

Information on Data Collection and Organization from the SGS-LTER

This data package was produced by researchers working on the Shortgrass Steppe Long Term Ecological Research (SGS-LTER) Project. This project was supported by National Science Foundation from 1982-2014. This data package includes one or more tab-delimited data tables, tab-delimited files that denote header definitions and data types for each column, and detailed metadata within an Ecological Metadata Language document (i.e. XML). Example image files of plots, digital datasheets, or schematics of the experimental design may also be included when applicable.

Background information on the SGS-LTER project is contained in related series of objects within the Digital Collections of Colorado and the Colorado State University archives. Together data packages and other background information, and items such as images, proposals, and reports contribute to a comprehensive SGS-LTER collection.

The data tables and associated EML documents represent components of the data package and SGS-LTER collection, which may be discovered and accessed through secondary repositories serving specific ecosystem science domains (e.g. PASTA (LTER Network Repository), DataONE, or The Knowledge Network for BioComplexity).

The following information is copied from the SGS-LTER field protocols to provide specific details on how these data were collected.

ARS #06 Long Term Net Primary Production

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Study Objectives: Monitor long-term net above ground primary production of the shortgrass steppe community.

What to know before you start sampling:

- ✓ ***You have been shown the locations of LTNPP sampling***
- ✓ ***You have been instructed how to layout transects and plots in the ungrazed areas in Owl Creek and ESA***
- ✓ ***You have been instructed on how the ridge in site 24 will be clipped differently for the ARS***
- ✓ ***You have noted what to clip and what not to clip ****OLD-STANDING DEAD ON THE RIDGE IN SECTION 24 SHOULD BE COLLECTED FIRST FOR ARS SAMPLES*******
 - clip live and recent dead by species
 - ***For RIDGE, SECTION 24 ONLY- FIRST collect 'old' standing dead (biomass NOT produced in the current year). For all other sites the standing old dead is sorted out the same way, but not saved.***
 - no very old dead, need to brush away grey material
 - no litter, no lichen

- only new growth for OPPO, but no barrel cactus
- only new, green growth on shrubs
- ✓ ***You have trained the crew on this clipping protocol***
- ✓ ***You have been provided labels and various sample bags***
- ✓ ***You have been instructed on how to move and restake the cages for next year***
- ✓ ***You have been instructed on how to inventory and deliver bags to the sample prep lab at CSU***
- ✓ ***You have the sample check-off sheet***
- ✓ ***You have been instructed on what to do if you see a grub-kill or any other disturbances***
- ✓ IF YOU HAVE NOT RECEIVED INSTRUCTIONS ON IDENTIFICATION AND COLLECTION OF 1) live, 2) recent dead, 3) old standing dead, 4) litter, 5) lichen (not collected for biomass), and 6) shrub recent year growth THEN **STOP** AND DO NOT CLIP.

Study Area Locations and Design: There are 6 sites: ridgetop (ridge), midslope (mid), swale, ESA (replicate 1 not 2; see 1D ARS #3 ESA map), Section 25 (SEC 25), and owl-creek (OC). Make sure all are done. Each location has 15 plots. There are 3 transects with 5 plots in each transect. Plots in the grazed locations are protected by cages. Chose a random direction and distance to move the cages for the LTNPP harvest next year and re-stake the cages. Plots in the ungrazed locations are chosen randomly each year. The 3 transects are marked by rebar. Measure the distance to the random location of the five plots along each transect. ***See appendix for “Directions for CPER Study Sites Map” ARS #6 sampling locations.***

Digital Photography Protocol: A digital picture must be taken of every plot before it is clipped. Use the $\frac{1}{4}$ m² black wood frame to show the perimeter of the plot. Label the white board with the same information used on the sample bags (shown below) and place to the side of the frame.

Equipment:

Orange Field Book for Digital Camera
 White board
 Dry erase markers and eraser
 Cleaner and paper towels
 Black $\frac{1}{4}$ m² wood frame

Field Procedures for digital photography:

Stand directly over the plot to gain a bird's eye view of the plot. Be sure that the wood frame is delimiting the plot as accurately as possible. Run your finger along the edge of the frame and pull vegetation in that is rooted within the frame and out that is rooted outside of the frame. A photo may need to be taken of the vegetation underneath a cage. In this case, remove the stakes around the cage and place the middle frame under the cage in the center of the plot. Lift and rotate the cage one meter to the east and south and re-stake the cage.

Create a complete label for that project and plot on the white board. The label should be consistent and include the project name, date, transect, and plot or treatment description. Place the labeled white board to the right or left of the plot. Pictures should be captured at 640 x 480 resolution. Review the picture on the screen to be sure that the image was captured. Keep track of the image # and plot label in the digital camera orange field book. It is very important to keep this record in case we need to go back and verify a digital image. Place a pin flag with the plot and transect number or coordinates in the middle of the metal frame after you capture the image. This marks the center of the plot that was beneath a cage. Put the cross of the metal clipping frame at the pin flag and clip the sample right away.

Archiving Images:

The images will be stored on the memory cards. Label each memory card with the date and Number Card of Total Number of Cards. Record the date, project, and image number in the orange field book that is kept with the camera. When you fill a memory card, remove it from the camera and return it to the black cabinet. Insert a fresh memory card and label it correctly. Remove the batteries from the camera and put them in the charger overnight. The images will be downloaded from the memory card and archived by the data manager.

Clipping Protocol:

Clip just above crown-level, except for shrubs. Clip only current year growth of shrubs that is green and has leaves, and which grows from an older woodier branch (see Mark for description). All live plus recent dead material needs to be harvested from the plot. For the ridge in **section 24 OLD-STANDING DEAD will also be collected, but not by species.** This means that all old-standing-dead is put in one bag for each plot. Old-standing-dead is "standing", NOT the LITTER that is lying on the surface of the ground. Both recent dead and old standing-dead are standing and both are dead, but they are not the same, and need to be collected differently. Old-standing dead is not included in samples from other LTNPP sites. It should be sorted out the same way but it is not saved. Old-dead is not included in any samples (the gray colored material). You can brush the basal old-dead material away from the clipped material with your fingers and sort out other taller stems. -- check your plot over before moving to next one.

Plots are clipped by species. It is usually easier to first clip species other than BOGR-BUDA. There are three cactus species on the site. Only current year growth of OPPO is clipped - these are the small pads. The two 'barrel' cactus are not clipped. There are only some times when combining of species may be done, but it is important that the following 'combining-rules' be followed:

- 1) The only time combining is allowed is when two species are each less than a gram (this is a few leaves, or one very small stem of an individual).
- 2) Some species are never combined even if there is only a very small quantity - these are BOGR, BUDA, SPCO, and CAHE.
- 3)

When combining, never combine forbs with shrubs, grasses with forbs, etc. Only combine grasses with grasses, forbs with forbs, shrubs with shrubs. Envelopes with combined species should have codes for all species on the envelope.

Do not clip on an ant mound or large disturbance. Note all small mammal, ant, and any other disturbances on the bag. Place all envelopes or small bags from each plot into the largest sample bag from that plot. This is usually, but not always, the BOGR bag. If there happen to be two or more large bags from one plot, try to keep them together. If there are, for example, three bags for one species, label the bags "1 of 3, 2 of 3, and 3 of 3".

CAN OTHER PEOPLE UNDERSTAND YOUR WRITING ???

Example Label for LTNPP (Labels will be provided):

STUDY	LTNPP
DATE (month,day,yr)	08 01 93
SITE	SWALE
TRANSECT #-PLOT #	T-2 P-3
SPECIES 4 LETTER CODE	CAHE

QAQC Instructions:

IMPORTANT At the end of each site, gather all bags together and sort by transect. Then check that all plots are there for each transect, and they are labeled correctly. This entails more than just counting that there are 5 plots for each of the 3 transects---are there two labeled the same?---are all envelopes in the large bag labeled with the same site and transect-plot numbers?

IMPORTANT When drying bags in the oven, temperature must be 55°C--not more and not less. Arrange bags by date placed in oven. Be careful not to rip bags on metal shelves of the drying oven.

Sample Check Off and Delivery Instructions:

IMPORTANT: Organize the samples bags by project and then location and then put them in a larger bag to be transported to the SGS-LTER Sample Prep Lab. Double check that all of the transects and plots sampled from one location are being transported to the SGS-LTER Sample Prep Lab together. Label the larger bags with the year the samples were collected, the name of the project, and the plot numbers from which the samples were collected. Make sure that the larger bags are tied down in the back of the pick-up truck when they are being transported to CSU campus. Keep an inventory of what bags have been brought to campus and what bags remain in the drying oven.

Check-off Sheet on separate pages.