



MILKWEED DENSITY MONITORING

Adapted from materials developed by Monarch Lab

PURPOSE

The primary goal for this protocol is to determine the milkweed density at a given site and a secondary goal is to identify species richness for nectar-rich plants. Land managers and biologists use milkweed density information to determine average milkweed densities across various habitat types throughout Missouri, as well as to ensure habitat goals are being met. Similarly, Missourians for Monarchs relies upon this information to determine whether the milkweed stem goal outlined in the “Missouri Monarch and Pollinator Conservation Plan” is being achieved. Together, milkweed density and species richness of nectar-rich plants can provide greater insight regarding quality monarch and pollinator habitat.

TIMING

Milkweed plants may not be above ground at the beginning of the growing season; therefore, density measurements should be conducted between June 15 and September 15.

PROCEDURES

Depending on the size of your site, you will use one of the three sampling methods listed below. The size of your site(s) is on the “**Site Information Sheet**,” provided to you when you were assigned a site.

METHOD A

OVERVIEW/INSTRUCTIONS - For sites small enough to visually observe and count all the milkweed stems, use “**Method A Data Entry**,” located on page 4 of this document, to record the actual number of stems and the area/size of your site.

METHOD B

OVERVIEW - For sites too large to easily count all milkweed stems, but smaller than 5 acres, you will select at least fifteen (15) randomly spaced locations, delineate a 1m x 1m (1m²) sampling-plot, and count the milkweed stems in each sampling-plot.

METHOD B INSTRUCTIONS

1. Randomly choose at least fifteen (15) sampling-plots per acre. A fun way to randomly select the sampling-plots is to toss a hula-hoop throughout the site and where ever it lands, that is the location for your sampling-plot. For an even greater level of randomization, you can determine the direction to toss the hula-hoop by throwing a pencil (or ruler, stick, etc.) into the air and use the direction the pencil is pointing to toss the hula-hoop.
2. At the chosen sampling-plot location, use a measuring device to measure a 1m x 1m (1m²) sampling-plot.
3. Count all the milkweed stems within the 1m² sampling-plot and record the information using the table under the “**Method B or C Data Entry**,” beginning on page 5 in this document.
4. You must select at least fifteen (15) 1m² sampling-plots per acre for the data to be statistically meaningful.





MILKWEED DENSITY MONITORING

Adapted from materials developed by Monarch Lab

METHOD C

OVERVIEW - For sites 5 acres or larger you will determine a path (transect) to walk, stop every 10 paces and delineate a 1m x 1m (1m²) sampling-plot, and count the milkweed stems in each sampling-plot.

METHOD C INSTRUCTIONS

1. Start at the edge, on any side of your site, and randomly choose a direction that leads inward on your site.
2. Mark this starting point with a [landscape flag](#) (or other object of your choosing). Use a measuring device to measure-out 200m and mark the end point with a landscape flag. If you cannot measure-out 200m without crossing the boundary of your site, measure-out 100m and mark the end point with a landscape flag. If you cannot measure-out 100m without crossing the boundary of your site, simply walk in a straight line until you reach the boundary of your site and mark that location with a landscape flag.
3. Return to your starting point and begin walking a path to the end of your transect. While walking the transect, stop every 10 paces, and use a measuring device to measure a 1m x 1m (1m²) sampling-plot. Use a consistent method for delineating each 1m² sampling-plot (i.e., the square is always directly to the right and in front of your right foot when you stop).
4. Count all the milkweed stems within the 1m² sampling-plot and record the information using the table under the "**Method B or C Data Entry**," beginning on page 5 in this document.
5. Take one step forward, then begin counting your next 10 paces.
6. When you reach the end of your transect, randomly choose a new direction (see below Tip) for your next transect. Repeat steps 2-5 for each defined transect. Do not worry if your transects cross each other, continue on your path as usual.
Tip: A good way to randomly select a direction is by throwing a pencil (or ruler, stick, etc.) into the air and use the direction the pencil is pointing.
7. Continue with this method until all relevant data for your site has been gathered. If you have more than 100 sampling-plots, use additional data sheets to record the information.

USEFUL INFORMATION: A 200m transect will have approximately 30 sampling-plots and a 100m transect will have approximately 15 sampling-plots.

You must take at least 15 sampling-plots per acre to be statistically meaningful, no matter the overall size of the site.

IMPORTANT INFORMATION: On sites larger than 10 acres, you do **not** need a transect on every acre, but you should distribute the transects across the site to ensure various terrain details and/or habitat types, located within your site, are included in your transects.

The goal is to sample as randomly as possible to help ensure the data obtained is representative of the whole site.



To ensure the data gathered is statistically meaningful, it is important not to allow the presence or absence of milkweed influence your choice of transects/sampling-plots.

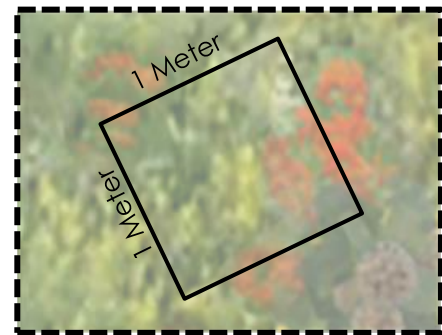


EXAMPLE OF TRANSECTS AND SAMPLING-PLOTS



Legend

| | |
|---|-------------------------------|
|  | Transect/Path |
|  | 1m ² Sampling-plot |



Note: Figure is not to scale. The sampling-plots will be farther apart than shown here.

Figure 1. Transects and Sampling-plots





DATA ENTRY SHEET

Milkweed Density Monitoring

Date: _____

Volunteer Name(s): _____

Site Name: _____

County of Site: _____ Location (GPS Coordinates): _____

Habitat Type: (Check (✓) all that apply)

| | |
|--------------------------|--|
| <input type="checkbox"/> | Agriculture (corn, soy, fruit trees, etc.) |
| <input type="checkbox"/> | Glade |
| <input type="checkbox"/> | Grassland |
| <input type="checkbox"/> | Pasture (Active or Inactive) |
| <input type="checkbox"/> | Savanna |
| <input type="checkbox"/> | Suburban/Urban |
| <input type="checkbox"/> | Woodland |

Are the sampling-plots representative of the overall site landscape and milkweed observed? Yes/No

Comments/Please not any management concerns (e.g. invasive species present, etc.):





DATA ENTRY SHEET

Milkweed Density Monitoring

Method A Data Entry

Use “**Method A Data Input**” if you are able to count all the milkweed plants at your site. Use the fields below to record the total number of milkweed plants for your site and the area/size of your site. You can record the area size in acres, square feet or square meters. Be sure to note which unit of measurement used.

Number of milkweed plants

Size/acreage of site

Unit of Measurement
 Acres
 Square Feet
 Square Meters

Method B or C Data Entry

If your site has too many milkweed plants to count, use the appropriate sampling procedure for your site, either Method B or Method C, and use the table below to record your findings. If known, record the species of milkweed or determine milkweed species with this [ID guide](#).

| Sampling Plot # | # of Milkweed Plants in 1m ² Sampling-plot | If known, list the Milkweed Species Identified in 1m ² Sampling-plot and OPTIONAL: If known, list the Nectaring Forb Species (Count is not needed) |
|-----------------|---|--|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |





DATA ENTRY SHEET

Milkweed Density Monitoring

| Sampling Plot # | # of Milkweed Plants in 1m ² Sampling-plot | If known, list the Milkweed Species Identified in 1m ² Sampling-plot and OPTIONAL: If known, list the Nectaring Forb Species (Count is not needed) |
|-----------------|---|--|
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | | |
| 29 | | |
| 30 | | |
| 31 | | |
| 32 | | |
| 33 | | |
| 34 | | |
| 35 | | |
| 36 | | |
| 37 | | |





DATA ENTRY SHEET

Milkweed Density Monitoring

| Sampling Plot # | # of Milkweed Plants in 1m ² Sampling-plot | If known, list the Milkweed Species Identified in 1m ² Sampling-plot and OPTIONAL: If known, list the Nectaring Forb Species (Count is not needed) |
|-----------------|---|--|
| 38 | | |
| 39 | | |
| 40 | | |
| 41 | | |
| 42 | | |
| 43 | | |
| 44 | | |
| 45 | | |
| 46 | | |
| 47 | | |
| 48 | | |
| 49 | | |
| 50 | | |
| 51 | | |
| 52 | | |
| 53 | | |
| 54 | | |
| 55 | | |
| 56 | | |
| 57 | | |
| 58 | | |
| 59 | | |
| 60 | | |
| 61 | | |
| 62 | | |
| 63 | | |





DATA ENTRY SHEET

Milkweed Density Monitoring

| Sampling Plot # | # of Milkweed Plants in 1m ² Sampling-plot | If known, list the Milkweed Species Identified in 1m ² Sampling-plot and OPTIONAL: If known, list the Nectaring Forb Species (Count is not needed) |
|-----------------|---|--|
| 64 | | |
| 65 | | |
| 66 | | |
| 69 | | |
| 68 | | |
| 69 | | |
| 70 | | |
| 71 | | |
| 72 | | |
| 73 | | |
| 74 | | |
| 75 | | |
| 76 | | |
| 77 | | |
| 78 | | |
| 79 | | |
| 80 | | |
| 81 | | |
| 82 | | |
| 83 | | |
| 84 | | |
| 85 | | |
| 86 | | |
| 87 | | |
| 88 | | |
| 89 | | |





DATA ENTRY SHEET

Milkweed Density Monitoring

| Sampling Plot # | # of Milkweed Plants in 1m ² Sampling-plot | If known, list the Milkweed Species Identified in 1m ² Sampling-plot and OPTIONAL: If known, list the Nectaring Forb Species (Count is not needed) |
|-----------------|---|--|
| 90 | | |
| 91 | | |
| 92 | | |
| 93 | | |
| 94 | | |
| 95 | | |
| 96 | | |
| 97 | | |
| 98 | | |
| 99 | | |
| 100 | | |

