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Prevalence of knowledge in forensic anthropological field methods within traditional forensic investigation.

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PREVALENCE OF KNOWLEDGE IN FORENSIC ANTHROPOLOGICAL FIELD
METHODS WITHIN TRADITIONAL FORENSIC INVESTIGATION

By

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B.A., University of Louisville, 2012

A Thesis
Submitted to the Faculty of the
College of Arts and Sciences of the University of Louisville
in Partial Fulfillment of the Requirements
for the Degree of

Master of Science

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University of Louisville
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A Thesis Approved on

April 18, 2014

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Philip DiBlasi

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DEDICATION

This thesis is dedicated to my daughters,

Callandra and Lillian.

“The only person you are destined to become
is the person you decide to be.”

-Ralph Waldo Emerson

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I would first like to thank my Co-advisors: Dr. Deborah Keeling, who has provided me with endless opportunities within the Department of Justice Administration and guided me in every way possible with regards to this research; and Philip DiBlasi, who through the past four years has taught me everything I know about forensic anthropology, given me invaluable advice, and helped guide me towards the academic path I've chosen. I would also like to thank my third committee member, Michael Losavio, for his time, effort, and feedback in regards to my research. Many thanks are also due to my family and friends, who have given their time and effort to help me in every step of the way with my daughters- it really does take a village. Finally, to my partner Royce, not only for his patience and understanding, but for believing in me during the moments when I forgot to believe in myself.

ABSTRACT

PREVALENCE OF KNOWLEDGE IN FORENSIC ANTHROPOLOGICAL FIELD METHODS WITHIN TRADITIONAL CRIMINAL INVESTIGATION

Cassandra Christina Rausch

April 18, 2014

As forensic evidence has come to be of increasing importance in the courtroom, standards and practices regarding documentation, collection, and preservation of evidence have also become increasingly necessary. This study examines forensic anthropological field methods and their incorporation into crime scene investigation. Prior research suggests that incorporation could increase evidence recovery, result in better preservation of evidence, and enhance chain of custody. Examination of baseline survey data and a specific cross-regional analysis seeks to discover how/if these methods are being utilized within crime scene investigation. Baseline results are compared with follow-up interviews from a small sample of agencies to examine relationships between criminal investigation and forensic anthropology. Discussion is focused on how the disciplines could be incorporated, and provides recommendations for training and education in interdisciplinary methods. Suggestions are made for further studies in this area, particularly on the standards and best practices currently utilized by forensic investigation units.

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CHAPTER I

INTRODUCTION

A little over a decade into the 21st century, the forensic disciplines have made tremendous advancements that many never thought were possible 20 years ago. New techniques of investigation and analysis are constantly developed and refined. One new orientation attempting to gain footing within forensic investigation is the incorporation of all forensic disciplines into one multi-disciplinary entity; many forensic experts from multiple disciplines and sub-disciplines have already been advocating for this approach (Amendt et al., 2007). Though the Forensic Science Foundation began the attempt to create tighter professional standards and multiple perspectives for forensic science experts in the early 1970's, the most recent development comes from the study funded through the National Institute of Justice (NIJ), published as *Strengthening Forensic Science in the United States: A Path Forward* in 2009 (Snow, 1982).

Two key components of the NIJ study relate specifically to the research proposed here. One was the instruction of the Forensic Science Committee to “make recommendations for maximizing the use of forensic technologies and techniques to solve crimes, investigate deaths, and protect the public”, while the other stated they needed to “disseminate best practices and guidelines concerning the collection and analysis of forensic evidence to help ensure quality and consistency in the use of forensic technologies and techniques” (NIJ, 2009, p. 2). Recognition was given to the fact that the

multiple disciplines involving forensic science are separated; multiple types of practitioners with different levels of education and training, standards, performance, and professional culture hardly lends itself to promoting forensics as a united discipline (NIJ, 2009). Therefore, the need exists to develop ways of incorporation that manages to include the multitude of current forensic disciplines.

In order to accomplish this, research must be conducted to examine where the incorporation should begin. Being that crime scene investigation is the first point of contact with forensic evidence, this area would be the most compatible to begin the transition of interdisciplinary incorporation. The pilot study presented here aims to support that notion and introduce forensic anthropological field methods as a valid means to improve and enhance current techniques.

An archaeological investigation is conducted with the same goals in mind as a forensic criminal investigation; specifically, the reliance on the establishment of evidentiary value and significance, with attention being paid to contextual relationships at the scene, leads to the conclusion that basic archaeological principles could be applied to the recovery of forensic evidence with great success (Dirkmaat, Cabo, Ousley, & Symes, 2008). One definition of forensic anthropological field methods (also known as forensic archaeology) states that the sub-discipline is “the application of simple archaeological recovery techniques in death scenes involving a buried body or skeletal remains” (Haglund, 2001, p. 26). By utilizing enhanced documentation, paying close attention to context, and having familiarity with stratigraphy and soil science, the forensic archaeologist can glean a vast amount of information from a death scene; though skeletal remains are typically identified as their main strength, these techniques can easily be applied to any scene involving human remains (Haglund, 2001).

In addition, a common misconception exists regarding forensic archaeological field methods that is quite widespread within the law enforcement community- anthropological techniques cannot be feasibly applied to many scenes due to time and personnel restraints. When properly implemented, their combination with traditional methods and current technology not only provide extremely relevant forensic information, but are as quick and efficient as other on-site forensic techniques and result in a significant gain of usable data (Dirkmaat et al., 2008).

Consequently, the following questions were identified in relation to forensic anthropological field methods and traditional crime scene investigation:

1. What are the current standards/best practices for forensic anthropological field methods?
2. What are the current standards/best practices for crime scene investigation?
3. What are the key differences between the two methods?
4. What specific areas of investigation could benefit from the combination of these methods in the field?
5. Who/how many/what percent of “traditional” crime scene investigators have been cross-trained in forensic anthropological field methods?

To answer these questions, the following study was developed to obtain an overall view of the prevalence of knowledge in forensic anthropological field methods within municipal, county, state, and federal agencies across the United States; data was used to create a baseline with which other results could be compared. A cross-regional analysis from a small sample of agencies located in the eastern United States worked to identify specific department-by-department differences in standards, education, and training. Examination of the literature and data gathered could potentially reveal that training in anthropological field methods may lead to developments in documentation, mapping, collection, and preservation of evidence; as of now, the majority of forensic investigation

units are lacking this training. Additionally, examination of standards and/or best practices, educational levels, training, and national certifications could allow for improvements to be implemented that would complement the incorporation of other disciplines.

CHAPTER II

LITERATURE REVIEW

Literature Search

Reviewing the literature pertaining to the development, standards, and techniques of forensic anthropological field methods, crime scene investigation, and the role of forensic evidence in the courtroom can help clarify why the research conducted in this study could potentially improve forensic field investigation as a whole and impact its future direction.

Development of forensic anthropology. Specifically, a “forensic anthropologist” can be defined as an expert trained in “dealing with the analysis of human skeletal material resulting from unexplained deaths” (Byers, 2011, p. 1). Forensic anthropologists are trained to answer the following questions:

- Is it human bone?
- How many persons are represented?
- What sex was the person?
- What is the ethnic affinity of the person?
- What was the person’s age at death?
- What was the person’s living height?
- What type of build did the person have?
- How long has the person been dead?
- What is the skeletal evidence for the cause of death?
- Are there any personal skeletal traits? (Lundy, 1986, p. 14-16)

Examination of the skeletal remains is essential when identifying a decedent's demographic profile; by answering the above, those characteristics can be utilized when reviewing missing person reports in order to establish a positive identification, with potential to aid in the establishment of cause and manner of death (Cattaneo, 2007; Lundy, 1986). Forensic anthropology as a grounded perspective in a criminal investigation started slowly, but has since entrenched itself into the law enforcement community.

Two "false leads" occurred at the beginning of incorporating physical anthropology and criminal investigation. The first occurred with the development of "criminal anthropology", developed by Cesare Lombroso; this theory followed the idea that criminals were easily distinguished by identified "criminal traits" (Snow, 1982). The second occurred with the anthropometry identification system developed by Alphonse Bertillon, in which anthropometric measurements and anthroposcopic traits describing an individual could be used to apprehend criminals (Snow, 1982).

One of the first instances of forensic anthropological evidence being used in court was testimony from Oliver Wendell Holmes and Jefferies Wyman during the 1850 Webster/Parkman trial; by examination of the decedent's remains, Holmes and Wyman were able to identify the victim and this led to the perpetrator's conviction (Burns, 2007). Years later, another anthropologist was utilized as a forensic expert in the United States: George Dorsey, who identified small pieces of bone and subsequently testified in the 1897 Luetgert case (Burns, 2007; Snow, 1982). From there, Wilton Marion Krogman became the first anthropologist to directly influence law enforcement with his publication "Guide to the Identification of Human Skeletal Material" in 1939, followed by "The Role of the Physical Anthropologist in the Identification of Human Skeletal Remains" in 1943

(Burns, 2007). During the 1970's, T. Dale Stewart and William M. Bass released similar (though updated) publications directed towards forensic investigation (Burns, 2007).

Throughout the modern age of forensic anthropology, comparative samples for identification purposes have become of particular importance, with the best example being the establishment of the Forensic Anthropology Center (FAC), Anthropological Research Facility (ARF), William M. Bass Skeletal Collection (BSC), and the Forensic Data Bank (FDB) at the University of Tennessee-Knoxville (Dirkmaat et al., 2008). While the FAC works mostly to provide training in anthropological field methods and techniques of identification, it does hold the laboratories utilized for intake and examination of remains provided to the ARF. However, a stronger relationship exists between the purposes of the ARF, BSC, and the FDB.

While the ARF originally started as a field area to examine human decomposition, the facility became popularized in Patricia Cornwell's novel *The Body Farm* and has maintained an extensive list of donors ever since. Due to the amount of skeletal material that remains from the experiments run in the facility, it has become the largest contributor of data for the BCS and FDB. Remains are stored within the BCS, and their demographic information (including age, sex, ancestry, stature, weight, place of birth, medical history, and occupation) are entered into the FDB, creating an excellent reference list when conducting a forensic anthropological examination (Dirkmaat et al., 2008). Data from the FDB is a strong component of the multivariate statistical program known as Fordisc, which utilizes known skeletal measurements from multiple collections for estimation of sex and ancestry of unknown individuals, providing a quantitative backbone to traditional subjective methods of identification (Dirkmaat et al., 2008; Jantz & Ousley, 2013). Regarding the shift in the scope of forensic anthropology, when Morse, Duncan, and

Stoutamire (1983) released their “Handbook of Forensic Archaeology and Anthropology” processing crime scenes with archaeological techniques was a very new development. Iscañ’s (1988) examination of the current and future state of forensic anthropology paid little attention to the relevance of crime scene evidence, with no discussion directed towards the postmortem interval and scene reconstruction (Dirkmaat et al., 2008). Therefore, forensic archaeology was considered a subfield separate from “physical” forensic anthropology until the late 1980’s, when forensic taphonomy was introduced and provided a critical conceptual and analytical framework (Dirkmaat et al., 2008).

Originally more related to the zooarchaeological approach and analysis of skeletal assemblages, the incorporation of paleontological approaches and techniques allowed forensic taphonomy to develop further and play a critical role within forensic investigation; scientifically grounded estimates of the postmortem interval, reconstruction of body position and orientation, and characterization of roles played by human intervention proves invaluable when collecting valid quantitative data for use in a homicide case (Dirkmaat et al., 2008). Furthermore, taphonomy examines the processes that affect the decomposition, dispersal, erosion, burial, and re-exposure of remains after, at, and even before death (Nawrocki, 1996). In a forensic context, taphonomy determines how these taphonomic forces alter evidence that is the subject of a medicolegal investigation (Nawrocki, 1996). Development of a taphonomic profile provides information related to the circumstances of death, greatly assisting an investigator in understanding what happened to the victim (Nawrocki, 1996). Forensic archaeology came to play an important role in relation to taphonomy, as its techniques of field recovery proved beneficial in recovery of evidence needed for analysis.

Therefore, in the last 30 years, expansion of archaeological techniques into other sub-disciplines has led to its development as a field science, particularly within the past decade (Haglund, 2001). Dirkmaat et al. (2008) conducted a critical review of the current evolution of forensic anthropology and field techniques, basing their comparisons to the previously mentioned study by Işcan (1988). Dirkmaat et al. (2008) contend that incorporation of taphonomic analysis has increased the role of forensic anthropology in crime scene investigations, especially in cases involving outdoor crime scenes and commingled or altered human remains. For example, forensic entomology lies within the range of taphonomy and is defined as the study of arthropods that form part of the evidence in legal cases, particularly death enquiries; this sub-discipline can greatly assist many types of forensic investigation by providing information on the where, when, and how a crime was committed or how a person died by providing insight related to establishment of the postmortem interval (Amendt et al., 2007).

Dupras, Schultz, Wheeler, and Williams (2012) argue that complete incorporation of archaeological techniques to crime scenes can greatly assist the investigator in accurate and thorough recording and recovery of all potential evidence. Moreover, they state that the context and association of evidence is equally important to both, as evidence loses most of its value if the context is lost. Constant improvements within methodology, field documentation (including site mapping and remote sensing), spatial analysis techniques, and applications in a forensic context have led to an increased interest on the implementation of a multidisciplinary approach within traditional crime scene investigation (Dirkmaat et al., 2008).

When considering other recent developments looking to develop the relationship between modern forensic anthropology and crime scene investigation, one example can

be found within soil solution analysis and decomposition chemistry, which can aid in the establishment of the postmortem interval. Vass, Bass, Wolt, Foss, and Ammons (1992) conducted a study based on specific volatile fatty acids and various anions and cations deposited underneath decomposing human cadavers to aid in the estimation of time-since-death. One basis the authors give for this examination is an estimation of perimortem weight, as the criminal investigator could use this information when attempting to identify the remains and match them to missing person's records. Ten years later, an advanced and refined form of this type of analysis was introduced- decomposition chemistry, which uses either soil sample or tissues from the decedent. In a study conducted by Vass et al. (2002), identification and analysis of time-dependent biomarkers was used in an attempt to develop an accurate method for measuring the postmortem interval; this study provided a novel scientific method to provide a more solid foundation for time-since-death estimations.

To legitimize forensic anthropological disciplines in regards to others, the American Board of Forensic Anthropology (ABFA) was created to certify forensic anthropologists and set standards for individual proficiency (Christensen & Crowder, 2009). Another significant step in the legitimization of forensic anthropology as a scientific discipline occurred with the addition of a physical anthropology section to the American Academy of Forensic Sciences (AAFS) and subsequent publications in the Journal of Forensic Sciences (Snow, 1982). Significant developments found throughout the literature expand the role of forensic anthropology, archaeology, and taphonomy into regular, mainstream techniques of crime scene investigation.

Development of crime scene investigation. Crime scene investigation in the field has taken on new meaning, as during the first part of the 20th century it was largely

ignored. As forensic science held the focus of the law enforcement community, little attention was paid to the chain of evidence. A brief review of forensic science proves beneficial to underlie why crime scene field techniques have become so significant in an investigation.

Forensic science rests on the assumption that two indistinguishable marks must have been produced by a single object, therefore leading scientists to link crime scene evidence to one specific person and exclude all other possibilities (Saks & Koehler, 2005). Origins are mostly European, with the first major book describing the application of scientific disciplines to criminal investigations written by Hans Gross in 1893, earning him the title “founder of scientific criminology” (Newton, 2008). The first forensic laboratory was established in 1910 by Edmond Locard- as an important early scholar in the field, he established what has come to be known as “Locard’s exchange principle”, which states that whenever two persons or objects make contact each leave some sort of trace evidence behind (Newton, 2008; Swanson, Chamelin, Territo, & Taylor, 2012). During the same time period, Sir Bernard Spilsbury became renowned in England as an expert witness in medicolegal evidence and investigation; his analysis and expertise in the field of death investigation was heavily relied upon during criminal trials throughout the early 20th century, with some considering him the first “crime scene investigator” (Evans, 2006).

Historically, three major scientific systems were utilized to identify criminals: anthropometry, previously mentioned in relation to anthropology; dactylography, the study of fingerprints, which underwent several interpretations by separate systems but focused on the ridges present on hands and feet; and Deoxyribonucleic acid (DNA), the structure of which was discovered by James Watson and Henry Crick in the early 1950’s.

DNA was introduced as a method of identification in criminal investigation by Alec Jefferys and colleagues in 1985, when the realization was made that the structure of certain genes are completely unique to an individual (Swanson et al., 2012).

The advent of DNA typing and its uses in identification was a significant development for the forensic sciences and influenced a tremendous change in admissibility of expert testimony; utilization of a statistical approach based on population genetics theory and empirical testing provided a sound scientific basis that withstood admissibility standards within the courtroom, discussed in detail further on (Saks & Koehler, 2005).

Once criminalistics and forensic science had firmly entrenched itself into law enforcement and criminal investigation, it became more important to recover multiple pieces of evidence that were often ignored (Goddard, 1977). However, this responsibility fell to patrol officers who had little or no formal evidence collection training, resulting in potentially valuable evidence being left at the scene; to counter this, the trained criminalist would be sent out in the field, but due to cost and other responsibilities of the criminalist in the laboratory another avenue was developed: evidence technicians and crime scene investigation officers (Goddard, 1977). Eventually, these specialized positions became the norm in law enforcement agencies nationwide and developed into the crime scene investigators seen today.

Modern criminal investigation focuses on physical evidence recovered from the scene of a crime; subsequent analysis of this evidence provides a scientific basis on which to build a criminal case that will withstand courtroom scrutiny (Burns, 2007; Hanley, Schmidt, & Nichols, 2011). Crime scene investigators specialize in the processing of a crime scene and gathering forensic evidence; they should have the ability

to recognize, photograph, organize, and collect evidence, and ideally are the first to arrive at the scene (Burns, 2007). Three main roles played at the scene are ensuring that the evidence stays contaminant-free, is fully documented, and follows chain of custody at all times (Pepper, 2005). Reliance and cooperation with the Medical Examiner and/or Coroner is also commonplace, as information gained at the scene of the crime could prove beneficial to establishing manner of death, be it natural, homicide, suicide, accident, or undetermined (Haglund, 2001; Snow, 1982).

Crime scene investigators today also face an ever-increasing problem. Media has significantly impacted the criminal justice system. Development and widespread consumption of shows such as *CSI*, *NCIS*, *Criminal Minds*, etc. have perpetuated multiple myths about forensic science, in turn dramatically increasing the expectations of jurors, judges, and attorneys- this has created what is known as the “CSI effect” (Durnal, 2010; Stevens, 2008). One study conducted determined that 26.5% of participants would not convict a person without some type of scientific evidence (Durnal, 2010). Shows such as *CSI* influence a general perception that there is always an ample amount of evidence at a crime scene and the technician just needs to find it, but this is not always the case (Durnal, 2010). Furthermore, the prevalence of criminal investigation on television shows has had an impact on the knowledge of criminals when committing a crime; though many techniques are fictional, some are represented correctly, allowing criminals to erase trace evidence that could have otherwise been collected (Larson, Vass, & Wise, 2011).

Developments have occurred rapidly within modern crime scene investigation. As of 2011, over 400 units were dedicated specifically to forensic investigation (Larson et al., 2011). New ideas and techniques continue to emerge; for example, in the quest to establish new methods of identification, use of Atomic Force Microscope (AFM) imaging

has been developed as a method of examination which can provide images of fingerprints on bullet cartridges (Swanson et al., 2012). Remote sensing utilizing infrared, magnetics, electromagnetics, and ground penetrating radar have begun to emerge and have gained increasing acceptance by criminal investigators; these methods can alleviate understaffed departments and reduce the time spent on searches, raising the probability of locating evidence of prime interest (Davenport, 2001). Furthermore, the incorporation of some anthropological methods has already begun to occur; archaeological visual foot search methods have been implemented into crime scene search patterns (such as line, strip, grid, and spiral patterns), resulting in efficient and effective pedestrian searches for surface remains (Dirkmaat et al., 2008; Dupras, Schultz, Wheeler, & Williams, 2012; Larson et al., 2011; Swanson et al., 2012).

Standards/techniques in forensic anthropological field methods. Considering the research conducted, this section will focus exclusively on the documentation, collection, and preservation of forensic evidence, with attention paid to how these methods work in relation to chain of evidence. As one of the first resources for any sort of standardized methods in forensic anthropological field methods, Morse et al. (1983) covers a detailed list of how outdoor scenes should be processed, including preparation (representing the initiation of chain of evidence), equipment, record keeping, recovery of surface finds, and recovery of buried remains. The authors placed specific emphasis on the following: documentation, stating that “maps, notes and photographs should record the relationship of each piece of physical evidence to all other encountered with respect to position, distance and depth” (p. 20); preplanning, especially personnel, detailing how extremely strict control of the scene is necessary to ensure admissibility of evidence; and record keeping, both written and visual, indicating that it must be done in a very

meticulous fashion. Following this, another main area of standards in forensic archaeology is the process in which human remains are recovered; although these standards are typically associated with buried remains, the principles remain the same for surface finds. According to Dupras et al. (2012), this process is achieved by completing the following steps in exact order:

1. Examining the recovery area and establishing spatial controls
2. Exposing and recording the main surface site
3. Removing surface remains
4. Removing buried remains and associated evidence (p. 115-116)

Completion of the above is subject to careful documentation; two concerns to the forensic archaeologist are the recording of provenience and context. Provenience refers to the exact location of an item in three-dimensional space- reflecting latitude, longitude, and vertical positioning- while context is an object's exact time and space with consideration to its association and relationship with other items (Dupras et al., 2012). Without question, this information is lost the moment objects are collected, as the process of investigation and collection destroys a scene from the moment it begins; investigators have only one chance to extract evidence completely and correctly, occasionally referred to as "controlled deconstruction" (To, 2013; White & Folkens, 2005).

When documenting the scene, mapping provides an excellent reference for later scene reconstruction; large-scale, medium-scale, and sketch maps all provide useful information (To, 2013). Byers (2011) details commonly used methods of mapping, stating that precision is important because of information that can be gathered from surface scatter. After potential items of interest have been flagged, a datum point should be established close to the remains, and the position should be recorded; typically, this is done by entering the coordinates into a Global Positioning System (GPS). After the

datum is established, a grid should be constructed in order to provide framework for the map; measurements of the evidence are conducted from the datum and are recorded, photographed *in situ* and after removal, then finally collected (Byers, 2011). One specific technique utilized in recovery is screening, whereby soil associated with an outdoor scene is sifted through appropriately sized mesh in order to discover small pieces of evidence that might otherwise be overlooked (Byers, 2011). Specifically, when dealing with skeletonized remains, this allows for recovery of small skeletal elements such as the hyoid, phalanges, auditory ossicles, and fetal or very young subadult remains if necessary (White & Folkens, 2005).

In regards to preservation, it becomes essential for those recovering the evidence to have proper attire to decrease the chance for contamination (gloves, shoe covers, coveralls, etc.) and that the evidence is only handled once before being placed in a container, preferably touched only on the edges (To, 2013). Items of evidence must also be separated piece by piece, placed in the appropriate container, and properly stored; for example, well-protected packaging such as those with an anti-tampering seal would need to be kept in a secured place that is cool, dry, and away from sunlight (Burns, 2007).

Labeling systems for all evidence are utilized, and must contain the following information: the agency or consultant responsible for recovering the evidence, the date of recovery, the site or location the evidence was recovered from (including provenience and context), item description, the item's condition at time of recovery, and a specific case number that should be assigned sequentially (Burns, 2007; Byers, 2011; To, 2013).

Along with labeling, two records are necessary to maintain chain of custody: an inventory of retrieved material and a log of persons who have had contact with the evidence (Byers, 2011).

Standards/techniques in crime scene investigation. As stated for forensic anthropological field methods, this section will also only consider the documentation, collection, and preservation of evidence with additional consideration paid to chain of custody. Standards involving the processes of securing the crime scene and controlling the evidence are illustrated by Swanson et al., (2012), who state the following:

- As rapidly as possible, identify the boundaries of the crime scene and secure it;
- Defining the scene requires officers to make sure they also identify possible or actual lines of approach to, and flight from, the scene and protect themselves also;
- Maintaining crime scene control is a crucial element in the preliminary investigation;
- Separate any potential combatants;
- Set up a physical barrier to protect the scene, prevent contamination or theft of evidence and for your own safety;
- Maintain a crime scene entry log of persons coming to and leaving the scene” (p. 42-43)

Parts of these guidelines are extremely critical to crime scenes involving forensic evidence, as securing the scene and preventing contamination are of particular importance when protecting the legitimacy of evidence. The authors also provide a list of supplies and equipment available for crime scene processing, though there is significant variation in what is actually utilized.

Documentation is very important at the scene; beginning with a rough, shorthand record, it expands into the crime scene entry log, administrative log, assignment sheets, incidence/offense report, photographic logs, sketches, and evidence recovery logs (Swanson et al., 2012). James and Nordby (2005) describe documentation as the most important step in the processing of a scene, and place emphasis on taking effective notes for a written record to be referred later. Besides videotaping and recording the scene, sketches are considered vital, starting with a rough sketch that will later be redrawn and

finished; measurements are obtained by identifying two fixed points (either through triangulation, baseline, or polar coordinates) and taking all measurements in relation to those established points (James & Nordby, 2005). Every piece is considered essential when proving continuity within chain of custody.

Considering this in regards to evidence collection, crime scene investigators must do the following: identify each item of evidence they collected and handled, describe the location and condition of the evidence at the time it was collected, state who had contact with and handled the evidence, state when and at what time the evidence was handled, declare under what circumstances and why the evidence was handled, and explain any changes that may have been made to the evidence (Swanson et al., 2012). When collecting evidence, James and Nordby (2005) state that while no rigid order exists for the process, some types of evidence should be given priority- for example, evidence that is transient, fragile, or could be easily lost. Each piece should be immediately placed in an appropriate primary container and then into a secondary container which must be completely sealed with tamper-resistant tape (James & Nordby, 2005). Furthermore, each new item should be packaged separately to effectively prevent the chance of cross-contamination (James & Nordby, 2005). As lesser amounts of evidence are needed due to improvements within forensic analytical techniques, proper collection and packaging of evidence is critical; certain advanced laboratory techniques are rendered impossible if evidence becomes lost or contaminated (James & Nordby, 2005; Swanson et al., 2012).

As crime scene investigation is highly focused on recovering biological evidence, correct collection and preservation is very important. One primary example of the importance of preservation can be seen with DNA evidence, now considered by many legal entities to be the evidence of choice and supported through extensive success in

case history (Larson et al., 2011). With that comes significant concern in protecting DNA as it is transported from the field to the laboratory. DNA is subject to degradation immediately following the perimortem period; being a relatively weak molecule, it degrades rapidly in an environment- and time-dependent manner, and is subject to bacteria, fungus, chemicals, ultraviolet light, etc. (Jobling et al., 2004; Swanson et al., 2012). When recovered at the crime scene, DNA may be contaminated or destroyed by the inexperienced or improperly trained investigator, either through incorrect collection or preservation methods; this would lead to inadmissibility in the courtroom (Swanson et al., 2012). Therefore, preservation of these types of evidence at the scene becomes paramount to ensure the reliability of subsequent laboratory results.

Role of forensic evidence in courtroom proceedings. Admissibility and quality of evidence is the main concern when a case enters judicial proceedings. A brief overview of the evolution in forensic evidence admissibility will show the importance the investigator is required to place on documentation, collection, and preservation of evidence. A need to evaluate expertise while at the same time being dependent on it creates tension that shapes the way in which courts admit forensic scientific evidence; an ever-increasing role of said evidence in criminal prosecution meant that refinement of admissibility requirements needed to occur (Black, 1988, Giannelli, 1992). Instead of focusing on the evidence presented, when conflicting conclusions were provided by medical experts, their qualifications and the certainty with which their opinion was expressed typically became the subject of discussion instead of the reasoning that connected the facts to the conclusions (Black, 1998).

Subsequently, the “Frye Rule” (Frye v. United States, 1923) became the first effort to standardize admission of forensic evidence and increase objectivity in forensic

testimony, stating that scientific evidence must have general acceptance in the field with which it is associated; however, this test was rarely discussed or analyzed until the establishment of the *Federal Rules of Evidence* (FRE) (1975) (Black, 1988; Grivas & Komar, 2008; Wiersema, Love, & Naul, 2009). Due to inconsistencies in interpretation of *Frye*, the *Federal Rules of Evidence* became the first standardized guidelines regarding forensic evidence and its use in criminal proceedings, intensifying and reevaluating the decisions of *Frye* (McCormick, 1982; Wiersema et al., 2009). However, as a common law rule still applied, inconsistencies existed until the ruling given in *Daubert v. Merrell Dow Pharmaceuticals* (1993) (Grivas & Komar, 2008).

Daubert set the standard that testable, replicable, reliable, and scientifically valid methods must be utilized when processing forensic evidence and must provide justification for a specific scientific opinion; this was essentially to prevent court cases from becoming a battle of the experts, keeping a trial decision from being based on the experts as opposed to the evidence (Christensen et al., 2009; Dirmaat et al., 2008; Wiersema et al., 2009). In addition, *Daubert* led to the decision that the *Federal Rules of Evidence* superseded *Frye* and one acceptance rule was not enough. Therefore, after the *Daubert* decision, significant changes were made to the *Federal Rules of Evidence*, with many new evidence guidelines being applied; for example, FRE Rule 702 was expanded and emphasized the relationship between data and the methods used to obtain that data rather than the credentials of the expert giving testimony (Dirkmaat et al., 2008). Furthermore, FRE Rule 702 set specific guidelines for satisfying the rule, stating that evidence must be testable by the scientific method, published in a peer-reviewed journal, have established reliability and error rates, and methods or opinions generally accepted within the related scientific community (Wiersama et al., 2009).

Two other cases have been essential for the interpretation of *Daubert- General Electric Co. v. Joiner* (1997) and *Kumho Tire Co. v. Carmichael* (1999). In *Joiner*, it was argued that methodology and conclusions are not completely separate from each other as mentioned in *Daubert*, and experts must explain how the methodologies have led to their conclusion; for *Kumho*, the Supreme Court ruled that *Daubert's* general reliability requirement applied to all expert testimony as opposed to only scientific knowledge, that science is too complex to evaluate with only one set of standards, and that experts could develop theories based on their observations and experience, applying those theories to the case (Christensen et al., 2009; Grivas & Komar, 2008; Saks & Koehler, 2005). From this, *Daubert*, *Joiner*, and *Kumho* have been established as a “trilogy” that significantly impacts the admissibility of expert witness testimony (Grivas & Komar, 2008).

Some disciplines can be problematic within the courts due to their reliance on a combination of traditional scientific methodologies and observational methodologies, such as case study evaluations or casework experience (Christensen et al., 2009). Moreover, due to the variances within the multiple forensic disciplines, the threshold of admissibility may not be equal for some areas, as one may be more sophisticated with more sensitive equipment, have more developed methods, or be able to control for more difficult variables (Christensen et al., 2009). One consistency, however, is seen when evaluating admissibility in regards to the “weight” of evidence; that is, its accuracy and believability in terms of procedures followed through the rules of evidence (Hanley et al., 2011). This points to the chain of custody- an essential part of evidence admissibility. Chain of custody specifically applies to any evidence that has been collected and subject to expert analysis; for example, a blood sample or material from a bodily specimen (Hanley et al., 2011). Every person who comes in contact with the evidence must be

documented and hold the ability to testify to their handling of the evidence in court; if not, the chain is broken and the evidence is generally inadmissible (Hanley et al., 2011). By following stringent documentation, collection, and preservation standards, questions regarding chain of custody can readily be answered and preserve the integrity of the evidence.

Literature Findings and Analysis

Throughout the literature, one can see that forensic anthropological field methods and crime scene investigation have extensive similarities within their development and techniques. As both fields of research emerged during the nineteenth century, they have and are concerned with the proper identification of materials encountered during investigation (Dupras et al., 2012). This leads to parallels between the crime scene investigator and the anthropologist, as both are attempting to protect the integrity of potential evidence and remains; challenges such as locating the remains, maximizing their recovery, and interpreting scene context become a common goal to overcome (Dupras et al., 2012; Haglund, 2001). Proliferation of these concerns occurred through the changes established from the Daubert criteria previously mentioned; the focus on proven quantitative methods led both disciplines to improvement of their field methods (Dirkmaat et al., 2008).

Considering this, both traditional crime scene investigation and forensic anthropological field methods are seriously concerned with chain of custody; even a brief gap in proof that chain of custody was maintained can discredit the evidence in the eyes of the court (Amendt et al., 2007; Haglund, Connor, & Scott, 2001; Giannelli, 1992; Imwinkelried, 1991). Compromising the integrity of evidence can have devastating effects on the strength of a case in court; specifically, one must be able to prove through

chain of custody that the evidence has neither contaminated nor lost in processing, typically through an inventory, log, and signature sheet detailed those who have come in contact with the evidence (Burns, 2007; Byers, 2011). Both fields concern themselves greatly with these criterion.

An interesting observation can be made in regards to the “standards” for crime scene investigation. Though a myriad of material existed for techniques and methods, no true “standards” were set in stone across the discipline. Techniques, methods, and materials varied from author to author, even within a small time period (or in the same year); while they were similar, they were not consistent enough to suggest that every scene was being managed the same way. From this, it could be assumed that the lack of set standards could potentially prove detrimental and may be an area in which attention should be focused. While some could argue that this may be due to variability in the types of scenes encountered and that flexibility is a necessity due to this variability, a set protocol is still needed to guide and direct the complex processes occurring during a crime scene investigation.

One very distinct difference between the anthropologist and forensic evidence technician points to a crucial aspect of anthropological training- osteology. When dealing with skeletal elements, knowledge of osteology is of the utmost importance, and it is essential to quickly perform an inventory of human bones and know how to identify them; when dealing with juvenile skeletal remains, small bone pieces could be misidentified or not recognized at all without the proper osteological training (Cattaneo, 2007). Furthermore, training in the archaeological recovery of a wide variety of evidence at the crime scene (including human remains, entomological evidence, geological evidence, and three-dimensional positioning of evidence) is absolutely required when one

is attempting to strengthen a criminal case, and can be summed up quite simply- every case is in need of multiple eyes from multiple perspectives (Amendt et al., 2007; Dirkmaat et al., 2008; Vass et al., 1992; Vass et al., 2002).

Utilizing this approach is advocated by many scholars, who contend that all forensic disciplines must work for strict quality assurance through proper training, method validation, accreditation, certification, etc. and follow best practices in order to protect the validity of evidence (Amendt et al., 2007; Christensen et al., 2009; Giannelli, 1992; Imwinkelreid, 1991). For forensic anthropological field methods, guidelines are set in place for documentation, collection, chain of custody, preservation, storage, analysis, interpretation, and reporting; in addition, quality checks are detailed for fieldwork to ensure proper steps have been taken, scene reconstruction can be completed, and all evidence has been successfully identified (Burns, 2007). Forensic science concerns the collection of multiple sources of evidence, and is therefore intrinsically interdisciplinary; emphasis and advocacy is placed on interdisciplinary teams in regards to criminal investigation, as those collecting evidence at the scene must be aware of how to recognize and preserve multiple types of evidence for expert analysis (Larson et al., 2011). Finally, as a well-prosecuted homicide case relies on excellent detective work, structured chain of command, well-conceived operational plans, use of forensic experts, adherence to detailed methods of evidence collection, and custody processing, every effort should be made to ensure that a scene is being managed in the best possible way (Larson et al., 2011). Therefore, extensive evidence exists within the literature to support the notion that reference to and training in forensic archaeological methods could lead to improvement in the recovery of evidence associated with human remains; from this, it can be inferred that incorporation of these techniques into all investigations involving

forensic evidence could prove beneficial (Cattaneo, 2007; Dirkmaat et al., 2008; Dupras et al., 2012; Haglund et al., 2001; Larson et al., 2011).

The purpose of the current research is to collect baseline information on the use of forensic field methods, training of personnel, and knowledge/implementation of forensic standards within law enforcement; this information will be useful in determining where municipal, county, state, and federal law enforcement agencies are in terms of advanced methods of documentation, collection, and preservation of evidence. No prior research has yet to address these issues within law enforcement agencies. Therefore, this research is a preliminary assessment of the “state of the field”. Analysis will be descriptive and will serve as the basis for further research that will promote the highest standards of evidentiary evidence collection within this profession.

CHAPTER III

METHODS AND MATERIALS

Sample and Inclusion/Exclusion Criteria

The sample for the survey questionnaire was drawn from the *National Directory of Law Enforcement Administrators* (45th edition). Potential participants for the survey included municipal, county, state, and federal agencies. Only agencies serving a population of 250,000 or more were chosen for the sample, with the exception being states that do not have this population density in municipal or county jurisdictions. In those cases, the top three populated cities/jurisdictions were selected.

For the municipal category, both metropolitan and city/county agencies were included. Being as the District of Columbia is identified as a metropolitan department, it fit the criteria for inclusion as a municipal agency. Hawaii, due to size, had only two agencies classified as municipal, and is the only other exception to the three agency criteria for the municipal category. All agencies designated in the county category were Sheriff's offices, with two exceptions. Alaska did not have a Sheriff's office; instead, the directory listed the Alaska State Troopers. Connecticut is completely absent from this category as the directory did not list any county agencies. Federal agencies were selected from Federal Bureau of Investigation (FBI) regional field offices for each state based off of the most populated city (if a field office was present). Below are the totals by category for agencies sent the survey questionnaire:

- Municipal: 173
- County: 278
- State: 50
- Federal: 38
- TOTAL: 539

Exclusionary criteria were necessary to preserve the validity of the data and were established after all responses had been received. No federal agencies returned the survey, requiring exclusion from the final sample total. Some surveys were returned as undeliverable; due to time constraints, they were not mailed again, and excluded from totals. Finally, respondents who did not fill out the survey correctly (i.e. those who stated they had a forensic unit, but stopped at the point where those agencies with no unit were directed to stop) were removed from the sample to keep results from being skewed by the questions that were not answered. Below are those excluded from the sample and the final sample total:

- Federal agencies excluded: 38
- Surveys returned to sender: 12 (4 municipal, 6 county, 2 state)
- Surveys answered incorrectly: 11 (4 municipal, 5 county, 2 state)
- FINAL TOTAL: 478

Survey Instrument

Surveys were mailed on January 23rd, 2014, with packets that included the following: a cover letter addressed to the highest ranking official of the agency, which explained the research being conducted; the survey questionnaire; and an addressed, stamped return envelope. Documents contained within the survey packet are included in Appendices A and B. Respondents were requested to return the survey by March 1st, 2014. Identifying data was collected but reserved for classification purposes only to

protect the anonymity of the agency; this was specified on the cover letter and reiterated before the signature line at the end of the survey. The survey instrument included 16 questions addressing standards, training, education, and certifications of an agencies forensic unit (if present). Those agencies without a forensic unit were asked the following: how often their agency encountered forensic related crime, who was responsible for handling those crimes, utilization of outside assistance, whether or not their agency performed laboratory functions, training regarding those laboratory functions, and whether or not anyone inside of the agency held a national certification in a forensic-related field. Supplemental discovery questions within the survey were utilized to identify potential areas for future research.

Stopping points were indicated within the survey, as certain responses to questions would exclude the agency from having pertinent answers to the remaining questions. Agencies who responded “yes” to having a specialized forensic investigation unit were directed to question #2, while those agencies without a specialized forensic investigation unit were informed to continue and that their survey responses were complete at the end of question #1. If these respondents answered “Never” to question #1.a. or “No” to question #1.a.ii., they were informed that they had completed the survey.

Interviews

To complete a more detailed cross-regional analysis, 10 agencies were selected from the eastern United States and invited to participate in an interview; interviews were conducted in February and March of 2014. Identifying information from these agencies is not disclosed, and all were assigned an anonymous identifier based on state. All interviews were conducted on-site with a digital voice recorder. Before the interview began, participants signed a consent and disclosure form, an example of which is located

in Appendix C. Participants were first asked the same questions present in the survey so that their representative data could be added to the baseline. A set of eleven quantitative and qualitative questions followed, with the participant asked to answer in terms of the agency as a whole. Questions were directed at the following: importance of forensic evidence; familiarity with forensic anthropology; documentation, collection, preservation of forensic evidence; importance of chain of custody; openness to cross-disciplinary approaches; and uniform standardization of methods. A copy of these questions and their scaling is located in Appendix D.

CHAPTER IV

RESULTS

Baseline trends and observations

Once the completed surveys were returned, the information was entered into an electronic database built with FileMaker Pro Version 6. Frequencies were developed with IBM SPSS Statistics Version 22. Tables shown represent the percentages of responses given, with more detailed frequency tables located in Appendix E. Of the 478 agencies who received the survey packet, 117 agencies responded, giving an overall response rate of 25%; when considering state representation, the overall national response rate was 82%. Table 1 illustrates the breakdown of responses by category.

Figure 1 shows the respondent percentages in terms of population served. Populations are grouped by those respondents serving residents at or below the number shown, with the final variable of 5,000,001 representing populations above that threshold. Most agencies within the sample served populations containing 500,000 to 750,000 residents.

Question #1 was directed at whether or not the agency maintained a specialized forensic investigation unit. The majority of participants answered “yes”, and this is represented in Table 2. The 26.5% without a specialized unit answered a series of questions that pertained to how forensic investigation was handled within their agency. For these 31 agencies, results are presented in terms of the majority. 48.4% responded

Table 1

Breakdown of responses by category

	Municipal	County	State
Total Sent	165	267	46
Responses	51	55	11
Return Rate	31%	21%	24%
National Response Rate	57%	59%	22%

Figure 1

Response rate in terms of population served

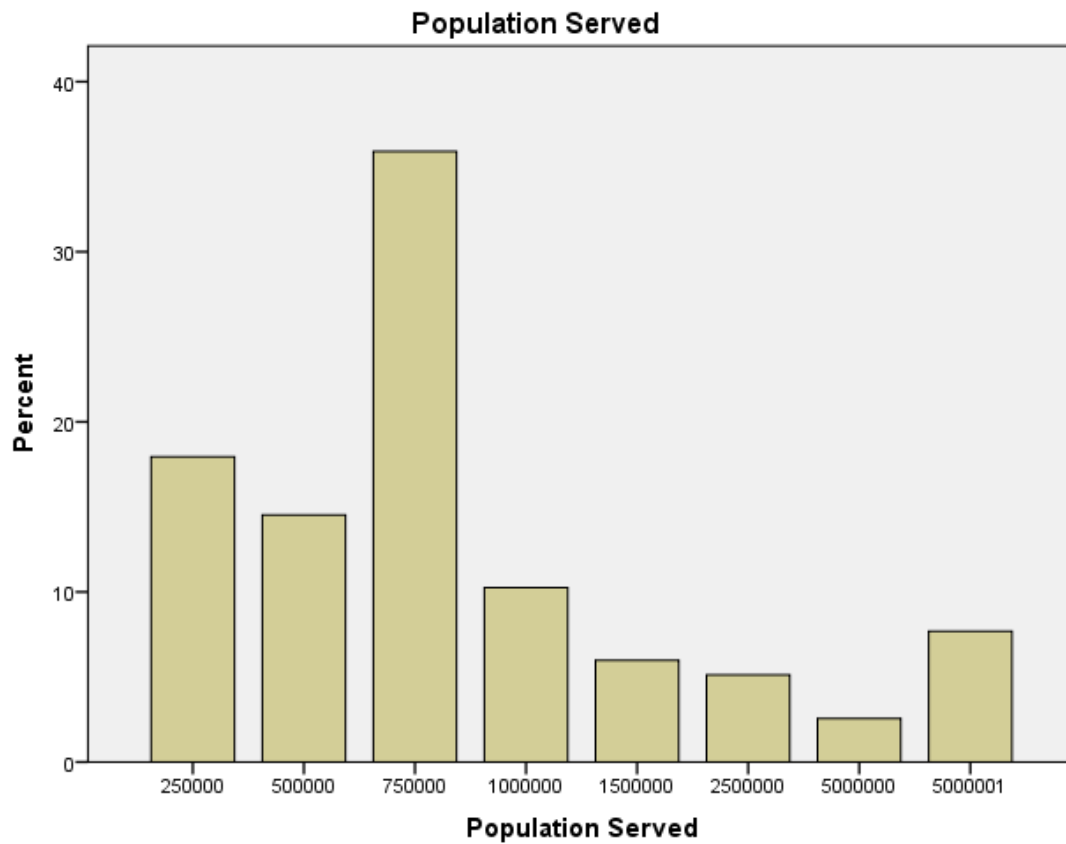


Table 2

Specialized Forensic Unit?

Yes	73.5% (86)
No	26.5% (31)
TOTAL	100.0% (117)

Table 3

Responses for Agencies without a Specialized Forensic Unit

	Utilize outside assistance	Any forensic processing	Specific training	National certification
Yes	93.1% (27)	67.9% (19)	76.2% (16)	5% (1)
No	6.9% (2)	32.1% (9)	23.8% (5)	95% (19)
TOTAL	100.0% (29)	100.0% (28)	100.0% (21)	100.0% (20)

that they encountered forensic crime on an occasional basis. Outside assistance was usually utilized to complete any forensic investigation encountered. Some type of forensic processing was completed by the agencies, and those responsible for performing those laboratory functions received specific training in techniques and practices of forensic evidence collection. Most agencies did not have a member of their department nationally certified in a forensic related field. Data pertaining to these results can be seen in Table 3.

Standards. For the 86 respondents who did report having a specialized forensic investigation unit, the remainder of the survey was completed. Over half of the respondents reported having a set policy on standards and/or best practices on investigative processes in the field, with responses shown in Table 4.

Table 4**Policy on Standards and/or Best Practices?**

Yes	75.3% (61)
No	24.7% (20)
TOTAL	100.0% (81)

Table 5**Responses Related to Education***Required/Preferred Education*

	Require	Prefer
High School Diploma/GED	57.0% (49)	21.2% (18)
Associate's or Certificate	12.8% (11)	15.3% (13)
Bachelor's	29% (25)	52.9% (45)
Master's	1.2% (1)	10.6% (9)
Doctoral	0.0% (0)	0.0% (0)
TOTAL	100.0% (86)	100.0% (85)

Does anyone in the unit possess a:

	Associate	Bachelor	Master	Doctoral	Anthro. Degrees
Yes	54.3% (44)	84% (68)	46.9% (38)	7.4% (6)	14% (12)
No	45.7% (37)	16% (13)	53.1% (43)	92.6% (75)	86% (72)
TOTAL	100.0% (81)	100.0% (81)	100.0% (81)	100.0% (81)	100.0% (84)

Education. Respondents were then asked a series of questions pertaining to the academic education of unit members. Most agencies required a High School Diploma or GED in their hiring practices, while they preferred those who hold a Bachelor's Degree. To examine how prevalent academic degrees are within their units, respondents were asked if anyone in the unit possessed an Associate's degree or Certificate, Bachelor's degree, Master's degree, or Doctoral degree. 54.3% of respondents had at least one individual in their unit possessing an Associate's degree or certificate; 84% reported a Bachelor's degree, 46.9% reported a Master's degree, and 7.4% reported a Doctoral degree. When asked if anyone in the unit possessed an anthropological degree, 86% of respondents answered "no". Data representing these results is shown in Table 5.

Training. Respondents were asked a set of questions pertaining to training within their forensic investigation unit. At 73.5%, the majority of agencies reported that individuals within the unit attended some type of specific training provided by the department prior to entering the field. 59.5% reported that yearly training was required, with 51% reporting that this training was the same or similar to the original training administered. For the 34 respondents who did not require yearly training, 15.1% reported that they did require attendance at some sort of routine training, though the subsequent question directed at the frequency of that training was not typically answered. Training provided outside of the department was encouraged by 99% of respondents; only 24.7% had a requirement for attendance at an outside training program. A list of outside training programs reported from question 9.b. is located in Appendix F. From those agencies that either encouraged or required training programs, 90.2% reported that this training was funded by the department. Table 6 shows data representing these results.

Table 6

Responses Related to Training

	Dept. training provided	Yearly training required	Same as dept. training	Required routine training	Outside training encouraged	Outside training required	Dept. funding for outside training
Yes	73.5% (61)	59.5% (50)	51.0% (25)	39.4% (13)	99.0% (84)	24.7% (19)	90.2% (74)
No	26.5% (22)	40.5% (34)	49.0% (24)	60.6% (20)	1.0% (1)	75.3% (58)	9.8% (8)
TOTAL	100.0% (83)	100.0% (84)	100.0% (49)	100.0% (33)	100.0% (85)	100.0% (77)	100.0% (82)

Question #11 contained multiple training areas, and respondents were asked whether or not members of their forensic investigation unit had received training in those areas. Combining anthropological methods and crime scene methods led to the following list of training areas utilized within the survey:

- Azimuth Baseline Mapping
- Ballistics
- Bloodstain Pattern Analysis
- Combined DNA Index System (CODIS)
- Crime Scene Mapping
- DNA Recovery
- Fingerprint Analysis
- Forensic Anthropology
- Forensic Botany
- Forensic Entomology
- Forensic Odontology
- Geographic Information Systems
- Toolmark Identification
- Total Station Mapping

- Trace Evidence Collection
- Zooarchaeology

Specifically, this list was developed from field techniques that impact the effectiveness of documentation and collection as well as analytical methods that require correctly preserved evidence to produce valid results. Reported answers indicated that bloodstain pattern analysis was the area in which most respondents were trained in, at 87.1%; this was closely followed by DNA recovery (84.7%) and trace evidence collection (83.5%). Respondents indicated little to no training in the areas of forensic odontology (8.2%), forensic botany (7.1%), and zooarchaeology (3.5%). Forensic entomology, at 35.3%, was the highest reported anthropologically related training area. More traditional forensic methods had higher rates of responses, while the anthropologically related disciplines had relatively low response rates. Ballistics, bloodstain pattern analysis, crime scene mapping, DNA recovery, fingerprint analysis, and trace evidence collection are grouped as the areas that most units received training in; this leaves azimuth/baseline mapping, CODIS, forensic anthropology, forensic botany, forensic entomology, forensic odontology, GIS, toolmark identification, total station mapping and zooarchaeology grouped as areas which most units do not receive training in. Respondents were also asked whether or not they utilized outside assistance to complete investigations involving these training areas; 92.9% reported yes, with most listing other agencies, specific units, private resources, and universities. Data illustrating the most common answers for each training area is shown in Table 7, with percentages regarding utilization of outside training in Table 8. For respondents with units that contained both sworn and civilian members, agencies were asked whether or not a differentiation existed between the forensic training received by sworn officers as

Table 7**Specific Training Areas**

	Training Received and Percentage
Azimuth Baseline Mapping	No (37.6%)
Ballistics	Yes (50.6%)
Bloodstain Pattern Analysis	Yes (87.1%)
Combined Index DNA System (CODIS)	No (32.9%)
Crime Scene Mapping	Yes (75.3%)
DNA Recovery	Yes (84.7%)
Fingerprint Analysis	Yes (75.3%)
Forensic Anthropology	No (25.9%)
Forensic Botany	No (7.1%)
Forensic Entomology	No (35.3%)
Forensic Odontology	No (8.2%)
Geographic Information Systems (GIS)	No (15.3%)
Toolmark Identification	No (40.0%)
Total Station Mapping	No (48.2%)
Trace Evidence Collection	Yes (83.5%)
Zooarchaeology	No (3.5%)

Table 8**Utilize Outside Assistance?**

Yes	92.9% (78)
No	7.1% (6)
TOTAL	100.0% (84)

opposed to civilian members of the unit. Of the 55 agencies that answered this question, the majority of respondents indicated that there was no difference in the training received.

Percentages representing this data is shown in Table 9.

Lastly, respondents were asked questions regarding national certifications in the

Table 9

Sworn vs. Civilian Training

Yes	36.4% (20)
No	63.6%(35)
TOTAL	100.0% (55)

Table 10

Responses Related to National Certification

	National Certification Encouraged	National Certification Required
Yes	68.3% (56)	8.1%(7)
No	31.7% (26)	91.9% (79)
TOTAL	100.0% (82)	100.0% (86)

forensic disciplines. While 68.3% of respondents had units who encouraged national certification, only 8.1% of those agencies required national certification. Data showing these responses is shown in Table 10; responses given for Question #14.b. on certifications held by members of the agencies' forensic units can be found in Appendix G.

Specific Cross-Regional Analysis

To protect anonymity of the participating agencies, each was assigned a unique identifier. For State X, participants were labeled X-1, X-2, and X-3; for State Y, Y-1, Y-2, Y-3, and Y-4; and for State Z, Z-1, Z-2, and Z-3. Detailed responses for each interview and analysis from which the following results were compiled are located within Appendix H. The following results are presented in comparative tables. For the survey,

answers with red text represent those responses under the baseline while those in green text represent responses above the baseline. For the interviews, text colors represent the same; additionally, yellow text is used for those responses that were in between.

Table 11 represents the responses from the two agencies who did not have a specialized forensic unit. Both serve populations far below the baseline results. All responses from X-1 matched the results from the baseline analysis. Y-2 matched the baseline aside from their absence of a policy on standards and/or best practices on investigative techniques in the field.

Table 12 compares the populations served by the remaining 8 agencies. Average population served of the respondents stands at 490,236, putting the small sample relatively close to the baseline average. All responded “yes” when asked whether or not the unit possessed a policy on standards and/or best practices for investigative processes in the field, fitting with the baseline results.

Results regarding education are shown in Table 13. X-2, Y-4, and Z-2 all required higher education levels than the baseline, with Y-4 requiring the highest level of education at a Bachelor’s degree; Y-4 was also the only unit that had a higher preferred education requirement (Master’s) than the baseline readings. Y-1, Y-2, and Z-3 preferred education levels lower than a Bachelor’s degree. Baseline readings indicated that units typically had at least one member with an Associate’s degree or Certificate; Y-3, Y-4, and Z-1 did not, though Y-4 could be excluded due to the fact that a Bachelor’s is required in their hiring processes. All units had at least one member possessing a Bachelor’s degree, fitting the baseline. Only Y-4, Z-1, and Z-2 had at least one member possessing a Master’s degree, and only Y-4 had at least one member possessing a Doctoral degree.

Table 11**Interview Results: Agencies without Specialized Forensic Unit**

	X-1	Y-2
Population Served	31,000	45,000
Standards?	Yes	No
How often forensic crime is encountered	Occasionally	Occasionally/Rarely
Utilization of outside assistance	Yes	Yes
Completes forensic evidence processing	Yes	No
Specific training in forensic processes	Yes	Yes
National Certifications held	No	No

Table 12

	Population Served
X-2	709,264
X-3	250,000
Y-1	35,000
Y-3	23,000
Y-4	1,400,000
Z-1	185,000
Z-2	619,626
Z-3	700,000

Table 13**Interview Results: Education**

	X-2	X-3	Y-1	Y-3	Y-4	Z-1	Z-2	Z-3
Education required	A	H	H	H	B	H	A	H
Education preferred	B	B	H	A	M	B	B	H
Associate's	n/a	Yes	Yes	No	No	No	Yes	Yes
Bachelor's	n/a	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Master's	n/a	No	No	No	Yes	Yes	Yes	No
Doctoral	n/a	No	No	No	Yes	No	No	No
Anthropological Degree?	n/a	No	No	No	No	Yes	No	No

H= High School Diploma/GED **A**= Associate's Degree or Certificate **B**= Bachelor's Degree
M= Master's Degree **D**= Doctoral Degree

Z-1 was the only unit reporting a member that possessed a degree in an anthropological discipline.

Table 14 contains the results for answers regarding training. All units except X-2 were provided training by the department prior to entering the field; additionally, all units except X-2 required yearly training thereafter, though X-2 did report that some type of routine training was required. Responses to both questions placed X-2 below the baseline readings. For the remaining units, only Z-2 responded definitively that their yearly training was similar to the previously received training, which fits the baseline response; both Y-4 and Z-3 responded that that training varied between new and old training areas, placing them in-between baseline responses. All others were below the baseline. While all units encouraged outside training, fitting the baseline, only X-3, Y-3, and Y-4 required it, which places them above the baseline. Department funding was answered "yes" by all units besides X-2, Y-4, and Z-3; these units were in-between baseline responses as all

Table 14**Interview Results: Training**

	X-2	X-3	Y-1	Y-3	Y-4	Z-1	Z-2	Z-3
Department training provided	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yearly training required	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Same as Department	n/a	No	No	No	Y/N	No	Yes	Y/N
Required routine training	Yes	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Outside training encouraged	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Outside training required	No	Yes	No	Yes	Yes	No	No	No
Department funding	Y/N	Yes	Yes	Yes	Y/N	Yes	Yes	Y/N
Sworn v. Civilian	Yes	No	Yes	n/a	n/a	Yes	Yes	No

stated that department funding was occasionally made available instead of being a reliable funding source. These responses deviate from the baseline, as the majority of units reported that they received department funding for outside training. In regards to sworn vs. civilian training, Y-3 and Y-4 contain only sworn and only civilian members (respectively), excluding them from a response. X-3 and Z-3 matched the baseline in that a differentiation between training did not exist, with X-2, Y-1, Z-1, and Z-2 responding oppositely. When looking at the specific training areas mentioned previously, Table 15 shows how many of these areas each unit had received training in. State X receives training in more areas than the baseline results, with State Y receiving training in the majority of areas and State Z receiving training in the same areas identified as common by the baseline results. All units utilize outside assistance for forensic investigation (if needed) inside of the specific training areas. When looking at national certification, only

Table 15

	Number of Training Areas
X-2	12 of 16
X-3	10 of 16
Y-1	15 of 16
Y-3	8 of 16
Y-4	14 of 16
Z-1	10 of 16
Z-2	6 of 16
Z-3	6 of 16

Y-3 and Z-3 reported that they did not encourage national certification, placing them below the baseline. All units responded that they did not require national certification, fitting baseline results.

In reference to chain of command within departments containing forensic units, degrees of separation between the technicians/investigators and higher ranked sworn officials varied greatly. Only four departments had technicians/investigators reporting to individuals with specialized forensic training, with the highest separation between technicians/investigators and higher ranked officials being 4.

Quantitative results from the in-person interviews are represented in Table 16. To examine the opinions of the departments involved in this regional sample, all responses to the quantitatively based interview-specific questions were compared. All agencies stated that forensic evidence was very important towards a forensic investigation. When asked about familiarity with forensic anthropological field methods, the average response was that these 10 departments were slightly to moderately knowledgeable with the discipline. Almost all of the departments responded that documentation and mapping is very important at the scene of a forensic investigation. For both scene and evidence preservation in the field and maintenance of chain of custody, all departments responded

Table 16**Interview Results: Specific Questions**

	X-1	X-2	X-3	Y-1	Y-2	Y-3	Y-4	Z-1	Z-2	Z-3
Importance of forensic evidence	5	5	5	5	5	5	5	5	5	5
Familiarity with forensic archaeology	1-2	4	3	1	1	1-2	5	5	3-4	5
Importance of documentation and mapping	5	5	5	5	5	5	5	5	3-4	5
Importance of scene and evidence preservation	5	5	5	5	5	5	5	5	5	5
Importance of chain of custody	5	5	5	5	5	5	5	5	5	5
Open to new training	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Believe that a cross-discipline approach would prove beneficial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
In favor of large-scale uniform standards	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

1= Not at all 2= Slightly 3= Moderately 4= Somewhat 5= Very

that these areas were very important. Every department was amenable to sending their investigators to learn methods that could enhance techniques utilized in documentation, mapping, scene and evidence preservation, and chain of custody. All agreed that a cross-discipline approach could prove to be beneficial to forensic investigation as a whole. Finally, all departments agreed that there should be large-scale uniform standards regarding forensic investigation on a state and/or federal level, though reasoning for why differed between all agencies.

CHAPTER V

DISCUSSION, IMPLICATIONS & RECOMMENDATIONS

Utilization of forensic evidence in courtroom proceedings will continue to be a mainstay in the judicial system for the foreseeable future, and therefore will need consistent improvement and advancement in order to ensure justice is being properly served. Results presented from this study aim to bring attention to the ever-increasing role of interdisciplinary cooperation in order to ensure the validity and accuracy of forensic evidence. Incorporation of forensic anthropological field methods is merely the first step; if utilized, these techniques that work to improve documentation, collection, and preservation will aid in the implementation of other forensic disciplines and sub-disciplines. Through the sample cross-regional responses, one can observe the overwhelming positive response to training in forensic anthropological field methods as well as the amenability to the development of standards on a state and/or federal level. Although this is a small representative sample, having all agencies agree on both points bodes well when considering future direction on the subject.

However, the baseline results present multiple inadequacies present within the current structure and processes of crime scene investigation units, seen through the majority of the baseline responses. While agencies reported having a policy on standards and/or best practices, every respondent that chose/had the ability to send a copy of their standards had distinctively different policies; this inconsistency does not lend itself well

to ensuring that every forensic related crime scene is being processed correctly. Required educational levels did not call for a college education, a rare finding in such a hard-science driven field. In addition, lack of discipline diversity as a direct result of not having college-educated unit members negatively effects the knowledge base of the unit as a whole.

In regards to training, while most units were provided specific training by the department prior to entering the field, training varied widely across agencies that chose/had the ability to send a copy of their training program, which could cause the same inconsistencies mentioned for policies on standards and/or best practices. Those agencies that did require yearly training were administering training the same or similar to that which the members had already received. For those agencies that responded “no” to a yearly training requirement, the majority of them did not require any routine training whatsoever. Lack of updated, diverse, and routine training is not conducive for a field that is still in constant development. No requirement for outside training means that unit members are only exposed to the perspectives and techniques of their department, causing stagnation in unit development and eventually leading to antiquation of methods in the same way as a lack of updated, diverse, and routine training. Training areas vary widely from department to department, and while classic methods were identified most often, a complete lack of extremely relevant forensic disciplines was present. Furthermore, the absence of requirement for national certification is troubling. A surprisingly significant 31.7% did not even encourage their members to obtain national certification. With no official recognition in the discipline, unit members being called as witnesses (expert or otherwise) lessen their abilities in the eyes of the court.

As this data was gathered through a pilot study, multiple recommendations can be

made for the direction of future research. Reasonable response rates indicate that an even larger sample may be able to be obtained, allowing for data to be gathered on units/agencies serving smaller populations. A closer examination of individual standards and/or best practices on a state-by-state basis could lead to the possibility of incorporating these standards into a statewide requirement, which might increase the likelihood of national standards being developed. Educational deficiencies could be explored even more through examining units who have college education requirements as opposed to those who do not in order to observe any differences in documentation, collection, and preservation of evidence and whether or not that has had a direct impact on the forensic cases those respective units have been involved in. For training, individual program evaluations of a specific agency may identify deficiencies that could then be rectified to improve the quality of departmental training unit members are receiving. Additionally, evaluation of forensic training programs across the United States could prove beneficial to observe their success in education and development as well as their impact on those who attend them. Lastly, though only mentioned briefly within this study, examination of unit structure and chain of command within agencies should be conducted to determine how many degrees of separation there are between those with and without specialized forensic knowledge.

As forensic science evolves, those who investigate forensic crime should evolve as well. By gaining awareness of multiple disciplines, identifying and rectifying deficiencies in standards, education and training, and conducting specific evaluations, forensic investigators can be as successful as possible in their documentation, collection, and preservation of evidence in the field. Being that the goal of forensic evidence is to identify and eventually become the basis for the conviction of a criminal, all should be

working to develop the best viable way of ensuring the evidence is of the highest quality.
Further research into the findings presented in this study could prove extremely beneficial to the field of forensic science and investigation as a whole.

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APPENDICES

Appendix A

Cover Letter

UNIVERSITY OF
LOUISVILLE
It's Happening Here.

Southern Police Institute
Excellence in Policing

Department of Justice Administration
College of Arts and Sciences
University of Louisville
Louisville, KY 40292

Office: 502-852-6561
Fax: 502-852-0335

www.louisville.edu/spi

Prevalence of Knowledge in Forensic Anthropology Field Methods

01/13/14

Dear (Ranking Official),

You are being invited to participate in a research study by answering the attached survey. If necessary, you may forward this packet to the appropriate party. As a graduate student in the Department of Justice Administration, I am conducting a study on the prevalence of knowledge in forensic anthropology field methods in relation to the forensic criminal investigation. Though the fields are closely related, forensic anthropology and traditional criminal investigation differ in procedure and protocol. This study aims to discover whether or not a combination of standards and best practices would be beneficial to forensic investigation as a whole. As the field of forensic anthropology is relatively new compared to the history of forensic investigation, I believe this information is crucial due to the increasing reliance on forensic evidence for conviction in the courtroom.

The enclosed survey concerns the training, policies, practices, and outside training of those involved in forensics within your department. There are no known risks for your participation in this research study. All responses will remain anonymous and confidential in regards to your department; any identifying information specific to your agency will not be disclosed in the findings of this survey. Information gathered will be released in aggregate form in comparison with the population served by each department in the sample. The information collected may not benefit you directly; however, a copy of the results can be provided to you if desired. The information gathered from this survey may be helpful in developing linear national training standards for those involved with forensic investigation. Your completed survey will be stored in the Department of Justice Administration, University of Louisville. The survey will take approximately 20 minutes to complete.

Individuals from the Department of Justice Administration may inspect these records. In all other respects, however, the data will be held in confidence to the extent permitted by law. Should the data be published, your identity will not be disclosed.

Taking part in this study is voluntary. By completing this survey you agree to take part in this research study. You do not have to answer any questions that make you uncomfortable, and may leave any of the questions blank. You may choose not to take part at all.

If you have any questions, concerns, or complaints about the research study, please contact Cassandra Rausch at (502) 852-8552. You may also contact the advisor of this research, Dr. Deborah Keeling, at (502) 852-0370.

If you choose to participate, please fill out the attached survey and return in the envelope enclosed by March 1st, 2014.

Thank you in advance for your time and participation.

Sincerely,

Cassandra Rausch

Graduate Assistant
Department of Justice Administration
University of Louisville

Appendix B

Survey Instrument

Forensic Anthropology and Forensic Investigation Questionnaire

For the purposes of this questionnaire, **Forensic Anthropology is defined as the examination of human skeletal remains for law enforcement agencies to determine the identity of unidentified bones. Forensic Anthropology field methods are defined as the application of archaeological principals, techniques, and methodologies in a medicolegal context. Forensic Investigation is defined as the traditional crime scene methods whereby a technician investigates crimes by collecting and analyzing physical evidence.**

Please be advised that all responses to this questionnaire will remain **anonymous and confidential**. Any identifying information specific to your agency will not be disclosed in the findings of this survey. Information from this survey will be released in aggregate form in comparison with the population served by each department in the sample **ONLY**.

Thank you for your time and effort in completing this questionnaire and contributing to our knowledge in this important area of criminal investigation.

Name of person completing this questionnaire: _____

Agency Name: _____

Address: _____

Phone: _____

Email: _____

Your department is best classified as:

Municipal County State Federal Other _____

Population served by department: _____

Number of sworn officers: _____

Number of civilian employees: _____

The following questions regard the standards and/or best practices, education level, and training of your forensic investigation unit (if applicable). Please answer each question to the best of your ability. Approximations are acceptable when no accurate number is available.

Please **check** or **write** the response that best represents your department:

1. Does your department have a **specialized** forensic investigation unit?

Yes **No**

*Number of officers/civilians in **forensic investigative unit**: _____

a. If **NO**, how often does your department encounter crimes involving forensic investigation?

Often **Occasionally** **Rarely** **Never**

If answer is **NEVER**, you have completed the survey. Please sign and date the bottom of this form.

i. Who is responsible for handling crimes involving forensic investigation within your department?

ii. Do you utilize any outside assistance (i.e. other agencies, specific units, private resources, universities, etc.) .for any part of your forensic investigation?

Yes **No**

aa. If **YES**, please write in the resources you utilize to assist in your forensic investigation:

iii. Does your department perform any processing that could be considered a laboratory function (i.e., evidence processing, forensic preservation of evidence, shipping of evidence, etc.)?

Yes **No**

If **NO**, you have completed the survey. Please sign and date the bottom of this form.

aa. If **YES**, do members of your department responsible for performing these laboratory functions undergo any specific

training regarding the techniques and practices of forensic evidence collection?

Yes **No**

ii. If **YES**, please attach a copy of the training schedule and/or topics covered during training.

bb. Does anyone in your department hold a national certification in forensic investigation?

Yes **No**

You have completed the survey. Please sign and date the bottom of this form.

2. Does your forensic investigation unit have a set policy on the **standards** and/or **best practices** on investigative processes in the field?

Yes **No**

If **YES**, please attach a copy of your policy.

3. What level of education is **required** in the hiring practices for your forensic investigation unit?

High School Diploma/GED

Associate's/Certificate

Bachelor's Degree

Master's Degree

Doctoral Degree

4. What level of education is **preferred** in the hiring practices for your forensic investigation unit?

High School Diploma/GED

Associate's/Certificate

Bachelor's Degree

Master's Degree

Doctoral Degree

5. Approximately how many people in your forensic investigation unit have a:

Associate's/Certificate: _____

Bachelor's Degree: _____

Master's Degree: _____

Doctoral Degree: _____

6. Does anyone in your department have a degree in any of the following fields? Please check **ALL** that apply.

Anthropology

Forensic Anthropology

Archaeology

Forensic Archaeology

No one in my unit possesses the above degrees

a. If so, approximately how many people hold one or more of the aforementioned degrees?

7. Do the members of your forensic investigation unit undergo specific training **provided by the department** prior to entering the field?

Yes **No**

If **YES**, please attach a copy of a training schedule and/or topics covered during training.

8. Are members of your forensic investigation unit **required** to attend yearly training?

Yes **No**

a. If **YES**, is this yearly training the **same/similar** to the training **provided by the department** prior to entering the field?

Yes **No**

If **NO**, please attach a copy of the yearly training schedule and/or topics covered during training.

b. If **NO**, are members required to attend any routine training?

Yes **No**

i. If **YES**, how often is routine training administered?

9. Are members of your forensic investigation unit **encouraged** to attend **outside** training?

Yes **No**

If **NO**, please skip to **Question #11**.

a. Are members of your department **required** to attend **outside** training?

Yes **No**

b. Please write in the names of training programs attended by members of your unit.

10. If **outside** training is **encouraged or required**, does your department and/or unit provide the funding necessary to cover the cost of **outside** training?

Yes **No**

11. Have members of your forensic investigation received training in any of the following areas? Please check **ALL** that apply and give an approximate number of how many people have been trained in those areas.

<input type="checkbox"/> Azimuth/Baseline Mapping _____	<input type="checkbox"/> Ballistics _____
<input type="checkbox"/> Bloodstain Pattern Analysis _____	<input type="checkbox"/> CODIS (Combined DNA Index System) _____
<input type="checkbox"/> Crime Scene Mapping _____	<input type="checkbox"/> DNA Recovery _____
<input type="checkbox"/> Fingerprint Analysis _____	<input type="checkbox"/> Forensic Anthropology _____
<input type="checkbox"/> Forensic Botany _____	<input type="checkbox"/> Forensic Entomology _____
<input type="checkbox"/> Forensic Odontology _____	<input type="checkbox"/> GIS (Geographic Information Systems) _____
<input type="checkbox"/> Toolmark Identification _____	<input type="checkbox"/> Total Station Mapping _____
<input type="checkbox"/> Trace Evidence Collection _____	<input type="checkbox"/> Zooarchaeology - _____

12. Does your unit utilize outside assistance (i.e. other agencies, specific units, private resources, universities, etc.) to accomplish any of part of the forensic investigation or any fields mentioned above?

Yes **No**

a. If **YES**, please write in the resources you utilize to assist in your forensic investigation:

13. Is there a differentiation in the forensic training received by sworn officers as opposed to civilian members of the unit?

Yes No

a. If **YES**, please provide a short description of the differentiation.

14. Are members of your unit **encouraged** to have national certification?

Yes No

a. Are members of your unit **required** to have national certification?

Yes No

b. Please write in the types of certifications held by members of your unit.

15. Please write in the chain of command in your forensic unit.

16. Please write in any **additional information** you feel would be **useful** for the purposes of this survey.

As stated previously, all responses to this questionnaire will remain **anonymous and confidential**. Any identifying information specific to your agency will not be disclosed in the findings of this survey. Information from this survey will be released in aggregate form in comparison with the population served by each department in the sample **ONLY**.

Thank you again for your time and effort in completing this questionnaire and contributing to our knowledge in this important area of criminal investigation.

Please enclose this form in the stamped, addressed envelope included with this survey.

Signature: _____

Date: _____

Appendix C

Interview Consent and Disclosure

Prevalence of knowledge in Forensic Anthropology Field Methods
Department of Justice Administration
University of Louisville

As a graduate student in the Department of Justice Administration, I am conducting a study on the prevalence of knowledge in forensic anthropology field methods in relation to the forensic criminal investigation. You are being invited to participate in a research study by participating in this interview. Though the fields are closely related, forensic anthropology and traditional criminal investigation differ in procedure and protocol. This study aims to discover whether or not a combination of standards and best practices would be beneficial to forensic investigation as a whole. As the field of forensic anthropology is relatively new compared to the history of forensic investigation, I believe this information is crucial due to the increasing reliance on forensic evidence for conviction in the courtroom.

The questions will concern the training, policies, practices, and outside training of those involved in forensics within your department. There are no known risks for your participation in this research study. Any identifying information specific to your agency will not be disclosed in the findings of this research, as your responses will only be compared to responses given by other agencies that have individuals being interviewed, and your department will not be mentioned by name; the only identifier in this research is the state in which your agency is located. The information collected may not benefit you directly; however, a copy of the results can be provided to you if desired. The information gathered from this interview may be helpful in developing linear state and/or national training standards for those involved with forensic investigation. A digital recording of this interview will be stored in the Department of Justice Administration, University of Louisville. The interview will be approximately 1 hour in length.

Taking part in this study is voluntary. By participating in this interview you agree to take part in this research study. You do not have to answer any questions that make you uncomfortable. You may choose not to take part at all. By signing this form you are giving consent for the data to be utilized in the findings of this research study.

All responses given in this interview **anonymous and confidential**. Any identifying information specific to your agency will not be disclosed in the findings. Information will be compared to other agencies and your department will **NOT** be identified by name; the only identifier for this interview is the **STATE** in which the agency is located.

Signature: _____

Department: _____

Date: _____

I would like to receive a digital copy of this study once it is completed.

Email: _____

Appendix D

Interview Questions

1. How important do you consider forensic evidence to be towards an investigation?

- 1- Not important
- 2- Slightly important
- 3- Moderately important
- 4- Somewhat important
- 5- Very important

2. In your opinion, what is the most important piece of forensic evidence to recover?

Write-in

3. How familiar are you with forensic anthropology and/or forensic anthropological field methods?

- 1- Not at all familiar
- 2- Slightly familiar
- 3- Moderately familiar
- 4- Somewhat familiar
- 5- Very familiar

4. In your opinion, how important is documentation and mapping at the scene of a forensic investigation?

- 1- Not important
- 2- Slightly important
- 3- Moderately important
- 4- Somewhat important
- 5- Very important

5. In your opinion, how important is scene and evidence preservation at the scene of a forensic investigation?

- 1- Not important
- 2- Slightly important
- 3- Moderately important
- 4- Somewhat important
- 5- Very important

6. In your opinion, how important is it to maintain chain of custody?

- 1- Not important
- 2- Slightly important
- 3- Moderately important
- 4- Somewhat important

5- Very important

7. If there were training methods that could enhance techniques utilized for the above, would you send your investigators to learn those techniques? Why or why not?

Y or N plus explanation

8. What do you think is most lacking in forensic investigation as a whole?

Write-in

9. Do you believe that a cross-discipline approach could be beneficial to forensic investigation as a whole? Why or why not?

Y or N plus explanation

10. In your opinion, should there be large-scale uniform standards regarding forensic investigation? Why or why not?

Y or N plus explanation

11. Briefly explain how the forensic unit in your department is operated (if applicable).

Write-in

Appendix E

Frequency Tables

Question #1 Specialized Forensic Unit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	86	73.5	73.5	73.5
	No	31	26.5	26.5	100.0
	Total	117	100.0	100.0	

Question #1.a. How Often Forensic Crime Occurs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	2	1.7	6.5	6.5
	Rarely	9	7.7	29.0	35.5
	Occasionally	15	12.8	48.4	83.9
	Often	5	4.3	16.1	100.0
	Total	31	26.5	100.0	
Missing	Not Applicable	86	73.5		
Total		117	100.0		

Question #1.a.ii. Utilization of Outside Assistance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	27	23.1	87.1	87.1
	No	2	1.7	6.5	93.5
	Not Answered	2	1.7	6.5	100.0
	Total	31	26.5	100.0	
Missing	Not Applicable	86	73.5		
Total		117	100.0		

Question #1.a.iii. Conduct Any Forensic Processing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	16.2	61.3	61.3
	No	9	7.7	29.0	90.3
	Not Answered	3	2.6	9.7	100.0
	Total	31	26.5	100.0	
Missing	Not Applicable	86	73.5		
Total		117	100.0		

Question #1.a.iii.aa. Specific Training in Forensic Evidence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	13.7	51.6	51.6
	No	5	4.3	16.1	67.7
	Not Answered	10	8.5	32.3	100.0
	Total	31	26.5	100.0	
Missing	Not Applicable	86	73.5		
Total		117	100.0		

Question #1.a.iii.bb. National Certifications

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	.9	3.2	3.2
	No	19	16.2	61.3	64.5
	Not Answered	11	9.4	35.5	100.0
	Total	31	26.5	100.0	
Missing	Not Applicable	86	73.5		
Total		117	100.0		

Question #2 Policy on Standards and/or Best Practices

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	61	52.1	69.3	69.3
	No	20	17.1	22.7	92.0
	Not Answered	7	6.0	8.0	100.0
	Total	88	75.2	100.0	
Missing	Not Applicable	29	24.8		
Total		117	100.0		

Question #3 Required Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High School Diploma or GED	49	41.9	57.0	57.0
	Associate's or Certificate	11	9.4	12.8	69.8
	Bachelor's Degree	25	21.4	29.1	98.8
	Master's Degree	1	.9	1.2	100.0
	Total	86	73.5	100.0	
Missing	Not Applicable	31	26.5		
Total		117	100.0		

Question #4 Preferred Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High School Diploma or GED	18	15.4	21.2	21.2
	Associate's or Certificate	13	11.1	15.3	36.5
	Bachelor's Degree	45	38.5	52.9	89.4
	Master's Degree	9	7.7	10.6	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

Question #5 Does anyone in the unit possess a:

Associate's Degree or Certificate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	44	37.6	54.3	54.3
	No	37	31.6	45.7	100.0
	Total	81	69.2	100.0	
Missing	Not Applicable	36	30.8		
Total		117	100.0		

Bachelor's Degree

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	68	58.1	84.0	84.0
	No	13	11.1	16.0	100.0
	Total	81	69.2	100.0	
Missing	Not Applicable	36	30.8		
Total		117	100.0		

Master's Degree

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	38	32.5	46.9	46.9
	No	43	36.8	53.1	100.0
	Total	81	69.2	100.0	
Missing	Not Applicable	36	30.8		
Total		117	100.0		

Doctoral Degree

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	5.1	7.4	7.4
	No	75	64.1	92.6	100.0
	Total	81	69.2	100.0	
Missing	Not Applicable	36	30.8		
Total		117	100.0		

Question #6 Any Anthropological Degrees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	10.3	14.0	14.0
	No	72	61.5	83.7	97.7
	Not Answered	2	1.7	2.3	100.0
	Total	86	73.5	100.0	
Missing	Not Applicable	31	26.5		
Total		117	100.0		

Question #7 Department Training Provided Prior to Entering the Field

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	61	52.1	70.9	70.9
	No	22	18.8	25.6	96.5
	Not Answered	3	2.6	3.5	100.0
	Total	86	73.5	100.0	
Missing	Not Applicable	31	26.5		
Total		117	100.0		

Question #8 Yearly Training Required

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	50	42.7	58.1	58.1
	No	34	29.1	39.5	97.7
	Not Answered	2	1.7	2.3	100.0
	Total	86	73.5	100.0	
Missing	Not Applicable	31	26.5		
Total		117	100.0		

Question #8.a. Is it the Same as Department Training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	25	21.4	29.1	29.1
	No	24	20.5	27.9	57.0
	Not Answered	37	31.6	43.0	100.0
	Total	86	73.5	100.0	
Missing	Not Applicable	31	26.5		
Total		117	100.0		

Question #8.b. Any Required Routine Training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	11.1	15.1	15.1
	No	20	17.1	23.3	38.4
	Not Answered	53	45.3	61.6	100.0
	Total	86	73.5	100.0	
Missing	Not Applicable	31	26.5		
Total		117	100.0		

Question #9 Outside Training Encouraged

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	84	71.8	97.7	97.7
	No	1	.9	1.2	98.8
	Not Answered	1	.9	1.2	100.0
	Total	86	73.5	100.0	
Missing	Not Applicable	31	26.5		
Total		117	100.0		

Question #9.a. Outside Training Required

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	16.2	22.1	22.1
	No	58	49.6	67.4	89.5
	Not Answered	9	7.7	10.5	100.0
	Total	86	73.5	100.0	
Missing	Not Applicable	31	26.5		
Total		117	100.0		

Question #10 Department Funding for Outside Training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	74	63.2	86.0	86.0
	No	8	6.8	9.3	95.3
	Not Answered	4	3.4	4.7	100.0
	Total	86	73.5	100.0	
Missing	Not Applicable	31	26.5		
Total		117	100.0		

Question #11 Forensic Training Areas

Azimuth Baseline Mapping

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	32	27.4	37.6	37.6
	No	53	45.3	62.4	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

Ballistics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	43	36.8	50.6	50.6
	No	42	35.9	49.4	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

Bloodstain Pattern Analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	74	63.2	87.1	87.1
	No	11	9.4	12.9	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

CODIS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	28	23.9	32.9	32.9
	No	57	48.7	67.1	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

Crime Scene Mapping

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	64	54.7	75.3	75.3
	No	21	17.9	24.7	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

DNA Recovery

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	72	61.5	84.7	84.7
	No	13	11.1	15.3	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

Fingerprint Analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	64	54.7	75.3	75.3
	No	21	17.9	24.7	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

Forensic Anthropology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	22	18.8	25.9	25.9
	No	63	53.8	74.1	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

Forensic Botany

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	5.1	7.1	7.1
	No	79	67.5	92.9	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

Forensic Entomology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	30	25.6	35.3	35.3
	No	55	47.0	64.7	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

Forensic Odontology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	6.0	8.2	8.2
	No	78	66.7	91.8	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

GIS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	11.1	15.3	15.3
	No	72	61.5	84.7	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

Toolmark Identification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	34	29.1	40.0	40.0
	No	51	43.6	60.0	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

Total Station Mapping

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	41	35.0	48.2	48.2
	No	44	37.6	51.8	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

Trace Evidence Collection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	71	60.7	83.5	83.5
	No	14	12.0	16.5	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

Zooarchaeology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	2.6	3.5	3.5
	No	82	70.1	96.5	100.0
	Total	85	72.6	100.0	
Missing	Not Applicable	32	27.4		
Total		117	100.0		

Question #12 Utilization of Outside Assistance for Forensic Training Areas

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	78	66.7	90.7	90.7
	No'	6	5.1	7.0	97.7
	Not Answered	2	1.7	2.3	100.0
	Total	86	73.5	100.0	
Missing	Not Applicable	31	26.5		
Total		117	100.0		

Question #13 Differentiation Between Sworn and Civilian Training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	17.1	23.3	23.3
	No	35	29.9	40.7	64.0
	Not Answered	31	26.5	36.0	100.0
	Total	86	73.5	100.0	
Missing	Not Applicable	31	26.5		
Total		117	100.0		

Question #14 National Certification Encouraged

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	56	47.9	65.1	65.1
	No	26	22.2	30.2	95.3
	Not Answered	4	3.4	4.7	100.0
Total		86	73.5	100.0	
Missing	Not Applicable	31	26.5		
Total		117	100.0		

Question #14.s. National Certification Required

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	6.0	8.1	8.1
	No	79	67.5	91.9	100.0
	Total	86	73.5	100.0	
Missing	Not Applicable	31	26.5		
Total		117	100.0		

Appendix F

Outside Training Programs Reported from Question #9.b.

American Academy of Forensic Science (AAFS) Conferences
Bevel, Gardner & Associates Forensic Training
Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF)
California Association of Criminalists (CAC) Conferences
California Criminalistics Institute
California State University, Long Beach
Davis Applied Technology College
Drug Enforcement Administration (DEA) Seminars and Workshops
Erie County Statewide Automated Biometric Identification System (SABIS)
Federal Bureau of Investigation (FBI) Academy
Florida Department of Law Enforcement
Florida Division of the International Association for Identification (FDIAI) Conferences
Henry Lee Institute of Forensic Science
Institute of Criminal Investigation (ICI)
International Association of Arson Investigators (IAAI) Fire/Arson Investigation
International Association of Bloodstain Pattern Analysts (IABPA) Conferences
International Association of Coroners and Medical Examiners (IACME) Conferences
International Association of Forensic Sciences (IAFS) Conferences
International Association for Identification (IAI) Conferences
Jacksonville State University Forensics Training
Kentucky Criminalistics Academy
Louisiana Association of Forensic Scientists (LAFS) Conferences
Midwest Forensics Resource Center (MFRC) at Iowa State University
Midwestern Association of Forensic Scientists (MAFS) Conferences
National Crime Investigation and Training
National Institute of Justice
National Forensics Academy
Nebraska Division of the International Association for Identification (NDIAI)
Conferences
Ron Smith & Associates Forensic Training
Southern Association of Forensic Scientists (SAFS) Workshops
St. Louis University School of Medicine
St. Petersburg College
Texas Forensic Science Academy
University of Louisville Southern Police Institute
University of South Florida C.A. Pound Human Identification Laboratory
University of Tennessee Forensic Anthropology Center and Anthropological Research
Facility
Virginia Forensic Science Academy
Wisconsin Association for Identification (WAI) Conferences

Appendix G

Certifications Reported from Question 14.b.

Association of Firearm and Toolmark Examiners (AFTE)
Association of Forensic Quality Assurance Managers (AFQAM)
American Board of Criminalistics
American Board of Medicolegal Death Investigators (ABMDI)
EnCase Certified Examiner (EnCE) for Computer Forensics
Federal Bureau of Investigation (FBI) Certified Latent Print Examiner
FBI Integrated Automated Fingerprint Identification Specialist (AFIS)
Florida Division of the International Association for Identification (FDIAI)
International Association for Arson Investigators (IAAI)
International Association for Identification (IAI)
 -Certified Bloodstain Pattern Analyst
 -Certified Crime Scene Analyst
 -Certified Crime Scene Investigator
 -Certified Latent Print Examiner
 -Certified Senior Crime Scene Analyst
 -Certified Forensic Photographer
Law Enforcement & Emergency Services (LEES)
 -Certified Forensic Video Analyst
National Fire Protection Association (NFPA)
 -Certified Fire Plan Examiner
Society of Forensic Anthropologists (SOFA)
Society of Forensic Toxicologists (SOFT)

Appendix H

Survey and Interview Responses with Analysis

X-1. X-1 serves a population of 31,000, does not have a specialized forensic unit, and encounters forensic-related crime on an occasional basis. For any type of forensic investigation, a Case Detective is assigned. They utilize outside assistance for forensic investigation, including the State Police laboratory and another department located within the state. X-1 does perform processing that could be considered a laboratory function, and provides specific training in forensic investigation to those involved with evidence processing. At the time of the interview, no one inside of the department held a national certification in forensic investigation.

During the interview, X-1 stated that forensic evidence was of utmost importance to a forensic investigation. Additionally, they believe that for their department, the most important pieces of evidence to recover during an investigation are latent prints and blood. Questions #4 through #6 were given the highest rating, indicating that the department believes that documentation, mapping, scene preservation, evidence preservation, and chain of custody is essential to an investigation. X-1 is in favor of sending investigators to learn enhanced techniques that would assist in the aforementioned areas, as it would reset the standards and raise the bar for forensic investigation as a whole. They stated that they believe the area needing the most attention in forensic investigation is the turnaround time on DNA analysis. X-1 is in favor of a cross-discipline approach, believing it to be beneficial as it would open up the view on forensic investigation as a whole. Finally, while X-1 is in favor of large-scale uniform standards in forensic investigation on the state level, they believe such standards would be hard to implement on a federal level.

X-2. X-2 serves a population of 709,264 and maintains a specialized forensic unit with a set policy on the standards and/or best practices on investigative processes in the field. The unit requires that an individual hold an Associate's Degree or Certificate in a science-related field to be hired, but prefers that they hold at least a Bachelor's degree in a science-related field. At the time of the interview, the member of X-2 being interviewed did not have knowledge of how many degrees and of what type were held by members of the unit or if any of those members had a degree in an anthropological field.

Prior to entering the field, members do not undergo specific training, but training is performed while on the job (field training phase), and members are required to attend either the National Forensic Academy or the State Criminalistics Academy within their first year of being hired. However, members are not required to attend yearly training, though are encouraged to do so. Members of the unit are encouraged to attend outside training, but it is not a requirement, with the exception of the training programs mentioned above. Training programs attended by members of the unit include short-courses at the University of Tennessee-Knoxville's Forensic Anthropology Center and Anthropological Research Facility; National Institute of Justice; Federal Bureau of Investigation; Bureau of Alcohol, Tobacco, Firearms and Explosives; and the Department of Justice. Members of the unit are encouraged to have over 400 hours of training. Outside training programs are paid for by the department if funding is available, though the majority of the time it is an out-of-pocket expense.

Members of X-2 have received training in the following areas: azimuth/baseline mapping, ballistics, bloodstain pattern analysis, crime scene mapping, DNA recovery, fingerprint analysis, forensic anthropology, forensic botany, forensic entomology, geographic information systems (GIS), total station mapping, and trace evidence

collection. Members have not received training in the Combined DNA Index System (CODIS), forensic odontology, toolmark identification, or zooarchaeology. Outside assistance is utilized to complete the above, including a traffic unit, State Police laboratory, and the state Medical Examiner. Within the unit, there is a differentiation between criminal investigative training received by sworn and civilian members; in addition to required training, sworn members are required to complete training in first response and securing the crime scene. X-2 does not currently require their members to hold national certification, though they are encouraged to do so. Types of certifications held by the unit include International Association for Identification (IAI) Crime Scene certifications and IAI Latent Print Certification. Chain of command primarily places sworn members at a higher level than the forensic technicians.

Responses to the interview placed a high importance on forensic evidence, with the unit considering DNA and firearms as the most important evidence to recover in regards to the types of crimes they encounter most often. The majority of members in the unit are familiar with forensic anthropological field methods. For questions #4 through #6 the highest rating was given, indicating that this unit believes documentation, mapping, scene preservation, evidence preservation, and chain of custody to be extremely important to a forensic investigation. X-2 is in favor of sending investigators to learn enhanced techniques that would assist in the aforementioned areas, stating that keeping up with current technology is very important. Lack of manpower was mentioned as the area most lacking in forensic investigation as a whole. X-2 is also in favor of a cross-discipline approach; however, X-2 stated that it was case-dependent. While X-2 is in favor of large-scale uniform standards in forensic investigation on the state and national level, they believe that different guidelines between the state and federal standards would

be necessary due to regional and environmental differences.

X-3. X-3 serves a population of 250,000 and maintains a specialized forensic unit with a set policy on the standards and/or best practices on investigative processes in the field. X-3 requires a High School Diploma/GED in their hiring practices, preferring that an individual hold at least a Bachelor's Degree. Seven members of the unit currently hold Bachelor's Degrees, with one member also holding a Master's Degree and another a Doctoral Degree. No one possessing a degree within the unit holds that degree in an anthropological field.

Members are required to attend specific training provided by the department prior to entering the field, and are thereafter required to attend yearly training which is different from than that initially provided by the department. Members are both encouraged and required to attend outside training. Training programs attended by members of the unit include the State Criminalistics Academy (both basic and advanced) and courses involving fingerprint examination, digital photography, trace evidence, and DNA. This outside training is funded by the department. Members of X-3 have received training in the following areas: azimuth/baseline mapping, bloodstain pattern analysis, CODIS, crime scene mapping, DNA recovery, fingerprint analysis, GIS, toolmark identification, total station mapping, and trace evidence collection. Members have not received training in ballistics, forensic anthropology, forensic botany, forensic entomology, forensic odontology, or zooarchaeology. Outside assistance from other agencies in the above areas comes from the Coroner and the state Medical Examiner. Within the unit, no differentiation exists between the training received by sworn officers as opposed to civilian members. While members of X-3 are encouraged to have national certification, it is not required; types of certifications held by members of the unit include

IAI Latent Print Certification, IAI Certified Crime Scene Analyst, and IAI Forensic Video Certification. Chain of command primarily places sworn members at a higher level than the forensic technicians.

Interview responses placed high value on forensic evidence, with X-3 believing DNA to be the most important piece of forensic evidence to recover in regards to the types of crime they encounter most often. Members of the unit are adequately familiar with forensic anthropological field methods. For questions #4 through #6 the highest rating was given, indicating that this unit believes documentation, mapping, scene preservation, evidence preservation, and chain of custody to be extremely important to a forensic investigation. X-3 is in favor of sending their members to receive training that could enhance techniques utilized in the aforementioned areas, stating that proper training is necessary and useful, particularly in a court-type situation. When asked what the most important problem is in forensic investigation as a whole, X-3 responded that the speed of good DNA analysis needs improvement. They are in favor of employing a cross-discipline approach, as it would bring in knowledge from different experiences. X-3 is in favor of large-scale uniform standards for forensic investigation on both the state and federal level.

Y-1. Y-1 serves a population of 35,000 and maintains a specialized forensic unit with a set policy on standards and/or best practices in the field currently in place. Y-1 requires and prefers a High School Diploma/GED in their hiring practices. One member of the unit currently holds an Associate's Degree or Certificate and another holds a Bachelor's Degree, though neither is in an anthropological field. Prior to entering the field members undergo specific training provided by the department and are required to attend yearly training thereafter, with this subsequent training being different than the

original training administered. Members of the unit are encouraged to attend outside training, though they are not required to do so. Outside training attended by members of the department is at their discretion, and typically includes advanced training in standard techniques of forensic investigation. This outside training is funded by the department.

Members of Y-1 have received training in the following areas: azimuth/baseline mapping, ballistics, bloodstain pattern analysis, CODIS, crime scene mapping, DNA recovery, fingerprint analysis, forensic anthropology, forensic botany, forensic entomology, forensic odontology, toolmark identification, total station mapping, and trace evidence collection. Members have not received training in GIS or zooarchaeology. To accomplish the above, outside assistance is utilized; the State Police, a nearby university, and the Medical Examiner are approached for this assistance. Within the unit, there is a differentiation between the sworn and civilian training, but their training overall is very similar. Members of Y-1 are somewhat encouraged to have national certification, though they must pay for it themselves, and therefore are not required to have it. No one in the unit currently holds any type of national certification. Chain of command primarily places sworn members at a higher level than the forensic technicians.

Responses in the interview placed high value on forensic evidence; Y-1 maintained that everything was important; when asked to pick a specific piece of evidence that they would place higher value on in regards to crimes they most often encounter, they identified latent prints. Members are not familiar with forensic anthropological field methods. For questions #4 through #6 the highest rating was given, indicating that this unit believes documentation, mapping, scene preservation, evidence preservation, and chain of custody to be extremely important to a forensic investigation. Y-1 is in favor of sending their members to training that could enhance those techniques,

stating that it is important to do the best they can possibly do in an investigation. When asked what is most lacking today in forensic investigation as a whole, they identified the lack of money for equipment and training as a serious concern. Y-1 is in favor of utilizing a cross-discipline approach, stating that better results come from more knowledge and when everyone is working together. While they were in favor of large-scale uniform standards on a state and federal level, stating that it could lead to better results, it was said they would be hesitant unless the people developing the standards were knowledgeable about criminal and forensic investigation.

Y-2. Y-2 serves a population of 45,000, does not have a specialized forensic unit, and encounters forensic-related crime on an occasional to rare basis. Within the department, the Detectives Division is responsible for handling forensic-related crime. Outside assistance through the Medical Examiner and the State Police are utilized for forensic investigation. The State Police is used primarily for scene reconstruction, though the department is working on becoming independent in that area. Y-2 used to perform processing that could be considered a laboratory function, but has since transferred that responsibility to the State Police Laboratory. Members of the department involved with forensic evidence undergo specific training regarding the techniques and practices of forensic evidence collection, including courses offered by the Southern Police Institute at the University of Louisville, Kentucky and courses offered through the Public Agency Training Council. At the time of the interview, no one inside of the department held a national certification in forensic investigation.

During the interview, Y-2 indicated that forensic evidence was of the utmost importance to forensic investigation. Considering the types of crime they encounter most often, they stated that the most important piece of evidence to recover was DNA.

Members of the department were not familiar with forensic anthropological field methods. For questions #4 through #6 the highest rating was given, indicating that this unit believes documentation, mapping, scene preservation, evidence preservation, and chain of custody to be extremely important to a forensic investigation. Y-2 is in favor of sending their members to training that could enhance techniques utilized for the above, stating that there is always room for improvement. When asked what they thought was most lacking in forensic investigation as a whole, they responded that there was a serious deficit in training and education funding. Members are in favor of a cross-discipline approach, believing that it would be beneficial. Y-2 is in favor of large-scale uniform standards on a state and federal level, stating that uniformity makes investigation better as a whole.

Y-3. Y-3 serves a population of 23,000 and is a special case in the sample; while Y-3 does not maintain a “named” forensic unit, select members of its Detectives Division are extensively trained in forensic investigation and handle forensic-related crimes in the same way as those departments that contain “named” units. Due to this distinction, they were interviewed in the same manner as those departments containing “named” units. A set policy is in place regarding standards and/or best practices in the field. While a High School Diploma/GED is required in hiring practices, an Associate’s Degree or Certificate and above is preferred. All members conducting forensic investigations hold a Bachelor’s Degree, though neither degree is in an anthropological field. Members undergo specific training provided by the department prior to entering the field, and are required to attend yearly training thereafter, though this training is not as detailed as the original training received. Y-3 requires its members to attend outside training; programs mentioned included courses offered by the Southern Police Institute at the University of Louisville,

Kentucky, training offered by the State Police, and other various training courses in areas pertaining to forensic investigation. This outside training is funded by the department.

Members of Y-3 have received training in the following areas: azimuth/baseline mapping, bloodstain pattern analysis, CODIS, crime scene mapping, DNA recovery, GIS, toolmark identification, and trace evidence collection. Members have not received training in ballistics, fingerprint analysis, forensic anthropology, forensic botany, forensic entomology, forensic odontology, total station mapping, or zooarchaeology. Outside assistance is utilized in accomplishing the above; specifically, the State Police was mentioned as assisting when Ground Penetrating Radar is found to be necessary within an investigation. There is no differentiation between training received by sworn officers and civilians, as all forensic investigators are sworn. Members are neither encouraged nor required to have national certification. Chain of command consists entirely of sworn members.

Responses in the interview placed high importance on forensic evidence, with Y-3 believing DNA to be the most important piece of evidence recovered in regards to the types of crime they encounter most often. Members conducting investigations possess some knowledge of forensic anthropological field methods. For questions #4 through #6 the highest rating was given, indicating that this unit believes documentation, mapping, scene preservation, evidence preservation, and chain of custody to be extremely important to a forensic investigation. Y-3 is in favor of sending its members to training that could enhance the techniques mentioned, stating that continual improvement is always important. When asked what is most lacking in forensic investigation as a whole, they responded with technology, specifically DNA analysis, citing the turnaround times for valid results. Y-3 is in favor of a cross-discipline approach, as different approaches

can sometimes be better than others. Regarding the implementation of large-scale uniform standards on a state and federal level, while they are in favor of the idea because it would result in structure, they would need to be developed in a way that certain modifications could be made on a case-by-case basis.

Y-4. Y-4 serves a population of 1,400,000 and maintains a specialized forensic unit; as they also house an accredited laboratory, they have a strict policy regarding the standards and/or best practices. Within their hiring practices, a Bachelor's Degree in a science-related field is required of forensic evidence technicians and crime scene investigators, while a Master's Degree is required for the more specialized technicians (including DNA, toxicology, firearms, latent print, document examiners, drug chemists, trace evidence, and arson analysis). Preferred education is a Master's Degree or Doctoral degree in a science-related field for all positions. Inside of the department, 33 members hold Bachelor's Degrees, 16 hold Master's Degrees, and 4 hold Doctoral Degrees, though none inside the unit hold a degree in an anthropological field.

Members of the unit undergo specific training provided by the department prior to entering the field, and are required to attend yearly training thereafter. This training is either advanced training of what they were previously provided or supplemental training in other fields. Y-4 highly encourages its members to attend outside training, including the American Academy of Forensic Sciences, Midwestern Association of Forensic Scientists, National Institute of Justice, and the Midwestern Forensic Resource Center at Iowa State University. Additionally, those who are involved with DNA are required to attend outside training to maintain the laboratory's accreditation. Department funding for outside training, however, is dependent on the unit's budget and ability to obtain grants.

Members of Y-4 have received training in the following areas: azimuth/baseline

mapping, ballistics, bloodstain pattern analysis, CODIS, crime scene mapping, DNA recovery, fingerprint analysis, forensic anthropology, forensic botany, forensic entomology, forensic odontology, toolmark identification, total station mapping, and trace evidence collection. Members have not received training in GIS or zooarchaeology. Multiple agencies are utilized for outside assistance, including a nearby university, Dental School, United States Food and Drug Administration, Medical Examiner, Bureau of Alcohol, Tobacco, Firearms and Explosives, United States Drug Enforcement Administration, Federal Bureau of Investigation, Homeland Security, State Police, Local Fire Departments, and independent laboratories for DNA backlog. There is no differentiation between training received by sworn and civilian members, as all members of the unit are civilian. Members are encouraged to have national certification, with processing in place to soon make it a requirement. Certifications held include IAI Latent Print Certification, Association of Forensic Quality Assurance Managers, and the American Board of Criminalistics (includes generalist as well as specialists). Chain of Command follows through three levels of civilian members before going primarily towards sworn members.

During the interview, Y-4 indicated that forensic evidence was the most important aspect of a forensic investigation, stating that the most important piece of forensic evidence to recover was extremely case-dependent; however, within the context of crime encountered most often by their unit, firearms were reported as most important. Members of the unit are very knowledgeable in forensic anthropological field methods. For questions #4 through #6 the highest rating was given, indicating that this unit believes documentation, mapping, scene preservation, evidence preservation, and chain of custody to be extremely important to a forensic investigation. Y-4 is in favor of sending members

to training that could enhance techniques utilized in the above in order to obtain the highest quality of evidence possible. When asked what is most lacking in forensic investigation as a whole, it was stated that the lack of communication between all those involved in investigation and analysis is one of the biggest issues facing the forensic community. They do believe that a cross-discipline approach could be beneficial, as it is important for investigators to be generalists, but maintain that it is still important to hold a specialization in one area. Y-4 is in favor of implementing large-scale uniform standards on a state and federal level, as it would be very useful when a case is headed to court.

Z-1. Z-1 serves a population of 185,000 and maintains a specialized forensic unit with a set policy on standards and/or best practices currently in place. In their hiring practices, while a High School Diploma/GED is required, a Bachelor's Degree is preferred. Currently, four members hold a Bachelor's Degree and 1 holds a Master's Degree. One of the degree holders has a minor in Anthropology. Prior to entering the field, members of the unit undergo specific training provided by the department, and are required to attend yearly training thereafter, which is different than the training originally administered. Outside training is encouraged, though not required (except for promotions); members have attended training programs such as the National Forensics Academy and have completed various courses in bloodspatter analysis, firearms identification, fingerprint analysis, ballistics, and polygraphs. This training is funded by the department.

Members of Z-1 have received training in the following areas: azimuth/baseline mapping, ballistics, bloodstain pattern analysis, crime scene mapping, DNA recovery, fingerprint analysis, forensic anthropology, forensic entomology, toolmark identification,

total station mapping, and trace evidence collection. Members have not had training in CODIS, forensic botany, forensic odontology, GIS, or zooarchaeology; however, Z-1 did state that its members possess basic level knowledge on all of these areas. Outside assistance utilized to help accomplish the above include the State Bureau of Investigation, Accident Reconstruction Unit, and a nearby university. No differentiation exists between the training received by sworn and civilian members of the unit. Members are encouraged to obtain national certification, though they are not required to do so (except for promotions). Four members of the unit hold IAI certification, in areas such as latent print and forensic photography. Chain of Command primarily places sworn members at a higher level than the forensic technicians.

Responses to the interview placed a high value on forensic evidence; when asked which piece of evidence was most important, they responded that it is case-dependent, but identified latent fingerprints in regards to the types of crime most often encountered by the department. Members are very knowledgeable in forensic anthropological field methods. For questions #4 through #6 the highest rating was given, indicating that this unit believes documentation, mapping, scene preservation, evidence preservation, and chain of custody to be extremely important to a forensic investigation. Z-1 is in favor of sending its members to receiving training that could enhance the techniques utilized for the above, stating that having more knowledge can elevate the investigator to the level of “expert”, with greater proficiencies and better techniques. When asked what is most lacking in forensic investigation as a whole, Z-1 responded that it was the role of non-crime scene investigators and their impact on the forensic evidence and response to the scene. Z-1 is in favor of a cross-discipline approach, stating that understanding (though not necessarily expertise) in multiple disciplines is important in order to correctly

preserve evidence and know who to call for recovery and/or analysis. Z-1 is also in favor of large-scale uniform standards on the state and federal level, as without standards work cannot be performed as best as it can; however, these standards would need to be attainable and based in credible science.

Z-2. Z-2 serves a population of 619,626 and maintains a specialized forensics unit with a current policy on the standards and/or best practices on investigative processes in the field. Their hiring practices require an Associate's Degree or Certificate in a forensic discipline or hard science, though a Bachelor's Degree is preferred. Six civilians within the unit possess Bachelor's Degrees, with one holding a Master's Degree; none of these degrees are in an anthropological field. Training is provided by the department prior to members entering the field and followed by monthly training thereafter; this additional training is similar to that which was previously administered. Members are encouraged to attend outside training, though they are not required to do so; the National Forensics Academy was specifically mentioned though it was stated that they look at whatever is available. Outside training is funded by the department.

Members of Z-2 have received training in the following areas: ballistics, bloodstain pattern analysis, crime scene mapping, DNA recovery, and trace evidence collection. Members have not received training in azimuth/baseline mapping, CODIS, fingerprint analysis, forensic anthropology, forensic botany, forensic entomology, forensic odontology, GIS, toolmark identification, total station mapping, or zooarchaeology. Outside assistance utilized in the above include a nearby university, Bureau of Alcohol, Tobacco, Firearms and Explosives, a specialized fingerprint analysis unit, Medical Examiner, and Private Investigators. There is no training differentiation between sworn and civilian members of the unit. While members are encouraged to

obtain national certification, they are not required to; some members of the unit hold various IAI certifications. Chain of command primarily places sworn members at a higher level than the forensic technicians.

During the interview, Z-2 indicated that forensic evidence was of the utmost importance, stating that fingerprints were the most important piece of forensic evidence to recover in regards to the types of crime they encounter most often. Members of the unit are moderately knowledgeable in forensic anthropological field methods.

Documentation and mapping at the scene of a forensic investigation was indicated to be important, but not extremely so. For questions #5 and #6 the highest rating was given, indicating that this unit believes scene preservation, evidence preservation, and chain of custody to be extremely important to a forensic investigation. Z-2 is in favor of sending their members to training that could enhance the techniques utilized for the above, stating that it is important to broaden skill sets and abilities. When asked what was most lacking in forensic investigation as a whole, they responded that it was the lack of communication between the sub-specialties in the forensic disciplines. They believe that a cross-discipline approach could be beneficial, as it allows investigators to become generalists and increases efficiency. Z-2 is also in favor of large-scale uniform standards on the state and federal level, stating that it puts everyone on equal footing.

Z-3. Z-3 serves a population of 700,000, maintains a specialized forensic unit, and a set policy on standards and/or best practices on investigative processes in the field is in place. A High School Diploma/GED is required in their hiring practices, and a preferred educational level was not identified. Inside of the unit, 15 members hold educational degrees; none of those degrees are in an anthropological field. Members undergo specific training provided by the department prior to entering the field, with yearly training

required thereafter; this training may or may not be similar to the training previously administered. Z-3 encourages its members to attend outside training, though they are not required to do so. Members have attended outside training in areas such as bloodstain analysis, shooting reconstruction, 3-D laser imaging, and crime scene reconstruction. Funding for outside training is occasionally available, but the majority of the time it is an out-of-pocket expense.

Members of Z-3 have received training in the following areas: azimuth/baseline mapping, bloodstain pattern analysis, crime scene mapping, DNA recovery, fingerprint analysis, and trace evidence collection. Members have not received training in ballistics, CODIS, forensic anthropology, forensic botany, forensic entomology, forensic odontology, GIS, toolmark identification, total station mapping, or zooarchaeology. Outside assistance is utilized to accomplish the above, with the Medical Examiner and State Bureau of Investigation specifically named. Within the unit, there is a differentiation in training received by sworn and civilian members, as sworn members are required to attend a 56 hour crime scene investigation class. Members of the unit are neither encouraged nor required to have national certification, though multiple civilians in the unit are FBI Certified Latent Print Examiners. Chain of command only involved sworn members, as civilians do not conduct investigations in the field.

Responses to the interview placed a high value on the importance of forensic evidence, with Z-3 stating that latent prints are the most important piece of evidence to recover in regards to the types of crime they most often encounter. Members of the unit are not knowledgeable in forensic anthropological field methods, though they are aware of them. For questions #4 through #6 the highest rating was given, indicating that this unit believes documentation, mapping, scene preservation, evidence preservation, and

chain of custody to be extremely important to a forensic investigation. Z-3 is in favor of sending their members to training that could enhance techniques utilized to accomplishing the above. When asked what is most lacking in forensic investigation as a whole, absence of equipment and funding for equipment was identified. They believe a cross-discipline approach could be beneficial, as multiple inputs could lead to a better conclusion. Z-3 is in favor of large-scale uniform standards on a state and federal level, stating that it would require the same expectations of what should be done at every scene, regardless of who works it.

Overall analysis. Comparisons were made within and between each state to observe similarities and differences between those departments containing specialized forensic units. Focus was placed on those responses dealing with standards, education, and general training.

State X. Both departments in the state containing forensic units maintain a set policy on the standards and/or best practices on investigative processes in the field. X-2 has a higher educational requirement (Associate's) in hiring practices than X-3 (High School Diploma/GED), though both units prefer a Bachelor's Degree. Neither department has a unit member who holds an anthropologically related degree. While X-3 sends their members to specific training prior to entering the field, X-2 provides on the job training. X-2 does not require yearly training, though members are required to attend training routinely; X-3 requires yearly training that is different than the training originally administered. Both departments encourage members of their unit to attend outside training. X-2 does not require outside training per se, but unit members must attend the National Forensics Academy or State Criminalistics Academy as a complement to their field training, preferably within the first year. X-3 requires unit members to attend

outside training. While X-3 provides departmental funding for this outside training, X-2 does not. Members of X-2's unit have received training in 12 of the 16 training areas mentioned; X-3's members have received training in 10 of the 16 training areas. Both X-2 and X-3 encourage national certification for their unit members but do not require it.

Overall, State X's regional sample fits the national baseline reading for policy regarding standards, possession of anthropological degrees, yearly training that is similar to previously provided departmental training, encouragement of outside training, and encouragement/requirement of national certification for unit members. State X is slightly above the baseline when looking at educational levels required and preferred and requirement of outside training. However, State X is slightly below the baseline for departmental training provided prior to entering the field, requirements on yearly training, and funding for outside training programs. Regarding the specific areas of forensic training, State X as a whole receives more training in areas that most units do not receive training in, as identified from the baseline readings.

State Y. All three departments within the state containing forensic units (or, in the case of Y-3, a forensic detective component) maintain a policy on the standards and/or best practices on investigative processes in the field. Y-4 has the highest educational requirement in their hiring practices at a Bachelor's or Master's (depending on position); both Y-1 and Y-3 require a High School Diploma/GED. Y-1 prefers a High School Diploma/GED, Y-3 prefers an Associate's degree or above, and Y-4 prefers a Master's or Doctoral degree (depending on position). None of the units have a member who holds an anthropologically related degree. All three units provide specific training to their members prior to entering the field; additionally, they all require their members to attend yearly training. For Y-1 and Y-3, this training is different from the prior training

received, and for Y-4 this training is enhanced and supplemental to their prior training. All three departments encourage their unit members to attend outside training, though only Y-3 and Y-4 require it. Y-1 and Y-3 provide funding through the department for these outside training programs, while funding for Y-4 is subject to budgets and grant awards. Members of Y-1 have received training in 15 of the 16 training areas mentioned; Y-3's members have received training in 8 of the 16 training areas; and Y-4's members have received training in 14 of the 16 training areas. Y-1 and Y-3 neither encourage nor require national certification. Y-4 greatly encourages national certification, and is in the process of making it a requirement.

State Y's regional sample fits the national baseline reading for policy regarding standards, possession of anthropological degrees, departmental training provided prior to entering the field, requirement of yearly training, encouragement of outside training, and requirement of national certification. State Y is slightly above the baseline on required and preferred educational levels, and requirement of outside training. State Y is slightly below the baseline of yearly training that is similar to previously provided department training, funding for outside training programs, and encouragement of national certification for its members. Regarding the specific areas of forensic training, State Y receives a much higher amount of training in areas that most units do not receive training in, as identified from the national baseline readings.

State Z. All departments within this sample contain a specialized forensic unit and maintain a policy on standards and/or best practices on investigative processes in the field. Z-1 and Z-3 require a High School Diploma/GED in their hiring practices, while Z-2 requires an Associate's degree. Z-1 and Z-2 prefer Bachelor's degrees, while Z-3 did not specify a preference. None of the units have a member who holds a degree in an

anthropologically related field, though Z-1 does have one member who has a minor in anthropology. All three departments provide training to unit members prior to entering the field and require yearly training thereafter. For Z-1, yearly training is not the same as the prior training administered, while Z-2 provides similar training. Z-3's yearly training is not always the same as the previously administered training. All three units encourage their members to attend outside training programs, though none require it. Z-1 and Z-2 provide funding necessary for these outside training programs; Z-3 occasionally provides funding, but most of the time they do not. Members of Z-1 have received training in 10 of the 16 training areas mentioned; Z-2's members have received training in 6 of the 16 training areas; and Z-3's members have received training in 6 of the 16 training areas. In regards to national certification, Z-1 and Z-2 encourage their members to hold certification but do not require it. Z-3 neither encourages nor requires national certification.

State Z's regional sample fits the national baseline reading for policy regarding standards, preferred educational levels, possession of anthropological degrees, departmental training provided prior to entering the field, requirement of yearly training, encouragement/requirement of outside training, and requirement of national certification. State Z is slightly above the baseline on required educational level and requirement of outside training. State Z is slightly below the baseline of yearly training that is similar to previously provided department training, funding for outside training programs, and encouragement of national certification for its members. Regarding the specific areas of forensic training, State Z generally receives training in the same areas that most units receive training in, as identified from the national baseline readings.

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Rausch, C. (forthcoming). Genocide. In W. Jennings (Ed.), *The Encyclopedia of Crime and Punishment*, (pp. tbd). Hoboken, NJ: Wiley-Blackwell.

Rausch, C. (forthcoming). Belle Gunness. In S. Chermak & F. Bailey (Eds.), *Crimes of the Centuries: An Encyclopedia of Notorious Crimes, Criminals, and Criminal Trials in American History*, (pp. tbd). Santa Barbara, CA: ABC-CLIO.

Keeling, D., Rausch, C., & Masterson, J. (forthcoming). International Policing. In W. Jennings (Ed.), *The Encyclopedia of Crime and Punishment*, (pp. tbd). Hoboken, NJ: Wiley-Blackwell.

PRESENTATIONS:

Rausch, C. (2014, February). *Genocide: Theories, prevention, & prosecution*. Panel chair, "Theoretical Explanations of Criminal Behavior"; research findings presented at the annual meeting of the Academy of Criminal Justice Sciences, Philadelphia, PA.

PROFESSIONAL SOCIETIES:

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AWARDS:

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