(s) that has been identified as a collaborator on the effort
 - The Monarch Joint Venture Integrated Monarch Monitoring Program (IMMP) site label
 - The name of any plan(s) associated with the effort
 - The effort record's unique database identification number
- Site Location
 - The method of specifying site spatial information in the web application (i.e. shapefile vs manually selecting state(s) and county(ies))
 - The size of the site in acres
 - Whether the site is located on public or private property
 - The baseline land use at the site
 - The post effort land use at the site (if applicable)
 - County(ies) in which the site is located
- Conservation Activities
 - The type of activity(ies) implemented at the site
 - The acreage of the activity(ies) implemented at the site (if different from the overall site acreage)
 - The status of the activity(ies) implemented at the site
 - The start and end dates of implementation of the activity
- Site Habitat Gain
 - The baseline and post effort milkweed densities
 - Any other milkweed, blooming nectar plant, or monarch fields populated by the record owner or editors

From the Conservation Effort View page, owners and editors of the record may:

- Edit site details by clicking the "Edit" button to the right of the Site Details section heading
- View details of a plan record associated with the effort by clicking on a plan name (if applicable) under the Site Details section
 - Clicking on a Plan Name will take the user to the Plan View (Figure 4) of the plan record
- Identify the method of providing Site Location details by clicking on the "Edit Spatial Method" button to the right of the Site Location section heading
 - You may either provide a shapefile OR manually select counties in which the site is located

- Edit additional Site Location details by clicking on the “Edit Details” button to the right of the Site Location section heading
- Associate activities with the site by clicking on the “Add an Activity” button to the right of the Conservation Activities section heading
- Edit the details of an existing activity or delete an activity by clicking on the “Edit” or “Delete” buttons to the right of the Activity Name under the Conservation Activities section heading
- Edit the cumulative gains in milkweed and blooming nectar plants at the site as a result of implementation of the conservation activities by clicking on the “Add” button to the right of the Site Habitat Gain section heading
- Delete the entire effort record by clicking “Delete” in the Operations Box
 - This will delete site information as well as activity information
- Identifying any missing fields or business rules for the effort record through the Data Quality Check box
- Allow other web application users to edit the details of the effort record or identify Data Coordinators for the effort by clicking “Add users as Editors or Data Coordinators” in the Effort users box
 - In order to add an editor or Data Coordinator to an effort, they have to be a registered user; other users can be found by typing in all or part of their last name in the search box

The screenshot shows the 'Test Site for User Guide' interface. Key elements and their functions are highlighted with red callouts:

- Edit the details of an effort:** Points to the 'Edit' button in the Operations panel.
- Delete the effort record:** Points to the 'Delete' button in the Operations panel.
- Identify any missing required fields or business rule violations:** Points to the 'Data Quality Check' panel, which lists missing information such as 'Required information missing: The site must specify a spatial location'.
- Access information about any plans associated with the effort:** Points to the 'Plans' section, specifically the 'Test Plan for User Guide' entry.
- Add other users as editors or Data Coordinators:** Points to the 'Effort users' panel, which includes a section for adding users.

Figure 5. Conservation Effort View page screen shot.

Creating Records in the MCD Web Application

Single Record Editor Interface

Plan Editor

Single plan records can be created through the Plan Editor page, which may be accessed by clicking on the “New Plan” button on the Plans Grid Page (Figure 2).

Creating a new plan record:

1. Click on the “New Plan” button on the Plans Grid Page (Figure 2) to access the Create a New Plan Record page (Figure 6)
2. Name: provide a name for the plan
 - This is an open text box
 - **This is a required field**
 - The plan name must be unique
3. Click “Create Plan” to create the record
 - This will take the user to the Plan View (Figure 4) page for the newly created record

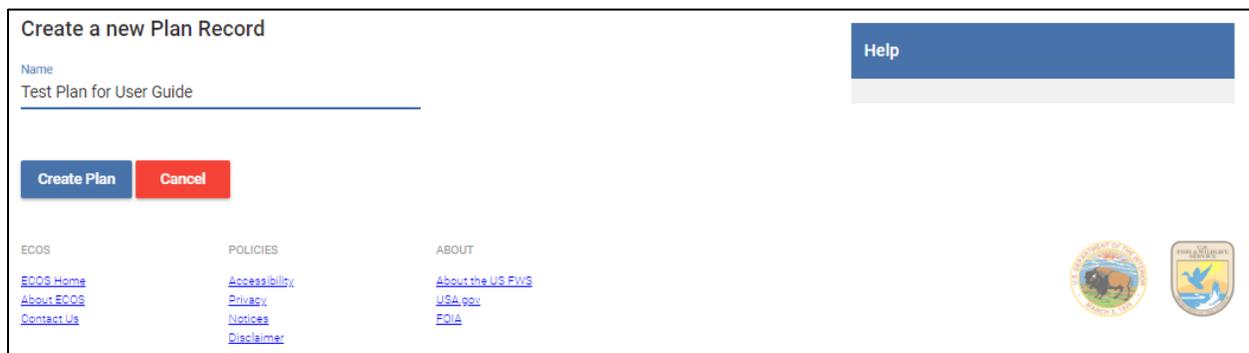


Figure 6. Create a New Plan Record page screen shot.

Editing the Plan Details of a plan record:

1. Access the Plan View (Figure 4) of the record by continuing from Step 3 above or clicking on the plan name on the Plans Grid Page (Figure 2)
2. Edit plan details (Figure 7) by clicking on the “Edit” button to the right of the Plan Details section heading
 - Plan Name: provide a name for the plan
 - This field should be auto-filled from initial plan creation step (Step 2 above)
 - This is an open text field
 - **This is a required field**
 - The plan name must be unique
 - Author: indicate the organization or the organization of the individual who authored the plan
 - This is a drop down menu
 - **This is a required field**

- Different author organization can be selected using the drop down menu
 - If you do not see your organization please email FW3_monarchconservation@fws.gov.
 - If you are not a part of a particular group or organization, select “Private Individual”
- Start/End Date: indicate the date on which the plan became or will become effective and the date on which the plan expired or will expire
 - These are date fields with the format MO/DA/YEAR
- Type: indicate the plan type
 - This is a [drop down menu](#)
 - If “Other”, please provide additional details in the Notes section
- Has this plan been finalized: indicate if the plan has been finalized by a federal agency, state or local government, tribal government, business, organization or individual
 - This is a yes/no field
 - **This is a required field**
- Have all of the efforts associated with the plan been completed or implemented: indicate if all of the efforts associated with the plan have been completed or at least implemented
 - This is a yes/no field
 - **This is a required field**
 - If the answer is “No”, users must answer the Policy for Evaluating Conservation Effort (PECE) implementation questions below
- State(s): indicate which the state(s) to which the plan applies
 - This is a drop down menu/multiple check box; more than one state may be selected
- County(ies): indicate which county(ies) to which the plan applies
 - This is a drop down menu/multiple check box; more than one county may be selected
 - If the plan applies to all counties in a state, do not select any counties
- Notes: provide any additional information about that plan that may be useful or as requested in other questions in the form
 - This is an open text box
 - If available, please provide a URL or web link for your plan in the notes section
- Policy for the Evaluation of Conservation Efforts (implementation)
 - **These are required fields *IF* the answer to “Have all efforts associated with the plan been completed or implemented” is “No”**
 - If necessary or desired, please qualify responses to PECE questions in the Notes section
 - Resources available: are the resources (e.g. staffing, funding, etc.) necessary to implement the conservation effort available?
 - This is a yes/no field

- Legal authority: is there the legal authority to implement the conservation effort?
 - This is a yes/no field
- Procedure: have the applicable legal procedural requirements (e.g. environmental reviews) necessary for implementation of the effort been addressed?
 - This is a yes/no field
- Authorization: have the applicable authorizations (e.g. permits, landowner permissions) necessary to implement the conservation effort been obtained?
 - This is a yes/no field
- Participation: is the necessary level of voluntary participation identified, and is there a high level of certainty the plan will obtain that level of voluntary participation?
 - This is a yes/no field
- Regulatory: are there regulatory mechanisms in place to allow for implementation of the conservation effort?
 - This is a yes/no field
- Funding: is there a high level of certainty that the party(ies) to the agreement or plan that will implement the conservation effort will obtain the necessary funding?
 - This is a yes/no field
- Implementation: is an implementation schedule (including incremental completion dates) for the conservation effort provided?
 - This is a yes/no field
- Agreements: have all parties involved in implementation of the conservation effort approved of this conservation plan?
 - This is a yes/no field

3. Click "Save" to save edits and return to the Plan View page of the record

Test Plan for User Guide
← Return

Plan Details

Plan Name *
Test Plan for User Guide

Author *
United States Fish and Wildlife Service

Start date
4/30/2018

End date

Type
Natural Community Conservat...

Has this plan been finalized? *

Yes No

Have the efforts associated with the plan been completed or implemented? *

Yes No

State(s)
Wisconsin

Counties
Dane

Notes

This is a sample plan for the MCD User Guide.

Help

Policy for Evaluation of Conservation Efforts (P.E.C.E) Implementation

Resource Available? Yes No

The conservation effort, the party(ies) to the agreement or plan that will implement the effort, and the staffing, funding level, funding resource and other resources necessary to implement the effort are identified.

Figure 7. Edit Plan Details page screen shot.

Effort Editor

Single effort records can be created through the Effort Editor page, which may be accessed by clicking on the “New Effort” button on the Conservation Efforts Grid Page (Figure 3).

Creating a new effort record:

1. Click on the “New Conservation Effort” button on the Conservation Efforts Grid Page (Figure 3) to access the Create a New Conservation Effort page (Figure 8).
2. Site (Location) Name: provide a name for the site of the conservation effort
 - This is an open text box
 - **This is a required field**
 - The site name should be unique
3. Organization leading the Conservation Effort Implementation: choose the organization primarily responsible for implementing the effort
 - This is a drop down menu
 - **This is a required field**
 - Different organizations can be selected using the drop down menu
 - If you do not see your organization please email FW3_monarchconservation@fws.gov
 - If you are not a part of a particular group or organization, select “Private Individual”

4. Click “Create Site” to create the record
 - This will take the user to the [Conservation Effort View](#) page for the newly created record

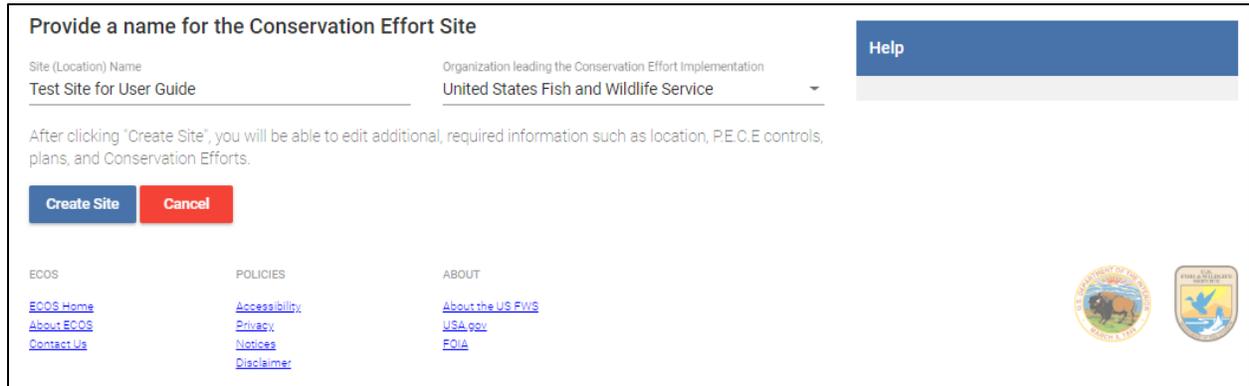


Figure 8. Create a New Conservation Effort page screen shot.

Editing the Site Details of an effort record:

1. Access the Effort View page (Figure 5) for the record by continuing from Step 4 above or by clicking on the site name on the Conservation Efforts Grid Page (Figure 3)
2. Access the Edit Site Details page (Figure 9) to edit the details of the site by clicking on the “Edit” button to the right of the Site Details section heading
 - Site name: provide a name for the site of the conservation effort
 - Should be auto-filled from initial effort creation step (Step 2 above)
 - This is an open text box
 - **This is a required field**
 - The site name should be unique
 - Organization leading the Conservation Effort Implementation: choose the organization primarily responsible for implementing the effort
 - Should be auto-filled from initial effort record creation (Step 3 above)
 - This is an open text box
 - Different organizations can be selected using the drop down menu
 - If you do not see your organization please email FW3_monarchconservation@fws.gov
 - If you are not a part of a particular group or organization, select “Private Individual”
 - **This is a required field**
 - Collaborators: indicate organization(s) that are collaborators on the effort
 - This is a multiple check box
 - More than one organization can be identified as a collaborator
 - Adding organizations as collaborators will allow other registered users that are associated with that organization to be able to view (but not edit) the details of your effort record

- IMMP Site Label: indicate the Integrated Monarch Monitoring Program site label if applicable and known
 - This is an open text box
 - The Integrated Monarch Monitoring Program is a national initiative to monitor monarch populations and habitat throughout the breeding range. For more information, or if you are interested in participating in the IMMP, please email monarchs@monarchjointventure.org, or visit <https://monarchjointventure.org/get-involved/mcsp-monitoring>.
 - Plans: indicate which plan(s) the effort(s) is being implemented under if applicable
 - This is a drop down menu/text box
 - Plans can be selected by using the drop down menu or searched for by typing the plan name (if known) directly into the text box
 - Once the correct plan is found, click the “Associate plan” button
 - New plans may also be created by clicking the “Create it” button
 - This will prompt the you to provide a new plan name
 - Once a plan name is submitted, note that it is not automatically associated with your conservation effort; you must type or search for the new plan name in the search box and click the “Associate plan” button
 - Remember to populate the required fields for the new plan; you can edit the details at any time
3. Click “Save” to save the information and return to the Effort View page of the record

Test Site for User Guide
← Return

Site Details

Site Name:

Organization leading the Conservation Effort Implementation:

Collaborators:

Help

What is the Integrated Monarch Monitoring Program (IMMP)?

The Integrated Monarch Monitoring Program is a national initiative to monitor monarch populations and habitat throughout the breeding range. For more information or if you are interested in site monitoring through the IMMP, please email monarchs@monarchjointventure.org or visit <https://monarchjointventure.org/get-involved/mcsp-monitoring>.

Plans (Not required)

Remove
Test Plan for User Guide

Add another plan

Associate plan

Cannot find your plan? [Create it](#)

Save
Cancel

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Figure 9. Edit Site Details page screen shot.

Editing the Site Location details of an effort record:

1. Access the Effort View page (Figure 5) for the record by continuing from the steps above or by clicking on the site name on the Conservation Efforts Grid Page (Figure 3)
2. Edit Site Location information manually **OR** upload a shapefile delineating the site by clicking on the “Edit Spatial Method” and “Edit Details” buttons to the right of the Site Location section heading
 - To provide Site Location details manually (i.e. without a shapefile):
 1. Click on the “Edit Spatial Method” button to the right of the Site Location section heading
 2. Click “I will choose U.S. Counties for this site” (Figure 10) to access the Select Site Counties page (Figure 11)
 3. State: indicate the State(s) in which the site is located
 - This is a drop down menu/multiple check box; more than one state may be selected
 - **This is a required field**
 4. Counties: indicate the County(ies) in which the state is located
 - This is a drop down menu

- Multiple counties may be associated with the site, but counties must be added one at a time
 - If all counties in a state need to be selected, please select “All” from the drop down menu
 - **This is a required field**
5. Click the “Add” button to add the State and County to the site
 6. Click the “Save” button to save the information and return to the Effort View page
 7. Click on the “Edit Details” button to the right of the Site Location section heading to access the Provide Additional Site Location Details page (Figure 12)
 8. Land Use Baseline: indicate the land use at the site before the activity was implemented
 - This is a [drop down menu](#)
 - Please refer to the [land use type definitions](#) for guidance and use best judgement when selecting
 - **This is a required field**
 9. Land Use After Effort: indicate the land use at the site after activity implementation
 - This is a [drop down menu](#)
 - Please refer to the [land use type definitions](#) for guidance and use best judgement when selecting
 - **This is a required field *IF* land use at the site changed or will change as a result of the effort**
 10. Acres: indicate the footprint of the project site (i.e. the area over which the activity is being implemented) in acres
 - Multiple patches of land may be combined into one site **IF**
 - all patches have the same land use type (or dominant land use type) and the same activities are implemented on all patches **AND**
 - the activities at the site have the same implementation status
 - activities that have a status of “not yet implemented”, “implemented”, or “completed for less than 3 years”, they are considered future activities and can be combined
 - activities that have a status of “completed for more than 3 years”, they are considered current activities and can be combined
 - current and future activities cannot be combined
 - **This is a required field**
 11. Land Ownership: indicate if the site is under private or public ownership
 - This is a [drop down menu](#)

12. Hit the "Save" button to return to the Effort View page

Site Location Choose Spatial Method

Please choose a method for providing spatial information for the site. Spatial information can be provided by uploading a shapefile delineating the site. If providing a shapefile, the baseline land use type, acres, and counties fields will automatically be populated. To provide a shapefile, please click the "I will upload a shapefile for this site" button below.

If you do not wish to or are unable to provide a shapefile, you may manually provide spatial information by choosing the state(s) and county(ies) in which the site is located by clicking on the "I will choose U.S. counties for this site" button below.

You may change the method for providing site spatial information at anytime.

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Figure 10. Select Spatial Method page screen shot.

Test Site for User Guide

[← Return](#)

Site Counties

Choose the State(s) and County(ies) in which your site is located.

State
Wisconsin

County
Dane

Counties which contain the site
Wisconsin, Dane

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Figure 11. Select Site Counties page screen shot.

The screenshot shows a web interface for providing site location details. The header includes a 'Return' button. The main section is titled 'Site Location Details' and contains a 'Help' button. The form has two rows of dropdown menus: 'Land Use Baseline' (Grassland (NLCD)) and 'Land Use After Effort', and 'Acres' (2) and 'Land Ownership' (Public). There are 'Save' and 'Cancel' buttons. At the bottom, there are navigation links for ECOS, POLICIES, and ABOUT, and two circular logos on the right.

Figure 12. Provide Additional Site Location Details page screen shot.

- To provide Site Location details by providing a shapefile²:
 1. Click on the “Edit Spatial Method” button to the right of the Site Location section heading
 2. Click “I will upload a shapefile for this site” (Figure 10) to access the Upload a Shapefile page (Figure 13)
 3. Description: provide a description for the shapefile to be uploaded in the “Description” box
 - This is an open text box
 4. Either drag and drop a zipped shapefile to the box labeled “Drag shapefile here” OR click “Upload” and navigate to the shapefile to be uploaded
 - The following fields will be auto-populated using your shapefile:
 - The overall acreage of the site
 - The county(ies) the site shapefile intersects with
 5. Click “Save” to save your information and return to the Effort View page
 6. Click on the “Edit Details” button to the right of the Site Location section heading to access the Provide Additional Site Location Details page (Figure 12) and populate the rest of the Site Location fields, including:
 - Land Use Baseline: indicate the land use at the site before the activity was implemented
 - This is a [drop down menu](#)
 - Please refer to the [land use type definitions](#) for guidance and use best judgement when selecting
 - **This is a required field**

² If there are multiple patches of land being combined into one site, the shapefile representing the site must be a single multi-part feature.

- Land Use After Effort: indicate the land use after the site after activity implementation
 - This is a [drop down menu](#)
 - If manually selecting baseline land use type, please refer to the [land use type definitions](#) and use best judgement when selecting
 - **This is a required field *IF* land use type will change as a result of the effort**
 - Land ownership: indicate if the site is under private or public ownership
 - This is a [drop down menu](#)
7. Click the “Save” button to return to the Effort View page of the record

Figure 13. Upload a Shapefile page screen shot.

Editing the Conservation Activities of an effort record:

1. Access the Effort View page (Figure 5) for the record by continuing from the steps above or by clicking on the site name on the Conservation Efforts Grid Page (Figure 3)
2. Multiple conservation activities can be added to the effort record
3. Access the Edit Effort Activity Details page (Figure 14) to add conservation activities to the site by clicking on the “Add an Activity” button to the right of the Conservation Activities section heading
 - Habitat Management Goal: indicate the overarching habitat management goal or objective of the activity
 - This is a [drop down menu](#)

- This is a required field
 - Sub-activity: provide additional details about the activity performed
 - This is a [drop down menu/multiple check box](#); more than one on sub-activities may be selected
 - This is a required field
 - Affected Acres: indicate over how many acres the activity was implemented if different from the overall project site acreage
 - This is an open text box
 - Implementing Organization: indicate the organization primarily responsible for implementing the activity if different from the organization of the record owner
 - This is a drop down menu
 - Different organizations can be selected using the drop down menu
 - If you do not see the organization please email FW3_monarchconservation@fws.gov
 - Status: indicate whether the activity is completed for more than 3 years, completed for less than 3 years, implemented (but not yet completed), or not yet implemented
 - This is a [drop down menu](#)
 - This is a required field
 - Start Date: indicated the date on which implementation of the activity began or will begin
 - This is a date fields with the format MO/DA/YEAR
 - This is a required field
 - End Date: indicate the date on which implementation of the activity ended or will end (this does NOT include maintenance and monitoring)
 - This is a date fields with the format MO/DA/YEAR
 - Target Species: indicate the primary reason for implementing the activity
 - This is a [drop down menu](#)
 - Policy for Evaluating Conservation Efforts (effectiveness)
 - Our initial approach was to evaluate any conservation effort that has not been completed for more than 3 years, been implemented but not completed, or not yet been implemented against the Policy for Evaluating Conservation Efforts (PECE). The PECE policy provides criteria to determine whether conservation efforts will be effective and whether conservation efforts not yet implemented will be implemented and effective. We have since determined that, due to the required fields in the MCD, all conservation efforts in the MCD associated with a specific sub-activity are effective. As a result, we will only be evaluating efforts that are attached to a plan and have not yet been implemented for the certainty of implementation, which are assessed through the effort's associated plan (see "[Plan Editor](#)"). Please note that you may still be prompted to answer PECE effectiveness questions for your efforts based on the information you provide, but to reiterate, you may ignore the PECE questions for conservation efforts.
4. Click on the "Save" button to return to the Effort View page of the record

- Note that after clicking “Save”, if you attempt to edit the details of the conservation activity, you may notice an option to “finalize” the Conservation Activity in the Operations box. Finalization or approval of an activity is not required for completion of the effort record. This function should only be used by your Data Coordinator if you have chosen to assign one; if you have assigned a Data Coordinator to QA/QC your effort records, your Data Coordinator will use the finalize function to indicate that they have reviewed your effort record. For more information about the Data Coordinator role, please see the [Data Coordinator](#) section of this document.

Test Site for User Guide
← Return

Conservation Activities

Habitat Management Goal *
Available habitat management goals are specific to the baseline land use of the site.
Grassland (NLCD)

Activity Types
 Increase Milkweed and Blooming Nectar Plants to Enhance Habitat and Nectar Resources

Sub-activity *
Available sub-activities are specific to the baseline land use of the site and the habitat management goal selected above. Sub-activity definitions can be found in the MCD User Guide

Sub-activity Types
 Planting

Affected Acres _____ Implementing Organization _____

Status * **Implemented** Start date * **5/2/2018** End date _____

Target Species
Pollinator Season _____

Notes _____

Help

Policy for Evaluating Conservation Effort (P.E.C.E) Effectiveness

Objectives Identified? Yes No

Explicit incremental objectives for the conservation effort and dates for achieving them are stated.

Figure 14. Edit Effort Activity Details page screen shot.

Editing the Site Habitat Gain of an effort record:

1. Access the Effort View page (Figure 5) for the record by continuing from the steps above or by clicking on the site name on the Conservation Efforts Grid Page (Figure 3)

2. Access the Edit Site Habitat Gain page (Figure 15) to edit habitat gains at the site resulting from the activity(ies) by clicking on the “Add” button to the right of the Site Habitat Gain section header
 - Milkweed Protocol: indicate the protocol used to measure milkweed metrics
 - This is a [drop down menu](#)
 - If the protocol used is not available, please provide additional details in the notes section
 - Milkweed Baseline Survey Date: indicate the date on which baseline (i.e. before effort implementation) milkweed metrics were measured
 - This is a date fields with the format MO/DA/YEAR
 - Post Effort Milkweed Survey Date: indicate the date on which post effort (i.e. after effort implementation) milkweed metrics were measured
 - This is a date fields with the format MO/DA/YEAR
 - Milkweed Baseline Density: indicate the milkweed density in stems per acre before the activity(ies) was implemented
 - This is an open text box
 - **This is a required field; if you do not have the time or resources to measure baseline milkweed density at the site or you have a new site where the milkweed has not yet established itself, you may leave this field blank and FWS biologists will populate this field with estimates provided in the “All Hands on Deck Publication” by Thogmartin et al., 2017 during data analysis.**
 - **Estimated baseline milkweed density for each land use type from Thogmartin et al., 2017 can be found in [Appendix B. Threats and Activities Table](#) of this document; FWS biologists will use the baseline land use type for the site to determine the estimated baseline milkweed density from the Estimated Baseline Milkweed Density column**
 - **Example: if the baseline land use type at the site was “Grassland (NLCD)”, the corresponding estimated baseline milkweed density from Thogmartin et al., 2017 is 3.09 stems per acre**

- Milkweed Post Effort Density: indicate the milkweed density in stems per acre after the activity(ies) was implemented
 - This is an open text box
 - **This is a required field; if you do not have the time or resources to measure post effort milkweed density at the site or you have a new site where the milkweed has not yet established itself, you may leave this field blank and FWS biologists will populate this field with estimates provided in the “All Hands on Deck Publication” by Thogmartin et al., 2017 during data analysis.³**
 - **Estimated post effort milkweed density for each land use type from Thogmartin et al., 2017 can be found in [Appendix B. Threats and Activities Table](#) of this document; FWS biologists will use the post effort land use type for the site to determine the estimated post effort milkweed density from the Potential/Amended Milkweed Density column**
 - **Example: if the post effort land use type at the site was “Grassland (NLCD)”, the corresponding estimated potential or amended milkweed density from Thogmartin et al., 2017 is 40 stems per acre**
- Milkweed Baseline Diversity: indicate the number of species observed before implementation of the activity(ies)
 - This is an open text box
- Milkweed Post Effort Diversity: indicate the number of species observed after implementation of the activity(ies)
 - This is an open text box
- Was one milkweed species dominant (i.e. >80% proportional abundance) during the baseline survey: indicate if one species is dominant (i.e. accounts for >80% of species observed) before implementation of the activity(ies)
 - This is a yes/no field
- Was one milkweed species dominant (i.e. >80% proportional abundance) during the post effort survey: indicate if one species is dominant (i.e. accounts for >80% of species observed) after implementation of the activity(ies)
 - This is a yes/no field
- Blooming Nectar Plant Protocol: indicate the protocol used to measure blooming nectar plant metrics
 - This is a [drop down menu](#)

³ Where possible, Appendix B. Threats and Activities table uses the estimated potential milkweed densities found in Table S3.1 of the supplemental materials of the Thogmartin et al., 2017 “All Hands on Deck” publication. The potential milkweed density represents the average estimate of biologically reasonable milkweed density from two panels of experts. Where potential milkweed densities were not able to be used (i.e. where land use themes were not consistent between table S3.1 and the Monarch Conservation Database), estimated amended milkweed densities from Table 1 of the Thogmartin et al., 2017 “All hands on Deck” publication were used. The amended milkweed density is different from the potential milkweed density in that the amended milkweed density is the regional mean estimate of the expected milkweed density for each land use type after management action.

- If the protocol used is not available, please provide additional details in the notes section
 - Blooming Nectar Plant Baseline Date: indicate the date on which baseline (i.e. before effort implementation) blooming nectar plant metrics were measured
 - This is a date fields with the format MO/DA/YEAR
 - Blooming Nectar Plant Post Effort Date: indicate the date on which post effort (i.e. after effort implementation) blooming nectar plant metrics were measured
 - This is a date fields with the format MO/DA/YEAR
 - Blooming Nectar Plant Baseline Frequency 0.25m Plot: indicate the percent of 0.25m plots with blooming nectar plants before implementation of the activity(ies)
 - This is an open text box
 - Blooming Nectar Plant Post Effort Frequency 0.25m Plot: indicate the percent of 0.25m plots with blooming nectar plants after implementation of the activity(ies)
 - This is an open text box
 - Blooming Nectar Plant Baseline Frequency 0.5m Plot: indicate the percent of 0.5m plots with blooming nectar plants before implementation of the activity(ies)
 - This is an open text box
 - Blooming Nectar Plant Post Effort Frequency 0.5m Plot: indicate the percent of 0.5m plots with blooming nectar plants after implementation of the activity(ies)
 - This is an open text box
 - Blooming Nectar Plant Baseline Frequency 1.0m Plot: indicate the percent of 1.0m plots with blooming nectar plants before implementation of the activity(ies)
 - This is an open text box
 - Blooming Nectar Plant Post Effort Frequency 1.0m Plot: indicate the percent of 1.0m plots with blooming nectar plants after implementation of the activity(ies)
 - This is an open text box
 - Blooming Nectar Plant Baseline Density: indicate the number of blooming nectar plants per meter² before implementation of the activity(ies)
 - This is an alternate field to blooming nectar plant frequency
 - This is an open text box
 - Blooming Nectar Plant Post Effort Density: indicate the number of blooming nectar plants per meter² after implementation of the activity(ies)
 - This is an alternate field to blooming nectar plant frequency
 - This is an open text box
 - Blooming Nectar Plant Baseline Richness: indicate the number of blooming nectar plant species observed before implementation of the activity(ies)
 - This is an open text box
 - Blooming Nectar Plant Post Effort Richness: indicate the number of blooming nectar plant species observed after implementation of the activity(ies)
 - This is an open text box
3. Click on the “Save” button to return to the Effort View page of the record

Test Site for User Guide
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Site Habitat Gain

Milkweed Measures

Milkweed protocol ▼

Baseline Measures	Post Effort Measures
Baseline date 📅	Post effort date 📅
Baseline density (stems/acre) *	Post effort density (stems/acre) *
Baseline diversity (species observed)	Post effort diversity (species observed)
Was one milkweed species dominant (i.e. >80 proportional abundance) during baseline survey? <input type="radio"/> Yes <input type="radio"/> No	Was one milkweed species dominant (i.e. >80 proportional abundance) during post effort survey? <input type="radio"/> Yes <input type="radio"/> No

Blooming Nectar Plant

Blooming nectar plant protocol ▼

Baseline Measures	Post Effort Measures
Baseline date 📅	Post effort date 📅
Baseline frequency 0.25m plot (% of plots w/BNP)	Post effort frequency 0.25m plot (% of plots w/BNP)
Baseline frequency 0.50m plot (% of plots w/BNP)	Post effort frequency 0.50m plot (% of plots w/BNP)
Baseline frequency 1m plot (% of plots w/BNP)	Post effort frequency 1m plot (% of plots w/BNP)
Baseline density (plants/m ²)	Post effort density (plants/m ²)
Baseline richness (species observed)	Post effort richness (species observed)

Help

Milkweed and blooming nectar plant metric definitions can be found the MCD User Guide

Save
Cancel

Figure 15. Edit Site Habitat Gain page screen shot.

Uploading Records in Bulk

Effort records may also be uploaded to the MCD in bulk (i.e. multiple effort records at a time). In order to complete a bulk uploads, users must first download the excel bulk upload template from the MCD website (<https://www.fws.gov/savethemonarch/mcd.html>). **If a plan will be associated with an effort(s), we highly recommend that users enter the plan information into the database before entering effort data (regardless if creating effort records one at a time or in bulk) so that the system will recognize the plan.** In the excel template, the required fields are highlighted in yellow while conditionally required fields are highlighted in green. If these fields are not populated the bulk upload will not be successful. To upload effort records in bulk:

1. Download the template from <https://www.fws.gov/savethemonarch/mcd.html>
2. Populate the required fields and any non-required fields to the best of your ability
 - Please refer to the step-by-step instructions above or the MCD Quick Reference (available at <https://www.fws.gov/savethemonarch/mcd.html>) for field definitions
 - For fields that are drop down menus as indicated by the template, please refer to [Appendix A. Drop Down Menu Domains](#) of this document to see what the options are; data fields that are drop down menus must be populated with information exactly as they appear in the Appendices
 - For fields where you can provide multiple entries (e.g. counties), please separate entries using a semi-colon(;
 - For the Lead Organization, Collaborators, or Implementing Organization fields, please enter the name of your organization and we will match your organization to one that already exists in our list of organizations, or we will create a new organization for you
 - For the Plans field (if applicable) please enter the plan name exactly as it appears in the MCD if you or another user have already created the plan. If you or another user did not create a plan before bulk uploading, please make sure you create the plan after you bulk upload being careful to spell the plan name exactly as it appears in the bulk upload template when creating the plan in the MCD
3. Access the Conservation Efforts Grid Page (Figure 2) and click “Bulk Upload” to access the Bulk Upload page (Figure 16)
4. Either drag and drop the populated template or zipped shapefile into the drag and drop box, or use the “Browse” button to locate the file
5. Return to your Conservation Efforts Grid Page (Figure 3) to make sure the effort records have been correctly uploaded

Upload conservation effort records in bulk

Many effort records may be added to the MCD at a time by using the bulk upload feature. Download a bulk upload template from the MCD website (<https://www.fws.gov/savethemonarch/mcd.html>) and drag and drop or browse for the populated template below. For additional details on bulk uploading, including required fields and useful definitions, please see the MCD User Guide.

Drop Shapefile Here

OR

Browse files

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Help

Need help with bulk upload?

The MCD User guide contains details about bulk uploading efforts such as step-by-step instructions, information on required fields, and key definitions.

- [Upload template](#)
- [Performing Uploads in the MCD user guide](#)

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Figure 16. Bulk Upload page screen shot.

Data Quality Assurance and Quality Control

Required Fields

In the context of the MCD, required fields are fields that must be populated in order for the core features and functions of the database to be carried out. Please refer to the step-by-step instructions above for detailed information on each required field, or consult the MCD Required Fields Workflow or MCD Quick Reference (both available on the MCD web page:

<https://www.fws.gov/savethemonarch/mcd.html>) for a simple list of required fields for each plans and effort records.

Business Rule Violations

Business rule violations occur when a user populates a field in such a way that is not allowed by the data model. For example, when a user indicates the baseline land use at a site and then adds activities to the site, the list of activities seen in the drop down menu are dependent on the baseline land use. If the user selects an activity and later tries to change the land use type, the user may get an error if the activity they have chosen does not match the update land use type. The following are business rules that apply to the MCD:

- Required fields must be populated
 - (See Required Fields section above for more information)
- There must be spatial location information for the site, either in the form of a shapefile or user-selected state and county
- The acreage for any individual activity (if applicable) must not exceed the overall acreage of the site the activity is implemented on
- The effort activity must be permissible per the baseline land use type
 - See [Appendix B. Threats and Activities Table](#) of this document to see which activities are permissible for each land use type
- Plans for which it is indicated that all of the associated efforts are “Complete” or “Implemented” must not have any efforts associated with it that have a status of “Not Yet Implemented”

Approving Efforts (Data Coordinators Only)

Finalization or approval of efforts records for which you have been assigned the Data Coordinator indicates that you have reviewed the record to make sure that:

- all information provided is accurate
- all required fields are populated
- all optional fields are populated to the best of the user’s ability and knowledge
- all business rule violations are addressed (i.e. that data in a record does not contradict or is somehow in conflict with other information in the same record)
- the effort record is not duplicative

Quality control and quality assurance of the effort record involves close coordination with the record owner and potentially any groups or individuals collaborating on the effort. **To reiterate, assigning a Data Coordinator is not required nor is having a Data Coordinator finalize effort records.** However, if you would like to take advantage of this feature of the MCD web application to indicate to FWS analysts that the effort record has been reviewed, please follow the instructions below:

1. Identify and coordinate with users for whom you will be a Data Coordinator so you can keep track of whose effort records you need to review
2. Once a user's effort records are ready for you to finalize, go to your Conservation Efforts Homepage (Figure 1) to find those records. To help filter for effort records you need to finalize, you may:
 - a. Use the filter feature to filter for efforts that are editable by you
 - b. Use the filter feature to filter for efforts associated with specific organizations
 - c. Use the Search Box to search for specific conservation efforts
3. Click on a site name to access the site's Conservation Effort View Page (Figure 4)
4. Scroll down to the Conservation Activities section
5. Click on the "Edit" button to the right of the Conservation Activity name
6. Click on "Set to finalized" in the operations box
 - a. This can be undone and re-done as needed
7. Click on the "Save" button to return to the site's Conservation Effort View Page
8. Repeat as necessary

How Will My Data Be Used

We will calculate the current amount of habitat due to completed and implemented conservation efforts and future habitat due to not yet implemented conservation efforts by adding milkweed numbers from the MCD to a baseline established for the year 2014 in the Thogmartin et al., 2017 "All Hands on Deck" paper. In the "All Hands on Deck Paper," Thogmartin et al., 2017 used literature and elicited information from subject matter experts to estimate the density of milkweed stems in stems per acre for different land use types in the upper Midwest. Note that for the purposes of this analysis, we assume milkweed density to be a surrogate for both habitat and nectar resources. Further, we assume that the milkweed density estimates in the upper Midwest can be reasonably applied throughout the continental United States until updated information is available. We calculate the baseline estimated number of milkweed stems on the landscape by multiplying the approximate acres of each land use type in 2014 by the corresponding estimated baseline number of milkweed stems for each land use type.

Using land use type and acreage information in the MCD, we then calculate the current amount of habitat by adding milkweed from completed and implemented conservation efforts to the 2014 baseline number of milkweed. We calculate the number of milkweed from conservation efforts by tallying the number of acres of each land use type that has been improved due to completed and implemented conservation efforts and multiplying those acres by the net change in milkweed. We calculate the net change in milkweed by subtracting baseline milkweed stem density from the potential or amended milkweed density for the land use type in question per Thogmartin et al. 2017 or user provided

information (i.e. milkweed density post effort). Potential milkweed density represents the average estimate of biologically reasonable milkweed density for a given land use from two panels of experts. Amended milkweed density is the regional mean estimate of the expected milkweed density for each land use type after a management action is implemented. We preferentially use potential milkweed (which can be found in Table S3.1 of the Thogmartin et al., 2017 supplemental data) over amended milkweed density (which can be found in Table 1 of Thogmartin et al., 2017) because the calculation for amended milkweed density includes adoption rates and could result in a lower the estimate for post-effort milkweed density. Potential milkweed density was not available for all land use types due to discrepancies between land use types used in Thogmartin et al., 2017 and the MCD. The estimated baseline and potential/amended milkweed densities represent the current state of knowledge and can be updated when additional information becomes available.

Finally, we will evaluate conservation efforts not yet implemented against the PECE policy for sufficient certainty of implementation and add the milkweed from future efforts meeting the PECE criteria to the current amount of habitat to project future habitat.

Key Terms and Definitions

- Amended milkweed density – the regional mean estimate of the expected milkweed density for each land use type after management action
- Completed for less than 3 years – when the effort was completed within 3 years of the record creation; effort activity completion means no on the ground work is still being conducted (not including maintenance and/or monitoring)
- Completed for more than 3 years – when the effort was completed more than 3 years ago from the date of the record creation; effort activity completion means no on the ground work is still being conducted (not including maintenance and/or monitoring)
- Data Coordinator – a Monarch Conservation Database web application user with all of the capabilities of a Data Editor but may also approve effort records
- Data Editor – a Monarch Conservation Database web application user that may create, edit, and query database records, allow other database users to view or edit records they have created, and associate Data Coordinators with records they have created
- Effective – when results have reduced a threat to the species
- Effort – specific actions, activities or programs designed to eliminate or reduce threats or otherwise improve the status of a species (in this case, monarch butterflies)
- Effort Record – a database record that consists of information regarding a specific site and the activity or activities being implemented at the site
- Formalized Effort – an effort identified in a conservation agreement, conservation plan, management plan, or similar document
- Habitat – for the purposes of the Monarch Conservation Database, milkweed density is considered a surrogate for habitat

- Implemented – when the appropriate staffing, funding, and legal authority are in place and it is ongoing and there is no reason to believe will change; on the ground work is still being conducted (not including maintenance and/or monitoring)
- Not Yet Implemented – when the appropriate staffing, funding, and legal authority are not yet in place; on-the-ground work has not been initiated
- Plan – a conservation agreement, conservation plan, management plan, or similar documents approved by Federal agencies, State and local governments, Tribal governments, businesses, organizations, or individuals
- Policy for Evaluating Conservation Effort – provides criteria for evaluating the certainty of effectiveness for conservation efforts that have not yet been proven to be effective and certainty of implementation and effectiveness for efforts that have not yet been implemented
- Potential Milkweed Density – the average estimate of biologically reasonable milkweed density for a given land use from two panels of experts
- Record Owner – a database user that has created a record
- Required Field – a Monarch Conservation Database field that is necessary for core database functions or evaluations to be carried and cannot be left null
- Site – a discrete patch of land with a single or obviously dominant land use or many patches of land within a discrete area (e.g. county) that have in common a single or obviously dominant land use
- Species Status Assessment – a framework used to evaluate the current and projected future condition of the species; summarizes species' life history and biology and identifies threats and limiting factors to the persistence of the species

Appendices

Appendix A: Drop Down Menu Domains

Plan Drop Down Menu Fields

- Plan types
 - Mitigation (Regulatory)
 - Mitigation (Non-regulatory/Volunteer)
 - Site Specific (Regulatory)
 - Site Specific (Non-regulatory/Volunteer)
 - City/Metro (Regulatory)
 - City/Metro (Non-regulatory/Volunteer)
 - County (Regulatory)
 - County (Non-regulatory/Volunteer)
 - State (Regulatory)
 - State (Non-regulatory/Volunteer)
 - Regional (Regulatory)
 - Regional (Non-regulatory/Volunteer)
 - National (Regulatory)
 - National (Non-regulatory/Volunteer)
 - Candidate Conservation Agreement
 - Candidate Conservation Agreement w/Assurances
 - Habitat Conservation Plan
 - Natural Community Conservation Plan
 - Other (Please Describe in Notes)

Effort Drop Down Fields

- Landowner type
 - Private
 - Public
 - Mixed
- Land use classification
 - (see [Appendix B: Threats and Activities Table](#))
 - (See [Appendix C: Land Use Type Definitions](#))
- Activity type
 - (see [Appendix B: Threats and Activities Table](#))
- Sub activity type
 - (see [Appendix B: Threats and Activities Table](#))
 - (see [Appendix D: Sub-activity Definitions](#))
- Status
 - Not yet implemented
 - Implemented (but not completed)

- Completed for less than 3 years
 - Completed for more than 3 years
- Target Taxon
 - Monarchs
 - Pollinators
 - General Wildlife Habitat
 - General Resource Management
 - Other (Please specify in Notes)
- Milkweed survey protocol
 - Integrated Monarch Monitoring Program Protocol
 - Environmental Defense Fund Habitat Quantification Tool Protocol
 - Rights-of-Way as Habitat Working Group Protocol
 - Other (Please specify in Notes)
- Blooming nectar plant survey protocol
 - Integrated Monarch Monitoring Program
 - Environmental Defense Fund Habitat Quantification Tool Protocol
 - Rights-of-Way as Habitat Working Group Protocol
 - Other (Please specify in Notes)

Appendix B: Threats and Activities Table

General Land Use Classification	Land Use Classification (Thogmartin et al. 2017)	Estimated Baseline Milkweed Density (Thogmartin et al., 2017)	Potential/Amended Milkweed Density (Thogmartin et al., 2017)	Habitat Management Goal/Activity	Management Sub-activity
Developed	22 - Developed Low Intensity (NLCD) (Inside Urban Areas)	1.00	50.00	Increase Milkweed to Enhance Habitat and Nectar Resources	Conservation Mowing
	23 - Developed Med Intensity (NLCD)	0.50	25.00		Early Successional Habitat Development/Management
	24 - Developed High Intensity (NLCD)	0.10	10.00		Establish Field Border
	26 - Developed Low Intensity (NLCD) (Outside Urban Areas)	19.74	84.50		Herbicide Treatment to Enhance
	21 - Developed Open Space (NLCD) Linear	0.00	16.31		Planting
	25 - Developed Open Space (NLCD) Core	0.00	3.09		Prescribed Burning
					Other (Please specify in Notes)
				Increase Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Conservation Mowing
					Early Successional Habitat Development/Management
					Establish Field Border
					Herbicide Treatment to Enhance
					Planting
				Prescribed Burning	
				Other (Please specify in Notes)	
				Increase Milkweed and Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Conservation Mowing
					Early Successional Habitat Development/Management
					Establish Field Border
					Herbicide Treatment to Enhance
					Planting
				Prescribed Burning	
			Other (Please specify in Notes)		
			Mitigate Negative Impacts of Herbicide Use on Habitat and Nectar Resources	Implement EPA Guidance	
				Implement FWS Pollinator Guidance	
				Implement NRCS Integrated Pest Management	
			Mitigate Negative Impacts of Insecticide use on Habitat Quality	Implement Other Best Management Practice (Please Specify in Notes)	
				Implement EPA Guidance	
				Implement FWS Pollinator Guidance	
Roads	120 - TIGER Secondary Roads	57.15	175.00	Increase Milkweed to Enhance Habitat and Nectar Resources	Implement NRCS Integrated Pest Management
	110 - TIGER Primary Roads and Ramps	57.15	150.00		Conservation Grazing
	140 - TIGER Local Roads	57.15	100.00		Conservation Mowing
	174 - TIGER Private Roads	3.09	3.09		Early Successional Habitat Development/Management
	180 - All TIGER Roads (Inside Urban Areas)	0.00	0.00		Establish Field Border
					Herbicide Treatment to Enhance
					Implement Integrated Vegetation Management
					Planting
					Prescribed Burning
					Other (Please specify in Notes)
			Increase Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Conservation Grazing	
				Conservation Mowing	
				Early Successional Habitat Development/Management	
				Establish Field Border	

General Land Use Classification	Land Use Classification (Thogmartin et al. 2017)	Estimated Baseline Milkweed Density (Thogmartin et al., 2017)	Potential/Amended Milkweed Density (Thogmartin et al., 2017)	Habitat Management Goal/Activity	Management Sub-activity	
					Herbicide Treatment to Enhance	
					Implement Integrated Vegetation Management	
					Planting	
					Prescribed Burning	
					Other (Please specify in Notes)	
					Conservation Grazing	
					Conservation Mowing	
					Early Successional Habitat Development/Management	
					Establish Field Border	
					Herbicide Treatment to Enhance	
					Implement Integrated Vegetation Management	
					Planting	
					Prescribed Burning	
					Other (Please specify in Notes)	
					Conservation Mowing	
				Other (Please specify in Notes)		
				Implement EPA Guidance		
				Implement FWS Pollinator Guidance		
				Implement NRCS Integrated Pest Management		
				Implement Other Best Management Practice (Please Specify in Notes)		
Barren	31 - Barren (NLCD)	0.00	0.00	Increase Milkweed to Enhance Habitat and Nectar Resources	Early Successional Habitat Development/Management	
					Planting	
					Other (Please specify in Notes)	
				Increase Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Early Successional Habitat Development/Management	
					Planting	
					Other (Please specify in Notes)	
				Increase Milkweed and Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Early Successional Habitat Development/Management	
					Planting	
					Other (Please specify in Notes)	
Forest	41 - Deciduous Forest (NLCD)	0.00	0.00	Increase Milkweed to Enhance Habitat and Nectar Resources	Brush Management	
	42 - Evergreen Forest (NLCD)	0.00	0.00		Conservation Grazing	
	43 - Mixed Forest (NLCD)	0.00	0.00		Early Successional Habitat Development/Management	
					Establish Field Border	
					Establish Riparian Herbaceous Cover	
					Open Canopy	
					Planting	
					Prescribed Burning	
					Range Planting	
					Other (Please specify in Notes)	
					Increase Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Brush Management
						Conservation Grazing
			Early Successional Habitat Development/Management			
			Establish Field Border			
			Establish Riparian Herbaceous Cover			
			Open Canopy			
			Planting			
				Prescribed Burning		
				Range Planting		

General Land Use Classification	Land Use Classification (Thogmartin et al. 2017)	Estimated Baseline Milkweed Density (Thogmartin et al., 2017)	Potential/Amended Milkweed Density (Thogmartin et al., 2017)	Habitat Management Goal/Activity	Management Sub-activity	
				Increase Milkweed and Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Other (Please specify in Notes)	
					Brush Management	
					Conservation Grazing	
					Early Successional Habitat Development/Management	
					Establish Field Border	
					Establish Riparian Herbaceous Cover	
					Open Canopy	
					Planting	
					Prescribed Burning	
					Range Planting	
					Other (Please specify in Notes)	
					Implement Land Protection to Prevent Loss of Habitat and Nectar Resources	Land Purchase
						Protect as Easement
						Other (Please specify in Notes)
			Mitigate Negative Impacts of Insecticide use on Habitat Quality	Implement EPA Guidance		
				Implement FWS Pollinator Guidance		
				Implement NRCS Integrated Pest Management		
				Implement Other Best Management Practice (Please Specify in Notes)		
Grassland	76 - Grassland (NLCD)	3.09	40.00	Increase Milkweed to Enhance Habitat and Nectar Resources	Brush Management	
	77 - Grassland (NLCD) PADUS Protected	3.09	250.00		Conservation Cover	
					Conservation Grazing	
					Conservation Mowing	
					Early Successional Habitat Development/Management	
					Establish Field Border	
					Establish Riparian Herbaceous Cover	
					Forage Harvest Management	
					Herbicide Treatment to Enhance	
					Native Grassland Management	
					Planting	
					Prescribed Burning	
					Range Planting	
					Other (Please specify in Notes)	
					Brush Management	
					Conservation Cover	
					Conservation Grazing	
					Conservation Mowing	
					Early Successional Habitat Development/Management	
					Establish Field Border	
					Establish Riparian Herbaceous Cover	
					Forage Harvest Management	
			Herbicide Treatment to Enhance			
			Native Grassland Management			
			Planting			
			Prescribed Burning			
			Range Planting			
			Other (Please specify in Notes)			
			Brush Management			

General Land Use Classification	Land Use Classification (Thogmartin et al. 2017)	Estimated Baseline Milkweed Density (Thogmartin et al., 2017)	Potential/Amended Milkweed Density (Thogmartin et al., 2017)	Habitat Management Goal/Activity	Management Sub-activity	
				Increase Milkweed and Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Conservation Cover	
					Conservation Grazing	
					Conservation Mowing	
					Early Successional Habitat Development/Management	
					Establish Field Border	
					Establish Riparian Herbaceous Cover	
					Forage Harvest Management	
					Herbicide Treatment to Enhance	
					Native Grassland Management	
					Planting	
					Prescribed Burning	
					Range Planting	
					Other (Please specify in Notes)	
					Mitigate Negative Impacts of Grazing on Habitat and Nectar Resources	Conservation Grazing
						Other (Please specify in Notes)
			Mitigate Negative Impacts of Mowing on Habitat and Nectar Resources	Conservation Mowing		
				Other (Please specify in Notes)		
			Mitigate Negative Impacts of Improper Fire Regime on Habitat and Nectar Resources	Prescribed Burning		
				Other (Please specify in Notes)		
			Implement Land Protection to Prevent Loss of Habitat and Nectar Resources	Land Purchase		
				Protect as Easement		
				Other (Please specify in Notes)		
Transmission Line ROW	100 - HSIP Transmission Line (Outside Urban Areas)	3.09	150.00	Increase Milkweed to Enhance Habitat and Nectar Resources	Brush Management	
	101 - HSIP Transmission Line (Inside Urban Areas)	0.00	0.00		Conservation Grazing	
					Conservation Mowing	
					Designate as Conservation Area	
					Early Successional Habitat Development/Management	
					Establish Field Border	
					Herbicide Treatment to Enhance	
					Implement Integrated Vegetation Management	
					Planting	
					Prescribed Burning	
					Other (Please specify in Notes)	
					Brush Management	
					Conservation Grazing	
					Conservation Mowing	
					Designate as Conservation Area	
			Early Successional Habitat Development/Management			
			Establish Field Border			
			Herbicide Treatment to Enhance			
			Implement Integrated Vegetation Management			
			Planting			
			Prescribed Burning			
			Other (Please specify in Notes)			
			Increase Milkweed and Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Brush Management		
				Conservation Grazing		
				Conservation Mowing		

General Land Use Classification	Land Use Classification (Thogmartin et al. 2017)	Estimated Baseline Milkweed Density (Thogmartin et al., 2017)	Potential/Amended Milkweed Density (Thogmartin et al., 2017)	Habitat Management Goal/Activity	Management Sub-activity
					Designate as Conservation Area
					Early Successional Habitat Development/Management
					Establish Field Border
					Herbicide Treatment to Enhance
					Implement Integrated Vegetation Management
					Planting
					Prescribed Burning
					Other (Please specify in Notes)
					Implement EPA Guidance
				Mitigate Negative Impacts of Herbicide Use on Habitat and Nectar Resources	Implement FWS Pollinator Guidance
					Implement NRCS Integrated Pest Management
					Implement Other Best Management Practice (Please Specify in Notes)
				Mitigate Negative Impacts of Mowing on Habitat and Nectar Resources	Conservation Mowing
				Other (Please specify in Notes)	
Rail Line ROW	200 - TIGER Rails (Outside Urban Areas)	3.09	200.00	Increase Milkweed to Enhance Habitat and Nectar Resources	Brush Management
	201 - TIGER Rails (Inside Urban Areas)	0.00	0.00		Conservation Grazing
					Conservation Mowing
					Early Successional Habitat Development/Management
					Establish Field Border
					Herbicide Treatment to Enhance
					Implement Integrated Vegetation Management
					Planting
					Prescribed Burning
					Other (Please specify in Notes)
				Increase Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Brush Management
					Conservation Grazing
					Conservation Mowing
					Early Successional Habitat Development/Management
					Establish Field Border
					Herbicide Treatment to Enhance
					Implement Integrated Vegetation Management
					Planting
					Prescribed Burning
					Other (Please specify in Notes)
				Increase Milkweed and Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Brush Management
					Conservation Grazing
					Conservation Mowing
					Early Successional Habitat Development/Management
					Establish Field Border
					Herbicide Treatment to Enhance
					Implement Integrated Vegetation Management
			Planting		
			Prescribed Burning		
			Other (Please specify in Notes)		
			Mitigate Negative Impacts of Herbicide Use on Habitat and Nectar Resources	Implement EPA Guidance	
				Implement FWS Pollinator Guidance	
				Implement NRCS Integrated Pest Management	

General Land Use Classification	Land Use Classification (Thogmartin et al. 2017)	Estimated Baseline Milkweed Density (Thogmartin et al., 2017)	Potential/Amended Milkweed Density (Thogmartin et al., 2017)	Habitat Management Goal/Activity	Management Sub-activity	
					Implement Other Best Management Practice (Please Specify in Notes)	
				Mitigate Negative Impacts of Mowing on Habitat and Nectar Resources	Conservation Mowing	
					Other (Please specify in Notes)	
Shrubland	S2 - Shrubland (NLCD)	3.09	3.09	Increase Milkweed to Enhance Habitat and Nectar Resources	Brush Management	
					Conservation Cover	
					Conservation Grazing	
					Conservation Mowing	
					Early Successional Habitat Development/Management	
					Establish Field Border	
					Establish Riparian Herbaceous Cover	
					Forage Harvest Management	
					Herbicide Treatment to Enhance	
					Planting	
					Prescribed Burning	
					Range Planting	
					Other (Please specify in Notes)	
					Increase Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Brush Management
						Conservation Cover
				Conservation Grazing		
				Conservation Mowing		
				Early Successional Habitat Development/Management		
				Establish Field Border		
				Establish Riparian Herbaceous Cover		
				Forage Harvest Management		
				Herbicide Treatment to Enhance		
				Planting		
				Prescribed Burning		
				Range Planting		
				Other (Please specify in Notes)		
				Increase Milkweed and Blooming Nectar Plants to Enhance Habitat and Nectar Resources		Brush Management
						Conservation Cover
					Conservation Grazing	
					Conservation Mowing	
			Early Successional Habitat Development/Management			
			Establish Field Border			
			Establish Riparian Herbaceous Cover			
			Forage Harvest Management			
			Herbicide Treatment to Enhance			
			Planting			
			Prescribed Burning			
			Range Planting			
			Other (Please specify in Notes)			
			Mitigate Negative Impacts of Grazing on Habitat and Nectar Resources		Conservation Grazing	
					Other (Please specify in Notes)	
			Mitigate Negative Impacts of Mowing on Habitat and Nectar Resources	Conservation Mowing		
				Other (Please specify in Notes)		
			Mitigate Negative Impacts of Improper Fire Regime on Habitat and Nectar Resources	Prescribed Burning		
				Other (Please specify in Notes)		

General Land Use Classification	Land Use Classification (Thogmartin et al. 2017)	Estimated Baseline Milkweed Density (Thogmartin et al., 2017)	Potential/Amended Milkweed Density (Thogmartin et al., 2017)	Habitat Management Goal/Activity	Management Sub-activity	
Cropland				Implement Land Protection to Prevent Loss of Habitat and Nectar Resources	Land Purchase	
					Protect as Easement	
					Other (Please specify in Notes)	
		1 - Corn LOW	0.05	4.04	Increase Milkweed to Enhance Habitat and Nectar Resources	Brush Management
		14 - Soybeans LOW	0.05	4.04		Conservation Cover
		3 - Other Crops (CDL) LOW	3.09	5.56		Conservation Grazing
		4 - Other Crops (CDL) MEDIUM	5.30	7.74		Early Successional Habitat Development/Management
		5 - Other Crops (CDL) HIGH	7.50	9.93		Enroll in CRP and Implement Qualifying CP
		6 - Fallow Idle (CDL) HIGH	3.09	4.05		Enroll in CSP and Implement Qualifying CP
		7 - Fruit Xmas Trees Vines (CDL) LOW	3.09	5.56		Enroll in EQIP and Implement Qualifying CP
		8 - Fruit Xmas Trees Vines (CDL) MEDIUM	5.30	7.74		Enroll in WRE and Implement Qualifying CP
		9 - Fruit Xmas Trees Vines (CDL) HIGH	7.50	9.93		Establish Field Border
		2 - Corn LOW (Marginal)	0.05	200.00		Establish Riparian Herbaceous Cover
		15 - Soybeans LOW (Marginal)	0.05	200.00		Forage Harvest Management
						Herbicide Treatment to Enhance
						Planting
						Prescribed Burning
						Range Planting
					Strip Disking/Tillage to Enhance	
					Other (Please specify in Notes)	
					Increase Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Brush Management
						Conservation Cover
						Conservation Grazing
						Early Successional Habitat Development/Management
						Enroll in CRP and Implement Qualifying CP
						Enroll in CSP and Implement Qualifying CP
						Enroll in EQIP and Implement Qualifying CP
						Enroll in WRE and Implement Qualifying CP
				Establish Field Border		
				Establish Riparian Herbaceous Cover		
				Forage Harvest Management		
				Herbicide Treatment to Enhance		
				Planting		
				Prescribed Burning		
				Range Planting		
				Strip Disking/Tillage to Enhance		
				Other (Please specify in Notes)		
				Increase Milkweed and Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Brush Management	
					Conservation Cover	
					Conservation Grazing	
					Early Successional Habitat Development/Management	
					Enroll in CRP and Implement Qualifying CP	
				Enroll in CSP and Implement Qualifying CP		
				Enroll in EQIP and Implement Qualifying CP		
				Enroll in WRE and Implement Qualifying CP		
				Establish Field Border		

General Land Use Classification	Land Use Classification (Thogmartin et al. 2017)	Estimated Baseline Milkweed Density (Thogmartin et al., 2017)	Potential/Amended Milkweed Density (Thogmartin et al., 2017)	Habitat Management Goal/Activity	Management Sub-activity	
					Establish Riparian Herbaceous Cover	
					Forage Harvest Management	
					Herbicide Treatment to Enhance	
					Planting	
					Prescribed Burning	
					Range Planting	
					Strip Disking/Tillage to Enhance	
				Other (Please specify in Notes)	Implement EPA Guidance	
				Mitigate Negative Impacts of Herbicide Use on Habitat and Nectar Resources	Implement FWS Pollinator Guidance	
					Implement NRCS Integrated Pest Management	
					Implement Other Best Management Practice (Please Specify in Notes)	
				Mitigate Negative Impacts of Insecticide use on Habitat Quality	Implement EPA Guidance	
					Implement FWS Pollinator Guidance	
					Implement NRCS Integrated Pest Management	
			Mitigate Negative Impacts of Haying on Habitat and Nectar Resources	Implement Other Best Management Practice (Please Specify in Notes)		
				Implement Pollinator Appropriate Haying Plan		
				Other (Please specify in Notes)		
Hay/Pasture	10 - Hay Alfalfa (CDL) LOW	3.09	40.00	Increase Milkweed to Enhance Habitat and Nectar Resources	Brush Management	
	78 - Pasture (NLCD)	3.09	40.00		Conservation Cover	
	79 - Pasture (NLCD) PADUS Protected	3.09	126.55		Conservation Grazing	
					Conservation Mowing	
					Early Successional Habitat Development/Management	
					Enroll in CRP and Implement Qualifying CP	
					Enroll in CSP and Implement Qualifying CP	
					Enroll in EQIP and Implement Qualifying CP	
					Enroll in WRE and Implement Qualifying CP	
					Establish Field Border	
					Establish Riparian Herbaceous Cover	
					Forage Harvest Management	
					Herbicide Treatment to Enhance	
					Planting	
					Prescribed Burning	
					Range Planting	
					Strip Disking/Tillage to Enhance	
					Other (Please specify in Notes)	Brush Management
					Increase Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Conservation Cover
				Conservation Grazing		
			Conservation Mowing			
			Early Successional Habitat Development/Management			
			Enroll in CRP and Implement Qualifying CP			
			Enroll in CSP and Implement Qualifying CP			
			Enroll in EQIP and Implement Qualifying CP			
			Enroll in WRE and Implement Qualifying CP			
			Establish Field Border			
				Establish Riparian Herbaceous Cover		

General Land Use Classification	Land Use Classification (Thogmartin et al. 2017)	Estimated Baseline Milkweed Density (Thogmartin et al., 2017)	Potential/Amended Milkweed Density (Thogmartin et al., 2017)	Habitat Management Goal/Activity	Management Sub-activity
					Forage Harvest Management
					Herbicide Treatment to Enhance
					Planting
					Prescribed Burning
					Range Planting
					Strip Disking/Tillage to Enhance
					Other (Please specify in Notes)
					Brush Management
					Conservation Cover
					Conservation Grazing
					Conservation Mowing
					Early Successional Habitat Development/Management
					Enroll in CRP and Implement Qualifying CP
					Enroll in CSP and Implement Qualifying CP
					Enroll in EQIP and Implement Qualifying CP
					Enroll in WRE and Implement Qualifying CP
					Establish Field Border
					Establish Riparian Herbaceous Cover
					Forage Harvest Management
					Herbicide Treatment to Enhance
					Planting
					Prescribed Burning
					Range Planting
					Strip Disking/Tillage to Enhance
					Other (Please specify in Notes)
					Implement EPA Guidance
					Implement FWS Pollinator Guidance
					Implement NRCS Integrated Pest Management
					Implement Other Best Management Practice (Please Specify in Notes)
					Implement EPA Guidance
				Implement FWS Pollinator Guidance	
				Implement NRCS Integrated Pest Management	
				Implement Other Best Management Practice (Please Specify in Notes)	
				Implement Pollinator Mowing Plan to Prevent Loss of Habitat and Nectar Resources	
				Conservation Mowing	
				Other (Please specify in Notes)	
				Implement Pollinator Grazing Plan to Prevent Loss of Habitat and Nectar Resources	
				Conservation Grazing	
				Other (Please specify in Notes)	
				Implement Pollinator Haying Plan to Prevent Loss of Habitat and Nectar Resources	
				Implement Pollinator Appropriate Haying Plan	
				Other (Please specify in Notes)	
Wetlands	95 - Herbaceous Wetlands (NLCD)	61.37	68.16	Increase Milkweed to Enhance Habitat and Nectar Resources	Conservation Mowing
	90 - Woody Wetlands (NLCD)	61.37	68.16		Drawdown
					Early Successional Habitat Development/Management
					Enroll in WRE and Implement Qualifying CP
					Establish Riparian Herbaceous Cover
					Herbicide Treatment to Enhance
					Planting
				Prescribed Burning	
				Other (Please specify in Notes)	

General Land Use Classification	Land Use Classification (Thogmartin et al. 2017)	Estimated Baseline Milkweed Density (Thogmartin et al., 2017)	Potential/Amended Milkweed Density (Thogmartin et al., 2017)	Habitat Management Goal/Activity	Management Sub-activity
				Increase Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Conservation Mowing
					Drawdown
					Early Successional Habitat Development/Management
					Enroll in WRE and Implement Qualifying CP
					Establish Riparian Herbaceous Cover
					Herbicide Treatment to Enhance
					Planting
					Prescribed Burning
					Other (Please specify in Notes)
				Increase Milkweed and Blooming Nectar Plants to Enhance Habitat and Nectar Resources	Conservation Mowing
					Drawdown
					Early Successional Habitat Development/Management
					Enroll in WRE and Implement Qualifying CP
					Establish Riparian Herbaceous Cover
					Herbicide Treatment to Enhance
					Planting
					Prescribed Burning
					Other (Please specify in Notes)
Unspecified	Unspecified				

Appendix C. Land Use Type Definitions

Land use types refer to those used in Thogmartin et al., 2017 and are derived from a number of datasets, including Cropland Data Layer (CDL), National Land Cover Dataset (NLCD), Topologically Integrated Geographic Encoding and Referencing (TIGER), and Homeland Security Infrastructure Program (HSIP).

- The majority of the agricultural land use types were derived from the Cropland Data Layer. Designations of “LOW,” “MEDIUM,” or “HIGH” indicate the relative amenability or potential for milkweed introduction. Corn and soybean fields within the CDL were further divided as “marginal” according to their Crop Productivity Index as defined in the 2012 National Commodity Crop Productivity Index distributed by the Soil Survey Geographic Database (https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_053627). See Appendix 3 of the Monarch Conservation Plan User’s Manual (https://www.umesc.usgs.gov/management/dss/monarch/desktop_monarch_conservation_planning_tools.html) for the following definitions:
 - 1 - Corn LOW
 - 2 - Corn LOW (Marginal)
 - 3 - Other Crops (CDL) LOW
 - 4 - Other Crops (CDL) MEDIUM
 - 5 - Other Crops (CDL) HIGH
 - 6 - Fallow Idle (CDL) HIGH
 - 7 - Fruit Xmas Trees Vines (CDL) LOW
 - 8 - Fruit Xmas Trees Vines (CDL) MEDIUM
 - 9 - Fruit Xmas Trees Vines (CDL) HIGH
 - 10 - Hay Alfalfa (CDL) LOW
 - 14 - Soybeans LOW
 - 15 - Soybeans LOW (Marginal)
- The definitions of the developed land use types are from the National Land Cover Dataset (<https://www.mrlc.gov/nlcd2011.php>) but are divided into certain categories (i.e. linear, core, within urban, outside urban) by processing the Cropland Data Layer. (https://www.nass.usda.gov/Research_and_Science/Cropland/SARS1a.php).
 - 21 - Developed Open Space (NLCD) Linear: areas at the edge of open space with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. A process was implemented to identify linear, single-cell width areas of developed open space.
 - 22 - Developed Low Intensity (NLCD) (Inside Urban Areas): areas within urban and suburban landscapes with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover.
 - 23 - Developed Med Intensity (NLCD): areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover.
 - 24 - Developed High Intensity (NLCD): highly developed areas where people reside or work in high numbers. Impervious surfaces account for 80% to 100% of the total cover.

- 25 - Developed Open Space (NLCD) Core: areas on the interior of open space with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. A process was implemented to identify linear, single-cell width areas of developed open space. Those remaining areas of developed open space area were defined as “core”.
- 26 - Developed Low Intensity (NLCD) (Outside Urban Areas): areas at the edge of urban and suburban landscapes with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover.
- The definition of the following land use types are from the National Land Cover Dataset (<https://www.mrlc.gov/nlcd2011.php>):
 - 31 - Barren (NLCD): areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
 - 41 - Deciduous Forest (NLCD): areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
 - 42 - Evergreen Forest (NLCD): areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
 - 43 - Mixed Forest (NLCD): areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.
 - 52 - Shrubland (NLCD): areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
 - 76 - Grassland (NLCD): areas dominated by graminoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
 - 77 - Grassland (NLCD) PADUS Protected: areas that are under conservation protection per the Protected Areas Database (<https://gapanalysis.usgs.gov/padus/>) and dominated by graminoid or herbaceous vegetation, generally greater than 80% of total vegetation.
 - 78 - Pasture (NLCD): areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.
 - 79 - Pasture (NLCD) PADUS Protected: areas of grasses, legumes, or grass-legume mixtures that are under conservation protection per the Protected Areas Database (<https://gapanalysis.usgs.gov/padus/>). Pasture/hay vegetation accounts for greater than 20% of total vegetation.
 - 90 - Woody Wetlands (NLCD): areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

- 95 - Herbaceous Wetlands (NLCD): areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
- Transmission line data is from the Homeland Security Infrastructure Program (<https://www.dhs.gov/infrastructure-information-partnerships>) and is defined as electric power transmission lines
 - 100 - HSIP Transmission Line (Outside Urban Areas): electric power transmission lines outside urban (see: Developed High Intensity) areas
 - 101 - HSIP Transmission Line (Inside Urban Areas): electric power transmission lines within urban (see: Developed High Intensity) areas
- Road and rail data are U.S. Census Bureau Topologically Integrated Geographic Encoding and Referencing (TIGER) products (<https://www.census.gov/geo/maps-data/data/tiger.html>)
 - 110 - TIGER Primary Roads and Ramps: primary roads are generally divided, limited-access highways within the interstate highway system or under state management, and are distinguished by the presence of interchanges. These highways are accessible by ramps and may include some toll highways. A ramp is a road that allows controlled access from adjacent roads onto a limited access highway, often in the form of a cloverleaf interchange. These roads are unaddressable.
 - 120 - TIGER Secondary Roads: secondary roads are main arteries, usually in the U.S. Highway, State Highway or County Highway system. These roads have one or more lanes of traffic in each direction, may or may not be divided, and usually have at-grade intersections with many other roads and driveways. They often have both a local name and a route number.
 - 140 - TIGER Local Roads: generally, a paved non-arterial street, road, or byway that usually has a single lane of traffic in each direction. Roads in this feature class may be privately or publicly maintained. Scenic park roads would be included in this feature class, as would (depending on the region of the country) some unpaved roads.
 - 174 - TIGER Private Roads: a road within private property that is privately maintained for service, extractive, or other purposes. These roads are often unnamed.
 - 180 - All TIGER Roads (Inside Urban Areas): roads within urban (see: Developed High Intensity) areas
 - 200 - TIGER Rails (Outside Urban Areas): rail road lines outside urban (see: Developed High Intensity) areas
 - 201 - TIGER Rails (Inside Urban Areas): rail road lines within urban (see: Developed High Intensity) areas
- Unspecified: please only use the “unspecified” option if a dominant land use type cannot be reasonably determined

Appendix D. Sub-activity Definitions

- Brush Management (Natural Resources Conservation Service Practice 314): management or removal of woody (non-herbaceous or succulent) plants including those that are invasive and noxious to create, enhance, or restore monarch habitat
- Conservation Cover (Natural Resource Conservation Service Practice 528): establishing and maintaining permanent vegetative cover to create, enhance, or restore monarch habitat
- Conservation Grazing (Natural Resources Conservation Service Practice 528): controlled harvest of vegetation with grazing animals to create, enhance, or restore monarch habitat
- Conservation Mowing: mowing to create, enhance, or restore monarch habitat
- Designate as Conservation Area: protecting and preserving a parcel or parcels of utility rights-of-way as habitat to create, enhance, or restore monarch habitat
- Drawdown: management of water levels in a man-made reservoir to create, enhance, or restore monarch habitat
- Early Successional Habitat Development/Management (Natural Resources Conservation Service Practice 647): manage plant succession to develop and maintain early successional habitat to benefit desired wildlife and/or natural communities
- Enroll in CRP and Implement Qualifying CP: enroll land in the Farm Service Agency's Conservation Reserve program qualifying conservation practices (see supplemental materials for qualifying practices: <http://iopscience.iop.org/article/10.1088/1748-9326/aa7637>)
- Enroll in CSP and Implement Qualifying CP: enroll in the Natural Resource Conservation Service's Conservation Stewardship Program and implement qualifying core conservation practice outlined in Table 1 of the 2016 Monarch Butterfly Conference Report (<https://www.fws.gov/savethemonarch/pdfs/MonarchConferenceReport2016.pdf>)
- Enroll in EQIP and Implement Qualifying CP: enroll in the Natural Resource Conservation Service's Environmental Quality Incentives Program and implement qualifying core conservation practice outlined in Table 1 of the 2016 Monarch Butterfly Conference Report (<https://www.fws.gov/savethemonarch/pdfs/MonarchConferenceReport2016.pdf>)
- Enroll in WRE and Implement Qualifying CP: enroll in the Natural Resource Conservation Service's Wetlands Reserve Easement program and implement qualifying core conservation practice outlined in Table 1 of the 2016 Monarch Butterfly Conference Report (<https://www.fws.gov/savethemonarch/pdfs/MonarchConferenceReport2016.pdf>)
- Establish Field Border (Natural Resources Conservation Service Conservation Practice 386): a strip of permanent vegetation established at the edge or around the perimeter of a field to create, enhance, or restore monarch habitat
- Establish Riparian Herbaceous Cover (Natural Resources Conservation Service Practice 390): grasses, sedges, rushes, ferns, legumes and forbs tolerant of intermittent flooding or saturated soils, established or managed as the dominant vegetation in the transitional zone between upland and aquatic habitats to create, enhance, or restore monarch habitat
- Forage Harvest Management (Natural Resources Conservation Service Practice 511): timely cutting and removal of forages from the field as hay, green-chop or ensilage to create, enhance, or restore monarch habitat

- Herbicide Treatment to Enhance: use of chemical herbicides to prepare the site for habitat creation, enhancement or restoration; using herbicides to control undesirable vegetation
- Implement EPA Guidance: implement U.S. Environmental Protection Agency guidance to reduce pesticide exposure to non-target wildlife and/or plants (for example, see <https://www.epa.gov/pollinator-protection/2013-summit-reducing-exposure-dust-treated-seed>)
- Implement FWS Pollinator Guidance: implementing methods from U.S. Fish and Wildlife Service guidance to reduce pesticide exposure to non-target wildlife and/or plants (see <https://www.fws.gov/pollinators/>)
- Implement Integrated Vegetation Management: use of biological, chemical, cultural, manual, mechanical or controlled burning techniques in utility rights-of-ways to create, enhance, or restore monarch habitat
- Implement NRCS Integrated Pest Management: implementing Natural Resource Conservation Service published methods to reduce pesticide exposure to non-target wildlife and/or plants (for example, see <https://directives.sc.egov.usda.gov/opennonwebcontent.aspx?content=34828.wba>)
- Implement Pollinator Appropriate Haying Plan: conduct haying in a way that creates, enhances, or restores monarch habitat
- Land Purchase: buying a parcel or parcels of land to prevent and protect from loss of habitat
- Native Grassland Management: managing and maintaining the site as native grassland
- Open Canopy: reducing tree canopy density to allow light to reach the understory and promote the establishment and growth of monarch habitat (i.e. milkweed and other blooming nectar plants)
- Planting:
 - Blooming nectar plants
 - Demonstration gardens
 - Educational gardens
 - Milkweed
 - Native grasses
 - Plants
 - Plugs
 - Pollinator gardens
 - Seeds
 - Urban gardens
- Prescribed Burning (Natural Resources Conservation Service Practice 338): application of a controlled fire to a predetermined area of land to create, enhance, or restore monarch habitat
- Protect as Easement: protecting a parcel or parcels of land by preserving as habitat
- Range Planting (Natural Resources Conservation Service Practice 550): establishment of adapted perennial or self-sustaining vegetation such as grasses, forbs, legumes, shrubs and trees to create, enhance, or restore monarch habitat

- Strip Disking/Tillage to Enhance: strip disking and/or tilling the soil at the site to create, enhance, or restore monarch habitat

Literature Cited

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