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CADAVER DOG SEARCH FOR UNMARKED BURIALS AT KETTLE CREEK BATTLEFIELD, WASHINGTON, GA

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Introduction

The Kettle Creek Battlefield Association ("the Association") contracted Bigman Geophysical to conduct a search for a church cemetery supposedly located on an adjacent bluff to War Hill and possible locations of buried fallen soldiers related to the revolutionary war battle of Kettle Creek. The Association suspected that the church was located on the adjacent bluff based on historical documentation and an archaeologists visual observation of stones possibly related to the church or cemetery. In addition, the Association was unclear if a mass grave exists on War Hill containing fallen British soldiers, and/or if the British soldiers were buried individually. The size of the study area is too large to survey with ground penetrating radar (GPR) at the point of contact, so Bigman Geophysical recommended a large-scale cadaver dog search for targets that could later be verified with GPR and possibly additional geophysical prospection techniques and probing. The dogs would be able to cover a large area quickly and pinpoint potential locations with human remains so the GPR survey could specifically target those locations. At the request of the Association, the dogs performed searches 1) near the suspected location of the church, 2) on War Hill, and 3) the flat area and draw (walking trail) at the base of War Hill part of which was located in the battlefield.

Cadaver Dogs as a Method for Locating Unmarked Graves

Cadaver dogs (technically known as Human Remains Detection dogs or HRD dogs) are trained to identify human remains scent from decomposed human bodies using olfactory cues. Decomposed bodies change the physical and chemical properties of the soil they interact with through the release of nutrients and energy (Carter et al. 2007). This interaction can possibly alter soil pH, electrical conductivity, and nutrient levels (Pringle et al. 2015; Stokes et al. 2013) which produce an odor that is detectable by properly trained HRD dogs. The odor can remain in the soil or on the surface long after the remains have completely decomposed and no bone is left (Alexander et al. 2015). Furthermore, multiple studies indicate that HRD dogs can distinguish between decomposing human cadavers and those of other animals (Cablk et al. 2012; Stokes et al. 2013) since each animal cadaver is composed of a unique set of volatile organic compounds (VOCs) that produce a unique odor. There is some overlap in the VOCs found in different animal cadavers, but each species has a unique set. Pigs are often considered the best proxy for decomposition studies (Schultz et al. 2006; Schultz 2008), but pigs and humans only share seven compounds of the 30 that human cadavers contain (Cablk et al. 2012). Despite the abundance of research showing the capability of dogs to locate human remains, it is still unclear exactly which compounds HRD dogs are using (Alexander et al. 2015). Thus, the qualifications of the dog handler remains an important factor in determining the success of any search (Riezzo et al. 2014). Bigman Geophysical hired Tracy Sargent of K9 Search & Rescue Specialists, Inc. to carry out this portion of discovery. She has over 20 years of experience, including experience locating graves at Revolutionary War battle sites.

Search Strategy

The dogs searched three areas during the investigation on Tuesday, December 15, 2015 including the suspected location of the Liberty Church (Area 1A and 1B), War Hill (Area 2), and the walkway around the base of War Hill which cuts through the battlefield (Area 3). Two

searches were performed in Area 1 which are labeled Area 1A and Area 1B in Figure 1. For the searches conducted in Areas 1A, 1B, and 2, three dogs (Draco, Chance, and Cinco) were deployed independently of each other for verification of results. Area 3 was larger and the handler deployed two dogs (Draco and Chance) independently during this search.

During the search, the dog is most often worked off lead (but may be worked on lead if there are safety concerns) (Figure 2), and is allowed to work independently to search the areas. If more than one dog is available to search the area, the other dogs will search the same areas to observe if multiple dogs react the same way in the area such as clearing the area with negative results or performing their trained indication/alert at the same location by sitting (Figure3). As the dog searches, the handler observes the dog for any body language changes as well as the dog performing its trained indication/alert to human remains scent. The handler will then advise the appropriate officials of the dogs' indications at each location, respectfully. The project manager marked each location with a brightly colored flag and recorded a GPS coordinate with a Trimble GeoXH unit.

Results and Discussion

All three dogs alerted the handler of the possible cemetery to the southwest of the suspected location of Liberty Church (Alert Target 1) (Figure 4). All three dogs alerted within three ft of each other indicating a strong correlation between the independent searches in Area 1A. A second round of search was conducted near the church to clear the area of negative results. However, each dog alerted the handler to a second area with possible human remains. This second site may be the location of the church cemetery, interments from the battle, or a small family cemetery from a farmstead located in the area following the war. The dogs did not alert as close together geographically in Area 1B compared to Area 1A and the spread of alerts was approximately 10 ft apart (Alert Target 2) (Figure 4).

The search in Area 2 also deployed all three dogs, and all three dogs alerted within three ft of each other as indicated in Figure 4 as Alert Target 3. The search on War Hill began on the north side of the hill and hoped to detect a mass grave if present. After picking up novelty scents, each dog made its way to the south side. The three dogs alerted at the bottom of an erosion gully. Based on the topography, it is unclear if this location is actually the site of an individual burial, mass grave, or just the accumulation of human scent from two centuries of ground water runoff and pooling. It is interesting to note that this is the location that the Association indicated contained elevated phosphorous levels.

Finally, the search in Area 3 identified a cluster of possible unmarked graves. The locations are indicated as Alert Targets 4-9 in Figure 4. Both dogs alerted multiple times, several of the targets were identified by both dogs while some were identified by only one. This cluster is in the battlefield, all are located on the eastern side of a small creek. These may be individual graves of fallen soldiers that were buried in place upon death.

Conclusions

The HRD dog search was successful in rapidly locating targets for future investigation over a large survey area. In Areas 1A, 1B, and 2, all three dogs alerted of of possible unmarked graves within a few feet of each other. In Area 3, both dogs combined alerted to six possible targets. We recommend a follow up investigation with GPR and minimal ground probing to characterize these targets and evaluate the locations identified by the HRD dogs as containing human remains scent. Furthermore, there is still much of the battlefield that is unsearched. We also recommend these areas for future HRD dog investigations for full coverage. The combination of techniques could lead to a complete record of unmarked graves.

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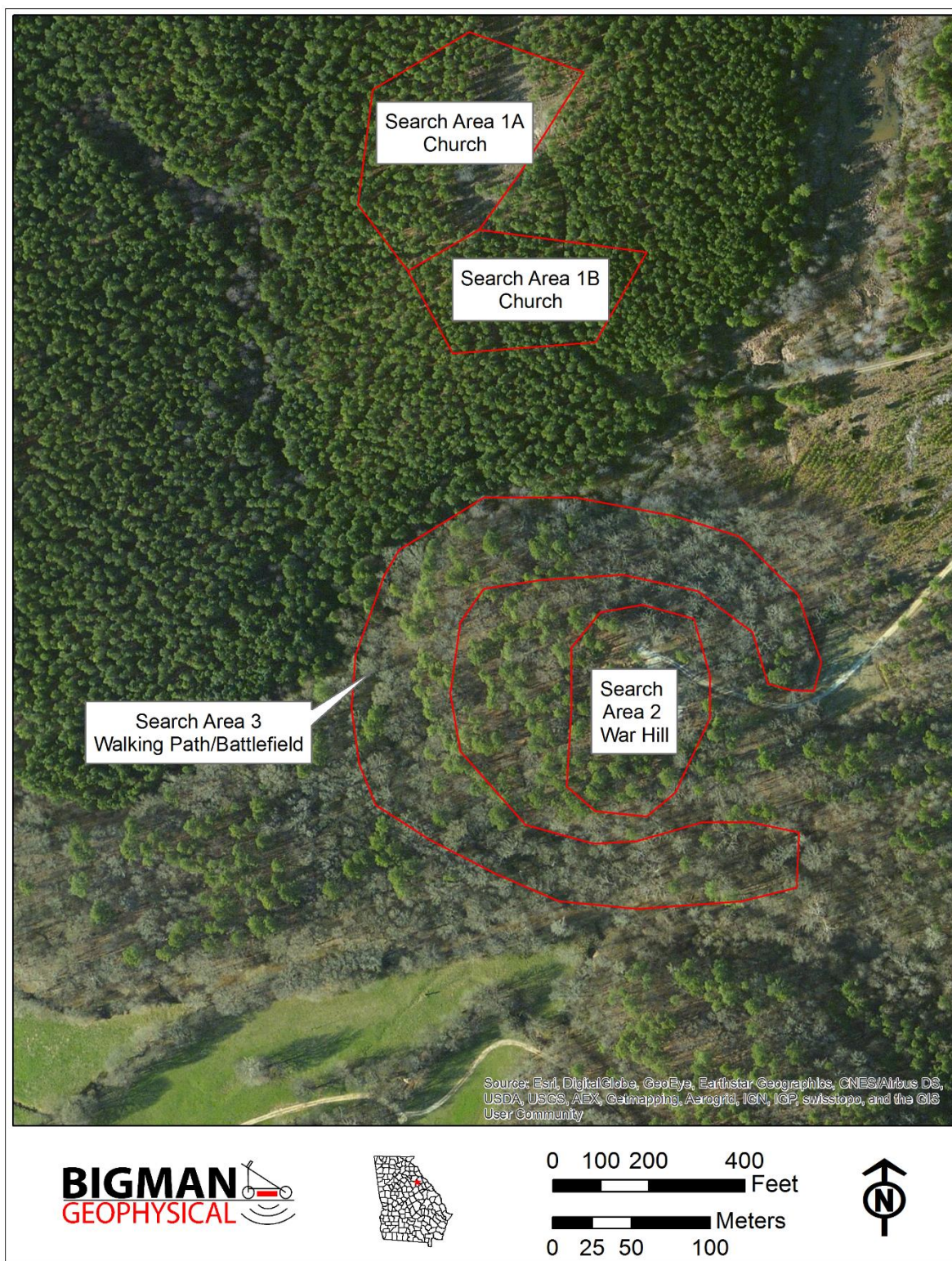
Figure 1. Locations of HRD dog search areas at Kettle Creek Battlefield.

Figure 2. Photograph of search in progress with dog off leash.

Figure 3. Photograph of HRD dog alerting handler.

Figure 4. Possible location of Liberty Church and locations of all dog alerts in all search areas.