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Rangeland Monitoring Frame and Construction Guide

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Introduction

The objective of rangeland vegetation trend monitoring is to document changes over time in vegetation or other rangeland resources. Common methods often used together throughout Arizona and the west include Point Ground Cover, Pace Frequency, Dry-Weight Rank, and Comparative Yield. Further details regarding these methods and ground rules can be found in Sampling Vegetation Attributes (Interagency Technical Manual, 1996), Guide to Rangeland Monitoring and Assessment (Smith et al., 2012), or Southeastern Arizona Monitoring Program: Methods and Ground Rules (McReynolds and Brischke, 2015). This suite of rangeland monitoring methods can be conducted using a single piece of equipment, a monitoring frame (Photo 1).

Selection of proper frame size, or quadrat size, is the most important consideration in using frequency sampling. Frequency of a plant species cannot be evaluated over time or areas unless the same frame size is used (Smith et al., 2012).

Photo 1. Rangeland monitoring frame

There are costs and benefits to frame size. Larger frames increase the probability of a species occurring in the quadrat, but if they are too large they can become unwieldly to use in the field. Smaller frame sizes may miss some of the more uncommon plants in the area. For example, Figure 1 shows that by increasing frame size from 0.5 m^2 to 1.0 m^2 will often not increase frequency values significantly and the smaller frame sizes encounter fewer species in the same area (Despain et al., 1997).

Each species has an optimum frame size, but it would be impractical to use many different frame sizes in the same area. However, if one frame size will not provide desired frequency values for all species of interest, two or more frame sizes may be used in a nested fashion. This situation is typically encountered where one or two species are very abundant in relation to others (Smith et al., 2012).

Often, rangeland monitoring programs use a .16 m^2 frame size (40 cm x 40 cm) for the methods listed above. If a nested frame size is required, a .01 m^2 (10 cm x 10 cm) frame size is used within the .16 m^2 frame (see Option 1). Points or screws are fixed to the frame to measure Point Ground Cover.

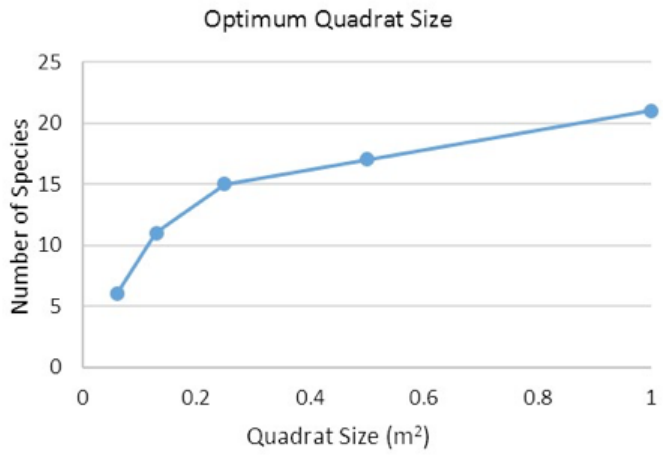
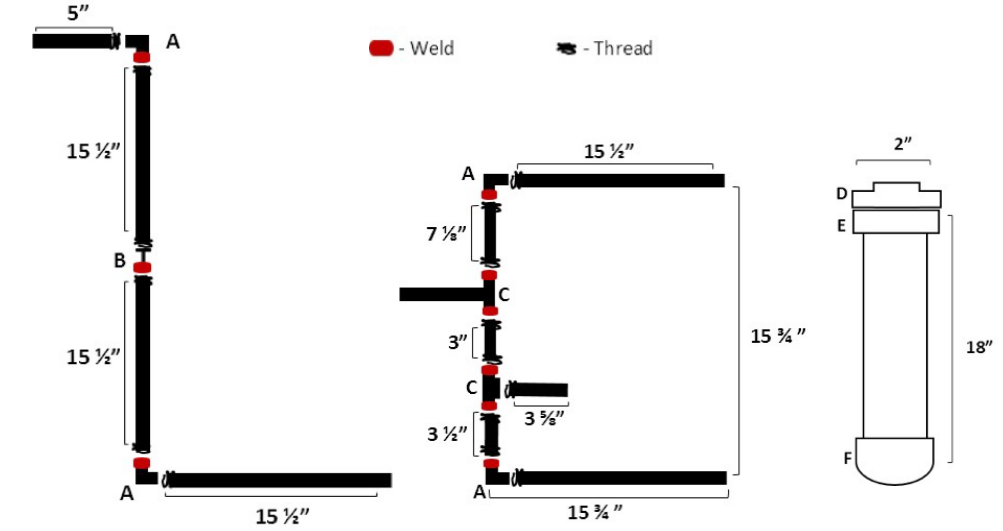
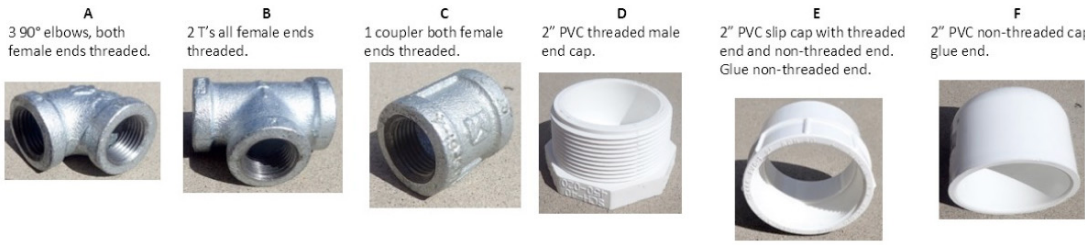


Figure 1. The relationship between number of species encountered and frame size (adapted from Despain et al., 1997).

Option 1: Metal Collapsible Frame

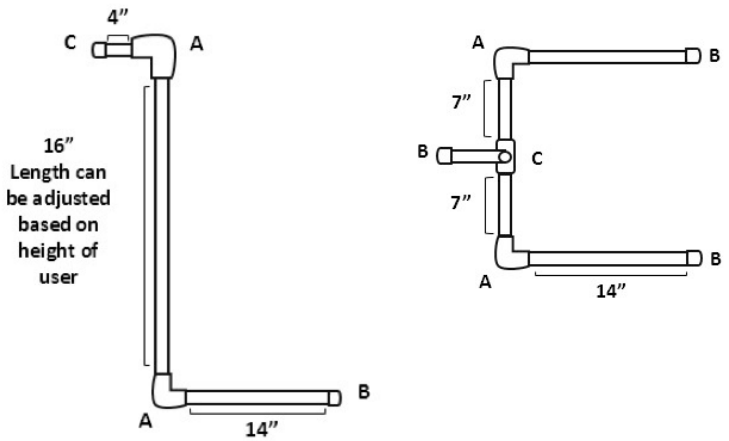
This 40 cm X 40 cm frame is made from 1/4 inch galvanized pipe and has a PVC carrying case. You will need the ability to weld and thread pipe. If you do not have the ability to thread pipe, pre-threaded pieces can be bought from a hardware store. It breaks down in seven smaller pieces. This frame can be made with a nested frame or without, following the same dimensions as option two.





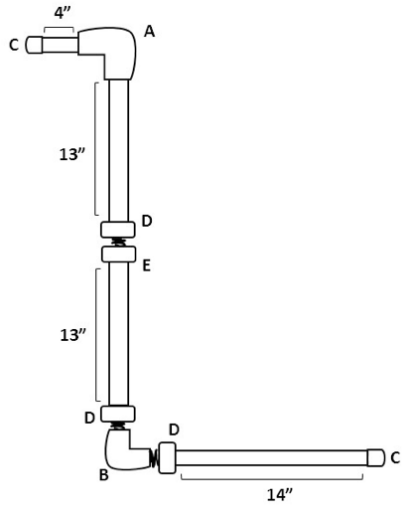
Option 2: One-piece Frame

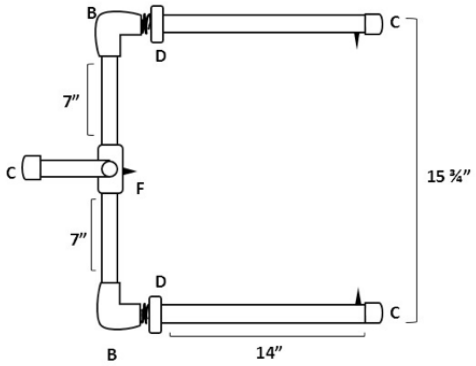
This frame is made with similar parts as Option 3; however, it does not break-down because the entire frame is glued together. This frame is easier to make because it involves minimal cutting of PVC. It is also more sturdy at the base at part C where Option 3 often breaks at part F.



Option 3: PVC Collapsible Frame

This standard 40 cm x 40 cm PVC frame is lightweight and can break down into five pieces to fit into a backpack, making it ideal for monitoring in remote locations. The finished dimensions of the frame should be 40 cm x 40 cm (~15 ¾″ x 15 ¾″). Before gluing check dimensions and adjust as needed. Screws (12 ½″ flathead) can be placed at the end of each 14″ arm just before the cap and in part F if used for ground cover points (▶ symbol).





A
1 Elbow with two non-threaded female ends. Glue both ends.

B
2 Elbows with one threaded female end and one non-threaded female. Glue non-threaded end.

C
3 Female non-threaded caps, glue end.

D
4 Connectors with threaded male end and non-threaded female end. Glue female end.

E
1 Connector with a threaded female end a non-threaded end. Glue non-threaded end.

F
1 T with center female thread, both sides are also female without thread. Glue non-threaded ends.

Resources

Despain, D., Ogden, P., and Smith L. 1997. Some Methods for Monitoring Rangelands and Other Natural Area Vegetation. Extension Report 9043, University of Arizona Cooperative Extension Service. Tucson, AZ. https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az9043.pdf

Interagency Technical Reference. 1996. Sampling Vegetation Attributes. National Applied Resources Center. Denver, CO. https://www.blm.gov/nstc/library/pdf/samplveg.pdf

McReynolds, K, and Brischke, A. 2015. Southeastern Arizona Monitoring Program: Methods and Ground Rules. Not Reviewed. https://cals.arizona.edu/cochise/mws/SandsRanchCRM/Methods%20and%20Ground%20Rules%202015%20Final.pdf

Smith, L., Ruyle, G., Dyess, J., Meyer, W., Barker, S., Lane, C., Williams, S., Maynard, J., Bell, D., Stewart, D., and Coulloudon, A. 2012. Guide to Rangeland Monitoring and Assessment. Arizona Grazing Lands Conservation Association. Phoenix, AZ. https://globalrangelands.org/sites/globalrangelands.org/files/dlio/37404/guide-to-rangeland-monitoring-assessment.pdf

Adapted from Phil Ogden and Steve Lunt

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