MEMORANDUM

To: Vegetation Analysis Specialists
From: Karen Launchbaugh
Subject: Sagebrush Cover & Biomass
Date: November 6, 2008

As you know there is considerable interest in the health and abundance of sagebrush communities in North America. We conducted a sagebrush assessment earlier this fall near Ponderosa State Park north of McCall, ID. You will need to locate your field trip data for "Woody Plant Biomass" and "Woody Plant Cover." Please read through this memo to determine what information I need to summarize sagebrush studies conducted this fall.

First, I am curious about the best technique to use for estimating sagebrush biomass. Which technique worked best for you (in terms of accuracy), the Direct-Weight Estimate, Reference Unit Method, or Dimension Analysis? Compare your estimates to actual clipped weight of shrubs on a dry weight basis. We collected several samples of sagebrush in the field and brought them back to the lab to dry and determine dry weight. This drying procedure resulted in an estimate that sagebrush was 63% dry matter (± 5 standard error).

Dimension Analysis can be a bit tricky but basically one must first measure the cubic volume of a shrub and then develop a regression relationship between volume and biomass. Recall that regression analysis is done with total biomass as the predicted value ("y") and shrub volume (in cubic centimeters) as your measured value ("x"). Once a the equation for the line is established, one can estimate a "predicted" shrub biomass with "x" (volume) substituted in the equation ($y = mx + b$). I have found several good papers on this topic of how to calculate volume and assess volume:weight relationships. I have posted these papers on the project web page (http://www.cnr.uidaho.edu/range357/class_assignments.htm). I have also attached a little more information on dimension analysis.

Second, with dimension analysis, you should be able to predict weight of shrubs in the belt transect you measured in the "Woody Plant Cover" activity. What was the biomass of shrub growth (in kg/ha) for your 15-m belt transect? (Hint: substitute plant volumes as "x" in the line equation created above). What was % cover in your belt transect?

Please answer my questions and look over the dimension analysis papers to let me know if you think dimension analysis will be useful in determining new seasons growth of sagebrush. Could you also please include a copy of your spreadsheets for my reference. I know your time is valuable and you are quite busy. However, my project is also reaching a deadline. Please provide this information to me in a 2- to3-page memo by **7:00 p.m., Friday, November 14th?** (Submit by www.blackboard.uidaho.edu) Any information that you can give me on estimating sagebrush is greatly appreciated. Please let me know if you have any questions (klaunchb@uidaho.edu).

References on Shrub Volume:

Bryant, F.C. and M.M. Kothmann. 1979. Variability in predicting edible browse from crown volume. J. Range Manage. 32:144-146.

Ludwig, J.A., J.F. Reynolds, and P.D. Whitson. 1975. Size-biomass relationships of several Chihuahuan desert shrubs. American Midland Naturalist 94:451-461.

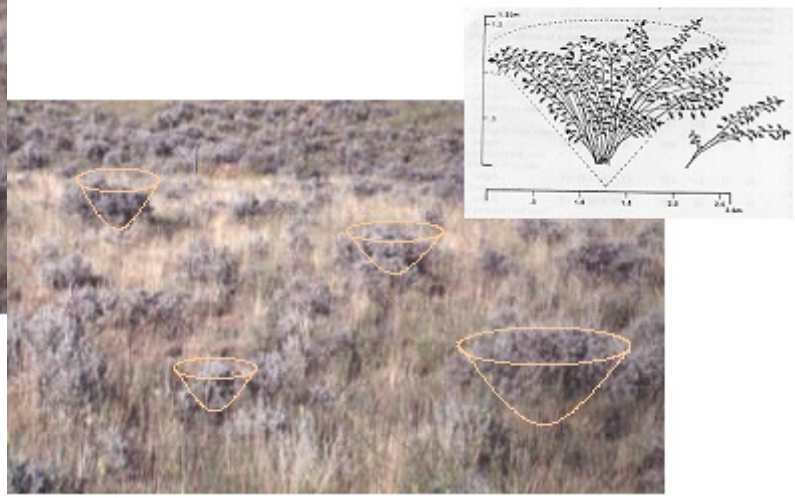
Lyon, L.J. 1968. Estimating twig production of serviceberry from crown volumes. J. Wildlife Manage. 32:115-119.

Murray, R.B., M.Q. Jacobson. 1982. An evaluation of dimension analysis for predicting shrub biomass. J. Range Manage. 35:451-454.

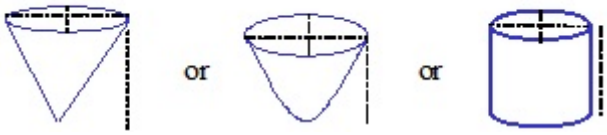
Uresk, D.W., R.O. Gilbert, and W.H. Rickard. Sampling big sagebrush for phytomass. J. Range Manage. 30:311-314.

Step 1 = Look at plant in its natural environment

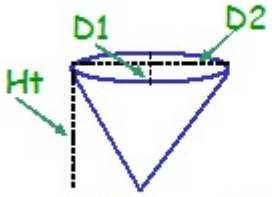
Step 2 = Envision a geometric shape that describes the plant



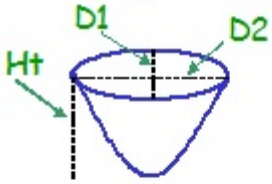
Step 3 = Take appropriate measurements of shape:



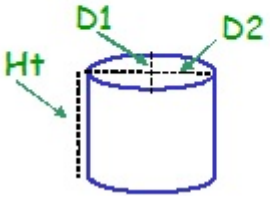
Step 4 = Calculate Volume *(v)*: (D1 & D2 = Diameter 1 & 2, Ht = Height)



$$v = \frac{\pi(D1/2)(D2/2)(Ht)}{3}$$



$$v = \frac{\pi(D1/2)(D2/2)(Ht)}{2}$$



$$v = \pi(D1/2)(D2/2)(Ht)$$