

# IEG

## KAEFS New Warming Site Handbook

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# Table of Contents

Table of Contents ..... 1

**Chapter 1. The Experimental Site and Maintenance .....3**

**I. About the new warming site .....3**

    Location .....3

    Plant and soil conditions.....3

    Experimental setup .....3

    Treatment mimicking global climate and land use change scenarios .....4

**II. Maintenance .....5**

**III. Field work guidelines .....7**

    General schedule.....7

    NEE measurements ..... 8

    Soil respiration measurements..... 9

    Soil moisture measurements ..... 9

    Plant community survey .....10

    Biomass harvest (clipping) ..... 11

    Soil sampling ..... 12

**Chapter 2. Safety and Emergency Response .....13**

**IV. Routine safety reminder .....13**

    Before you go .....13

    When you arrive.....13

    When working in plots.....13

    Other things you need to know .....13

**V. Snake bite plan ..... 14**

    First Aid Treatment of Snakebites in the Field ..... 14

    Procedures for Sawyer Extractor Kit ..... 15

**VI. Nearest hospital contact and address ..... 16**

    Purcell Municipal Hospital Emergency Room ..... 16

    Oklahoma Poison Control ..... 16

    Emergencies requiring immediate care/ ambulance ..... 16

Appendix..... 17

Appendix 1. A map from SRTC to the field station ..... 18

Appendix 2. Fieldwork preparation checklists..... 19

Appendix 3. Blank record sheet - moisture .....	20
Appendix 4. Blank record sheet - plant survey .....	21
Appendix 5. Soil sample bag labeling template .....	22
Appendix 6. Previously sampled soil core locations .....	23
Appendix 7. Travel reimbursement information .....	24
Appendix 8. Oklahoma venomous snakes .....	25
Appendix 9. Important contact information .....	26

## Figures

<b>Figure 1.</b> Site plots and treatments layout .....	3
<b>Figure 2.</b> Facilities layout in a plot .....	4
<b>Figure 3.</b> Plant survey method .....	10
<b>Figure 4.</b> The map from the field site to the nearest hospital emergency room .....	16
<b>Figure 5.</b> A map from the lab to the field site .....	18
<b>Figure 6.</b> Venomous snakes in Oklahoma.....	25

## Tables

<b>Table 1.</b> Site maintenance summary .....	6
<b>Table 2.</b> Fieldwork schedule in a year .....	7
<b>Table 3.</b> Contact information .....	26

# Chapter 1. The Experimental Site and Maintenance

## I. About the new warming site

### Location

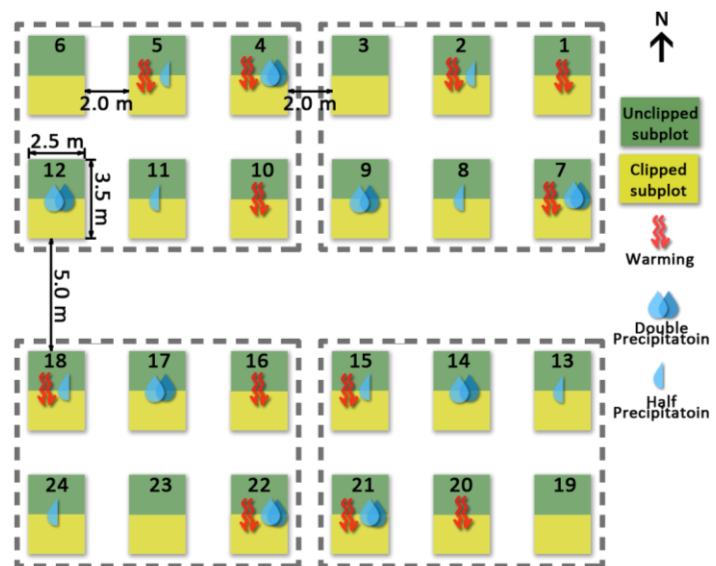
The new warming site (referred to as “the site” below in this handbook) is located in the Kessler Atmospheric and Ecological Field Station (KEAFS) in McClain County, Oklahoma, USA (ca. 34°59'N, 97°31'W). KEAFS itself is a 360 acre (146 ha) environmental research and education facility located approximately 28 km southwest of the University of Oklahoma campus in Norman. A map from the lab (SRTC) to the field site is attached in **Appendix 1**. It is home to a number of long-term meteorological and biological experiments. The mixed grass prairie ecosystem at Kessler Atmospheric and Ecological Field Station includes a diverse landscape with mixed and tall grass prairie, woodlands, and riparian communities along Finn Creek, several ponds, protected habitats, research areas, and pastures. It is an example of the predominant land use in the southern Great Plains that has a land use legacy commonly seen in this area.

### Plant and soil conditions

The site is “new” relative to an old warming site established 10 years earlier in the same area. It is an old-field tallgrass prairie and abandoned from agriculture applications in 1974. The land was lightly grazed until 2002 when large herbivores were excluded. The mixed-grass prairie is dominated by C3 forbs and grasses in spring, and C4 grasses in summer. Mean annual temperature is 16.3 °C and mean annual precipitation is 914 mm (Oklahoma Climatological Survey). The soil is part of the Nash-Lucien complex with neutral pH, high available water holding capacity (around 37%), and a deep (ca. 70 cm), moderately penetrable root zone.

### Experimental setup

After its establishment in 2009, the site has been manipulated to mimic the climate change scenarios and allow us to observe the tall grassland ecosystem responses to these conditions. Three factors are incorporated: manipulation of temperature (two levels, ambient and elevated) and precipitation (three levels, half, normal, and double), and a nested factor of clipping (two levels, clip and no clip). Each treatment is randomly repeated 4 times in 4 blocks. Within each block, 6 plots (2.5 m by 3.5 m) were randomly assigned the combinations

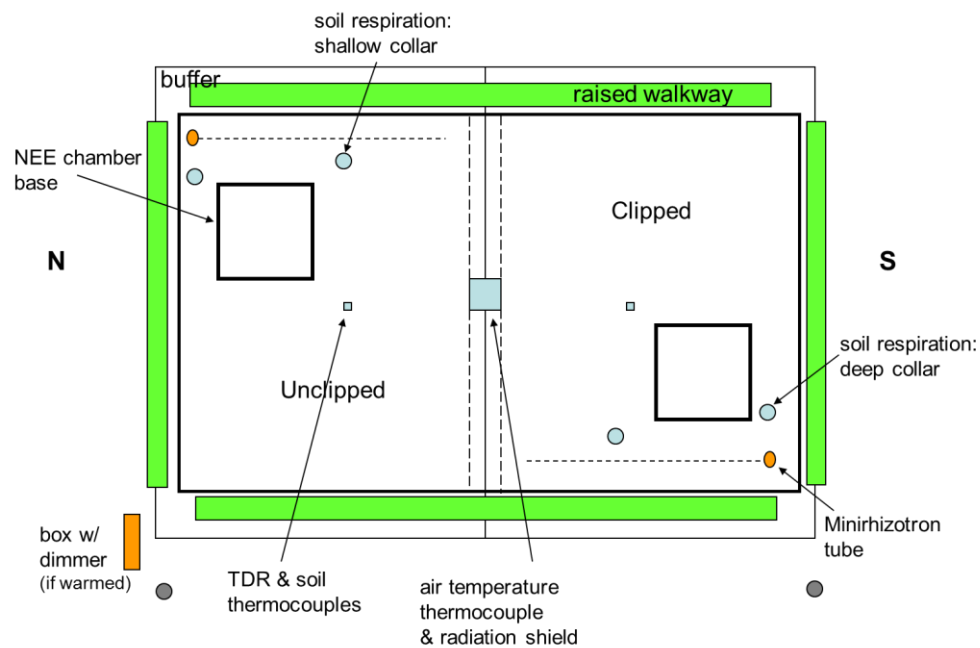


**Figure 1.** Site plots and treatments layout

of warming and precipitation treatments. In each of the 24 plots, the southern subplot (2.5 m by 1.75 m) was clipped at peak plant biomass every year (**Figure 1**). In total, this field experiment has 12 treatment conditions that are replicated 4 times.

### **Treatment mimicking global climate and land use change scenarios**

Warming treatment is achieved by infrared heaters operating at about 1.5 meters above ground surface, resulting in the whole ecosystem warming, and by about 3 °C at ground surface. The control plots have woody “dummy” heaters to mimic the shading effects of the heaters. The rain-out-shelter coupled with a rainfall-collection-redistribution device are used to manipulate precipitation amount received by the plots. The rain-out-shelter is a fixed-location shelter with a roof consisting of bands of transparent acrylic that block either none or half amounts of rainfall, resulting in normal and half precipitation treatments. The rainfall-collection-redistribution device is a non-penetrable roof of the same size as the plot. It collects precipitation and distributes it into double precipitation treatment plots. Each 2.5 m x 3.5 m plot is divided into two 2.5 m x 1.75 m subplots. Plants in the southern 2.5 m x 1.75 m subplots are clipped at a height of 10 cm above the ground once a year to mimic the land-use practice of mowing for hay while the northern subplots are unclipped. Clipped materials are taken away and not returned back to the plots. There are sets of facilities installed in each plot. **Figure 2** is a simple diagram of these facilities.



**Figure 2.** Facilities layout in a plot

## II. Maintenance

Daily maintenance of the site is needed either when necessary or on schedule, depending on the work to be done. **Table 1** summarizes aspects that require special attention for maintenance.

For any maintenance problem, if the problem spotted is not solved, please notify Liyou Wu () as soon as possible with the following information.

1. When spotted
2. Subplot# (e.g. Plot 3 south) or general site issue
3. Problem
4. Whether orders of supply are needed
5. What further actions are needed

For maintenance actions requiring experienced personnel, please make sure correct steps are followed. Those protocols are not included in this handbook.

**Table 1. Site maintenance summary**

Facilities and aspects	Normal condition	Maintenance action	Problem	Maintenance personnel	Solution to problem	Notes
Infrared heater	One can feel the heat beneath	Check every time on site	A few stop working	Whoever on site	1) Adjust the heat level to maximum 2) Check power plug	Wait for a few minutes to see if heater is back to work
			Still not working	Experienced	Change fuse	
		Change heater	Heater broken	Experienced	Change heater	
		Check every time on site	All or many heaters are down	Experienced	Check electricity system	
	Plants cannot reach the heater	Check every time on site, especially in fall	Plants grow tall and reach the heater, may cause fire	Whoever on site	Cut the plant at about 10cm beneath the heater to prevent contact.	Scissors are placed in the shelter
Dummy heater	Hanging about 1.5m over land surface in the middle of each subplot	Check every time on site	Falls down to ground, or at wrong place	Whoever on site	Put it back to correct place	Wire and other tools are in the shelter
	Hanging at same position as infrared heaters	Check every time on site	Falls down to ground, or at wrong place	Whoever on site	Put it back to correct place	Wire and other tools are in the shelter
		Check every time on site	Wasp and nest	Whoever on site	Use wasp spray to clean them up	Spray is in the shelter
Plot roof	With full lengths of acrylic channels covered above the whole plot area	Check every time on site, pay special attention to roof above half-precipitation plots	Some channels break and fall off	Whoever on site	1) Put back the channel if not broken 2) Replace it with new ones if broken	Spare channels are put in the shelter
			No spare channels	Experienced	Make new channels for the roof	
Precipitation collection system	All parts are connected and sealed, water can drain as directed	Check every time on site	Broken	Experienced	Fix or change the broken part	
	No stuff blocking the tubes, water can drain as directed	Check every time on site	Blocked	Whoever on site	Clean up the blocking stuff	
Respiration column	No plant and bug inside	Check 24 to 48hrs before respiration measurements, or at nearest on site date before measurements	Plant growth or bug activity	Whoever on site	1) Remove the whole plant including root, and place the plant back inside the plot but outside the column 2) Remove insect	<b>NEVER disturb the soil inside column within one day before measurements.</b> If there are living plants inside at measurement time, leave them there for measuring process. If there are insect, remove them and leave soil undisturbed.
	Column edge higher than ground surface	Check 24 to 48hrs before respiration measurements, or at nearest onsite date before measurements	Soil piled up by animals buried the column	Whoever on site	Remove the soil pile	If the column is buried at time of respiration, give up the measurement and mark the reason.
Data logger	Sending temperature data to the office computer onsite continuously. Data are transmitted to lab every day	Copy and store data to local device at least every two weeks	Stop receiving data in lab	Designated and experienced	1) Check internet connect on site 2) Check data logger condition	
Tree seedlings	No tree seedlings inside and near plots	Check every spring and fall before plant survey	Trees grow	Experienced in plant identification	Cut the trees at the place as near as possible to the root	Scissors are in the shelter
Between plot buffer area and all round site	Relatively neat. Do not block the ways when walking	Clean up or mow early spring, early summer, and before big field work events	Plants grow too dense and block the way	Designated	Cut plant by scissors or use a mower	Mowers must be borrowed in advance from site manager
	No garbage left	Collect garbage before leaving the site and bring back to discard		Whoever on site	Clean up the field site	
Shelter	Clean and neat, tools are put in designated places. Doors closed.	Check every time when use closed.		Whoever on site	Put tools back to place. Close and latch the door.	
Site gate	Remain closed and latched	Check every time when use		Whoever on site	Close and latch the gate	
Office	Remain clean and neat	Check every time when use		Whoever on site	Take garbage away and keep place neat	

### III. Field work guidelines

#### General schedule

A schedule of the field measurements, sampling, and scheduled maintenance work are in **Table 2**.

**Table 2.** *Fieldwork schedule in a year*

Month	Work/measurements	# of people required	Length of work	Notes
<b>JAN</b>	respiration, NEE, moisture	4-5	1 day	
<b>FEB</b>	respiration, NEE, moisture	4-5	1 day	
<b>MAR</b>	respiration, NEE, moisture	4-5	1 day	
<b>APR</b>	(buffer area clean up)			
	respiration, NEE, moisture	4-5	1 day	
	spring plant survey*	8	2 days	
<b>MAY</b>	respiration, NEE, moisture	4-5	1 day	
<b>JUN</b>	respiration, NEE, moisture	4-5	1 day	
	(buffer area clean up)			
<b>JUL</b>	respiration, NEE, moisture	4-5	1 day	
<b>AUG</b>	respiration, NEE, moisture	4-5	1 day	
<b>SEP</b>	respiration, NEE, moisture	4-5	1 day	
<b>OCT</b>	(buffer area clean up)			
	respiration, NEE, moisture	4-5	1 day	before clipping
	Fall plant survey*	8	2 days	before clipping
	annual soil sampling*	3-6	1-0.5 day	Not immediate after rain
	clipping/biomass harvest*	4-8	1-2 days	After plant survey and gas measurements of current month
<b>NOV</b>	respiration, NEE, moisture	4-5	1 day	
<b>DEC</b>	respiration, NEE, moisture	4-5	1 day	

Note:

- Maintenance work are in parenthesis.
- NEE measurements must be taken in a day with full sun and no cloud, and not immediate after rain, so that soil moisture is not high.
- Length of work depends on number of people involved. This table summarizes the typical number of people and work length in previous events.
- \*these are tentative schedules. Events could be scheduled to the month before or after depending on the weather condition and plant growth.



## **NEE measurements**

Items to bring: LICOR-6400 system, screw for fixing the sensor to the chamber, chamber cover, tape to fix fan batteries, charged equipment batteries (3 to 4 of them), fan batteries, fan electrical cord (2 of them), for cleaning the sensor: small screw, dust spray, alcohol, cotton swab

Items in the field: Plastic chamber

To measure NEE and ecosystem respiration,

1. Charge the batteries the day before going to the field.
2. In the field, plug in the batteries. Connect the sensor to the chamber. Make sure the fan in the chamber is working.
3. Turn on LICOR 6400, then "Press Any Key".
4. "Is the chamber/IRGA" connected?" [Y]
5. New Msmnts (measurements) [F4]
6. Use [UP] & [DOWN] keys to change "a", "b", "c" to "a", "g", "h"
7. Open log file [F1]. FILE: Data\*\*\*\*\* (input your field date here; This creates a file for data logging)
8. Input the Remark for the measurement without COVER ("01NL", for instance). Remark: (input the "plot ID". "S/N (South or North)", and L/D (Light or Dark)) (For instance: 01NL indicates "plot 01 North Light"; 01ND indicates "plot 01 North Dark")
9. Put the chamber to "plot 01 North" without cover. Press [Enter] twice. Measurement will start and will last for about 1.4 min.
10. Input the Remark for the measurement with COVER ("01ND", for instance). Let the chamber vent for a few seconds.
11. Cover the chamber. Press [Enter] twice immediately. Measurement will start and will last for about 1.4 min. Then it is done for one Plot (Plot 01 in this case).
12. Go through all plots (01-48). Usually, the whole process will last for 5 hours.
13. Turn off: Press [Escape] --> [Home Menu] --> [Quit open] --> [Y] --> turn the power off --> pull out the batteries.

Common error and trouble shooting:

14. When there is an "irga sensor not ready" message and it won't disappear after a while, turn off the machine, open the sensor over (8 small screws) and clean the metal mirror as well as the fan inside with pure alcohol. Dry and put everything back. The machine should be running normally.
15. If any other error occurs, refer to the handbook to trouble shoot, or call LICOR technical support at 402-467-3576. There are some spare parts (fuses, filters, etc.) along with the sales package in Luo Lab. If anything needs to be replaced, please contact Dr. Lifan Jiang (lfjiang@ou.edu).

### **Soil respiration measurements**

Items to bring: LICOR-8100 system with 10cm chamber (2 in total), charged batteries (7 to 8 in total), iPod touch with installed 8100 app.

To measure soil respiration,

1. Install batteries and turn on LICOR-8100. Wait until lights turn green.
2. Locate the shallow and deep columns in each subplot. These columns are installed approximated as shown in **Figure 2**.
3. Make sure Wi-Fi is enabled in iPod touch. Choose the desired network (soil network, e.g. IP address 192.168.100.98 or 192.168.100.96).
4. Start LICOR-8100 APP. Tap [connect to instrument], choose the IP address you chose in step 3).
5. Setup measurement. Tap [Setup]. Change the file name based to measurement date. For each measurement, modify the chamber offset value (the length of columns above inside column soil surface), the plot number (1 to 24N, 1 to 24S) and treatment label (S, shallow or D, deep). For example, 1NS stands for shallow column in plot 1N, and 1SD stands for deep column in plot 1S.
6. Check if there is plant or animal (insect) inside the column. Pick out the insect if you can, but only without disturbing the soil. If they cannot be removed, go ahead with the measurements, and deal with them afterwards. Pick the insect out, and pull out the plants with roots, and discard them in the plot but outside the column.
7. Put the 10 cm chamber horizontally on the top of shallow or deep columns, check the joint sealed.
8. start and wait for the measurement to finish.
9. When the measurement stops, the chamber seal will automatically go up. Record the CO<sub>2</sub> flux value, which are often around 0.9 to 2 in Oct, but 2 to 4 in summer. If the values are abnormal, repeat the measurement.
10. Go through every plot. Each time you need to modify the chamber offset value and plot label.
11. When finished all the measurements, turn off the system and pull out the battery.

### **Soil moisture measurements**

Items to bring: portable TDR meter, sensor needles, record sheet on a clipboard, pen.

To measure moisture in the field,

1. Install the two sensor needles onto the TDR meter.
2. Turn on the TDR meter.
3. Push the needles into the ground as deep as possible. Push the “read” button on the meter, and wait for a VWC result to show on the screen. VWC typically range from 0 to 20 % in the plots, depending on the weather and season.
4. For each subplot, measure soil moisture at three locations - one near the shallow column for respiration, one near the deep column, and the other at a random location within the plot. Record these VWC results onto the moisture sheet.

### Plant community survey

Plant identification references available as separate documents:

- IEG Plant specimen book
- Commonly Seem Plants in KAEFS New Warming Site (request from Maggie Yuan)
- New Site Plant List\_Becky\_Apr13.doc (request from Maggie Yuan)
- USDA Plant Database ()
- Flora of North Central Texas ()
- Field Guide to Oklahoma Plants, available in lab
- Weeds of the West, available in lab
- Identification of Oklahoma Plants, available in lab

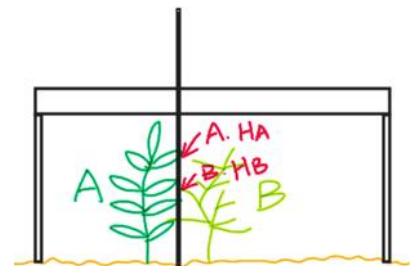
Items to bring: blank survey record sheets with clipboards, pen, colored tape, marker pen, ruler latex gloves, survey frames, plant identification references (we have several books, a plant list of this area, brochures with plant pictures, and a specimen book), envelope for specimen, camera.

Items can be found in the shelter: frame legs, pin with marked height fractions. If the pin is not clearly fractionated for height, use the ruler to measure, and bind colored tape and write down the height at 10 cm increment with a marker pen.

To survey the plant communities,

1. Install the legs onto the frame. Put a frame with legs at the northeast or southwest corners of each plot (the whole plot including two subplots), with the long edge of the frame along the long edge of the plot. So that each subplot is surveyed at the corner for the area of the size of the frame.
2. Place the pin straight down (perpendicular to the ground surface) at one corner of each small cell that is separated with others by the rope. The corner chosen to place the pin should be consistent for all 50 cells in the survey of one subplot.

3. Each time after the pin is correctly placed, find out all plant species that touch the pin. For each species touched, record in the corresponding cell on the survey sheet the species name and its highest touch with the height fraction of this touch, as shown in



**Figure 3.** Sometimes there are very small sprouts at the

understory layer covered by litter. Be careful to check beneath the litter layer the touch with those small plants. Touch with dead plant should be recorded as “litter” and you do not have to record the height of a litter touch. If no plant is touched, record “bare ground”.

**Figure 3.** Plant survey method

4. The pin should be placed 50 times in the 50 cells on the frame when surveying one subplot.
5. After doing the pin-touch survey, seek within the subplot for any species that occur, but is not touched. Record the species name at the section “Others” on the survey sheet.

6. Be cautious about the identification of plant. Only record the species you recognize. If you are not sure or cannot identify the plant, do not hesitate to ask. There should be at least one person familiar with these plants during the survey.
7. If no one knows what it is, take pictures, give it a tentative name or a number, write it down, and write down the time the picture is taken on the sheet next to the name you give it. Also, try to find an individual of the same species outside the plot if you can, put it in an envelope, write down the name you give it on the envelope, and take it back as a specimen. We can take it to the professionals in plant biology department for more information.
8. Take at least one picture for each plot for future reference.

When back to lab, arrange the record sheets, figure out the plant unidentified, and add new specimen to the book. Data will be analyzed by designated people.

### **Biomass harvest (clipping)**

Items to bring: marker pen, garden gloves, big paper bags to store biomass, big plastic garbage bags to bring biomass back, tape.

Items can be found in the shelter: garden scissors, 1 × 1 m frame.

To do biomass harvest,

1. Only the plants in each southern half-plot are clipped. Wear garden gloves when use the garden scissors.
2. Lay the 1 × 1 m frame in the middle of the subplot flat. Use the garden scissors to clip all the plant inside the frame at about 10 cm above ground surface. Separate the clipped biomass into C3 and C4, each put in a separate paper bag. Leave the plant litter out, and there shouldn't be much if clipping is done at the right time of year. Fold the bag opening to prevent things come out. Use tape if necessary. Mark Plot number (1-24) and biomass type (C3 or C4) on the bag. If there are more than one bag for the same biomass type from the same plot, indicate on the bag, too. Refer to experienced person for the classification of C3 and C4 plants.
3. Clip all the plants outside the frame but inside the southern subplot at 10 cm above ground surface. Remove the biomass outside of the plot area.
4. Use big garbage bags to carry the biomass bags back to lab.

When back to lab, put the harvested biomass with paper bags in the oven and dry them at 65 °C until constant weight, typically 72 hrs. Weigh and subtract the bag weight to get biomass.

## **Soil sampling**

Items to bring: marker pen, soil core (2.5cm in diameter, for top 15cm soil); sample bags (labeled before taking to the field, see **Appendix 5**); gloves and paper towel; spatula; 70% ethanol; sampling location marker (flag or plastic knives) with sampling date labeled; icebox with icepacks.

Items can be found in the shelter: small spade; soil bucket; plastic funnel.

Note: Gloves are required during whole sampling process if the samples are for microbial/molecular analysis.

To take a soil core of top 0-15cm,

1. Locate where the core should be taken. Make sure no other facility is in the same location. Each year one core is taken at a specific location within each plot, which can be recognized by its distances to other facilities. Do not take soil samples from the same locations as previously (see **Appendix 6**).
2. Clean the soil core and chemical spoon with ethanol/paper towel and let dry.
3. Point the head of core at the sampling location. Step down the core into soil while keep the core perpendicular with ground surface. Stop stepping down when the 15cm marker on the core reaches the ground surface. If rocks stop the core from reaching 15cm, keep soil from current core according to following steps, and another core should be taken at a near location to ensure sampling amount enough.
4. Slowly rotate the core in clockwise direction, make it loose in soil and slowly draw it out straight.
5. Tear off the very top 1-2cm soil in the core if too many roots/plant materials occur. If no plant, keep all the soil.
6. Put the soil into a clean sampling bag. Get rid of the air inside the bag and seal it. Leave the label easily seen. Label immediately if not done yet. If multiple cores are being taken to represent one sample, put soil from multiple cores into one clean bucket and mix well before putting it in the sampling bag. If soil contains too many plant material/stones/rocks or require sieving for downstream analysis, sieve the soil with a clean sieve of required size (typically 2mm) onto a clean plate. Then put the sieved soil into sampling bag.
7. Put the sample bag in the icebox immediately.
8. Collect some soil in the bucket with the spade outside the plots. Use the funnel to fill the outside soil in the empty core. Put a marker in the filled core to record sampling event.
9. Clean the chemical spoon and the core with ethanol and paper towel before next sampling.

When back to the lab, put the soil sample bags in designated place in -80 °C freezer as soon as possible. Notify Joy Van Nostrand () the arrival of new samples and their location

## Chapter 2. Safety and Emergency Response

### IV. Routine safety reminder

Safety is the most important issue when we work in the field. Please read carefully and follow these safety guidelines and the corresponding emergency plan.

#### Before you go

1. NEVER go to or plan to go to the site in heavy rain, heavy snow, and foggy, stormy and other bad weather conditions. **NEVER go to the site alone** in early morning and late evening. Large and attackable animals live around this area. When go to the site, **carry at least one cell phone on AT&T network**. Signals on site are bad for other carriers. Be careful and DO NOT speed when driving.
2. Make sure you or someone with you know the passcode to the lock of the gate. If not, contact Liyou Wu ( in advance for the passcode.

#### When you arrive

3. When enter and leave the KAEFS, leave the gate as it is. Sign in at the designated place. There is a camera working for safety and management purpose.
4. Wear long sleeves and leggings, and shoes that cover all of your feet for fieldwork. Hat is recommend for hot weather. Bug spray is recommended to prevent tick bite. Put small personal items (keys, cell phones, etc.) in bags or deep pockets. It will be difficult to locate them if they are lost in the field. Focus on the road when you walk, especially when carrying heavy goods. Be careful about uneven ground, wires, tubes, cow drops, plants and animals in the way.

#### When working in plots

5. Make sure you are aware of how to use the tools and equipment you work with. Wear gloves when using the garden scissors for a long time. When working in the plot, mind the heater and the roof when you stand up. A working heater can burn your hair upon touch.
6. Be careful about the creatures that call the place home - unless you have to, do not disturb the bugs, spiders, even snakes to prevent biting. However, wasp nest in the plot should be removed with the help of wasp spray. A guide to identify the local snakes are attached in **Appendix 9**. Snake bite response plans are listed in section **V**.

#### Other things you need to know

7. DO NOT eat or touch anything you do not recognize from the field. **Some plants are toxic** and cause skin irritation upon touch, and diarrhea when eaten. Some plants have sharp leaf edge and can cut your skin. Some insects leave exudates that contain their eggs or harmful microbes on plant leaf.

8. **DO NOT drink the pipe water from the office restroom, and the spring from outside the office.** NEVER use them to clean wounded body, either. ONLY drink the potable water brought to the site. Clean and treat scratches, cuts or bug bites on skin with first aid kit.
9. **A First aid kit and a First Aid Guide are stored in the office.** Anything more serious than scratches cuts or non-allergic bug bites should be taken care of in the hospital. A map from the field site to the nearest hospital (Purcell Municipal Hospital Emergency Room) is attached as **Figure 4** in section VI.
10. Call 911 upon emergency.
11. If necessary, call the field site manager Benjamin Dixon at (405) 208-9317.

## V. Snake bite plan

### First Aid Treatment of Snakebites in the Field

The following are minimum guidelines that should be adhered to in case of a snakebite in the field. **A first aid package and is located in the office of the field. First aid response plans for emergencies are located both in the office and in the shed near the field plots.**

1. Allow bite to bleed freely for 15-30 seconds.
2. Cleanse and rapidly disinfect area with Betadine or Alcohol pad
3. If bitten on the hand, finger, foot or toe, wrap leg/arm rapidly with Ace Bandage past the knee or elbow joint immobilizing it.
4. Leave area of fang marks open.
5. Apply Sawyer Extractor immediately until there is no more drainage from fang marks. (See specific instructions for Sawyer Extractor Kit.)
6. Cleanse and disinfect bite area again.
7. Apply hard direct pressure over bite using a 4 x 4 gauze pad folded in half.
8. Soak gauze pad in Betadine(TM) solution if available, but only if victim is not allergic to iodines.
9. Strap gauze pad tightly in place with adhesive tape.
10. Over-wrap dressing above and below bite area with additional ACE bandage.
11. Wrap ACE (elastic) bandage as tight as one would for a sprain but not too tight to cut off circulation.
12. Check for pulses above and below elastic wrap; if absent it is too tight.
13. Use splinting to immobilize bitten extremity.
14. If possible, try and keep bitten extremity below heart level or in a gravity dependent position.
15. Visual identification / description of the offending snake is necessary for medical purposes.
16. Bites to face, torso or buttocks are more problematic. Disinfect first. Prep (shave hair) area with razor provided in extractor kit.
17. Use extractor device until there is no further drainage possible and then apply pressure dressing with gauze pad and tape.
18. Go to nearest hospital or medical facility as soon as possible.

**Procedures for Sawyer Extractor Kit**

The Extractor pump creates a powerful suction designed to remove venom from the body by sucking it out the same cavity (fang or stinger track) through which it was injected.

1. If necessary to improve suction, use the safety razor provided to remove body hair from the bitten area. Other techniques for improving suction include wetting or covering the surface under the suction cup with petroleum jelly or Vitamin A&D ointment to help provide a seal.
2. Select suction cup size depending on area of body bitten as well as distance between multiple fang punctures. Insert the smaller end into the extractor nozzle.
3. Pull the plunger out fully and place the cup firmly over the bite or sting.
4. Using the thumb, push the plunger all the way down until you feel the suction and let the pump remove the poison.
5. Insect bites take up to 90 seconds of continuous application for effective removal of venom. Due to spreading factors of snake venom, suction for only the first few minutes after a snakebite is beneficial but you can continue applying vacuum for as long as possible if you are getting results (fluid removal in the cup).
6. In snakebites, it is recommended to use one extractor device over one fang track. For maximum efficiency, two fang tracks require two extractors placed simultaneously and separately over each mark. Applying a pressure bandage above the bite marks pushes the venom toward the vacuum exerted by the extractor device. If you only have one extractor device on hand, place the device over one fang track at a time and alternate between separate fang tracks every two minutes for up to 10 minutes if you are getting results.
7. Pull the plunger up gently to release the vacuum. If present, venom mixed with body fluids will be visible on the skin. Wipe away carefully and avoid splatter. Disinfect bite-site with alcohol wipes or pour betadine on wounds and dress with bandages.
8. Seek medical attention.

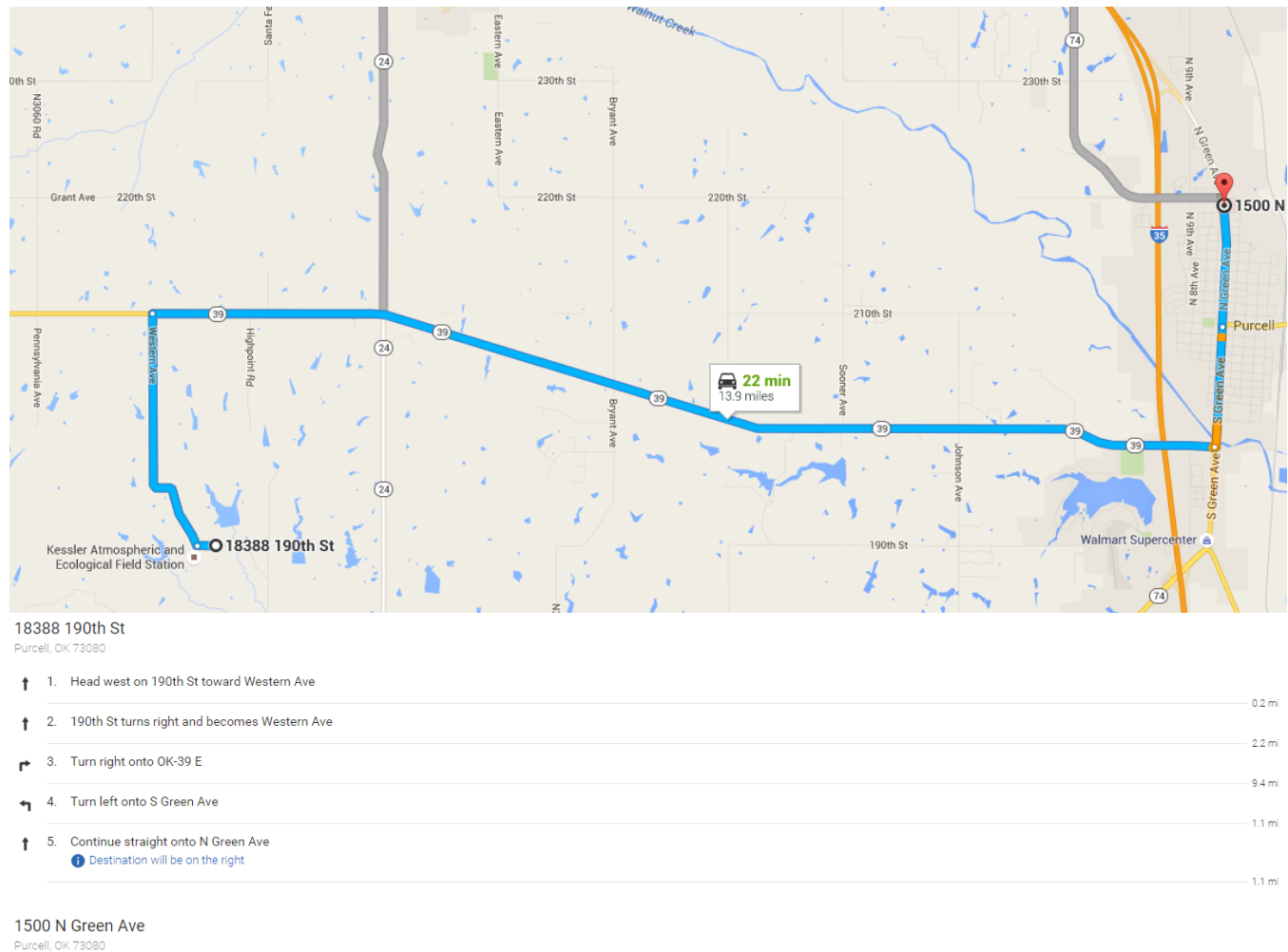


## VI. Nearest hospital contact and address

### Purcell Municipal Hospital Emergency Room

Phone number: (405) 527-2250

Address: 1500 North Green Avenue, Purcell, Oklahoma 73080



**Figure 4.** The map from the field site to the nearest hospital emergency room

### Oklahoma Poison Control

Phone number: (800) 222-1222

The Oklahoma Poison Control Center can help people decide what to do if bitten by a venomous snake or spider or in other situations involving poisons.

### Emergencies requiring immediate care/ ambulance

Call 911

## Appendix

Appendix 1. A map from SRTC to the field station

Appendix 2. Fieldwork checklist

Appendix 3. Soil moisture and respiration record sheet

Appendix 4. Plant survey record sheet

Appendix 5. Soil sampling label template

Appendix 6. Previously sampled soil cores locations

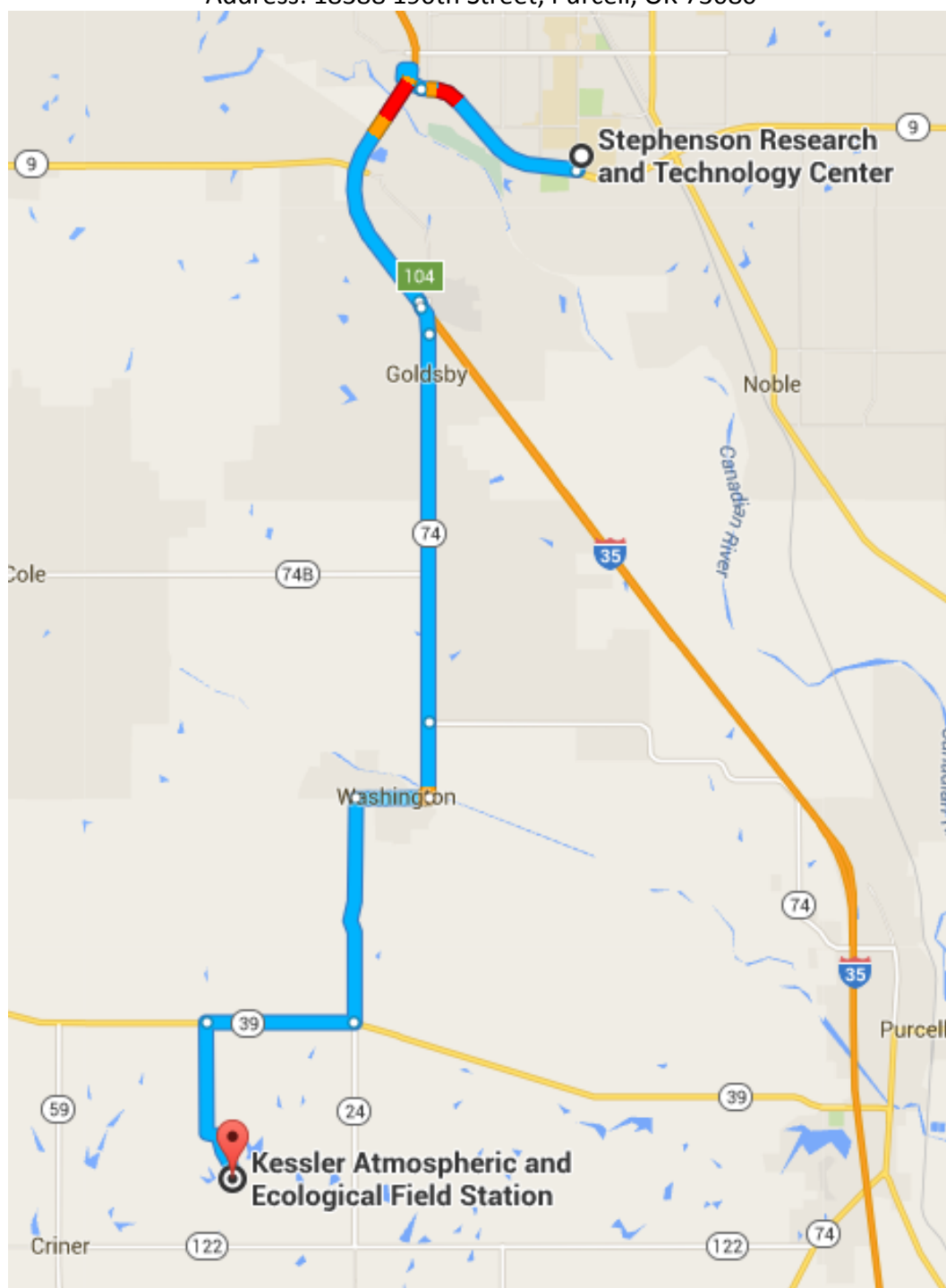
Appendix 7. Travel reimbursement information

Appendix 8. Venomous snakes in Oklahoma

Appendix 9. Important contact information

## Appendix 1. A map from SRTC to the field station

Address: 18388 190th Street, Purcell, OK 73080



**Figure 5.** A map from the lab to the field site

## Appendix 2. Fieldwork preparation checklists

### **Checklist - For all fieldwork**

- ☐ Make sure the weather is ok
- ☐ A site map
- ☐ Water and food supplies
- ☐ Bug spray and sun screen
- ☐ (Wasp spray in the shelter)
- ☐ a phone with AT&T network
- ☐ medical kit
- ☐ hats in summer

### **Checklist - Respiration measurement**

- ☐ Respiration equipment with the air chamber
- ☐ 2 charged batteries for equipment
- ☐ Charged iPod touch device and charger
- ☐ The sheet showing chamber set-off values, or rulers
- ☐ A protocol of using the equipment

### **Checklist - Moisture measurement**

- ☐ TDR meter
- ☐ TDR meter sensing needles (2 of them)
- ☐ Extra dry batteries
- ☐ Pen and blank record sheets

### **Checklist - NEE measurement**

- ☐ Photosynthesis equipment with sensor
- ☐ 4 charged batteries for equipment
- ☐ Chamber cover cloth
- ☐ Charged fan batteries
- ☐ Fan electrical cord (2 of them)
- ☐ Tape to fix fan batteries
- ☐ Screw for fixing the sensor to the chamber
- ☐ For cleaning the sensor: small screw, dust spray, alcohol, cotton swab
- ☐ A protocol for using the equipment
- ☐ Umbrella for shading the equipment if temperature is too high
- ☐ (Plastic chamber in the farm office)

### **Checklist - Plant survey**

- ☐ Blank survey record sheets with clipboards
- ☐ Pen
- ☐ Colored tape
- ☐ Marker pen
- ☐ Ruler
- ☐ Latex gloves
- ☐ Survey frames
- ☐ Plant identification references
- ☐ Envelope for specimen
- ☐ Camera
- ☐ (Frame legs in the shelter)
- ☐ (Pin with marked height fractions in the shelter)

### **Checklist - Clipping**

- ☐ Marker pen
- ☐ Garden gloves
- ☐ Big paper bags to store biomass
- ☐ Big plastic garbage bags to bring biomass back

### **Checklist - Soil sampling**

- ☐ Soil core (2cm diameter, for top 15cm soil)
- ☐ Sample bags (better labeled before taking to the field)
- ☐ Gloves and paper towel
- ☐ Chemical spoon
- ☐ 70% ethanol
- ☐ Sampling location marker (flag or plastic knives) with sampling date labeled
- ☐ Icebox
- ☐ (Small spade in the shelter)
- ☐ (Small bucket in the shelter)
- ☐ (Plastic funnel in the shelter)

## Appendix 3. Blank record sheet - moisture

**Respiration and Soil Moisture Record Sheet**

Date				Surveyor				
Plot#	Respiration	Moisture		Respiration	Moisture		Respiration	Moisture
1nd			9nd			17nd		
1ns			9ns			17ns		
1sd			9sd			17sd		
1ss			9ss			17ss		
2nd			10nd			18nd		
2ns			10ns			18ns		
2sd			10sd			18sd		
2ss			10ss			18ss		
3nd			11nd			19nd		
3ns			11ns			19ns		
3sd			11sd			19sd		
3ss			11ss			19ss		
4nd			12nd			20nd		
4ns			12ns			20ns		
4sd			12sd			20sd		
4ss			12ss			20ss		
5nd			13nd			21nd		
5ns			13ns			21ns		
5sd			13sd			21sd		
5ss			13ss			21ss		
6nd			14nd			22nd		
6ns			14ns			22ns		
6sd			14sd			22sd		
6ss			14ss			22ss		
7nd			15nd			23nd		
7ns			15ns			23ns		
7sd			15sd			23sd		
7ss			15ss			23ss		
8nd			16nd			24nd		
8ns			16ns			24ns		
8sd			16sd			24sd		
8ss			16ss			24ss		

## Appendix 4. Blank record sheet - plant survey

Survey date: \_\_\_\_/\_\_\_\_/20\_\_\_\_

Plot No: \_\_\_\_\_ North/South

Surveyors: \_\_\_\_\_

	1	2	3	4	5	6	7	8	9	10
A										
B										
C										
D										
E										

Other Species Occurring in this plot:

\_\_\_\_\_

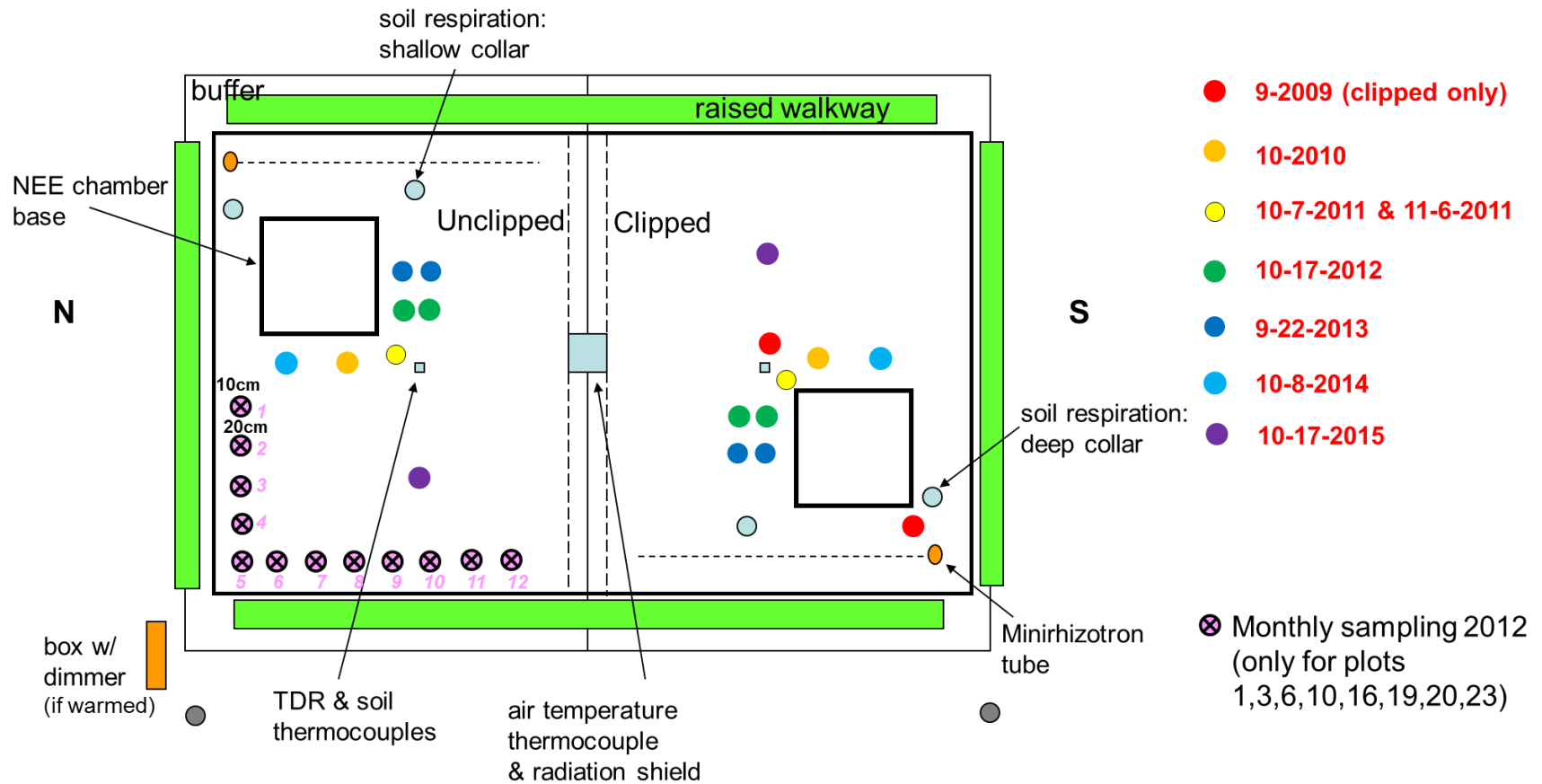
\_\_\_\_\_

## Appendix 5. Soil sample bag labeling template

Use the correct template for the label sheet you are printing on. In each label, use the following template to inform the sample information. Change highlighted parts.

OK New Warming Site Annual Soil Archive 10/16/2015 Plot 3S Heat: Y / N      Clip: Y / N Precipitation: half / normal / double
---

## Appendix 6. Previously sampled soil core locations





## Appendix 7. Travel reimbursement information

### **Allowable items**

1. Vehicle mileage from the lab to the field and back
2. Water and supply
3. Equipment and tools for field work

### **How to reimburse travel expenses to the field site**

Please send the following information to Missy Lee ([mslee@ou.edu](mailto:mslee@ou.edu)) **as soon as possible** when came back from the trip. There is a time limit of submitting claim requests, and the reimbursement cannot be processes afterwards. Each person should send a separate list of information. A person paid by OU is recommended to claim the reimbursement.

1. Name of person who claims the reimbursements (better to be a person paid by OU)
2. Trip date and time both for setting out and coming back, and a simple description of the fieldwork done.
3. If claiming for mileage, include the vehicle tag number.
4. If claiming for merchandise, bring missy all the receipts with a description of what each item is for.

## Appendix 8. Oklahoma venomous snakes



broad-banded copperhead



Texas coral snake



western cottonmouth



Rattlesnake rattle



western diamond-backed rattlesnake



western massasauga



prairie rattlesnake



western pygmy rattlesnake

**Figure 6.** *Venomous snakes in Oklahoma*

## Appendix 9. Important contact information

Please contact these people by email if the issue is not urgent. For urgent issues during office time, contact office number. For any urgent issue off hours, contact by the cell phone numbers.

**Table 3.** *Contact information*

<b>Issue type</b>	<b>Person</b>	<b>Email</b>	<b>Work phone</b>	<b>Cell phone</b>
<b>Severe medical emergency</b>			911	
<b>Medical emergency</b>	Purcell Municipal Hospital ER	NA	(405) 527-2250	
<b>Site management</b>	Liyou Wu	Liyou.Wu-1@ou.edu	(405) 325-2537	(405) 371-8521
<b>Site management</b>	Benjamin Dixon	bdixon@ou.edu		(405) 208-9317
<b>Severe issues</b>	Jizhong Zhou	jzhou@ou.edu	(405) 325-6094	405-808-2414
<b>Reimbursement</b>	Missy Lee	mslee@ou.edu	(405) 325-6094	
<b>Ordering supplies</b>	Joy Van Nostrand	joy.vannostrand@ou.edu	(405) 325-4403	