On October 9, 2017, a firestorm swept through northern California. Eventually reaching over 180,000 acres, the fire destroyed more than 8,400 buildings and killed 43 people. The Tubbs Fire was the most destructive in California history resulting in an estimated 10 billion dollars in damages. Thousands of families lost their homes and all their material possessions. In many instances, the cremated remains of previously deceased family members were stored within the home. A canine forensic team and volunteer crew of archaeologists banded together in an attempt to recover cremains lost during the firestorm. Here we tell the story of our recovery effort and describe how canine teams and archaeologists worked together to help those affected by a significant natural disaster. This effort represents a new application for archaeology that fulfills an important and previously unrecognized need. Given the current climate changes in California and throughout the United States, this new application will likely grow in importance in the coming years.

**BACKGROUND – COLLABORATIVE VOLUNTEER RECOVERY EFFORT**

Following the North Bay fires, the Federal Emergency Management Agency (FEMA) and the United States Army Corp of Engineers (USCOE), as part of their response to this National Disaster Area, began removal of debris and toxic substances within the area affected by wildfire in November 2017. The steel carcasses of burnt cars and whole buildings reduced to just a few inches of ash were loaded into trucks and hauled away to a landfill. For many families affected by the fires, the thought that their loved ones could end up in a toxic waste dump added grief to an already awful situation. Desperately needing help, families reached out to local archaeologists to see if anything could be done. Knowing that specially trained dogs are capable of recognizing the scent of human remains, including cremated remains, we contacted a canine forensic team to solicit their input and petition them for help.

The Institute for Canine Forensics (ICF) is a non-profit organization dedicated to advancing the use of dogs in detecting human remains. This team has been deployed to national disaster sites throughout the county including the 1995 Oklahoma City Bombing, the World Trade Center following the terrorist attacks of September 11, 2011, and the 2003 explosion of the space shuttle Columbia.

On November 18, 2017, six weeks after the firestorm, our volunteer group assembled within the surreal and toxic landscape of a devastated residential neighborhood in Santa Rosa. Volunteers included six forensic canine crews (dog and handler), 15 professional archaeologists and numerous support members. Our task was to search the ruins of two dozen homes to recovery cremated remains that were lost in the fire. The group separated into six teams, each consisting of a forensic dog and handler and at least two archaeologists. Search sites were divided among the teams. Once the dog had investigated the scene and alerted the team, the archaeologists went to work excavating through ash and rubble to identify and recover cremains.
Site Formation – Distinguishing Human Cremains from Ordinary Ashes

Attempting to recover a small amount of human cremains from the expansive ashes of a burnt building may seem like a futile task. However, human cremains have distinguishing traits that are markedly different from ordinary ash. Understanding the cremation processes provides some important clues that can help in their identification. We interviewed several morticians to better understand this process. At the crematorium the body is placed in a retort and incinerated at 2,000 degrees Fahrenheit. Following incineration any remaining bone is put into a mechanical grinder, pulverized and processed down into tiny pieces and powder. Small bits of calcine bone and fragments of teeth will be present within the ashes. The average person results in about 10 pounds of ash, a volume of approximately 220 cubic inches. No sand or other substance is added to the ashes. Human cremains often have a distinctive tan-orange hue, possibly due to the high calcium or iron content found in bone, blood, and tissue. By law, each cremation is accompanied by a stainless-steel disk that is embossed with a unique two-part code. The first part of the binomial denotes the crematorium and the second part the individual. This steel disk accompanies the body through-out this process and is included with the ashes when placed in an urn or other vessel by the mortician. During a house fire, when the temperatures are especially hot, the metal disk can melt and be lost. The ash however, having had most of its burnable components removed, can survive.

Field Recovery Methods

To our knowledge, the recovery of human cremains from a wildfire disaster has never been attempted before. As such, archaeologists and canine crews had to develop methods, which evolved through trial and experience. There remains room for improvement and standardization. Here we provide brief outline of the basic field recovery methods.

Task 1 – Site Assessment

The initial task is site assessment. The search area is observed in an attempt to identify any safety concerns such as unstable walls or crumbling chimneys that could collapse, evidence of toxic substances and other hazardous materials or situations that could be potentially harmful to either the canine search team or archaeologists.

Task 2 – Client Interview

A personal interview with the disaster survivor is performed on site. The goal of the interview is to gather information that will help in the identification/recovery of the cremains within the project site. Typical interview questions include:

- Who are we looking for? Asking the name of the loved one personalizes the recovery of the remains, making the process easier on both family members and the archaeological and canine teams.
- How are you related (daughter, husband, mother)?
- Where in the house were the cremains stored?
- Can you point out the area?
- Are there other objects, which were near the cremains, visible in the wreckage?
- In what vessel were the cremains kept (ceramic urn, wooden box, cardboard)?
- How big was the vessel?

Task 3 – Canine Forensic Search

Following the interview, the human detection dogs are bought to the scene. The dog is allowed to freely search the wreckage and is not guided by the handler (Figure 1). The handler studies the dog’s behavior. When the dog identifies the scent of the cremains it will alert the handler by laying down, often facing the direction of the source of the scent (Figure 2). Following the alert, the first dog is placed into the...
kennel and a second dog is brought to the scene to verify location. The second dog did not see the first dog work. The second dog conducts the search and generally alerts at the same location.

Task 4 – Archaeological Investigation

The search area for the cremains is confined based upon the client interview and the alert by the human detection dogs. At first, the archaeologists will carefully survey the area where the dog alerted in an attempt to spot cremains that may be visible on the surface (Figure 3). If no recognizable cremains are identified, then the archaeologists will begin excavating through the ash and debris with trowels or shovels. Because the goal is to recover human ashes, no screens are used. The excavation is performed systematically, starting from the outer limits of the alert area and progressing inward. Once human cremains or associated funerary objects are encountered the area around the discovery is exposed in an effort to isolate and define the cremains feature. The technique used for exposing cremains within a disaster area is similar to the standard methods used to expose features within archaeological contexts. The cremains are collected using dust pans and trowels, placed into bags and returned to the relatives.

Personal Accounts

This volunteer effort occurred over a period of two months and resulted in the recovery of 48 individual cremains. Here we provide three personal accounts, written by volunteer archaeologists and canine handlers, which portray what it’s like performing this kind of work. The individuals described in the following stories granted permission to publish photos and accounts of the cremains recovery process.

Story 1

Somewhere within the twisted mass of debris and ruins of Lenore Hanson’s home were the remains of her 30-year-old daughter Erin, who died of cancer, leaving behind two sons. Lenore kept her daughter Erin’s ashes in a wooden box in the bedroom closet. There was no time to grab the box when the firestorm bore down on Lenore’s creek side home. The fire destroyed Lenore’s home and now Erin’s ashes were mixed in the mass of collapsed walls, broke furniture and layers of debris. “Just the thought of her ashes winding up in a toxic waste dump were more than I could handle,” said Lenore.

Lenore pointed to the part of the devastated house where Erin’s ashes were kept. Lynne Engelbert (ICF) called her dog, Piper, a black border collie, to come search the scene. Cautiously stepping through the ruins, Piper keenly searched over the area adjacent broken cinder block walls and around deformed metal objects periodically testing the air for faint odors. Piper’s careful gait abruptly stiffened. Having picked up the scent she immediately laid down alerting Lynne that she smelled human remains. We carefully troweled through the loose ash and rubble, exposing the ground where the dog signaled, then progressing inward in an effort to identify, isolate and expose the cremated remains. After minutes of searching we found a discrete pocket of faint red-colored, gritty ash. Picking through the deposit we recognized small bits of bone. We’d found Erin’s ashes (Figure 4). – Alex DeGeorgey

Story 2

Debbie had raced to get her aunt, mother and dog out of the house as the wind-blown flames spread toward them. Without Debbie’s help her mother and aunt may have died. None the less, Debbie sobbed from guilt knowing she’d left the urns of her father and brother in the home. “We would have been trapped and probably died,” she said. Nick and Debbie Rasmussen were desperate to find the cremains. Debbie asked if we could help before the authorities cleared their property.

Ordinarily the green lawn in front of the Rasmussen’s home would be unremarkable among the colorful trees and manicured hedges of the residential subdivision. Now, the fresh grass was perplexing in
Figure 1. Canine Forensic Team Searching a Home for Cremains; photo Tom Nash.

Figure 2. Canine Signal that it has Detected Cremains; photo Tom Nash.
Figure 3. Archaeologists Mike Newland and Alex DeGeorgey Search for Cremains; photo Tom Nash.

Figure 4. Lenore Hanson Embraces Kris Black Following the Discovery of her Daughter’s Ashes; photo Beth Schlanker.
an otherwise incinerated gray landscape. The cremains of their brother Ray, who was just 23 years-old when he was murdered, were kept in a small metal box in his mother’s bedroom. Piper, the ICF dog, searched the area of the bedroom, now reduced to ashes and the wire of a box spring mattress. Troweling through the debris we soon found the metal box, completely intact, buried underneath nearly a foot of ash and roof tiles. When the Rasmussen’s saw the box, their knees buckled. Both Debbie and her older brother Nick were completely astonished. “In a matter of seconds, Piper closed a wound that no one else could,” said Nick’s wife, Pam (Figure 5). – Lynne Engelbert

Story 3

Lisa Siebert’s situation was problematic. The house was a split-level residence and the ashes of her father-in-law were kept on the upper level, on top of a metal file cabinet, in a black ceramic urn. We found the steel body of the file cabinet. It was knocked over with the top facing the lower level. Nearby was a concrete retaining wall and behind that a narrow trench. It was completely unknown whether the walls of the upper story had collapsed downward pulling everything with into the lower level or if materials on the upper floor had fallen farther away into the trench. Dirt slumped down into the trench, obscuring our view and making the search difficult. Further complicating matters was the spaghetti bowl of distorted steel piping and wires in this portion of the house. While searching the lower level home, Kris Black’s dog (ICF), Annie, a Belgian Malinois, cut her foot, began bleeding and was removed for treatment.

Without a dog, we archaeologists were flying blind. We talked it over with the dog trainer and, looking at the angle of the fallen filing cabinet, it seemed probable that the urn collapsed into the trench and was perhaps buried under layers of debris and dirt. Our team started shoveling the earth and rubble out. Before long we found a crushed metal container. Below that, still deeper into the trench, we exposed the broken urn, its two pieces pressed together holding the ashes carefully like two hands in prayer. – Michael Newland

Story 4

When you watch a disaster like the fires in northern California play out across your television, you sit in your own home, hundreds of miles away, knowing there is no possible way to help these communities out, to help your friends waiting to find out if their homes remain intact. When the opportunity came to work with canine units in the attempt to recover cremated remains of loved ones, my husband and I, both archaeologists, knew it was a way to help. Not just the people in Santa Rosa who lost literally everything, but a way to help ourselves deal with the devastation.

Most archaeologists are familiar with burials and cremations—I’ve excavated the skeletons of both children and adults—and we’re attuned to even the smallest bits of human bone or a tooth. Being an archaeologist doesn’t prepare you for the emotional toll of reuniting living loved ones with the remains of a parent, or a child, a sibling, or a spouse. Handing someone the ashes of their father, while covered in the ash of their former homes, and surrounded by the charred and broken remains of their lives is utterly overwhelming. And as an archaeologist, you can’t just look for the cremated remains, trowel through an entire home now compacted into six inches of ash, without seeing the rest of the destruction: a small ceramic elephant; a record collection; hand-made pottery masks; melted Christmas decorations; grandma’s porcelain collection. You want to gather it all, return all of it to the owners. Archaeologist are used to broken bits of peoples’ lives, but not like this, not on such a scale, not with living people connected to those artifacts.

In the end, the most impactful moment for me was watching another crew recover the remains of a 40-year old woman who had died earlier that year. Watching her mother hold her daughter’s remains broke every barrier that had kept me from crying with the previous homeowners. I don’t know how her daughter died, but having faced aggressive breast cancer myself, I knew that woman could have been my mother.

After a day both physically and emotionally exhausting, it was too hard to see this mother’s pain. I tried to be discreet and cry away from the family, but I still caught someone’s attention. The human
remains detection dog we’d been working with all day, Piper, came over and lay down next to me, putting her head in my lap and demanding I pet her. It was an amazing, healing moment on every level. – Kimberly Wooten

Some Closing Thoughts

Families that have suffered the loss of their home will remark that what they’ll miss most are the irreplaceable objects such as family heirlooms and old family portraits. Similarly, cremains are endowed with significant meaning and they hold great sentimental worth. The recovery of human cremains fulfills an important and previously unrecognized need. In addition, as well as cremains, archaeologists can play a role in recovering important heritage artifacts from the burned remains of a home.

Through this effort we have demonstrated that it is possible to recover human cremains from a wildfire disaster area, even one as extreme as the 2017 fire in Santa Rosa. While human cremains have key characteristics that make it possible to distinguish them from ordinary ash, specially trained dogs are instrumental in helping to pinpoint the location of cremains within the overwhelming ruins of burned buildings. Archaeologists and canine teams can assist people who are in great need of help, keeping fire victims from experiencing further loss, and actually assisting in the healing process. Archaeologists and canine forensics teams working in concert proved to be far more effective in recovering remains than either acting individually.

Archaeology has to constantly justify itself as a relevant and meaningful field of study. This is a new application for archaeology that is uniquely meaningful to living populations. Our hope in sharing this information is that federal agencies will get involved to support this important work.