

MONITORING PLOT SETUP

Overview

Monitoring activities typically occur in a 1-hectare monitoring plot at each site. The shape of the plots may differ based on the type of site being monitored (Table 3). Defining the plot boundaries is important to ensure that monitoring activities occur consistently in the same location at the site, that similar sized areas are assessed across sites, and that the plot size and location are properly tracked within the IMMP.

Note: If using IMMP protocols to monitor a site and the site exceeds 5 hectares, more than one plot may be placed to better characterize the site. See the **Large Sites** section below.

In all cases, 90 percent of the area must be the desired Site Type (Table 2). For example, if the desired Site Type is protected grassland, 10 percent or less could contain forest cover, water, or another Site Type.

Table 3. Description of Possible Plot Types and Their Applicability

Shape	Applicable Site Types	Dimensions (Area)
Standard rectangle*	PGS, UGS, ACL, AGC,** DEV, FOR, ROW (solar)	50m x 200m (1 ha)
Standard square	PGS, UGS, ACL, AGC,** DEV, FOR, ROW (solar)	100m x 100m (1 ha)
Irregular	PGS, UGS, ACL, AGC, DEV, FOR, ROW (solar)	Fitted to site boundaries and/or property lines (typically 0.4 – 1 ha)
Linear	ROW, AGE	500m x the width of the right-of-way or agricultural edge (approx. 1 ha)
Census	PGS, UGS, ACL, AGC, DEV, FOR, ROW (solar)	Fitted to site boundaries and/or property lines (<0.4 ha)

*The standard rectangle is the preferred layout. If a standard rectangle fits on the site, select this shape. If it does not, use the standard square. If the square does not fit, create an irregular plot.

**In agricultural fields, shift these standard shapes to the nearest field corner (Appendix D, Figure 1.d.).

In Field Plot Set-up Instructions

Mark the plot corners with flagging or pin flags if desired and permitted by the landowner or manager. Plot set-up may be completed in conjunction with a Site Description (see next section). See Appendix D and Appendix I for additional guidance and examples.

Note: If you are monitoring a randomly selected site, follow the instructions below to place the plot in an unbiased way that is representative of the landscape. **If the plot does not happen to contain milkweed, that's ok** – this is how unbiased data are collected. Do not move the plot to include milkweed. You may set up an additional *self-selected plot* to include milkweed of specific interest to you.

Standard rectangle: The standard rectangle is the preferred monitoring plot configuration and should be used if it fits within the desired Site Type. See Figure 1 for example.

1(R). Navigate to your starting point's latitude and longitude. This is Point 1, unless 2.b. or 2.c. below are applicable. Record these coordinates on your Site Description form.

2(R). Determine your Start Bearing. This is 0 degrees (North) unless any of the following apply:

a. There is a substantial elevational gradient at the site. If so, *take a compass bearing in the direction of the gradient* (so that you move across the gradient or topography) and use this bearing in Step 3.

b. The standard rectangle (200 m x 50 m) does not fit on the site if it is orientated north. If so, rotate the rectangle clockwise and *take a compass bearing in the first direction that allows the rectangle to fit*.

c. The site is a crop field (AGC). If so, place the plot corner at the nearest field corner to accommodate access (rather than using the sampling point in the middle of the field).

Take a compass bearing that allows the length of the rectangle to parallel the crop rows.

d. The standard rectangle will not fit on the site even if it is rotated around the sampling point. If so, you may *shift the plot slightly* to allow the rectangle to fit, as long as the original random point falls within the plot. In this case, take a new point at the location where the first corner now falls.

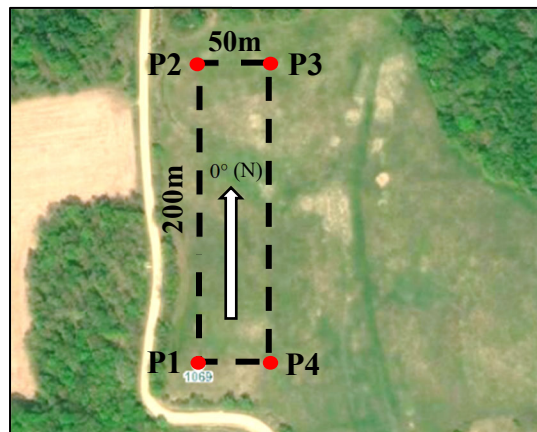


Figure 1. Standard rectangle plot setup. This plot is oriented to the north (0 degrees) but may be rotated when necessary to fit within the site.

3(R). Use a transect tape, GPS, or phone/tablet tracking app to walk **200 m** in the direction of the bearing determined in Step 2.

4(R). Record the latitude and longitude for your new location, Point 2, on the Site Description Form.

5(R). Add 90 degrees to your original compass bearing (turn right) and walk **50 m** in that direction (or subtract 90 degrees and turn left if the plot does not fit to the right). Record the direction that you turned at P2 (left or right) on your Site Description form.

6(R). Record the latitude and longitude for your new location, Point 3, on the Site Description Form.

7(R). Add 90 degrees to your current compass bearing (turn right) and walk **200 m** in that direction (or subtract 90 degrees if you are fitting the plot to the left).

8(R). Record the latitude and longitude for your new location, Point 4, on the Site Description Form. Your monitoring plot is now mapped.

Standard square: Use a standard square design if the standard rectangle does not fit within the site. See Figure 2 for example.

- 1(S). Navigate to your point's latitude and longitude. This is Point 1. Record these coordinates on your Site Description form if not done so already.
- 2(S). Follow Steps 2(R).2-2(R).8 for the standard rectangle above but walk **100 m** in each direction instead of walking 200m or 50m.

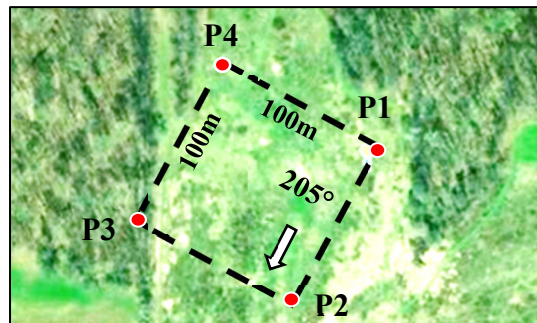


Figure 2. Standard square plot setup. This plot is oriented to 205 degrees, approx. southwest.

Irregular: Irregularly shaped plots are used when standard rectangles or squares do not fit. Irregular plots are typically used for the entire area of a **small field**, in **developed areas** to align with property boundaries, or on **solar sites** within panels (Figure 3 or Figure 5 for solar). See the Solar Sites section below. The site area should be a minimum of 0.4 ha (1 acre) to accommodate transects in Activity 1. For smaller sites, see Census below.

- 1(I). Navigate to your sampling point coordinates.
- 2(I). Select a point at the field's edge, such as the southwest corner, to begin mapping your plot. Record the latitude and longitude; this is Point 1.
- 3(I). Walk clockwise around the field. Stop at corners or sharp curves and record the latitude and longitude, so that four points are recorded. Your plot is now mapped.

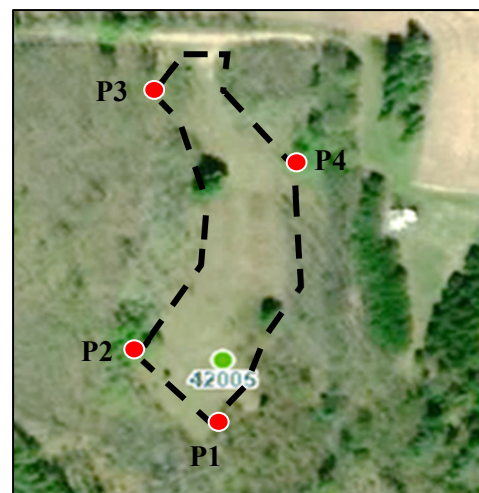


Figure 3. Irregular plot setup. This observer recorded four points that help visualize where the plot was placed. The original sampling point, 42006, is contained within the plot and does not need to be a corner.

Linear: Linear plots are used on most rights-of-way and some agricultural edges where the width is <50 m (Figure 4).

- 1(L). Navigate to your point's latitude and longitude, taking care not to enter the roadway. Record these coordinates on your Site Description form if not done so already.
- 2(L). Select a direction of travel below.
 - a. On roadsides, travel in the direction of oncoming traffic.
 - b. If (a) is not applicable, travel in the direction of any visible elevation gradient.
 - c. If neither (a) nor (b) are applicable, flip a coin to randomly determine the direction.
- 3(L). Use a transect tape, GPS, or phone tracking app to walk **500 m** in the direction determined in Step 2.
- 4(L). Record the latitude and longitude for the location on your Site Description form. This is Point 2.

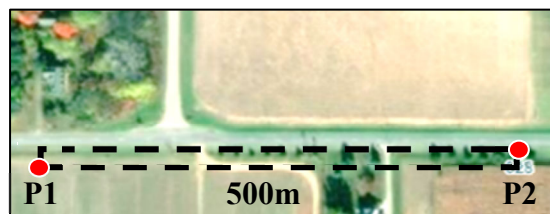


Figure 4. Linear plot setup. This plot extends toward the west from the sampling point, against the flow of traffic. It extends the full width (N to S) or the right-of-way.

Linear plots extend the full width of the right-of-way or agricultural edge, up to 50m, in which case a 200 x 50m plot should be used. The width may vary across the plot if the right-of-way or agricultural edge width varies. There is no need to take additional GPS points to map these locations (you can leave the point 3 and 4 spots blank on the datasheet); record the right-of-way or edge width on the Site Description form.

Census: Census plots are used on small sites when standard rectangles or squares do not fit, and the plot area is less than 0.4 ha (1 acre). Census plots typically fill the entire area of a small field or developed area to align with property or garden boundaries. Activity 1 surveys are modified because the small site cannot accommodate transects. Activity 3 should not be conducted if the plot perimeter is less than 400 m.

Large Sites (e.g., conservation projects)

Because the IMMP plots are limited to 1 hectare, **it is recommended (but not required) to place one plot for each 5 hectares on large project areas**. Always place a plot where a random priority plot exists (see <https://bit.ly/RandomSiteSelection>). Next, consider your monitoring priorities. Stratify plots to capture the full spectrum of habitat on the project area (e.g., a representative central space, on each side of a hill, across an expanse of exposed soil with a different plant community). The number of plots to establish is up to the discretion of the land manager, based on the heterogeneity of the habitat and their information needs.

Solar Sites

On solar sites, plots can be established in areas that contain solar panels (**Solar within panels**) or in open areas at the edge of the solar site (**Solar outside panels**).

For Solar (outside panels), place a standard rectangle plot. If this shape does not fit, establish a standard square, irregular, linear, or census plot.

Solar sites (within panels) are recorded as irregular plots. Although a solar plot (within panels) may be the same size or shape as a standard plot, vegetation data (Activity 1) are collected in a specialized way due to the rows of panels, requiring an irregular plot designation. Establish a 50 m x 200 m rectangular plot that maximizes the number of panel rows contained within the plot (Figure 5). If this shape does not fit, establish a square (100 m x 100 m) plot or irregularly-shaped plot within the solar site. Note that the maximum plot size is 1 hectare, so there is no need to survey the entire solar site. Orient solar plots perpendicular to the panel rows (Figure 5).

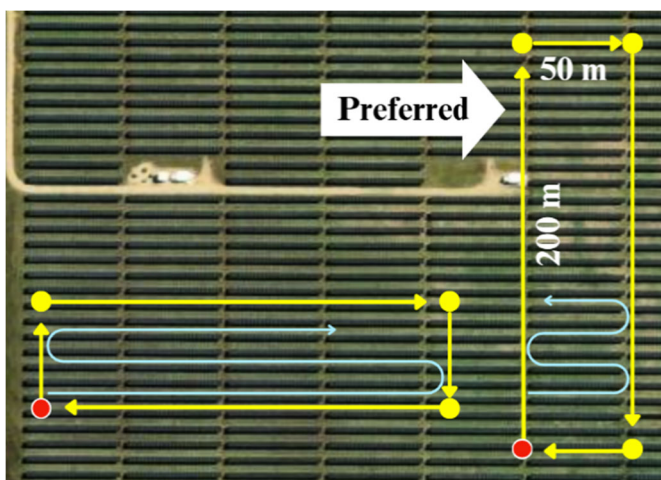


Figure 5. Solar (within panels) plot setup. Orient solar plots perpendicular to the panel rows as in the plot on the right.