Annual Report: Distribution and prevalence of native Fire ants in the Balcones Canyonlands Preserve

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Overview

Imported fire ants (*Solenopsis invicta*) invaded central Texas in the 1980's. They greatly depressed the diversity of co-occurring ants and arthropods in the systems they invaded (Camilo & Phillips 1990, Morris & Steigman 1993, Porter & Savignano 1990) although in some systems many impacts were transitory (Morrison 2002). The group mostly strongly impacted by *S. invicta* are the native fire ant species (*S. geminata*, *S. xyloni,* and *S. amblychila*) (Tschinkel 1988). Although healthy populations of these ant species exist outside of the range of imported fire ants in North America, these ants have been eliminated in most of their previous range in Texas and the southeastern United States (Tschinkel 2006).

Recent sampling work conducted in Wild Basin Preserve under a separate project permit granted to Dr. Allan Hook revealed the presence of dense local populations of native fire ants in some of the meadows of the preserve. Pitfall trap residues from these meadows contained a diverse group of ant species including dense populations of native fire ants (*S. geminata,* and *S. aurea)* as well as low density imported fire ants. This species assemblage contrasts strongly with other Edwards Plateau ant assemblages sampled by E. LeBrun which have been uniformly characterized by dense populations of imported fire ants and an absence of native fire ant species. The meadows sampled in Wild Basin are largely isolated from the surrounding suburban and rangeland matrix by juniper woodlands, an environment unsuitable to imported fire ants. The suggestion then is that more isolated meadows within the preserve system may contain ant assemblages more reflective of the pre-imported fire ant invasion assemblages of central Texas.

Intended use of results

The results will be used to plan future research into co-existence between native and imported fire ants. There is no commercial application for these results.

Objective

Our objective is to assay the ant assemblages within isolated and less isolated meadows within the Balcones Canyonlands preserve system to determine the prevalence of native fire ants within the preserve. We also wish to characterize the composition of the ant assemblages associated with native fire ant dominated meadows and a similar number of introduced fire ant dominated meadows to assess whether the species of fire ant impacts the richness or abundance of the remainder of the assemblage.

Methods

Study Area

Procedures

Ant assemblages in meadows will be sampled with baits and hand collection techniques. 30 baits spaced a minimum of 10 m apart will be deployed per meadow. Meadows that baiting and hand collection identify as dominated by native fire ants and an equal number of meadows that are dominated by imported fire ants will subsequently be sampled with pitfall traps. A maximum of 7 native fire ant dominated and 7 imported fire ant dominated meadows will be sampled with pitfall traps. 20 pitfall traps spaced 10 m apart will be installed. Pitfall traps will be 50 ml centrifuge tubes with 3 cm diameter openings. They will be charged with a mixture of water and 50% propylene glycol (non-toxic antifreeze) and left open to collect ants for 1 week. The small diameter openings of these traps ensure that only ants and other small, primarily non-flying arthropods are captured. The non-toxic trapping fluid ensures that no vertebrates are at risk. Pitfall trapping allows for a much more comprehensive survey of the ant assemblage and quantifies relative abundance in a largely unbiased manner.

Collections

Approximately 5-30 worker ants from each bait or colony encountered will be vouchered into ethanol. Species identification of ants generally must be done under a microscope using preserved specimens so vouchering is required. However, as worker ants are non-reproductive members social insect colonies that typically possess large worker populations, removal of these workers will not harm resident colonies. All specimens will ultimately be deposited into the UTIC (University of Texas Insect Collection).

Results

Data Analysis

The purpose of this project is to collect baseline data on fire ant species distribution patterns. These patterns are summarized in Table 1. Figure 1 provides a series of maps and photographs of the meadows surveyed. The contents of pitfall traps have not yet been sorted. These traps will be sorted during January 2014. Because ants have not been counted and identified, we cannot report results from the pitfall traps at this time.

Conclusions

Native fire ants occur commonly in the meadow habitats of the BCP. Their prevalence in these meadows is much higher than in any other habitat type in central Texas the investigators are aware of. The reason that native fire ants appear to be so much more successful in the pocket prairie meadows of the Edward's Plateau as compared to other grassland habitats in central Texas is unknown. However, meadows with native fire ants typically also contain imported fire ants, so the prevalence of native fire ants does not result from isolation from imported fire ants.

Our expectation from the outset was that these more isolated meadows would possess largely monogyne colonies of imported fire ants. Monogyne fire ants also engage in winged dispersal

and independent colony foundation while polygyne fire ants do not. Monogyne fire ant populations are less dense, than polygyne populations and considered to be less damaging to as a result. In fact, these meadows contain largely polygyne imported fire ants. The co-occurrence of native fire ants with polygyne fire ants in these meadows rejects the hypothesis that the social form of the imported fire ant in the isolated BCP meadows facilitates the persistence of native fire ants.

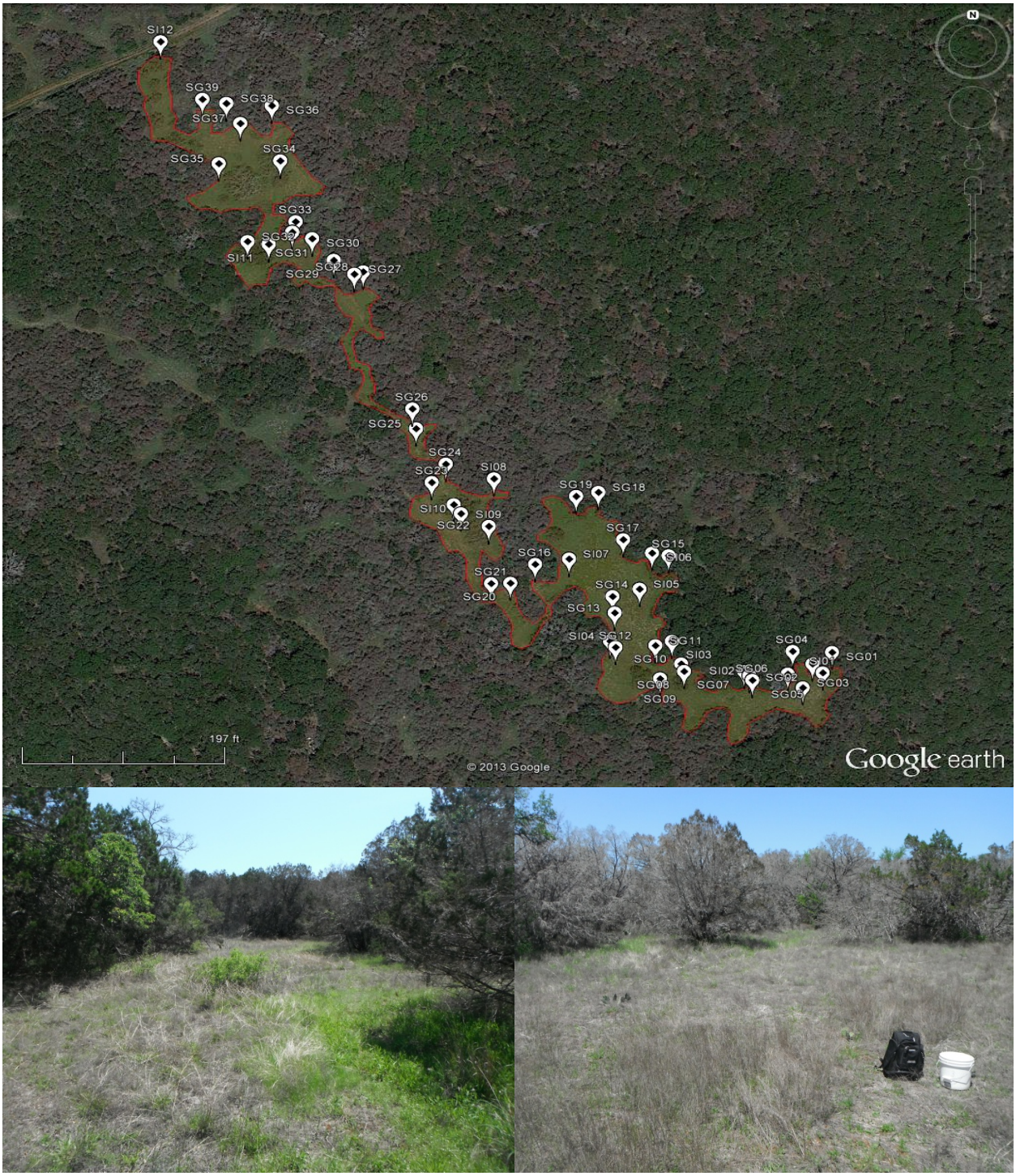
Because this effort represents a baseline survey, no more conclusions are possible at this time. We hope to resurvey these meadows in the future to see if the prevalence of species reported in Table 1 changes.

Table 1: Prevalence of and characteristics of fire ant populations in BCP meadows.

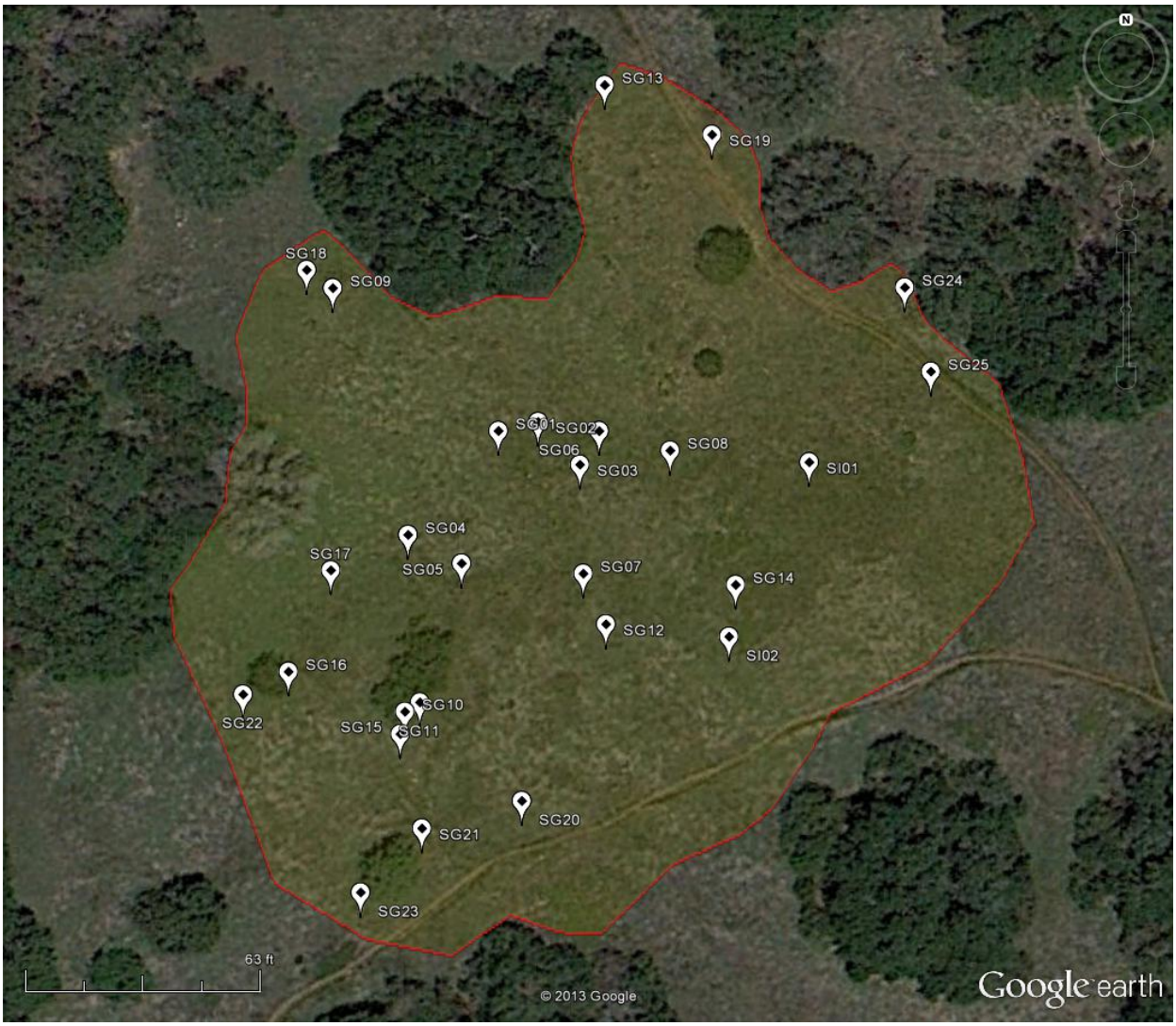
Meadow ID	Latitude	Longitude	Meadow Area (acres)	Total *S. geminata* colonies	Total *S. invicta* colonies	% of Fire Ants - Native	Percent of *S. invicta* colonies - Polygyne	*S. geminata* colonies per acre	*S. invicta* colonies per acre
BCWP1	30.26056	-97.8249	1.087	39	12	76	100%	35.88	11.04
BCWP2	30.25347	-97.8231	0.831	25	2	93	100%	30.07	2.41
BCWP4	30.25575	-97.827	0.477	19	16	54	79%	39.87	33.57
BCWP5	30.25873	-97.8336	0.393	0	20	0	95%	0	50.91
BCWP6	30.2613	-97.832	0.643	9	20	31	95%	14	31.11
BCWP7	30.25291	-97.8268	0.959	21	0	100	N/A	21.89	0
BCWP8	30.25905	-97.8365	0.442	0	20	0	100%	0	45.22
BCWP9	30.2502	-97.8225	0.747	20	0	100	N/A	26.76	0
VP1	30.31213	-97.818	2.088	4	15	21	100%	1.92	7.19
VP2	30.31037	-97.8164	0.947	0	0	NA	N/A	0	0
VP3	30.31382	-97.8155	1.928	30	14	68	93%	15.56	7.26

Figure 1: Satellite image maps and habitat photographs of BCP meadows surveyed.

Meadow BCWP1:



Meadow BCWP2:



Meadow BCWP4:







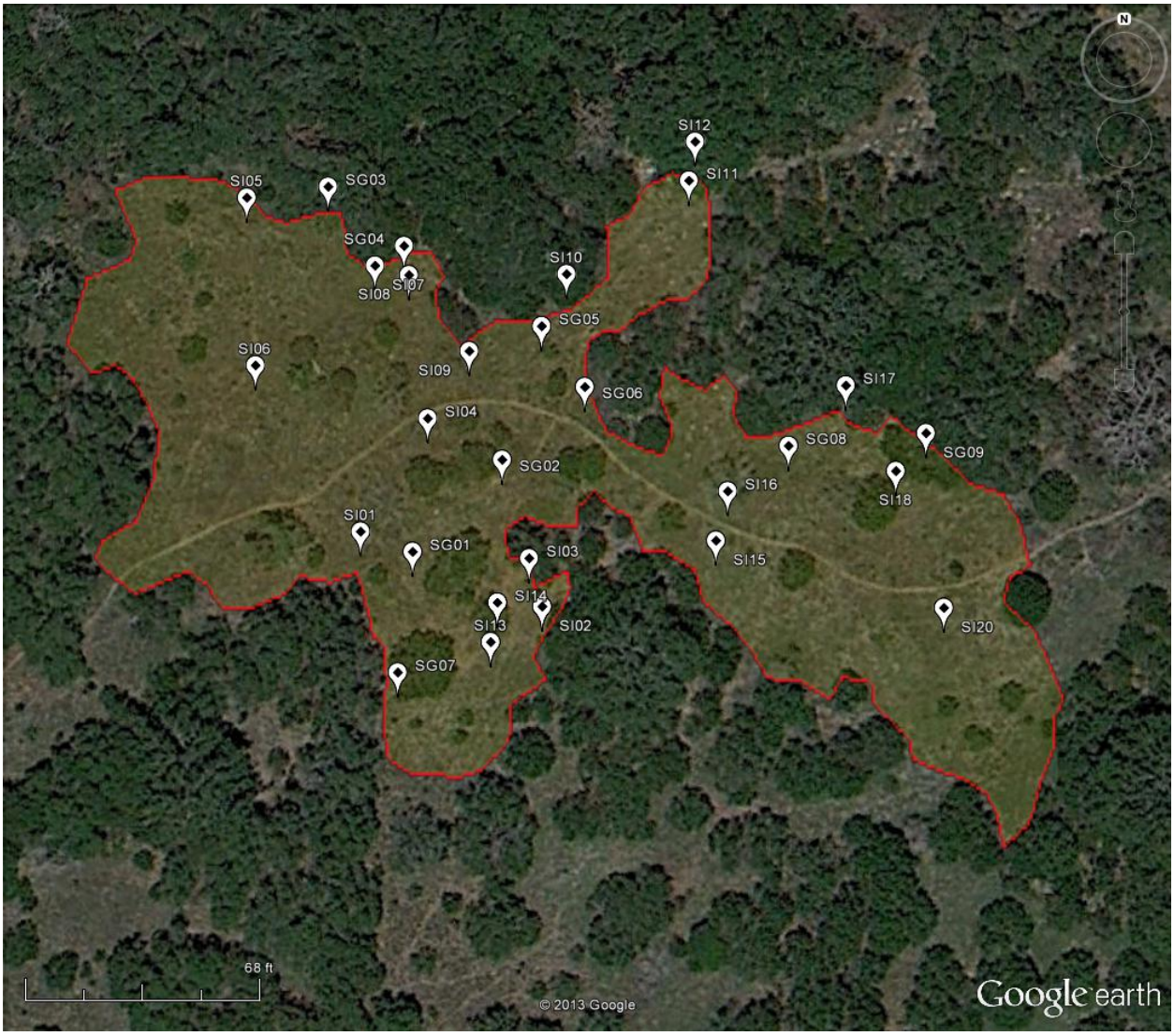
Meadow BCWP5:



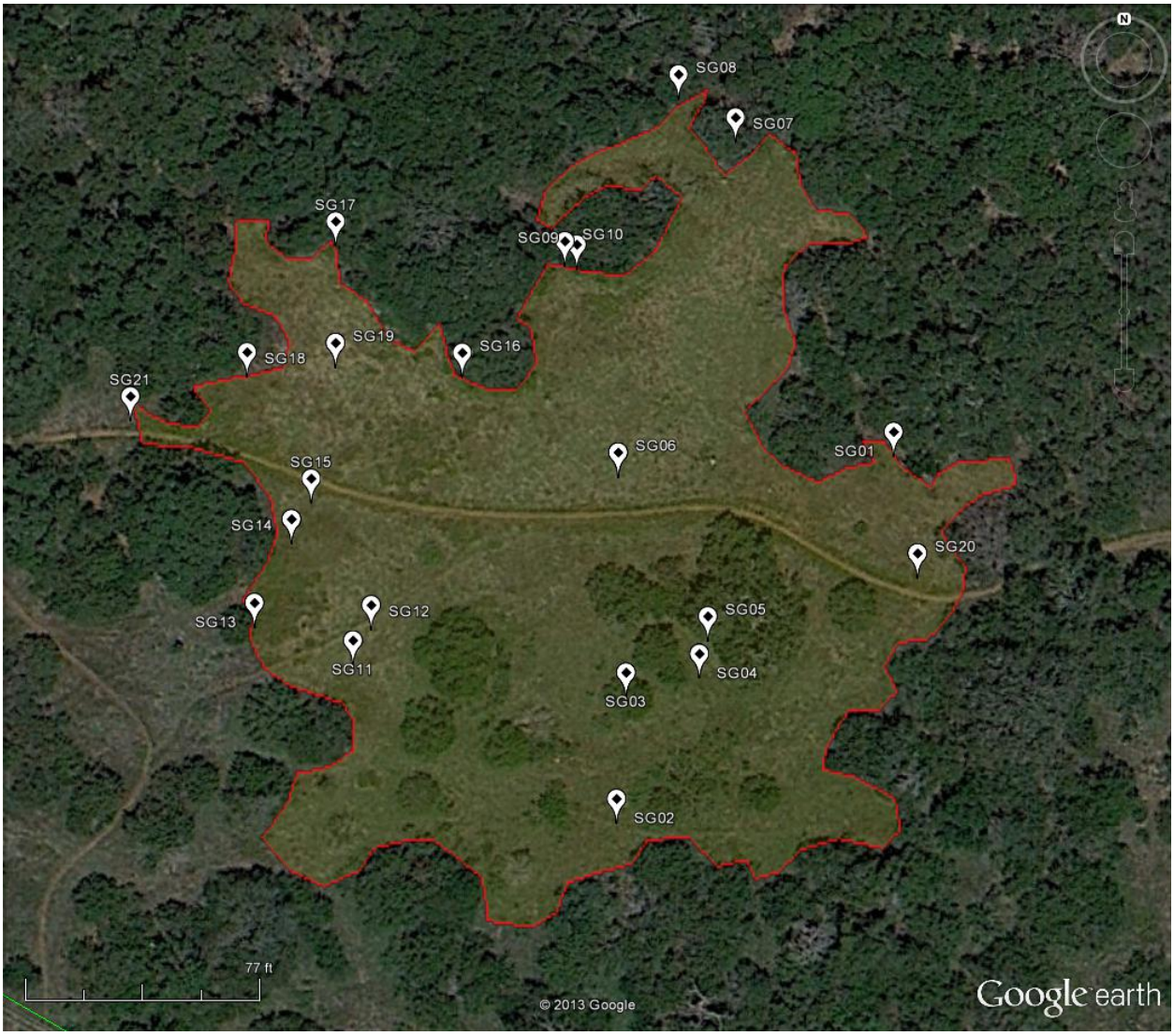




Meadow BCWP6:



Meadow BCWP7:



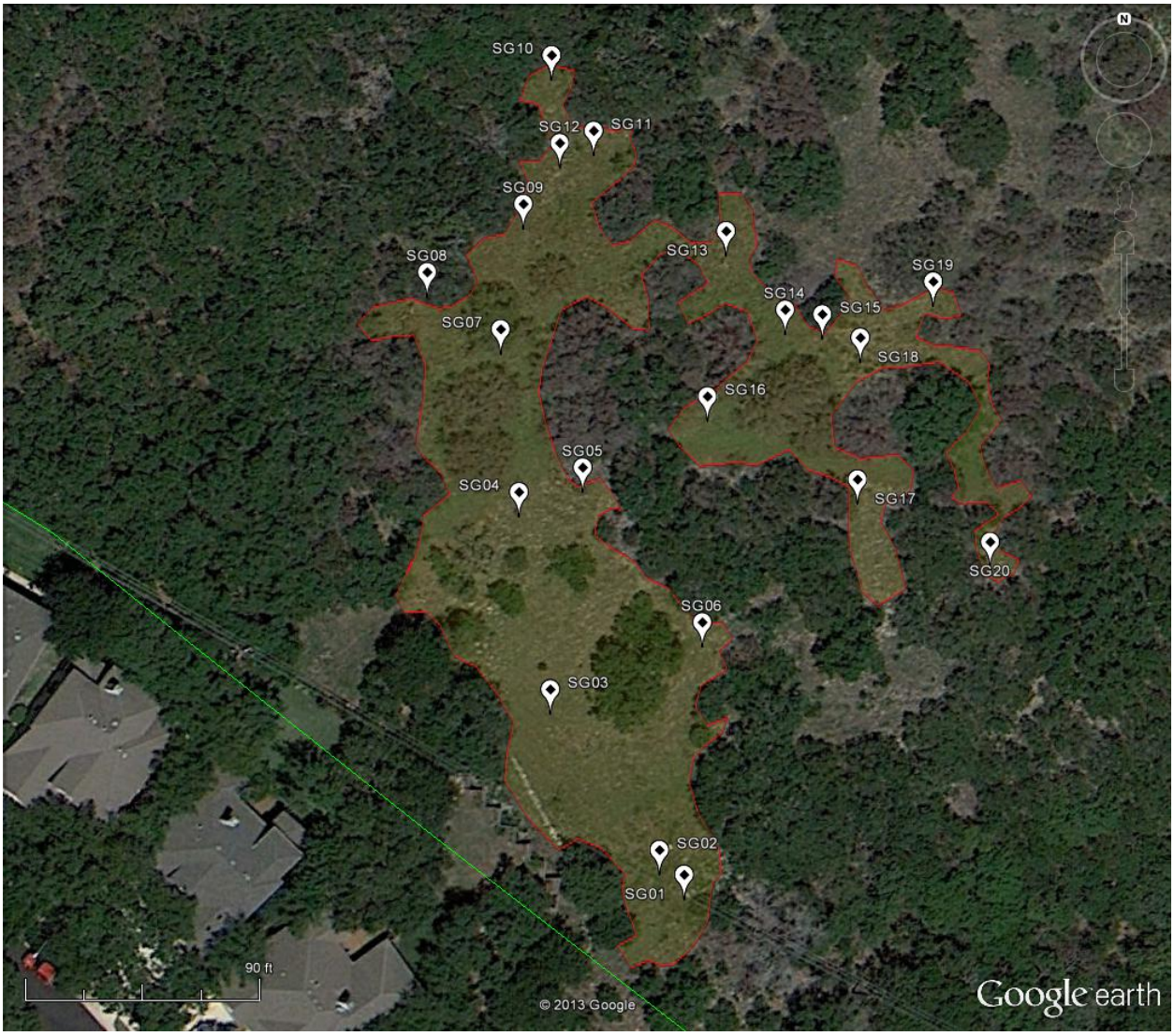
Meadow BCWP8:







Meadow BCWP9:



Meadow VP1:


SG04
SI11
SI14
SI15
SI12
SI13
SG01
SI01
SI03
SI04
SI05
SI06
SI09
SI10
SG02
SI07
SI02
SI08
SG03
152 ft
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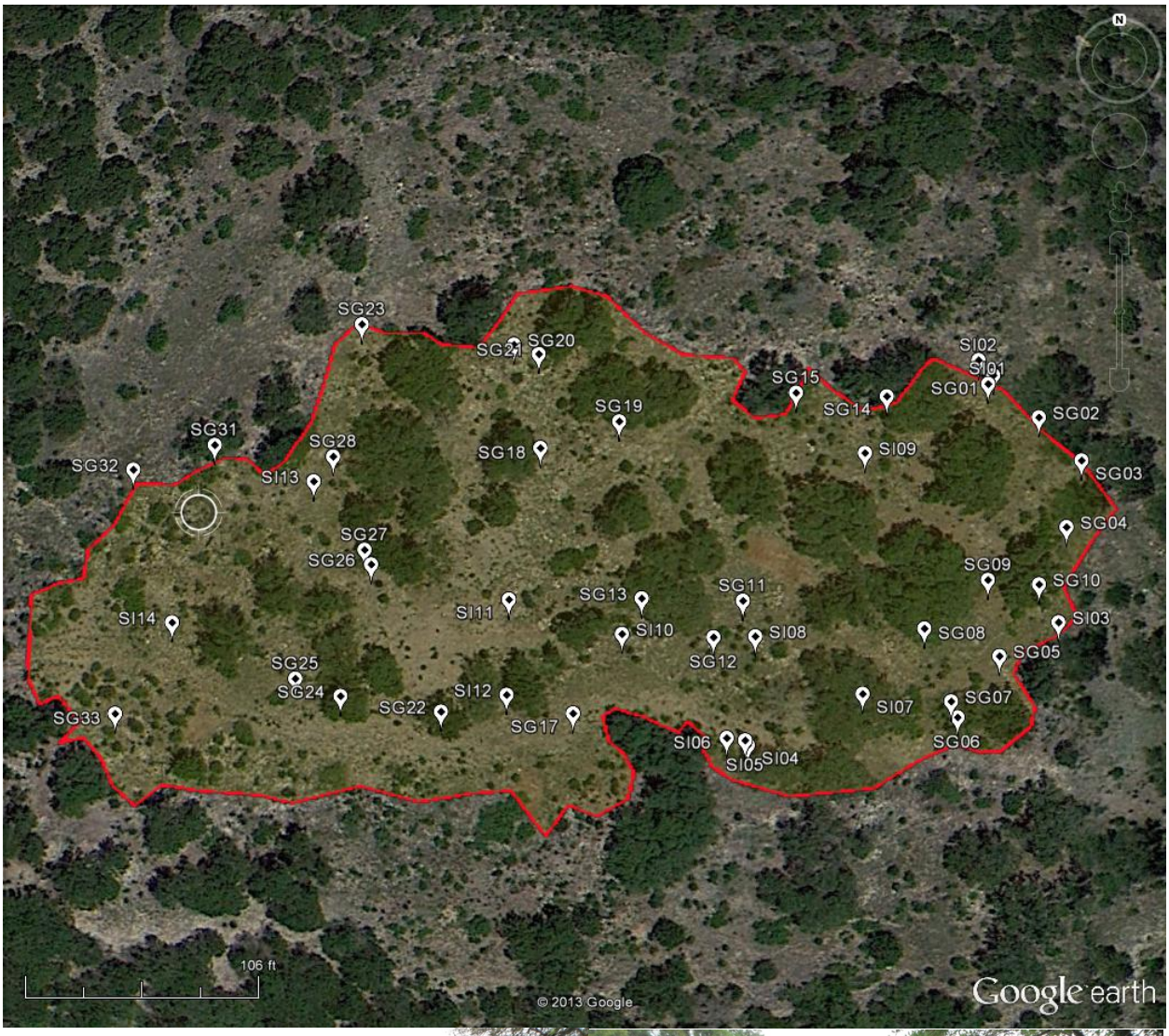
Meadow VP2:







Meadow VP3:


SG23
SG21
SG20
SI02
SI01
SG01
SG15
SG14
SG19
SG02
SG31
SG28
SG18
SI09
SG03
SG32
SI13
SG27
SG04
SG26
SG09
SG10
SG13
SG11
SI14
SI11
SI10
SI08
SG08
SI03
SG12
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SG22
SI07
SG07
SG33
SG17
SI06
SG06
SI05
SI04
106 ft
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