

Survey Methodology: Active Assessment of Archaeological Inventory Methods

L. Todd (GRSLE; Colorado State University; University of Wyoming) and D. Dalmas (University of Utah; GRSLE)



ABSTRACT
 Since 2002 the GRSLE (Greybull River Sustainable Landscape Ecology) project in NW Wyoming has undertaken artifact-based, largely non-collection regional archaeological research at high elevations (>2500m) and often in designated Wilderness areas where few prehistoric sites had been previously recorded. Using a variety of methods, a fundamental goal has been to develop landscape scale artifact distributional and attribute dataset that currently contains nearly 250,000 individually mapped artifacts. A range of transect spacings and coverage protocols have been employed and although slight changes have been made, the basic documentation protocol has been used for the last 22 field season. Having large blocks of previously inventoried terrain available for re-documentation provides a research opportunity to reinvestigate areas using different methods and comparing the results – to conduct methodological research. Results of applying nest sampling units, high-intensity evaluation transects, artifact cluster re-recording, and other methods to evaluate the larger, landscape scale patterns are described.

Methods – basic field/descriptive protocols

Methodology – systematic comparison of methods

Results – Some Comparisons & Next steps

Inventory:

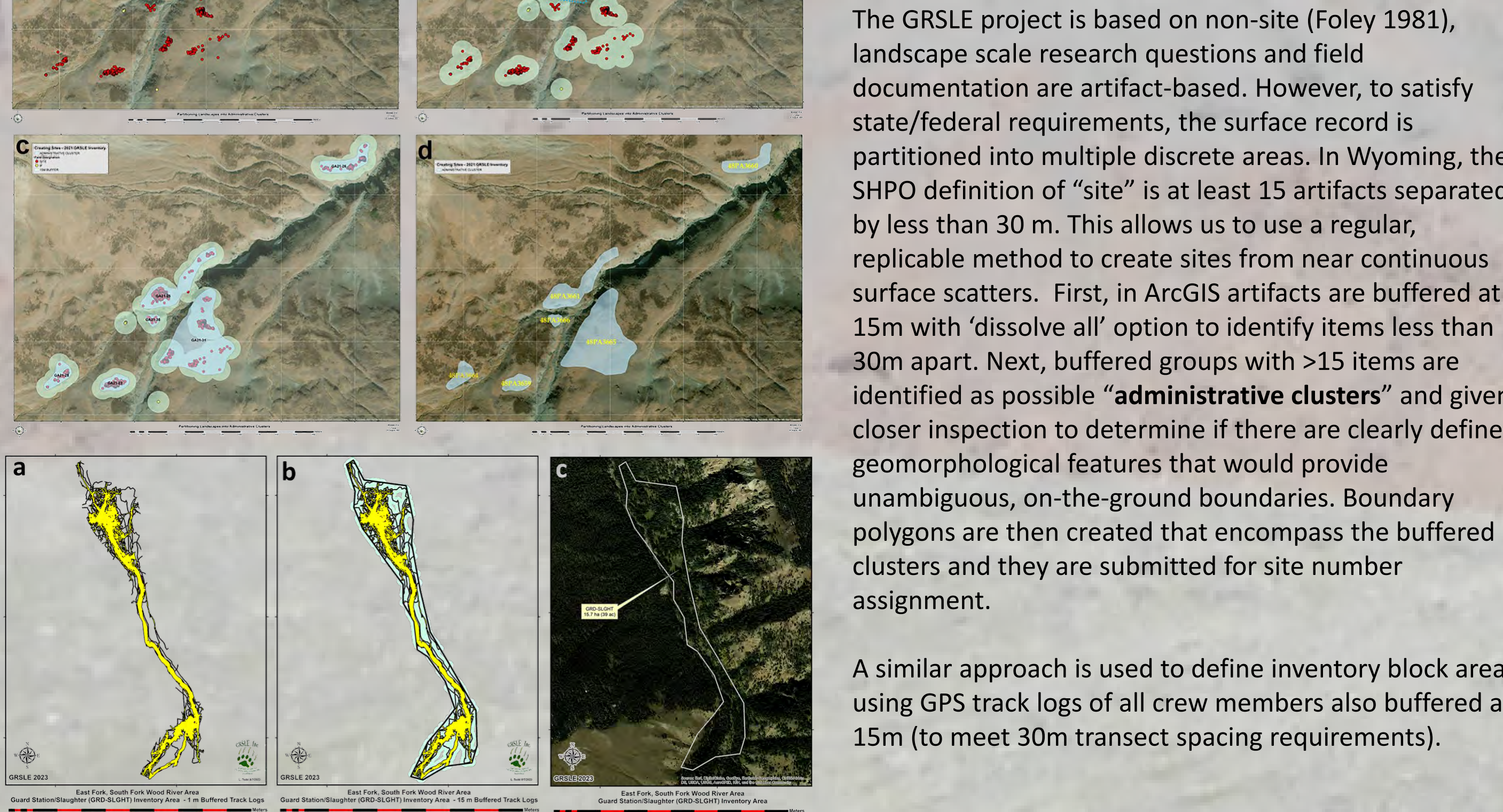
In 2002, when we began inventory of portions of the Shoshone National Forest, Washakie Wilderness, only a single archaeological site had been reported (48PA781, Boulder Ridge trap) and we were unsure what to expect in terms of surface artifact density and distribution. Our initial linear transect survey (5 m spacing) was centered on a Forest Service trail and by the end of the first 10-day session we had covered just over 2km in an approximately 200m wide inventory block documenting nearly 4000 surface artifacts. Since then, annual fieldwork has continued with at total of 196 survey block areas totaling 3996ha having been covered as part of Section 110 inventory for the Shoshone National Forest. Transect spacing for pedestrian survey has varied from a maximum of 10 m to 70cm. In some cases, crawl survey has been undertaken on specific clusters or as part of Modified-Whittaker sample plots documentation.



Regardless of discovery method, once artifact clusters are encountered, the goal is to complete full documentation of 100% of surface artifacts, irrespective of whether clusters are “isolates” or “sites.” The project has been predominately non-collection, which provides opportunities for methodological research on surface archaeological documentation.

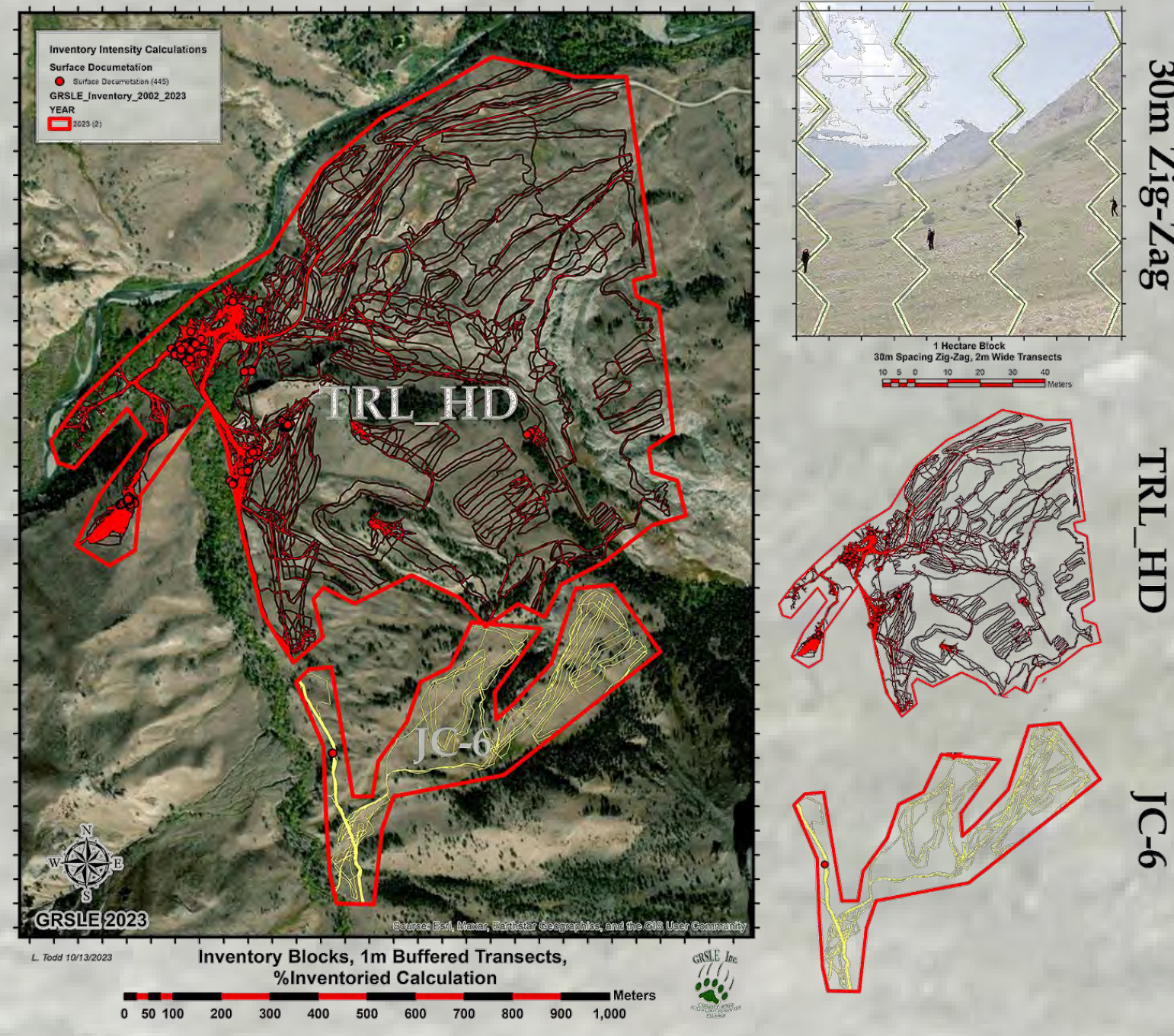
Defining Administrative Clusters: The GRSLE project is based on non-site (Foley 1981), landscape scale research questions and field documentation are artifact-based. However, to satisfy state/federal requirements, the surface record is partitioned into multiple discrete areas. In Wyoming, the SHPO definition of “site” is at least 15 artifacts separated by less than 30 m. This allows us to use a regular, replicable method to create sites from near continuous surface scatters. First, in ArcGIS artifacts are buffered at 15m with ‘dissolve all’ option to identify items less than 30m apart. Next, buffered groups with >15 items are identified as possible “administrative clusters” and given closer inspection to determine if there are clearly defined geomorphological features that would provide unambiguous, on-the-ground boundaries. Boundary polygons are then created that encompass the buffered clusters and they are submitted for site number assignment.

A similar approach is used to define inventory block areas using GPS track logs of all crew members also buffered at 15m (to meet 30m transect spacing requirements).



Estimating Inventory Coverage:

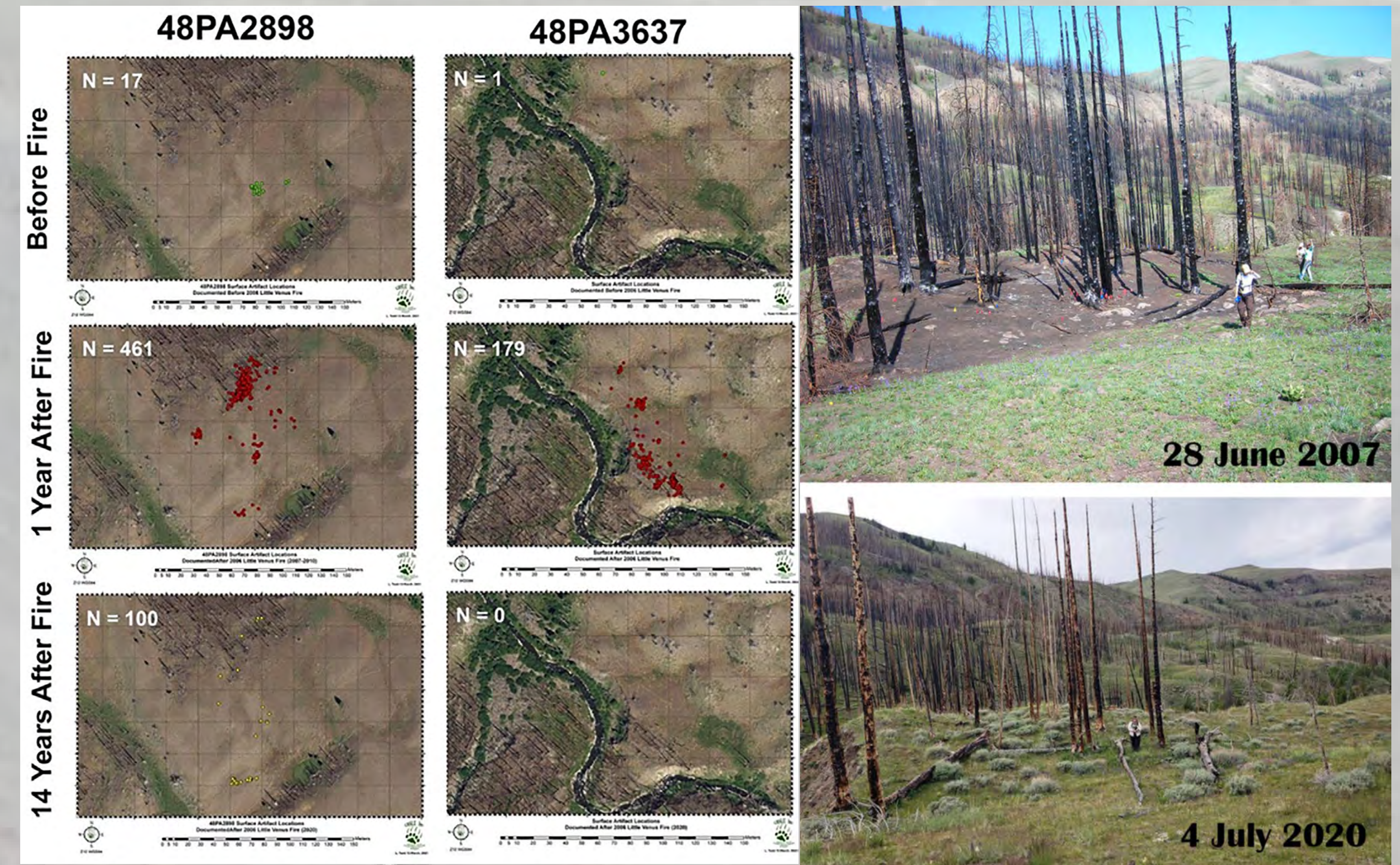
Although 30m transect spacing is often referred to as 100% coverage, this is demonstrably not the case as illustrated by multi-scale investigations (e.g., Burger *et al.* 2004). To provide a more evidence-based estimate of coverage, we’ve begun using all crew tracklogs (as used to define inventory blocks) buffered at 1m (to provide a 2m wide observation window) and clipped within a previously defined block area. Total block area and combined 2m buffered track log areas are then used to develop individual percentage coverage estimates for each area inventoried as part of GRSLE cooperative agreement for Section 110 survey for the Shoshone National Forest. Using this method, standard 30m spaced, zigzag transect survey results in a near 10% inventory coverage.



While none of our large-scale blocks approach 100% and likely never will, as described by Burger *et al.* (2004) additional multi-scale small plots positioned within these larger areas can be used to provide small sample windows with greater intensity coverage. In practice, every time an artifact is located by a team member, the area around it receives more intensive coverage, which can be used to document intensity of surface examination for the smaller administrative clusters once they are identified.

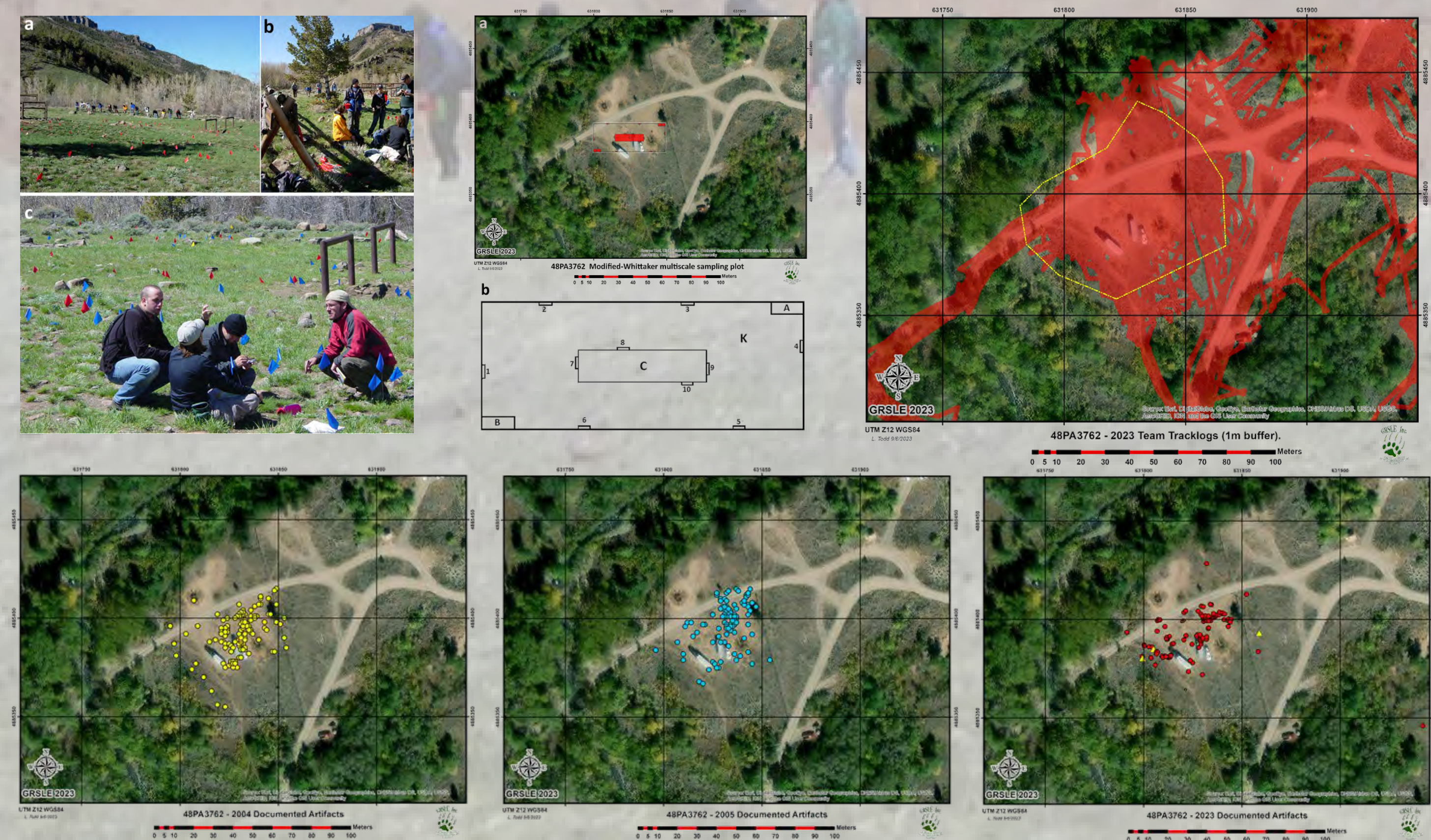
Natural Experiments:

In contrast to methods, methodological studies provide comparisons of results of inventory methods. One of the most often applied methodological studies in the GRSLE project has been provided by being able to use the same inventory methods in cases where surface visibility has been altered by fires. Such natural experiments provide an exceptional opportunity to assess the regional range in frequency variation of surface and near-surface artifacts. Such re-surveys also provide excellent means to monitor cluster condition for attributes such as documentation consistency, artifact theft, or thermal alteration.



Replicated Documentation:

How does the record expressed by surface archaeology vary when a range of inventory and documentation methods are used? Since we do non-collection archaeology, localities can be revisited and examined several ways and the results compared. How does our impression of the nature of an administrative cluster change when examined in different seasons, with different types of crews, and with a range of methods?



Intensive Re-Inventory:

Once a block area has been surveyed using a non-collection approach, it provides opportunities for conducting a variety of methodological investigations. The use of multi-scale plots (Burger *et al.* 2004) focuses on 1000m² landscape parcels but has a high investment time in positioning, set-up, and recording. Beginning in 2020, we’ve added a linear re-examination method that uses a three-person team to provide an intensive examination of 2m wide transects. This method has also become our primary method to inventory trail corridors and as one method to evaluate surveyed blocks.



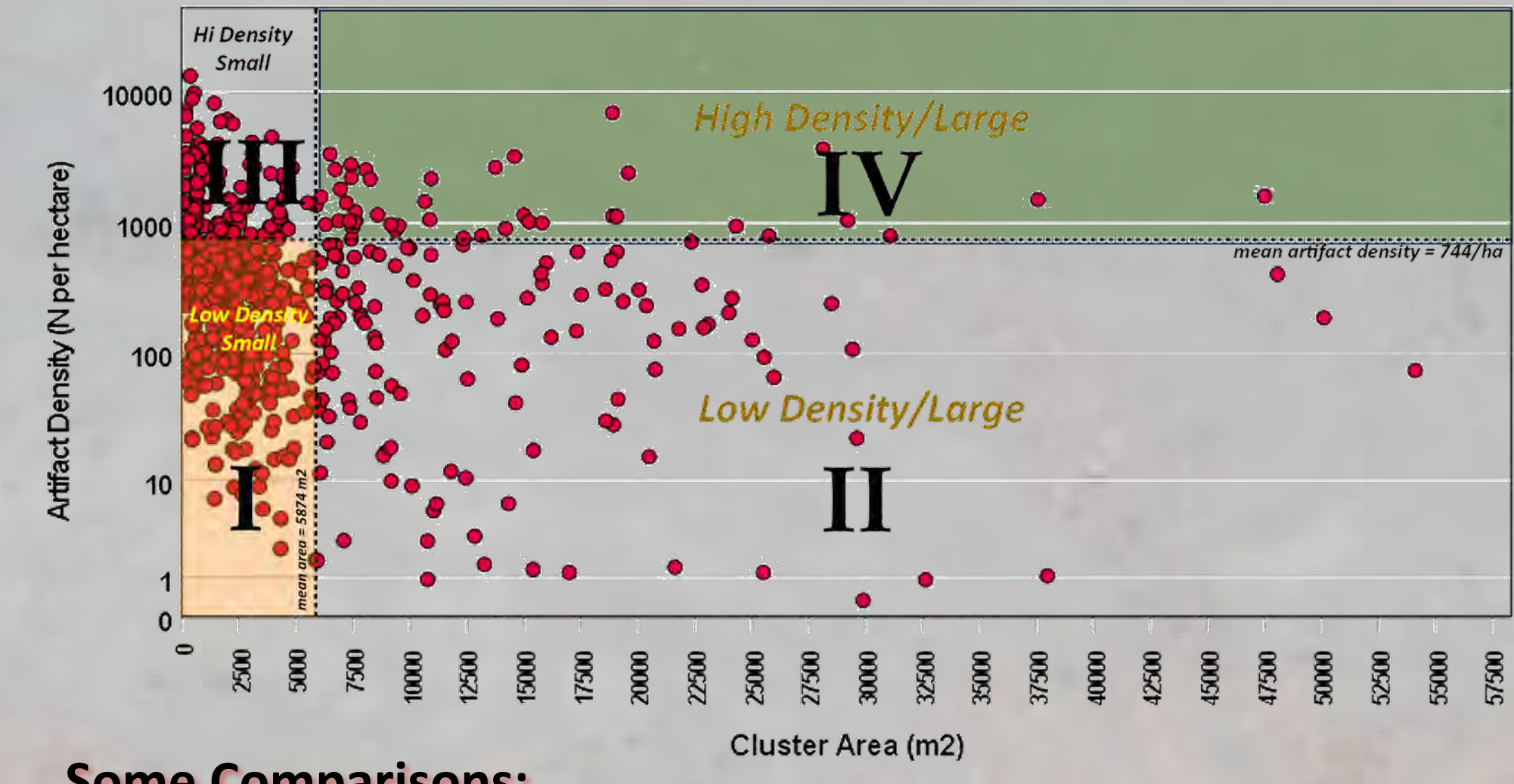
Acknowledgements:

Data presented here have been collected by many students, volunteers, and colleagues under often difficult field conditions since 2002. Their efforts are the foundation on which any GRSLE analysis is built. The Shoshone National Forest has been supportive in terms of both encouragement and funding. This has been a truly engaging process linking research and management. Thanks to everyone involved!

Cluster Attributes/Discovery Potential:

One issue of relevance in attempting to develop a landscape scale surface archaeological record documentation using block inventories is the potential that sometimes artifact clusters are not recognized on an initial inventory. Why not? Lots of potentials: crew member inattention/experience level, inadequate transect spacing, lighting, vegetation cover, weather conditions, *et cetera*. Many of these are difficult to evaluate. As some initial steps, we have begun looking at the GRSLE administrative cluster sample in terms of two attributes that likely influence inventory recognition: 1) spatial extent (area, m²) and 2) artifact density (#/ha). Using 601 clusters recorded in the Absaroka Mountains since 2002, means and ranges have been calculated. The mean cluster size in this sample is 5875 m² and the mean artifact density is 745/ha.

Sample means are subdivided into four classes/groups as the basis for evaluating if such characteristics have impacts on cluster discovery in future methodological studies in the area. Research questions will not be “does an inventory method find sites,” but rather “are there cluster properties that are more or less likely to be encountered/recognized?”



CLUSTER CLASS GROUPS	Elevation (m)	N Chipped Stone (CS)	Density (CS/ha)	Area (m ²)
I Low Artifact Density Small Area	Mean	316	316	316
	Minimum	2129.00	1	1.70
	Maximum	3472.00	316	734.01
	Std. Deviation	301.28	56.15	200.05
II Low Artifact Density Large Area	Mean	123	124	124
	Minimum	2007.00	264.68	184.60
	Maximum	2128.00	1	0.33
	Std. Deviation	3457.00	1854	716.36
III High Artifact Density Small Area	Mean	2781.59	322.68	2324.23
	Minimum	1653.00	1	756.02
	Maximum	3477.00	1774	13138.30
	Std. Deviation	268.50	342.48	2050.26
IV High Artifact Density Large Area	Mean	2891.13	2362.64	1609.80
	Minimum	2326.00	568	750.20
	Maximum	3448.00	12999	68708.00
	Std. Deviation	284.89	2544.40	1113.21
Total	Mean	599	601	601
	Minimum	1653.00	323.53	744.58
	Maximum	3477.00	12999	13138.30
	Std. Deviation	284.73	936.66	1285.20

Some Comparisons:

Taking a quick look at one type of methods comparison – 5m transect interval block inventory versus 2m 3-person intensive transecting has been undertaken in several ways: a) with the 2m transect centered on Forest trails passing through a GRSLE inventoried block and b) with multiple 2m transects through inventoried block areas.

How do estimated surface artifact densities compare between large block inventoried areas and 2m transect evaluation transects? The 2m transect methods estimated the presence of artifact densities ranging 86-158 artifacts per hectare. In both cases, the large block inventories produced higher artifact density estimates, but given the extreme differences in total area examined (386ha examined in blocks and only 2.21 ha in the multiple 2m transects) this may not be surprising.

How effective are 2m transects at relocating previously recorded artifact clusters? In the two areas shown here 14 of the 21 artifact clusters (67%) that 2m transects passed through had artifacts recorded. In terms of the artifact cluster classes defined above, class IV clusters (high artifact density/large area) had artifacts encountered in the 2m transects 5 out of 6 times (83%) and class II clusters (low density/large area) also commonly recorded artifacts (8 of 11 [73%] previously defined clusters had artifacts recorded in 2m transects).

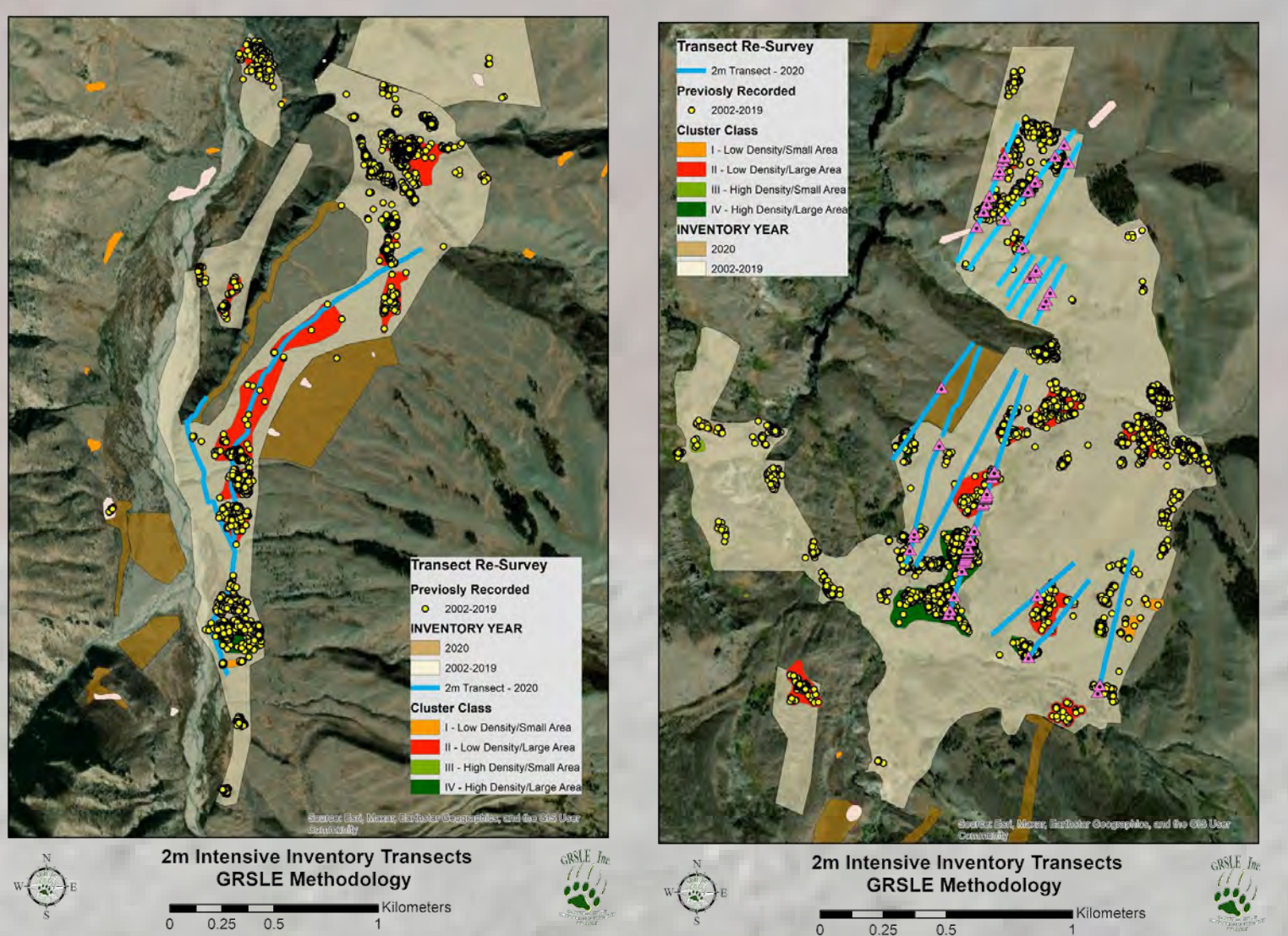
What next?:

Finding large administrative clusters (regardless of density) with 2m intensive transects has a higher probability than finding clusters that cover smaller areas. Not exceptionally earth shaking. But what we find exciting is the potential for continued, more sophisticated methodological research with the GRSLE documented mountain landscapes. Unlike Section 106 projects where outcomes are aimed at mitigating impacts of a project, the data collected with these non-collection Section 110/research projects can be used as the basis for continuing to build future research questions and expand topics on an inventoried area. Expand instead of mitigate. Rather than considering research significance on a site-by-site basis, work with these sorts of inventoried landscape laboratories can be seen as incorporating a diverse array of clusters as components of relevant future research.

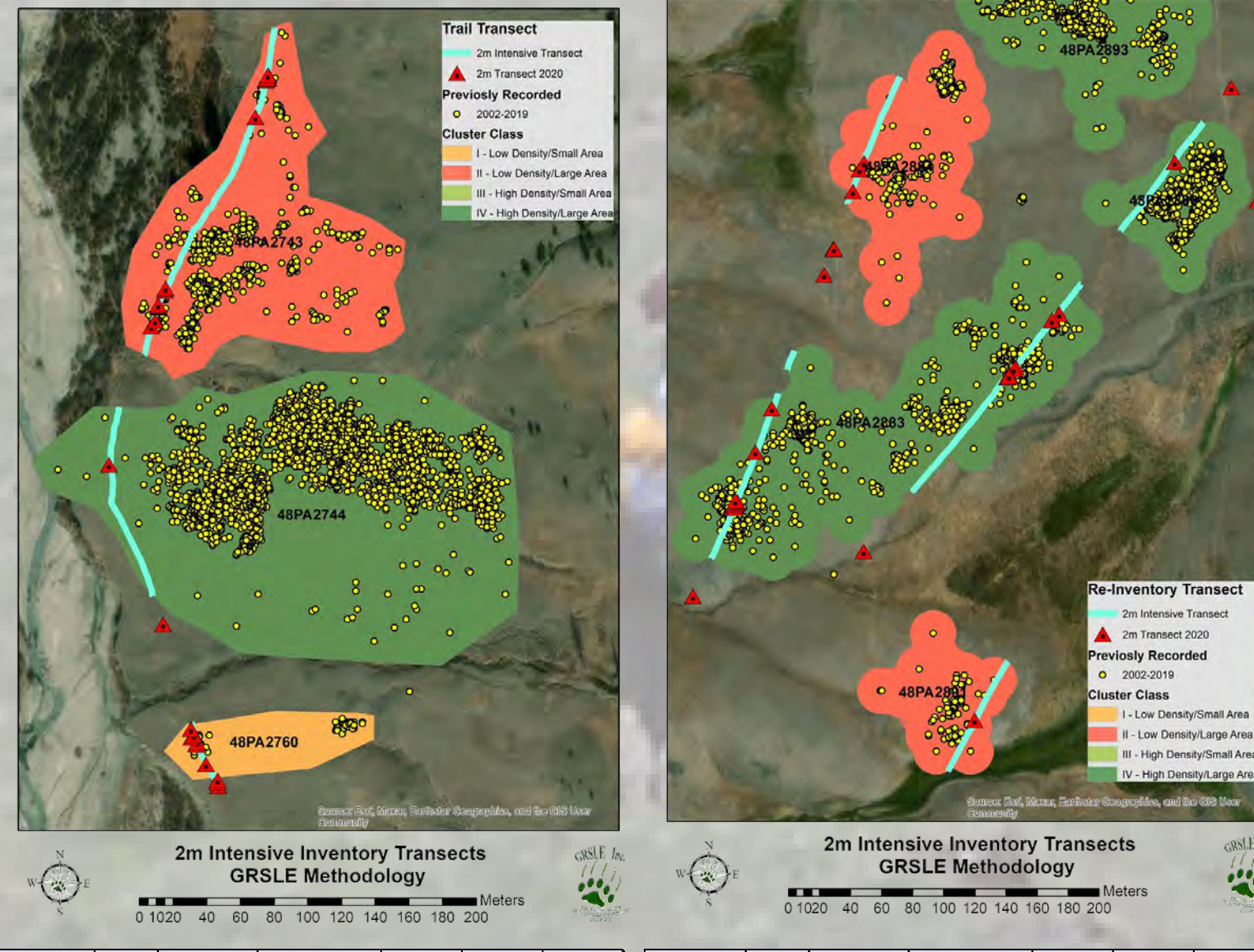
We envision continuing activities that incorporate results of previous year’s work into each up-coming GRSLE field season. We try to constantly engage in methodology to evaluate our methods.

References Cited:

Burger, O., Lawrence C. Todd, T. Stohlgren, P.C. Burnett, and D. Stephens (2004). Multi-Scale and Nested Sampling Techniques for Archaeological Survey. *Journal of Field Archaeology* 29(3):409-423.
 Foley, R.A. (1981). Off-Site Archaeology: An Alternative for the Short-Sited. In *Patterns of the Past: Essays in Honour of David L. Clarke*, edited by I. Hodder, G. Isaac, and N. Hammond. Cambridge University Press, Cambridge.



Inventory Type	Area (ha)	N CS	Artifact Density (CS/ha)
Block	133	21072	158
Transect	0.687	59	86



Cluster Class	N	Transect Area (m ²)	ID	Cluster Area (m ²)	Transect CS/ha
48PA2781	1	430	YES	1500.21	85.30
48PA2784	1	265	YES	420.03	2187.50
48PA2790	1	60	YES	420.03	2187.50

Cluster Identified?	COUNT	Class				Total
		I	II	III	IV	
NO	1	3	2	1	7	
%	50.0%	27.3%	100.0%	16.7%	33.3%	
YES	1	8	0	5	14	
%	50.0%	72.7%	0.0%	83.3%	66.7%	
TOTAL	2	11	2	6	21	
%	100.0%	100.0%	100.0%	100.0%	100.0%	