EXAMPLE SOLAR SITE MONITORING PLAN

2023 EDITION

phase
pollinator habitat aligned with solar energy

Example solar site monitoring plan

This document provides a template monitoring plan using the Solar Pollinator Habitat Assessment Tool on a solar site. A monitoring plan is *not required*; however, some organizations may find a plan is helpful in maintaining consistency from surveyor to surveyor (year to year), providing specifications needed for contracting, or documenting organization-specific procedures for quality control purposes. This Monitoring Plan includes two primary sections:

A. Overview, Goals, and Objectives, and
B. Sampling Design

Part A., Overview, Goals, and Objectives, encourages users to clearly outline their management and monitoring overview, goals, and objectives that underpin a desire to conduct habitat monitoring. Users are encouraged to provide at least one management and sampling objective pair when completing this monitoring plan, but more than one pair may be identified depending on site and organization characteristics. For more insight into example objectives, please refer the Management and Sampling Objectives on Solar Sites document.

Part B., Sampling Design, describes the who, what, when, where, and how of collecting monitoring data. Use the table below to summarize the sampling design elements of this plan, numbered 1 Through 10. Each section of this sampling design plan allows for further documentation of your organization's approach to monitoring. This template is provided as an example resource; we encourage you to build upon this example for your own purposes. Please refer to the Planning for Monitoring Guidance 2023 Edition for assistance completing this template.

All *blue text* included in this document is used as an example and guide only. Please enter your organization's information as appropriate when completing this template monitoring plan.

A. Overview, Goals, and Objectives

Organization Name	*Solar site owner or operator name, email*
Monitoring Plan Author	*Jane Doe, email*
Date of Completion	*MM/DD/YYYY*

Monitoring Goals		*Monitoring goals should be clearly identified and communicated to all team members prior to conducting monitoring. If there are specific monitoring goals for your organization, provide a description of the monitoring goals to share with team members.*	
The purpose of monitoring is to evaluate the essential habitat features provided by pollinator habitat established at the solar site. Monitoring is also intended to detect changes in host plant densities and flowering plant abundance.			
Management Overview		*Provide a brief description of the management plan for areas to be monitored. This will help inform the monitoring objectives and management response sections of this plan.*	
Management consists of periodic mowing of vegetation in accordance with the site Vegetation Management Plan.			
Management and Sampling Objectives		*Provide one or more pairs of management and sampling objectives (copy rows in the table below to add more). Management objectives describe the desired state of the habitat; sampling objectives describe the level of precision required to detect progress towards or achievement of each management objective. The Tier Scorecard or other assessment approach will be informed by these objectives; identify them where feasible.*	
	Management Objective	*Maintain greater than 6 milkweed stems per plot on managed lands from 2020 through 2050.*	
1	*Sampling Objective*	*Obtain estimates of milkweed stem abundance with 90% confidence intervals no wider than +/-2 milkweed stems per plot.*	*Tier 3*
	Management Objective	*Enter second management objective here.*	
2	*Sampling Objective*	*Enter second sampling objective here.*	*Enter assessment approach here.*

B. Sampling Design

1. Area of Interest	*Describe the geographic extent of the area that will be characterized with monitoring data. Attach an overview map as Appendix A (optional).*
All 100 managed pollinator acres are included in the monitoring effort. See Appendix A for map of pollinator acres on site.	
2. Sampling Protocol	*The survey protocols developed for Solar Site Habitat Assessments are provided via the User Guide* of the ROWHWG Pollinator Habitat Scorecard. *If a different monitoring protocol is used, describe any differences. Select which Tier(s) will be used. Indicate whether data collection method (paper forms, Survey123 App, other).*
The Tier 2 assessment form will be used for monitoring efforts. Protocol includes: 1. *The Survey Manager will establish the annual monitoring plan at least one month prior to sampling.* 2. *The Survey Manager will communicate any updates to Data Manager and Survey Technicians prior to commencing survey planning for the year.* 3. *The Survey Manager will work with the Data Manager to determine the extent of adopted acres to generate predetermined GIS plot selections.* 4. *The Data Manager will upload and communicate the plot locations to the Survey Manager and Technicians.* 5. *Survey Technicians will ensure that updated plot locations are available on mobile and GPS devices prior to commencing field sampling.* 6. *Protocols for sampling are described in the assessment tool User's Guide.* 7. *Monitoring data should be collected and provided to the survey manager annually no later than October 31.* 8. *Data will be uploaded to the ROWHWG Geospatial Habitat Database following final review by the Survey Manager.*	
3. Number of Plots	*Indicate the number of plots to be surveyed. Describe how this number was calculated.*
Survey staff will sample approximately 16 plots per year in accordance with the monitoring plans. This value was calculated using the Number of Plots guidance document.	
4. Plot Locations	*Sampling plots may be representative, or randomly selected within targeted acres prior to the survey. Describe the selection process used, for example: randomized using GIS, randomized field establishment, etcetera. Provide a map of survey locations if possible. Include pictures of plots where appropriate.*
Plots will be randomly distributed throughout the managed pollinator acres within the solar site using random plot generation in GIS. See Appendix B for a list of plot coordinates. Plots will be located in the field using the coordinates provided using a GPS with sub-meter accuracy. The 150 x 10-foot plot should be oriented parallel to the solar arrays in the vegetated rows, when possible. Otherwise, the data collector should rotate the plot to fit within the vegetated rows. The coordinate provided will serve as the left side of the plot as the data collector faces the plot. *If a plot cannot be accessed, the data collector will record the plot number and the reason for skipping. The data collector will first determine if an oversample plot is available nearby or will become available during the day's monitoring effort. If so, the oversample plot will be used. If not, the data collector may use a random number generator to select a bearing and a distance (within 100 meters) to locate a new plot from the safest accessible location next to the inaccessible plot. If a plot is unvegetated, in whole or in part, the data collector will proceed with data collection, recording a 0 where appropriate.*	
5. Timing	*Sampling can be conducted any time during the growing season but is ideally carried out during peak bloom. Conduct monitoring when response to vegetation management are most likely to be evident. Describe the timing expectations specific to your organization and sites.*

Sampling will occur during the active growing season for flowering nectar plants, mid-July to mid-September. When revisiting plots in subsequent years, efforts will be made to assess the plot within +/- 2 weeks of the date the plot was first assessed.

6. Equipment	*Identify required and/or optional equipment need by the survey technicians to successfully and safely complete sampling efforts.*	
Equipment	***Required?***	***Use***
PPE (personal protective equipment)	*Yes*	*Bring high-visibility vest, hat, water, sunscreen, bug spray, other items necessary based on site and contractor specifications.*
GPS unit with backup paper map, coordinates, and spatial projection	*Yes*	*Plot locations are uploaded to a GPS unit; paper maps can be used if GPS unit fails.*
Clipboard/pens or tablet/smartphone	*Yes*	*Data may be collected via paper form or monitoring app*
Solar Pollinator Habitat Assessment Tool	*Yes*	*Tier 2 version; bring paper copies in case monitoring app experiences errors.*
Survey123 App	*Optional*	*Monitoring may be completed via the Rights-of-Way as Habitat Working Group Geospatial Database mobile app.*
Flagging, marker cones, or stakes	*Optional*	*Used to mark transect boundaries*
Camera	*Optional*	*Photo document plot conditions*
Sampling binder	*Optional*	*Reference documentation such as safety forms, field protocol, and data sheets*

7. Personnel and Roles	*Provide the contact information for the organization personnel assigned to the monitoring roles (see Planning for Monitoring Guidance for role responsibilities)*
Survey Manager	
Name:	Address:
Phone:	Email:
Survey Technician	
Name:	Address:
Phone:	Email:
Survey Technician	
Name:	Address:
Phone:	Email:
Survey Technician	
Name:	Address:
Phone:	Email:
Data Manager	

Name:	Address:
Phone:	Email:
Other	
Name:	Address:
Phone:	Email:
Other	
Name:	Address:
Phone:	Email:

8. Training	*Training is recommended to orient survey staff to sampling protocols, procedures, and other pertinent information. It is recommended that personnel engaged in monitoring be trained at least once annually on:* *1. Identification of native and non-native species, including invasive and noxious weeds, milkweed species, and common nectar providing plants.* *2. Expectations of surveyors including access, communications, safety, and data quality.* *Describe training strategy that will be utilized.*

Vegetation management staff will be trained annually and periodically throughout the season on the identification of both native and non-native species, particularly invasive and noxious weeds, host plants, and nectar plant resources for pollinators. A half-day training exercise for staff conducting assessments will be held each year to orient staff to the sampling protocols and teach plant identification.

9. Data Management	*A data management strategy should be developed to ensure that data collected during monitoring efforts is properly submitted and stored for later use and review. For example:* *1. Once surveys are completed, verify sample pots are uploaded into the appropriate geospatial database.* *2. Survey technicians can any hard copy data sheets and provide copies to data managers.* *Describe the data management protocols expected of your organization.*

Data may be collected in paper form using the Solar Pollinator Habitat Assessment Tool data collection form or using the ROWHWG Geospatial Database monitoring app. Data collected on paper will be entered through the app within the week it is collected. Paper forms will be archived in by the Survey Manager and digital copies will be made.

10. Data Notification and Reporting	*Describe the data reporting protocols expected of your organization.*

1. *Notify the survey manager or data manager after each sampling event is conducted. This may allow for optimal quality control verification.*
2. *After surveys are completed, the data will be provided to the data manager and survey manager. The data gathered will be used to inform monitoring goals and complete annual reporting.*
3. *Schedule annual team review of collected monitoring data and identify adaptive management considerations when needed.*
4. *Plot data will be uploaded to the Rights-of-Way as Habitat Geospatial Database at the conclusion of each field season, no later than November 1.*
5. *The results of the data analysis will be reported to the VP of Vegetation Management annually in the fourth quarter of the calendar year. Any management response will be planned to begin the following season.*

Appendix A: Map of Area of Interest (with plot locations, optional)

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