

# UNRESOLVED CASES

A Review of Protocols and Resources for  
Supporting Investigations Involving American Indians  
and Alaska Natives

*Bruce Budowle, PhD, Jeffrey Lindsey, PhD, B.J. Spamer, MFS*



**COPS**  
Community Oriented Policing Services  
U.S. Department of Justice



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# Letter from the Acting Director of the COPS Office

Colleagues:

Unresolved (or cold) cases—homicides and sexual assaults, long-term missing persons cases, and unidentified human remains—are an ongoing source of trauma to victims and survivors of violent crime. They also pose a challenge for law enforcement, whose resources of time, money, and expertise must often be directed to newer cases.

In American Indian and Alaska Native communities, these adverse effects are magnified by existing challenges—lack of law enforcement resources and victim and survivor services, and high rates of violent crime. The Missing or Murdered Indigenous Persons movement, a grassroots effort to draw attention and resources to violent crimes and disappearances in Indian Country, has led to a renewed focus on reinvestigating unresolved cases.

This publication draws together best practices and resources for local, state, and tribal law enforcement agencies reviewing and investigating unresolved cases, including sections on developing protocols, state and federal databases, DNA typing, fingerprint evidence, and forensic dentistry. These resources support the tasking of Executive Order 14053: Improving Public Safety and Criminal Justice for Native Americans and Addressing the Crisis of Missing or Murdered Indigenous People, regarding “Supporting Tribal and Other Non-Federal Law Enforcement Efforts to Prevent and Respond to Violence Against Native Americans,” to “. . .develop guidance, identify leading practices, and provide training and technical assistance.”

The COPS Office has long supported tribal law enforcement agencies through direct technical assistance and through the Tribal Resources Grant Program. We hope that this guidebook and the information in it will help enhance our support of tribal agencies as they work to resolve cold cases and work to improve the safety of their communities.

Sincerely,



Rob Chapman  
Acting Director  
Office of Community Oriented Policing Services



# Introduction

## Unresolved case investigations

Investigating cold cases involving acts of violence is one of law enforcement's more challenging tasks (Davis, Jensen, and Kitchens 2011; Buckley 2012; IACP 2016; NSA 2011). Unresolved homicide and sexual assault cases, as well as long-term missing persons and unidentified human remains, have a significant adverse impact on living victims, survivors, families, communities, and the law enforcement agencies responsible for the investigations. Despite this impact, resources for cold case investigations are extremely limited (Davis, Jensen, and Kitchens 2011; Moran 2021). Such limitations are especially relevant for American Indian and Alaska Native (AI/AN) communities, where a lack of law enforcement resources, and particularly of victim and survivor services, already lead to these communities being disproportionately affected by violent crime (Adcock 2021; IACP 2016; VoA 2021; Weyand and McPherson 2021).

The grassroots Missing or Murdered Indigenous Persons (MMIP) movement began as an effort to raise awareness of the rate at which AI/AN persons are victimized or go missing but quickly became a call to action to enhance reporting of cases, increase the use of existing resources, develop new resources to resolve these important cases, and develop educational and awareness initiatives to mitigate unresolved cases moving forward. All incidents of missing or murdered AI/AN persons should be reported and investigated to help prevent cases from remaining unresolved.

On November 26, 2019, Executive Order 13898 established the Presidential Task Force on Missing and Murdered American Indians and Alaska Natives, which later became known as Operation Lady Justice (OLJ) (White House 2019). Taskings in Executive Order 13898 included

- consultations with tribal governments to assess the scope and nature of the MMIP issue;
- developing model protocols, procedures, and best practices to support case investigations and data collection and sharing using existing criminal justice databases;
- establishing multidisciplinary, multijurisdictional teams to review cold cases.

Between January 2020 and December 2021, the task force

- conducted consultations and listening sessions with tribal leaders, community members, and others;
- formed working groups to develop model protocols and procedures, multidisciplinary cold case teams, education and outreach campaigns, training, comprehensive guides, and best practices;
- launched the OLJ website, which provides read-outs from events, FAQs, links to resources, information on tribal and state efforts, and reports from the task force ( <https://operationladyjustice.usdoj.gov/> ) (OLJ 2020b).

On November 15, 2021, Executive Order 14053, Improving Public Safety and Criminal Justice for Native Americans and Addressing the Crisis of Missing or Murdered Indigenous People, was signed to further address the MMIP issue. This Executive Order includes a section titled "Supporting Tribal and Other Non-Federal Law

Enforcement Efforts to Prevent and Respond to Violence Against Native Americans” that directs the development of guidance, identification of leading practices, and provision of training and technical assistance, to include the promotion and coordination of federal, state, local, and tribal law enforcement agencies (White House 2021). The order also directs the assessment of current DNA testing and DNA database use to identify missing or murdered indigenous persons and any parties responsible for their death.

This document supports these efforts to develop and share promising practices in addressing unresolved cases by providing investigative guidance on unresolved MMIP cases. However, the recommended investigative concepts and practices also can be applied effectively to other categories of unresolved violent crime cases, such as those involving sexual assault.

## Defining (and redefining) the term “cold case”

In the United States and Canada, there is no standard and accepted definition of what comprises a “cold case” (Buckley 2012; Davis, Jensen, and Kitchens 2011; NSA 2011; PERF 2018). Generally, the classification of a cold case is determined by the investigative agency (NSA 2011; Miami Police Department 2017). Less often, the definition of a cold case is written into a state statute (NSA 2011). The most common variable in cold case definitions is the absence of any additional probative investigative leads, which means a case could be deemed “cold” after only a few months of investigation (NIJ 2019; PERF 2018).

Cold cases are differentiated from long-term and complex investigations that still have some momentum and identified suspects or targets but are paused or slowed while awaiting a process or procedural step, such as a judicial proceeding or complete evidence analysis. Many large agencies have dedicated Cold Case Units primarily focused on crimes of violence (NIJ 2019;

Miami Police Department 2017; PERF 2018), and it is not uncommon among medium-sized and small agencies to have investigators assigned to work certain cold cases as their primary or collateral duty.

In addition to the challenges of defining what constitutes a cold case, the term itself is problematic (NSA 2011). Although it has passed into common parlance, both in the law enforcement field and among the public, the term was promulgated by the media largely for its emotional charge. For victims, survivors, families, impacted communities, and even law enforcement agencies themselves, the fact that a case has a “cold” designation brings with it non-empathetic, negative connotations (Moran 2021; NSA 2011). Unresolved crimes of violence, long-term missing persons, and unidentified human remains cases bring with them significant emotional trauma for everyone involved (Moran 2021). In addition, *cold* to many people implies the investigation has ceased. Within the realm of unresolved MMIP cases, investigators should keep in mind that long-term missing persons may be living victims of abduction or may have escaped family violence or left voluntarily.

Regardless of an investigative agency’s actual focus and efforts on a case, referring to a case as “cold” implies inaction and lack of concern. Within the U.S. Department of Justice (DOJ) and across the spectrum of U.S. law enforcement agencies and organizations, there have been efforts to modify the designation of these cases to better reflect the level of interest and effort they receive, as well as to address the message sent to victims, survivors, families, and communities. Herein, we recommend that “cold cases” be re-designated as *unresolved cases*. While “cold case” is widely used, the more accurate “unresolved” will better convey the state of a case and foster better relationships with victims, families, and the community. In this protocol review, the term “unresolved case” is used to describe a case that has reached an investigative stalemate with regard to actionable tips or leads, regardless of the passage of time.

# Investigation Protocols

## Refocusing on unresolved cases

### → *Why do cases remain unresolved?*

Cases remain unresolved for a variety of reasons. Major impediments to advancing unresolved cases toward solutions include the following:

- Lack of currently actionable leads or forensic evidence
- Investigator turnover
- Absence of witnesses
- Reluctance of witnesses to cooperate or testify
- Limitation of resources
- Incomplete understanding or use of existing resources

Of all these constraints on an agency's ability to dedicate effort to an unresolved case, lack of resources is perhaps the most significant—especially for tribal law enforcement agencies, which are often under-resourced in many areas (Adcock 2021; Davis, Jensen, and Kitchens 2011; Moran 2021). For agencies trying to make the most of limited resources, it is important to have an effective process in place to prioritize those unresolved cases with the highest potential to be solved.

## Locating, accounting for, and prioritizing unresolved cases

### → *Criteria for prioritizing and choosing cases for investigation*

### → *Conditions for devoting resources to a case*

### → *Creating an unresolved case matrix or checklist*

### → *Creating a priority scale based on solvability factors*

There is a general consensus that the decision to maintain a high level of investigative effort in an unresolved case should be made in a systematic and thoughtful manner (Adcock 2021; NIJ 2019; PERF 2018; NSA 2011). Even in situations where an investigative agency has the resources to support a full-time unresolved case unit, the agency has to invest those resources wisely to achieve the best chance of successfully concluding the case. Frequently, objective assessment can be difficult: a high-profile, high-impact case can generate stronger emotion and commitment than an older, lower-profile unresolved case, even when the older case may be more solvable as a result of recently emergent evidence, a new forensic science capability, or a fresh investigative lead. Thus, all cases, high-profile or not, should be assessed with standardized criteria based on the case's potential for being solved. When other pressures require focus on a high-profile case, the case should be triaged to determine whether new leads can be developed. Lower-profile cases are just as important as higher-profile ones to victims, families, and their communities. Prioritizing investigative efforts by means of solvability factors is consistently recommended by unresolved case investigation experts as a better way to manage the expectations of victims and their family members (Adcock 2021; Miami Police Department 2017; NIJ 2019; PERF 2018; NSA 2011).

The consistent and systematic triaging of unresolved cases in search of the best place to allocate additional investigative resources is highly recommended both as an important part of the investigative process and as a way to get the most out of scarce resources. Many unresolved case experts recommend the use of a solvability matrix or checklist to triage and prioritize cases, especially when an agency has multiple unresolved cases to consider (Adcock 2021; Miami Police Department 2017; NIJ 2019; PERF 2018; NSA 2011). As resources are likely to be even more limited for smaller

agencies (even if they have fewer unresolved cases), a solvability matrix can also be beneficial in more effectively focusing a more limited investigative capacity.

One important area to consider for enhancing efforts in an unresolved case is the existence of evidence, in particular DNA evidence, which was not tested initially (Adcock and Stein 2013; Miami Police Department 2017; NIJ 2019; PERF 2018). There are a number of reasons why evidence may not have been analyzed earlier in an investigation, including the following (Adcock and Stein 2013; Davis, Jensen, and Kitchens 2011; Moran 2021):

- The technology did not exist.
- Resources were not available to pursue analysis of the evidence earlier in the investigation.
- Investigators were not aware of the value of the evidence or of the contemporary technology and supporting investigative databases.
- The technology has advanced so that results may be obtained where not previously possible.

There is consistent emphasis in the literature that unresolved cases with testable evidence should be prioritized above those lacking testable evidence. Among others, the National Institute of Justice Cold Case Investigation Working Group (NIJCCIWG) (2019) offers several recommendations for evaluating and prioritizing the continued investigation of unresolved cases. In addition to recommendations to review unresolved cases through the prism of a solvability matrix, case reviewers with “fresh eyes”—that is, no prior connection to the case—can provide new insights, leads, and clues that could be critical to the successful resolution of the case. These fresh reviewers can be existing agency personnel or volunteers and can focus on the case in its entirety or on specific components of the case, such as collected evidence or interview transcripts.

The use of new forensic technologies or advancements should not lead to an overemphasis or overreliance on forensic evidence in an unresolved case. Consideration also should be given to non-forensic factors that may have changed with time or not been evident initially. For instance, in the time since the crime occurred, relationships between persons of interest and potential witnesses may have changed, prompting them to reveal information they were previously reluctant to share. Individuals involved in the case may have developed significant health conditions or may be experiencing guilt related to the crime, making them more likely to share information today. Similarly, the arrest of an individual involved with the case for another serious crime might lead to the opportunity to solicit confessions to other crimes during plea agreements. The passage of time inherent to unresolved cases can itself lead to the creation of new leads that could help solve the case.

### **Who should be part of an unresolved case team, even where there is no unresolved case unit?**

- ***Incorporating the team from the start of the project***
- ***Gaining buy-in from the team members***
- ***Establishing regular touchpoints with the team***
- ***Incorporating feedback from the team, stakeholders, families, friends, victims, and the public***

The vast majority of small law enforcement agencies in the United States do not have the resources to establish and operate a dedicated full-time unresolved case unit (NSA 2011). This lack of resources is the case for many tribal law enforcement agencies, which often face challenges carrying out basic functions such as primary patrol and public safety service missions. Nonetheless, most agencies should proactively look for routine

as well as innovative ways to acquire the necessary resources and staffing to investigate unresolved cases. Retired investigators are an invaluable resource. They tend to have substantial investigative experience, are dedicated to the work, and can bring a fresh set of eyes when reassessing or triaging cases. Many agencies have successfully implemented unresolved case projects using retired investigators as paid part-time consultants or unpaid volunteers. In an effort to increase participation of volunteers in MMIP cases, the DOJ's Office of Community Oriented Policing Services (COPS Office) is currently working with the International Association of Chiefs of Police (IACP) to deliver a training program for tribal authorities entitled *Introduction for Leadership: Volunteer Engagement for American Indian and Alaska Native Missing Persons Cases*. More information about this important initiative can be obtained from IACP's Collaborative Reform Initiative Technical Assistance Center (CRI-TAC) Program website (<https://www.theiacp.org/projects/collaborative-reform-initiative-technical-assistance-center-cri-tac>).

Even without a dedicated, full-time unresolved case unit, it is possible, with proper resourcing and leadership, to establish effective unresolved case teams. There is consistent guidance from unresolved case investigative experts on what combination of components constitutes a successful unresolved case team (NIJ 2019). Foremost is a highly capable primary investigator. Experienced investigators with a proven track record of success in solving violent and complex crimes are crucial to the success of any unresolved case investigation. In addition to being highly motivated to work unresolved cases, investigators should be culturally competent and empathetic and should bring to bear a trauma-informed mindset when interacting with victims, survivors, families, witnesses, and highly invested community members and organizations (Adcock 2021; Moran 2021; NIJ 2019; NSA 2011; Weyand and McPherson 2021). Even investigators with demonstrated effectiveness and years of experience can

benefit from training on new investigative techniques and interpersonal skills, such as better ways to engage victims, witnesses, and survivors (Davis, Jensen, and Kitchens 2011; Heurich and Haskins 2019; Moran 2021; NSA 2011; PERF 2018).

*“A trauma-informed approach begins with understanding the physical, social, and emotional impact of trauma on the individual, as well as on the professionals who help them” (OVC 2021). Such an approach can result in more effective interviews, increased cooperation of victims and witnesses, and the development of trauma-informed stories to assist juries in understanding the effects of trauma and evaluating evidence presented at trial.*

It is also important to gain support of prosecutors for each case being investigated (Adcock 2021; Davis, Jensen, and Kitchens 2011; Heurich and Haskins 2019; Miami Police Department 2017). Even if no one is ultimately charged or convicted for the crime being investigated, prosecutors on the tribal, local, state, or federal levels can provide extremely valuable strategic guidance and assistance in the investigative process, including subpoenas and other practical and moral support required to properly investigate a case. Prosecutors’ offices may also be able to provide additional analytical and victim and survivor assistance for the case; this benefit can be especially effective when an investigation crosses geographical and jurisdictional boundaries (NSA 2011; NIJ 2019; PERF 2018).

In unresolved cases that cross geographical and jurisdictional boundaries, investigating agencies should consider building an ad hoc team of investigators and partner agencies that can bring complementary points

of focus (NSA 2011). In addition to gaining investigative expertise and manpower, building an alliance with other dedicated experts may gain an agency access to resources and processes not originally available to it. Even external assistance that is singular in nature and related only to a specific aspect of the case can produce significant leads or breaks in the case.

When pursuing new or additional forensic analyses, it can be extremely beneficial to establish and maintain contact with the laboratories responsible for processing and analyzing evidence as well. Beyond simply conducting examinations, laboratories will likely be able to provide guidance on their most current testing capabilities, as well as potentially provide previously unconsidered resources and services, or point to other laboratories that may provide unique services not existing in local laboratories. Getting support from laboratory directors and examiners may help expedite examinations when time is critical (PERF 2018).

Unresolved case experts also recommend using the skills of properly vetted community volunteers, interns, academic experts, and victim or survivor advocates to enhance the investigation (Adcock 2021; Adcock and Stein 2013; NIJ 2019; PERF 2018; Weyand and McPherson 2021). In addition to providing specific expertise and insight and acting as force multipliers in an investigation, external stakeholders can free the primary investigator from ancillary responsibilities for the case, letting them give greater focus and energy to purely investigative steps (Adcock 2021; Heurich and Haskins 2019; PERF 2018; NIJ 2019). Even without formal standing agreements, building the most robust unresolved case investigative team possible for each case can substantially enhance the probability of successful case closure. More and diverse stakeholder involvement in an unresolved case can also produce more engagement from impacted communities, leading to insight and valuable suggestions and feedback for the investigators (Weyand and McPherson 2021).

## Tracking cases

→ *Selecting a case management system*

→ *Obtaining funding to support a case management system*

→ *Transferring paper records to an electronic tracking system*

Unless an agency has recently completely digitized, consolidated, and updated its records, information, and evidentiary management systems, its first step for prioritizing unresolved cases should be to consolidate all those cases' components into one digital or physical space (Adcock and Stein 2013; Heurich and Haskins 2019; Miami Police Department 2017; PERF 2018). It is not unusual, even in smaller agencies, for files and evidence associated with longer-term cases to be dispersed across multiple storage areas and different evidence rooms or perhaps even to be in the personal possession of a previous investigator assigned to that case (Adcock 2021). Even if an agency has only a few unresolved cases on which to focus, the consolidation, accounting, and tracking functions of electronic records management can substantially contribute to case selection and solvability.

Once these records have been consolidated, establishing a comprehensive searchable database or spreadsheet is a critical next step (Adcock 2021; Heurich and Haskins 2019; PERF 2018; NIJ 2019). A simple case tracking system can be implemented using a spreadsheet. At the beginning of an investigation, locating, consolidating, and thoroughly documenting and tracking case components can identify gaps in information, documents, and evidence that should be available and new investigative steps and opportunities that have arisen since the initial investigative efforts. As cases advance and time elapses, a robust and comprehensive case management system can provide current and

future investigators—and vetted stakeholders—with the ability to more quickly assess the status of a case and make better-informed decisions about investigative next steps and prioritization (NIJ 2019).

## Benefits of Developing Unresolved Case Protocols

Developing and instituting well-defined protocols for prioritizing and investigating unresolved cases can bring a number of benefits at every stage of the investigative process:

- **Improved workflow.** Clarifies assigned responsibilities and allows for more effective processing.
- **Established procedures.** Better ensure a positive outcome through standardized processes.
- **Transparency.** Improves investigators' awareness of scenarios, issues, and available resources that support continued investigation.
- **Cost benefits.** Equip an agency without resources to develop a dedicated unresolved case unit or team to create a roadmap and access additional support.
- **Consistency and sustainability.** Allows new personnel to pick up an investigation where it left off and maintains investigative efforts, including communicating with families and providing justice for victims.
- **Future-proofing.** Ensures effective handling of initial investigations to preserve evidence for future investigations and testing as technologies advance—today's hot cases could be tomorrow's unresolved cases.

## Develop a protocol for investigation

- *Casework criteria*
- *Triaging strategies*
- *Formalized procedures*
- *Team processing*
- *Securing support*
- *Funding resources*

Unresolved case investigative protocols can be general or specific; if specific, they can be tailored to the type of team or agency investigating, or the type of crime.

Multiple agencies offer excellent examples of unresolved case investigation protocols and guidelines that can be tailored and adapted for individual agencies and investigators in specific types of cases. One example can be found in the NIJ CCIWG, and other law-enforcement sensitive examples can be obtained directly from the Bureau of Indian Affairs – Office of Justice Services (BIA-OJS) and the Federal Bureau of Investigation (FBI). Investigative agencies should request the BIA’s law enforcement sensitive protocol document by contacting the BIA Missing and Murdered Unit at 833-560-2065 or [mmu@bia.gov](mailto:mmu@bia.gov). In addition, there are several accessible protocol exemplars on subjects ranging from establishing a unit (NIJ 2019) to investigating a specific type of crime (Miami Police Department 2017). Some law enforcement agencies may prefer an approach more adapted to their unique circumstances instead of a more generalized “one size fits all” unresolved case investigative protocol (Weyand and McPherson 2021). Regardless, a well-reasoned plan of action has proven to be a vital component in successfully concluded unresolved cases. Agencies should assess the aforementioned resources to assist them in building relevant protocols for case selection and solvability.

Whether an agency adopts and tailors an existing unresolved case investigation protocol, develops its own, or a combination of both, a defined protocol is a critical component of effective unresolved case investigation (Heurich and Haskins 2019; NIJ 2019; NSA 2011; PERF 2018). Such a protocol is important even if an agency has only one full- or part-time investigator devoted to unresolved cases. Serving as more than just formal checklists, well-reasoned and evidence-based protocols generate substantial benefits for both agencies and investigators, helping investigators and prosecutors cover all investigative and prosecutorial bases and demonstrating to external stakeholders a high level of professionalism and commitment (IACP 2016; NSA 2011; PERF 2018). This demonstration of commitment can increase stakeholder confidence in the agency’s investigative efforts by signaling to victims, survivors, families, and community members that the agency fully appreciates its responsibilities to bring about justice and provide safety and security (Adcock 2021; IACP 2016; Weyand and McPherson 2021). Demonstrating a consistent, best-practices approach to unresolved case investigations—one that will likely yield successful outcomes—can also be a positive foundational element when agencies seek funding and resources to sustain or expand their unresolved case investigations.

Following investigative protocols designed for brand-new cases can assist an investigator in bringing a case to resolution more effectively and rapidly. Similarly, thoroughly following unresolved case investigative protocols can greatly assist future investigators assigned to the case, should it not be solved by the present efforts. Investigative thoroughness in new and current cases is critical, as they may become unresolved cases of focus in the future. The forensic and investigative thoroughness exercised when the case was initially

## Case Study: The Krashoc Case

U.S. Army Specialist Darlene Krashoc's body was discovered by the Colorado Springs Police Department (CSPD) in a parking lot behind a restaurant early on the morning of March 17, 1987. Assigned to nearby Fort Carson, 20-year-old Specialist Krashoc had been viciously assaulted and murdered, and her body had been dumped near the restaurant's trash container. The homicide was investigated jointly by the CSPD and the U.S. Army's Criminal Investigation Command, commonly known as Army CID. Both agencies made an initial extensive effort to find the killer, but viable leads were eventually exhausted. Many years later, after changing lead investigators several times, Army CID Special Agent (SA) Jessica Veltri was assigned the case. Determined to provide some continuity in an effort to resolve the case, SA Veltri convinced the Army to keep the investigation assigned to her as she changed duty stations. Leveraging communications technology, SA Veltri kept in touch with her Colorado Springs co-investigators as they periodically sought fresh leads in the matter. The major break in the case came when the CSPD and SA Veltri were able to have the DNA evidence checked against samples that had been submitted to databases focused on genetic genealogical

research. With the cooperation of distant relatives who had submitted DNA to the databases, a prime suspect was identified: Michael Whyte, a former soldier who had been assigned to Fort Carson at the same time as Krashoc and who still lived in Colorado. Using old-fashioned legwork, investigators were able to surreptitiously collect Whyte's DNA sample from a fast food cup he had thrown away. As a result of the subsequent DNA match, Whyte was arrested on June 13, 2019, and charged with Krashoc's sexual assault and murder.

In June 2021, Michael Whyte was convicted of the first-degree murder of Darlene Krashoc and sentenced to life in prison without parole. It had taken 32 years to solve this horrific crime. In addition to the investigators' persistence and advancements in forensic science, SA Veltri credits three other factors for substantially contributing to the successful resolution of the Krashoc case: the comprehensive and thorough processing of the initial crime scene by the CSPD, good case file management, and the longstanding positive working relationship between Army CID and the CSPD.

Source: J. Veltri, Personal communication, telephone interview with Jeffrey Lindsey, May 7, 2021.

opened is consistently correlated with the successful conclusion of unresolved cases (Adcock 2021; Davis, Jensen, and Kitchens 2011; Moran 2021; NIJ 2019). The original investigators' diligence with interviews and evidence collection and processing, even if the case becomes unresolved, can still open doors to new leads and evidence processing possibilities that arise later (Veltri 2021).

### **Incorporating culturally appropriate and trauma-informed victim services**

- *Managing family expectations at the start of continued investigations*
- *Using a family liaison for routine touchpoints*
- *Strategies for ongoing communication*
- *Ensuring families know they haven't been forgotten*

## A Trauma-Informed Approach to Community Interaction

A trauma-informed approach to working with victims, families, and community members involves “understanding the physical, social, and emotional impact of trauma on the individual, as well as on the professionals who help them” (OVC 2021). Investigators should seek information and assistance to ensure they are providing services in a manner consistent with the cultural beliefs, norms, and customs of the population they are serving. As each tribe has unique beliefs and customs, investigators may wish to appoint a tribal spokesperson or other point of contact to attend community or chapter meetings, engage with MMIP task forces, or otherwise collaborate with tribes in their jurisdiction, to gain a deeper understanding of those cultural beliefs and customs and develop protocols for how and when to engage with tribal members. The following factors are extremely important considerations for investigators interacting with victims, family members, and communities in a trauma-informed manner:

- New strategies to engage the community or tribe
- Disposition of remains in accordance with cultural beliefs and customs, to include factors such as being aware of tribal customs surrounding the use of a deceased person’s name
- Referrals for external mental health supports and other victim services
- Guidance for investigators in interacting with families, such as in providing death notifications and obtaining additional information to aid an investigation

Unresolved case investigators should approach their efforts from a trauma-informed perspective—one that takes into account the effects of trauma on victims and families and the professionals engaging with them (Adcock 2021; Heurich and Haskins 2019; NIJ 2019; COPS Office 2020; Moran 2021). Establishing and building trust with victims and family members is critical for unresolved case investigators (Weyand and McPherson 2021; Moran 2021; NSA 2011). Garnering this trust requires empathetic and consistent communications and presence (Adcock 2021; NSA 2011; NIJ 2019). Adcock (2021) notes that a frequent criticism by victims and family members is not that the case did not get resolved but that the investigators did not keep them updated on the developments of the investigation, even if the findings were negative. To counter the tendency toward noncommunication, agencies should consider developing protocols or strategies to maintain engagement with victims, families, and other relevant stakeholders. Unresolved case investigators may, and likely will, change over the course of a long-term investigation; a protocol for maintaining regular contact, even if infrequent, will help to maintain continuity.

A primary motivating factor for working cold cases is to bring resolution to victims, survivors, families, and the communities impacted by an unresolved crime of violence or long-term missing person case (Adcock and Stein 2013; Moran 2021; NSA 2011). Even before an investigation begins, however, the mere act of choosing an unresolved case for additional or renewed effort creates significant ripple effects for victims, survivors, families, and impacted communities (Moran 2021; NSA 2011). Investigators should be cognizant that the act of renewing focus on an unresolved case will itself heighten expectations of a final resolution and should be prepared to address the personal and interpersonal reactions that will result (NSA 2011). Victim and survivor service professionals should be included in the investigative process to help guide victims and families through the emotions of the renewed focus as well as to

serve as an information bridge in case of strained relations between the law enforcement agency and those directly impacted by the crime (NSA 2011; NIJ 2019). If at all possible, engage victim advocates. Should victim advocates not be readily available, investigators should properly prepare themselves for the highly emotional interactions they likely will have with victims and their family members. Investigators also should be aware of dashing newly raised hopes when the investigation of the unresolved case has not generated new leads and

should be prepared to interact accordingly with those involved. There are many guides available to support agencies in developing best practices and strategies for effectively interacting with victims and families, such as the Minnesota Department of Public Safety's *Best Practices Guidelines: Crime Victim Services* ([https://ovc.ojp.gov/sites/g/files/xyckuh226/files/pubs/InnovativePractices/Practices\\_Best\\_practices\\_guidelines-508.pdf](https://ovc.ojp.gov/sites/g/files/xyckuh226/files/pubs/InnovativePractices/Practices_Best_practices_guidelines-508.pdf)) and OLJ's presentation "Victim Centered, Trauma Informed, Culturally Appropriate Services in

## Emerging Best Practices for Protocols for AI/AN Unresolved Cases

A literature review of the publications of contemporary unresolved case subject matter experts resulted in the following list of emerging best practices for investigative protocols (NIJ 2019; PERF 2018; Davis, Jensen, and Kitchens 2011; NSA 2011; Miami Police Department 2017; Moran 2021; Adcock 2021):

- Adopt, tailor, or integrate investigative protocols that have proven to be successful.
- Assign skilled and motivated investigators trained in trauma-informed techniques.
- Conduct an extensive and thorough initial investigation.
- Consolidate information in a robust, searchable case management database.
- Continue to seek funding sources that have proven to be successful, such as grants offered by the U.S. Department of Justice's COPS Office and Bureau of Justice Assistance.
- Develop and implement a comprehensive communications plan that includes all stakeholders.
- Engage and use the skills and abilities of properly vetted volunteers, advocates, interns, and academics. Guidance on screening police volunteers can be found in publications such as the Denver Police Department's Volunteers in Police Service Policy Manual (<https://www.denvergov.org/files/assets/public/police-department/documents/vips/vips-policy-manual.pdf>) and the Volunteer Engagement for American Indian and Alaska Native Missing Persons Cases training ([https://operationladyjustice.usdoj.gov/sites/g/files/xyckuh281/files/media/document/Volunteer\\_Engagement\\_Flyer.pdf](https://operationladyjustice.usdoj.gov/sites/g/files/xyckuh281/files/media/document/Volunteer_Engagement_Flyer.pdf)) being developed through a collaboration of the COPS Office and the International Association of Chiefs of Police.
- Identify, locate, consolidate, and test or retest evidence.
- Prioritize cases to be addressed.
- Proactively engage other criminal justice stakeholders.
- Review and assess cases using a solvability matrix.

AI/AN Missing Persons Cases” (<https://operationladyjustice.usdoj.gov/sites/g/files/xyckuh281/files/media/document/oljmissingpersonscases.pdf>). Investigators may also find it helpful to provide families with resources, such as the OLJ guidebook *When a Loved One Goes Missing: Resources for Families of Missing American Indian and Alaska Native Adults* (<https://operationladyjustice.usdoj.gov/missing-loved-one-guide>).

Investigators should craft detailed communications plans to address the information needs of all external stakeholders (NIJ 2019; NSA 2011). Tailoring the

communications plan to the individual case should be a preliminary step of refocusing on an unresolved case (Heurich and Haskins 2019; NIJ 2019; NSA 2011).

In addition, AI/AN cultural mores and practices specific to the tribal community involved need to be considered at every step of the investigation from basic interviews to the final disposition of the case (Adcock 2021; Moran 2021; IACP 2016; Weyand and McPherson 2021). This thoughtful preparation is especially critical for investigators who normally operate outside of the cultural environment of the victims, families, and communities they endeavor to help.

# Databases and Other Service Providers

Databases facilitate the automatic exchange of information among users—and, for the ones described in this section, across jurisdictional boundaries—enabling investigators to share, compare, and analyze criminal justice information on tribal, local, state, regional, and national levels. By expediting and increasing case resolutions, this exchange helps bring answers to searching families, secure justice for victims, and identify offenders to prevent additional victimization. This section details five national databases, along with associated resources provided by each database’s administering agency. All of these databases are part of larger criminal justice programs designed to share and compare information to resolve missing, unidentified, and unclaimed person cases as well as sexual assaults, homicides, and other violent offenses. The Operation Lady Justice (OLJ) website (<https://operationladyjustice.usdoj.gov/>) provides a helpful reference that includes additional federal and nongovernmental organization (NGO) systems that house MMIP data (OLJ 2021).

## **The National Missing and Unidentified Persons System (NamUs)**

The National Missing and Unidentified Persons System (NamUs) is a DOJ program funded and administered by the National Institute of Justice (NIJ). In addition to providing investigative support and free forensic services, NamUs serves as an information clearinghouse for missing, unidentified, and unclaimed person cases through the secure, online NamUs 2.0 database. This database is accessible to criminal justice users and the general public at the website <https://namus.nij.ojp.gov>.

The NamUs database contains fields to capture all available information on missing, unidentified, and unclaimed person cases, including the following. Note that this list encompasses all fields, including those viewable only to professional users:

- Demographic information, such as sex, race/ethnicity, height, and weight
- Circumstances of the missing person’s disappearance or the recovery of the body, including location information and case narratives
- Detailed physical descriptors, including scars, marks, piercings, tattoos, prior medical procedures, and medical conditions
- Clothing and accessories, including articles found near bodies that might link the case to a particular missing person

- Information on the availability of DNA profiles, where they exist, and the laboratory that performed the analysis and uploaded the DNA profiles to CODIS (the Combined DNA Index System; see “DNA typing and searching” in chapter 3, “Forensic Evidence”)
- Fingerprint cards, dental radiographs, written treatment cards, and other biometric records
- Other images and documents, such as facial photographs of missing and unidentified persons, and images of jewelry, clothing, and tattoos

Criminal justice–sensitive information and personally identifiable information (e.g., dates and places of birth) can be viewed only by registered and vetted professional users of the NamUs system; however, unlike in other criminal justice systems, certain demographic and circumstance information in NamUs is publicly viewable. While some information may be redacted if deemed sensitive, all users can access case information appropriate to their user role in the system and will at least be able to see that the case has been published. Members of the public can use NamUs to search for missing loved ones, participate in the comparison of case information, and report tips and leads which may result in case resolutions. For example, the sister of a missing woman searched NamUs and located a

decendent with tattoos that matched her sister’s. She reported the tip, which led to a DNA analysis and, after more than a decade of searching, positive identification of the remains.

Registered public users of NamUs can also enter missing person cases into the database. This access allows friends, family members, and victim advocates to report missing person cases to NamUs and enter information that only the victim’s friends or family may know, such as a missing person’s tribal enrollment or affiliation. When cases are initially entered into NamUs, they are in an unpublished state, meaning that all data are visible only to NamUs staff and the party who entered the case. Once a missing person report has been confirmed with law enforcement and that investigating agency has granted permission, the case can be published in NamUs. Note that investigators may not wish for cases to be immediately published in NamUs for various investigative reasons. For instance, if possible remains of a missing person have been located, the agency may wish to conduct DNA testing before authorizing the case be published in NamUs for public viewing. Once published, a case is searchable and viewable to all visitors and registered users of the NamUs system, although sensitive information remains restricted to professional users.



**Figure 1. NamUs database interface**

In addition to the automatic comparison features of NamUs, users can create sophisticated custom searches of case data to locate potential matches based on unique traits such as scars, tattoos, implants, or prior surgeries; geographic locations; clothing and accessories; and even dental characteristics. (See “Forensic Odontology” in chapter 3, “Forensic Evidence.”)

## NamUs Success Stories

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Some examples of system-generated potential matches that have led to case resolutions include the following:

- An investigator performing a review of all unresolved cases from his department entered a 1999 missing person case into NamUs with available biometrics and the indication that the missing man may have been traveling across state lines at the time of his disappearance. Noticing these circumstances, the NamUs Regional Program Specialist (RPS) reviewing the case examined the list of unidentified remains cases suggested by the system as potential matches. The first case on the list involved a decedent who bore a striking physical resemblance to photos of the missing man; the body had been found within 24 hours of the man's disappearance and within the geographic area where the man was thought to have been traveling. The NamUs RPS reported her finding to the investigating agencies, and a comparison of fingerprint records led to a positive identification within 48 hours of the case being reported to NamUs.
- A law enforcement officer entered a case involving a missing man whose vehicle had been found abandoned on the eastbound side of an interstate highway. The investigator then viewed the system-generated potential matches and discovered a case involving skeletal remains found approximately 250 miles east of the abandoned vehicle, near the same interstate highway. In addition to the geographic similarities, the investigator noted that clothing found with the remains matched the clothing worn by the missing man on the date of his disappearance. Based on this lead, dental records were compared, and a positive identification of the decedent was made.

All missing person cases must be reported to a local, state, tribal, or federal law enforcement agency to be published in NamUs. The task of reviewing new case entries before publication and coordinating with the appropriate local, state, tribal, or federal law enforcement agencies is done by NamUs Regional Program Specialists (RPS).

The NamUs RPS team can help connect families in need of filing a missing person report with law enforcement agencies across the country. These agencies, part

of the NamUs network of professional users, may assist families in filing missing person reports and connect families to other investigative resources.

Once a case is published in NamUs, the system can be used to create missing person posters. Professional users (such as law enforcement and medical examiners and coroners) can access a case comparison tool to view any system-generated potential matches. System-generated searching is based on a subset of criteria that includes demographic information such as

race, sex, age, and height; these default criteria can be adjusted by professional users to expand or narrow the list of potential matches. Investigators can access system-generated matches by clicking the “comparisons” tab within each NamUs case file.

Another important tool that NamUs offers is the ability to “archive” a case once it has been resolved. Archiving a case in NamUs removes all case data from public view but allows NamUs and the investigating agency to retain the case record for future reference and statistical and data analyses.

Since 2018, NamUs has been working to close the gap on data collection related to missing indigenous person cases. In December 2018, NamUs launched new data fields that enable the collection, analysis, and reporting of missing person cases that involve an AI/AN person who

1. was enrolled in or affiliated with a state- or federally recognized tribe;
2. was last seen on tribal land within the jurisdiction of the United States; or
3. had a primary residence on tribal land within the jurisdiction of the United States.

For unidentified person cases, NamUs also allows agencies to indicate if a decedent was found on tribal land within the jurisdiction of the United States.

All users—including public users—can search these tribal data fields in NamUs and perform searches for all published cases involving individuals missing from a specific tribe. In addition, NamUs provides the following monthly case reports that are accessible from its

informational website (<https://namus.nij.ojp.gov/library/reports-and-statistics>), one of which is specific to missing AI/AN cases:

1. **NamUs Case Statistics – All Cases.** This report provides aggregate statistics on all published cases in NamUs, including geographic and demographic information on all missing, unidentified, and unclaimed person cases.
2. **AI/AN Case Statistics.** This report provides aggregate statistics on all published AI/AN cases in NamUs, including geographic and demographic information; statistics from all tribal data fields; and the percentage of cases investigated by tribal law enforcement agencies versus local, state, or federal agencies.

## **The National Center for Missing & Exploited Children (NCMEC)**

The National Center for Missing & Exploited Children (NCMEC) was founded in 1984 as a nonprofit 501(c)(3) corporation with a mission to help find missing children, reduce child sexual exploitation, and prevent child victimization (NCMEC 2021). Today NCMEC serves as a national clearinghouse for information related to missing children and child exploitation, with regional offices in New York, Texas, and Florida in addition to its headquarters in Alexandria, Virginia. Some of NCMEC’s resources for missing, unidentified, and exploited child investigations include the following:

- A searchable database of missing and unidentified child cases
- Case analysis and investigative support, including a dedicated long-term case unit
- A forensic art unit that provides age-progressed images of long-term missing children, as well as composite images of unidentified deceased children

## More NamUs Success Stories

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Some examples of user-initiated searches that led to case resolutions include the following:

- A law enforcement officer searching for a missing person suspected of jumping from a bridge searched NamUs and located a drowning victim found one month after the disappearance. The NamUs RPS facilitated the collection of dental records for the missing man, which were then compared with the decedent, resulting in a positive identification.
- A missing woman's daughter attempted to file a report with law enforcement; however, the agency declined to take a report. The woman then searched NamUs and located an unidentified decedent case she thought could be a match to her mother. She reported the tip to a NamUs RPS, who then worked with local law enforcement to facilitate a family reference DNA sample collection and comparison, which resulted in a positive identification of the missing woman by the medical examiner's office.
- A forensic odontologist working with a medical examiner's office searched NamUs for any missing persons who might match the general description and time frame of an unidentified decedent under investigation. After extending the search to cases across the state line, the odontologist found a possible match; using dental records in the missing person's NamUs case file, the agency was able to make a rapid identification.
- Investigators working an unresolved missing person case from the 1970s searched NamUs for potential matches and located a decedent found two years after the missing person was last seen, in a county the missing person was thought to have been traveling through at the time of his disappearance. DNA was collected from a close relative of the missing man, allowing the medical examiner to make a positive identification.
- The mother of a man missing since 1992 contacted a NamUs RPS for assistance. She had been attempting to file a missing person report since her son disappeared, but no agency would accept the case. The RPS entered the information on the missing man into NamUs, then conducted searches for potential matches. The RPS located a decedent found in the same city the missing person was known to be visiting at the time of his disappearance, wearing clothing similar to that described by the missing man's mother. The RPS coordinated family reference DNA sample collections from the missing man's relatives; based on the DNA comparison and other relevant information, the investigating agency made a positive identification of the remains.

- Partnerships with forensic laboratories and subject matter experts who provide assistance with biometric collections and analysis, as well as forensic genealogy
- Research and investigative resources related to the investigation of child sexual abuse material (CSAM), also known as child pornography, and other forms of sexual abuse and exploitation of children
- Emotional and professional support, as well as reunification assistance, for families and child victims

More information or assistance from NCMEC can be obtained at [www.missingkids.org](http://www.missingkids.org) or by calling their toll-free number at 800-THE-LOST (800-843-5678).

## The National Crime Information Center (NCIC)

### *The database*

The National Crime Information Center (NCIC), administered by the FBI through its Criminal Justice Information Services (CJIS) division, is a computerized index of criminal justice information that is available to federal, tribal, state, and local law enforcement agencies as well as other criminal justice agencies. In some instances, NCIC access may be granted to non-criminal justice agencies, such as the National Center for Missing and Exploited Children; however, these agencies may have limited access to its files or information.

NCIC contains 22 person and property files that allow investigators to share information across jurisdictional boundaries, perform real-time queries of data in the field, and perform searches to support case resolutions.

Tribal police may gain access to NCIC and other national crime information systems through their state CJIS Systems Agency (CSA) or the DOJ's Tribal Access Program (TAP) for National Crime Information. As of 2021, 450 Tribal Government agencies from 108 tribes participate in TAP (TAP 2021).

It is important to note that while medical examiner and coroner (ME/C) offices *may* be granted access to NCIC through their state CSA, not all CSAs grant NCIC access to these agencies. Where ME/Cs do not have access to NCIC, they must rely on local or state law enforcement agencies to enter unidentified remains cases into NCIC and relay any potential matches returned.

### *NCIC comparisons and offline searching*

When case information is entered into the Missing Person File or Unidentified Person File, NCIC performs automatic comparisons to return lists of potential matches based on a ranking algorithm. These potential matches, referred to as \$M reports (pronounced "dollar M"), provide a list of potential matches for agencies to further investigate. However, because the cases returned in a \$M report are based on the comparison of only a subset of demographic information (e.g., sex, race, and height), it is common to receive multiple potential matches to every case entered; a correct match may not be included in the \$M report.

A valuable NCIC tool that may not be widely known to investigators is the ability to request NCIC offline searches. In offline searches, analysts and investigators can request a search of both active and cancelled NCIC entries that include searches of any NCIC field, including keyword searches of the miscellaneous (MISC) field within NCIC. These searches are typically more discriminating than \$M searches and can produce viable investigative leads.

Offline NCIC searches are most productive when investigators can search characteristics, such as unique tattoos that might be found by searching the MISC for keywords, because searches of general demographic information alone (e.g., height, weight, or hair color) could yield hundreds of results—or even more, if cancelled entries are included in the search. However, offline searches can be a powerful investigative tool

*cont'd on page 22*

## NCIC Database Contents

The National Crime Information Center (NCIC) enables the exchange of criminal justice information related to 22 person and property files. The Privacy Impact Assessment for NCIC provides the following descriptions of the Person Files included in the NCIC database:

- 1. The Wanted Person File** contains records of individuals who have outstanding arrest warrants. This file also contains records of juveniles who have been adjudicated delinquent and who have escaped from custody or supervision or who have absconded while on probation or parole. The file also contains records of juveniles who were charged with committing an act of delinquency that would be a crime if committed by an adult and who have fled from the state in which the act was committed. Agencies may also enter temporary felony want records into this file. Temporary felony want records are automatically retired 48 hours after entry.
- 2. The Missing Person File** contains records of missing persons of any age who have a proven physical or mental disability; records of persons who are missing under circumstances indicating they may be in physical danger or abducted; records of persons missing after a catastrophe; records of persons under the age of 21 who are missing but who do not meet any of the above criteria; and records of persons aged 21 and older who are missing, who do not meet any of the above criteria, but for whom there is a reasonable concern for their safety.
- 3. The Foreign Fugitive File** contains records from the International Criminal Police Organization (INTERPOL) and the Royal Canadian Mounted Police (RCMP). INTERPOL records within this file contain information on persons wanted in other countries for crimes that would be felonies if committed in the United States. The wanting country must have signed an extradition treaty or convention with the United States, or the subject must be wanted for a violent crime or otherwise must be known to be violent, armed, or dangerous. The RCMP records within this file contain information on persons who are wanted for violations of the Criminal Code of Canada and for whom there is an outstanding Canada-wide warrant. Only the staff of INTERPOL's United States National Central Bureau (USNCB) and the RCMP can enter records into this file.
- 4. The Immigration Violator File** contains records of criminal aliens whom immigration authorities deported for drug or firearms trafficking, serious violent crimes, or both; information on aliens who have outstanding administrative warrants for removal from the United States and who have unlawfully remained in the United States; and records of aliens who have outstanding administrative warrants for failure to comply with national security registration requirements. Only the Department of Homeland Security's Bureau of Immigration and Customs Enforcement can enter records into this file.
- 5. The Protection Order File** contains records of individuals who are subject to court-issued orders to prevent violent or threatening acts, harassment against, contact or communication with, or physical proximity to another person(s). The Protection Order File also contains information about the protected person(s) for whom the court order was issued and terms and conditions of the protection order. Only authorized law enforcement / criminal

justice agencies and civil courts involved in domestic violence and stalking cases may enter records into this file.

6. The **National Sex Offender Registry (NSOR)** contains records of sex offenders or other persons required to register under a federal, state, local, or tribal jurisdiction's sex offender registry program.
7. The **Supervised Release File** contains records of individuals who are under specific restrictions during their probation, parole, supervised release, or pre-trial or pre-sentencing release. In addition to biographic descriptors about individuals under supervised release, this file contains conditions of the supervised release.
8. The **Identity Theft File** contains records of victims of identity theft with descriptive and other information that law enforcement personnel can use to determine if an individual is a victim of identity theft or if the individual might be using a false identity. Victims of identity theft voluntarily provide their information to law enforcement for entry into this file.
9. The **Gang File** contains records of criminal gangs and their members. This information serves to warn law enforcement officers of the potential danger posed by individuals and to promote the exchange of information about gangs and gang members to facilitate criminal investigations. To enter individuals into the gang file, a criminal justice agency must have developed sufficient information to establish membership or other relationship in a particular gang by either the individual's self-admission or pursuant to documented criteria. For the purpose of this file, a gang is defined as a group of three or more persons with a common interest, bond, or activity characterized by criminal activity or delinquent conduct.

10. The **Known or Suspected Terrorist (KST) File** contains records on individuals known or suspected to be or have been engaged in conduct constituting, in preparation for, in aid of, or related to terrorism; and national security threat actors, including individuals, organizations, groups, or networks assessed to be a threat to the safety, security, or national interests of the United States including cyber threat actors, foreign intelligence threat actors, military threat actors, transnational criminal actors, and weapons proliferators as defined in National Security Presidential Memorandum 7, issued on October 5, 2017, or any subsequent authority. The KST file can also accept records on military detainees who are individuals officially detained during military operations who pose an actual or possible threat to national security, but not persons detained as Enemy Prisoners of War. The FBI's Terrorist Screening Center is the only entity that can enter records into this file, which is available to all criminal justice agencies.
11. The **Protective Interest File** contains records of individuals whom an authorized agency reasonably believes, based on its law enforcement investigation, might pose a threat to the physical safety of protectees or their immediate families. Only law enforcement agencies with a protective mission as specified within municipal, state, or federal statutes, regulations, or other appropriate legal authority may enter records into this file. The Protective Interest File expands upon the U.S. Secret Service Protective File that was originally created in 1983.
12. The **National Instant Criminal Background Check System (NICS) Denied Transaction File (NDTF)** contains records regarding individuals who have been disqualified from possessing, transferring,

or receiving firearms or explosives, or have been denied a weapons permit under applicable state or federal law pursuant to the NICS. NDTF records are entered and canceled through an interface between the NCIC and the NICS. Only the FBI's NICS Section can enter records into this file.

- 13. The Violent Person File (VPF)** contains records of individuals who have been convicted of violent crimes against law enforcement, have made credible threats of violence against a member of the law enforcement or criminal justice community, have been convicted of a violent crime against a person, or have been convicted of a violent crime where a firearm or weapon was used. The VPF

was designed to alert law enforcement officers that an individual they are encountering may have the propensity for violence against law enforcement.

- 14. The Unidentified Person File** contains records of unidentified deceased persons, living persons who are unable to ascertain their identities (e.g. amnesia victim, infant), unidentified catastrophe victims, and recovered body parts.
- 15. The Case Subject List** includes biographical information on individuals who are or were, within the last five years, under investigation for a potential nexus to terrorism. Only the FBI can enter records into this file.

The Privacy Impact Assessment for NCIC provides the following descriptions of the NCIC Property Files:

- 1. The Article File** contains records of any stolen item valued at \$500 or more; records of all property taken, regardless of value, if the aggregate value taken in one theft exceeds \$5,000; records of property taken, regardless of value, if the investigation indicates interstate movement of the property; records of property taken in which the seriousness of the crime indicates that the investigating agency should enter a record for investigative purposes; or records of lost Public Safety, Homeland Security, or Critical Infrastructure items of identification.
- 2. The Gun File** contains records of stolen weapons; recovered (abandoned, seized, or found) weapons; lost or missing weapons; or weapons that have been used in the commission of a felony. The information contained in this file includes the serial number, caliber, make, type, and model of the weapon listed.
- 3. The License Plate File** contains records of stolen license plates.
- 4. The Vehicle File** contains records of stolen vehicles, vehicles used in the commission of a felony, or vehicles that a law enforcement agency seizes based upon a federally issued court order.
- 5. The Securities File** contains records of securities that were stolen, embezzled, used for ransom, or counterfeited. Securities are identified as currency and documents or certificates that are evidence of debt or ownership of property or documents that represent subscription rights.
- 6. The Boat File** contains records of stolen boats.
- 7. The Vehicle/Boat Part File** contains records of stolen component parts from a vehicle or boat or stolen ownership documentation such as titles.

Source: Federal Bureau of Investigation (FBI), Privacy Impact Assessment for the National Crime Information Center (NCIC) (Washington, DC: FBI, 2019), <https://www.fbi.gov/file-repository/pia-ncic.pdf>.

*cont'd from page 18*

for cases involving unique characteristics or searches limited to a short window of time, such as all men and boys who went missing in the week prior to the recovery of a body.

In addition to conducting offline searches of missing and unidentified person entries, investigators can also request offline searches of NCIC transactions, which are records created each time the system is queried. For instance, an officer conducting a traffic stop will create a transaction record when they query the driver's name and date of birth in NCIC to search for active warrants or other flags on the individual's identity.

Offline searches of NCIC transactions can be conducted for any instance of a particular name, date of birth, or Social Security number being run through NCIC by law enforcement.

The OLJ website (2020a) provides a fact sheet summarizing the key points of the NamUs and NCIC systems with regard to missing and unidentified person investigations; this sheet is reproduced as Appendix B.

## **National Data Exchange (N-DEX)**

The FBI's CJIS also operates the National Data Exchange (N-DEX), a national, web-based system that provides authorized agencies with 24/7 access to

## **NCIC Success Stories: Offline Searches**

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NCIC offline searches were used to resolve the following missing and unidentified person cases:

- A handwritten identification card was found in the possession of an unidentified child who died in a car accident. Searches of active missing juvenile cases yielded no results that matched the name on the card, so it was suspected the name was an alias identity the child had assumed. However, a subsequent search of cancelled NCIC entries found a child involved in a prior runaway incident whose name was a close match to the name on the identification card. After the child was located and the initial case cancelled, he ran away again, but a subsequent missing person report was never filed. Follow-up investigation confirmed the decedent was the former runaway child.
- A toxicology report indicated that chlorpromazine was found in the blood of an unidentified woman who was found in a body of water and was thought to have died by suicide. An NCIC offline search was conducted for all missing women matching the decedent's physical description and the letters "SCHIZOPHREN" in the MISC field. (Only a partial name of the medical condition was searched to accommodate variant forms, such as "schizophrenic" and "schizophrenia.") Anticipating such data entry variations—even possible misspellings of words—in an NCIC offline search can yield additional results of value to an investigation. Of the results returned in this offline search, an entry was found for a missing woman who was noted to be taking schizophrenia medication at the time of her disappearance and matched the physical descriptors of the decedent. Forensic comparisons confirmed an identification.

criminal justice records. The N-DEx system is a “strategic investigative information sharing system that fills information gaps and provides situational awareness” by making the following records available to agencies across the country (CJIS 2021):

- Incident, arrest, and booking records
- Pretrial investigations
- Supervised release reports
- Calls for service
- Photos
- Field contact/identification records
- Corrections data

N-DEx complements other FBI systems by providing access to additional records that are not contained within national systems such as NCIC or NGI (Next Generation Identification, a fingerprint database—see “A Brief Introduction to the Study of Fingerprints” in chapter 3, “Forensic Evidence”). The records contained in N-DEx allow investigators and analysts to analyze information using built-in data visualization tools to create maps and link charts. In addition, the system creates notifications so searchers can be automatically alerted if relevant new information has been uploaded to the system or if more than one user is searching the same criteria; this facilitates the linking of cases and suspects (CJIS 2021). N-DEx also allows users to invite investigators from other agencies to view, share, and interact with case information, allowing interagency collaboration within the secure N-DEx environment.

Tribal law enforcement agencies that do not currently have access to N-DEx can obtain access through the TAP program or through their state CJIS System Officer (CSO).

## **NCIC Success Story: Transaction Search**

For several weeks after a woman’s disappearance, an agency declined to take a missing person report from family members. During those weeks, and unbeknownst to the investigating agency, the woman was in contact with law enforcement in another state; however, when that agency ran the woman’s identity through NCIC, they did not receive any hits because the woman had not yet been entered into the system. An NCIC offline transactional search on the woman’s name and date of birth returned this transaction after her reported date of last contact, which led to the woman’s current location and the resolution of the case.

## **Violent Criminal Apprehension Program (ViCAP)**

The Violent Criminal Apprehension Program (ViCAP) is administered by the FBI through its Critical Incident Response Group’s (CIRG) National Center for the Analysis of Violent Crime (NCAVC). ViCAP combines analytical personnel with a nationwide data information center designed to collect, collate, and analyze violent crime information through a sophisticated database application. Case submissions to the online ViCAP database include the following:

- Solved and unsolved homicides and attempted homicides, especially those that involve abduction; that are known or suspected to be part of a series of crimes; or that are apparently random, motiveless, or sexually motivated
- Missing persons, where the circumstances indicate a strong possibility of foul play and the victim is still missing

- Unidentified human remains, where the manner of death is known or suspected to be homicide
- Sexual assault cases

The ViCAP database application is a behavior-based crime analysis tool that facilitates linking unresolved cases to previous cases and developing leads for them. One of the many large-scale projects undertaken by ViCAP has been dubbed the Highway Serial Killer (HSK) Initiative. This initiative continues to track information related to homicide victims whose remains were recovered along a highway or location associated with highways (e.g., truck stops or rest stops); missing persons and sexual assault victims linked to these types of locations; and truck drivers or other individuals who have been investigated or arrested for murder, kidnapping, or sexual assault of one or more victims along a highway or at a location associated with a highway.

In addition to the ViCAP database technology, ViCAP crime analysts may provide investigative support, including the creation of maps, timelines, and matrices; information dissemination (e.g., ViCAP bulletins); coordination and communication between agencies; and task force assistance.

The online ViCAP database is accessible only to law enforcement personnel through the Law Enforcement Enterprise Portal, [https://www.cjis.gov/CJISEAL/TAMOperationHandler?TAM\\_OP=login](https://www.cjis.gov/CJISEAL/TAMOperationHandler?TAM_OP=login). For access to the ViCAP system, agencies must apply and provide a single agency point of contact, referred to as the Law Enforcement Agency Manager (LEAM), to serve as the link between ViCAP and the users within the agency. Once agency access is granted, the LEAM manages access to ViCAP for all users within the agency.

### **National Integrated Ballistic Information Network (NIBIN)**

For homicides, suicide deaths, and any other cases involving firearm evidence, laboratory examination can associate recovered bullets and cartridge casings

to known weapons or firearm evidence recovered at other crime scenes, leading to linkage of cases whose associations were previously unknown. Similarly, test fires from recovered weapons can associate known weapons to other, unresolved crimes. The most comprehensive system to share and compare such ballistic evidence is the National Integrated Ballistic Information Network (NIBIN). (For discussion of the field of molecular ballistics, which combines molecular biology with forensic and wound ballistic analyses to assist in the association of weapons, victims, and offenders using DNA, see “Firearms and DNA” in chapter 3, “Forensic Evidence” (Euteneuer and Courtis 2021).

Administered through the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), NIBIN automates ballistic evaluations by allowing examiners to upload ballistic images (such as images of fired cartridge casings) and search those images against evidence from their jurisdiction, neighboring jurisdictions, or cases across the country. The NIBIN database currently contains records on 4.2 million pieces of ballistic evidence and 45 million ballistic images and has produced 223,000 investigative leads (ATF 2021).

It is important to note that, like all automated system comparisons, a NIBIN lead is an unconfirmed, potential association between two items of evidence, which must be confirmed by a trained examiner through a manual scientific examination. A firearm or toolmark examiner must perform a microscopic comparison of the actual evidence to confirm any evidence or case associations.

Like all criminal justice data systems, NIBIN relies on agencies at the local, state, tribal, and federal level to input and share their case data. Entering information into NIBIN can support the development of quick leads and thus identification and prosecution of offenders. A related ATF system, eTrace, can also help investigators effectively track the origin and purchaser of firearms and identify patterns of violent gun crimes.

# Forensic Evidence

In some unresolved cases, forensic evidence such as fingerprints, firearms, documents, or DNA, may have been overlooked as not probative during the initial investigation. However, technological advances during the intervening time may allow new, viable leads to be generated using forensic evidence that was not originally considered meaningful. Reviewing cases for such forensic evidence could reinvigorate an investigation. In addition, having a fresh set of eyes reviewing a case file may identify potential lead value in forensic evidence that was not initially considered. Investigators should seek and welcome collaboration in evaluating their cases.

## **DNA typing and searching**

### *Introduction*

Of all the advances in forensic technology that have expanded the information to be gleaned from forensic evidence, DNA typing has had perhaps the most significant impact. Biological evidence is often collected in the investigation of violent crimes, and in missing person investigations when human remains are discovered; however, before the 1990s, whole categories of biological evidence, such as hair collected from crime scenes, provided limited assistance in identifying viable suspects. In the 1990s, the FBI developed more sensitive technologies and introduced the first forensically validated DNA technology suitable for analyzing hairs, which are often found at crime scenes, making such minute evidence substantially more informative than it had ever been (Wilson et al. 1995). These same approaches (common in crime laboratories today) also allowed for more informative analyses of human remains. The advances in the science of forensic DNA since its inception have turned biological evidence once considered limited or even useless into valuable items to support investigations.

With current technology, nearly any biological evidence can be relevant in supporting an investigative lead. Any biological sample, such as blood, semen, saliva, sweat, hair, bones, or teeth, as well as a variety of touched items, may contain DNA that can be analyzed to provide a profile of the source(s) of the sample. These DNA profiles can be directly compared with the profile of a person of interest to determine whether that person is—or is not—a contributor of the DNA in the probative item of evidence. If there is no person of interest to compare, the evidentiary DNA profile can be searched against DNA databases, either governmental or commercially controlled, that house reference profiles of known individuals. A match or association in such a

database can provide strong investigative lead value about the source of the biological evidence. In this way, an investigator can identify a person of interest even without any other indicators about the crime and can proceed to determine if this lead is supported by more traditional investigative practices—predominately by investigating corroborative evidence to determine or refute if the identified individual may be the perpetrator. Triaging cases is necessary to determine whether biological evidence is available, probative, and sufficient

*DNA typing is the process of generating DNA profiles from evidence and known reference samples. Those profiles then can be compared to determine who can—or cannot—be the source of evidence.*

to be analyzed as well as the best options among currently available tests to use in that analysis.

DNA typing is only one of the biometric identity tools used for human identity testing, or the analysis

of human remains and forensic evidence found at crime scenes. Other tools include facial recognition, fingerprints, and forensic odontology (also called forensic dentistry; see “Forensic Odontology” later in this chapter). While these methods can be rapid and cost-effective, they rely on a specific body part or feature to be useful. In contrast, forensic DNA typing can be used to identify an individual from any part of a body, so long as it contains sufficient DNA. DNA analysis also can be a powerful exculpatory tool to eliminate wrongly associated individuals, reduce candidate lists derived from database searches to the most probative, and redirect resources to pursue other viable avenues of investigations.

There are several reasons why DNA typing may not have been pursued in a particular unresolved case, including the following:

- DNA technology only began to be used in forensic cases in the United States in the late 1980s, and most crime laboratories did not begin to adopt it fully until the mid- to late 1990s. Thus, most cases that predate 1990 and many later cases likely did not use DNA typing to characterize biological evidence. Those cases with probative biological evidence that predate the use of forensic DNA technologies are good candidates for further investigation using today’s DNA technologies.
- The technology’s ability to detect DNA evidence and use it to discriminate between individuals has increased substantially since its inception in forensic casework. Thus, many trace samples that were considered too minuscule or degraded to provide results may be typable today.
- The investigating agency may have lacked the financial and personnel resources to seek DNA typing.
- The national DNA database (known as the Combined DNA Index System, or CODIS), which was designed to help identify potential suspects, was not established until 1998. Even after being established, not all DNA profiles even from convicted offenders were entered into CODIS immediately. Thus, DNA profiles generated from crime scene evidence may have been searched against CODIS in an attempt to develop investigative leads but returned no hits. Because the number of profiles entered into CODIS continues to increase, a lead may be in CODIS today that was not there at the time of the initial search of the database.

- The initial investigators may not have been aware of all the local, state, or national DNA databases that could be searched for developing leads.
- Cultural issues that relate to the collection of samples, analysis of DNA, and maintenance and storage of samples and data may have impacted the use of this forensic tool. Some individuals may be reluctant to share their genetic data with government or private agencies. DNA is very personal; it carries the genetic history of a person and a people. Especially with cases involving AI/AN victims and families, investigators should anticipate individual and community concerns around privacy and potential harm that has occurred regarding the use of personal data. For instance, in 1989, members of the Havasupai Tribe donated blood to researchers they believed were only studying genetic links to diabetes, but later discovered their DNA had been used for a number of other studies without their informed consent, including tracing the origin and migration of their tribe (Sterling 2011). Investigators should develop processes, policies, and protocols to address informed consent, sample collection strategies (especially for missing person family reference samples), ownership, approval for specific uses, storage and maintenance of DNA and DNA profiles, and the appropriate use of DNA evidence for criminal investigations. Family members who were initially unwilling to consent to certain types of data collection and analysis may reconsider if sound policies are in place addressing their concerns.

Any of these situations may indicate that an unresolved case is a viable candidate for further investigation.

### *Theory and practice*

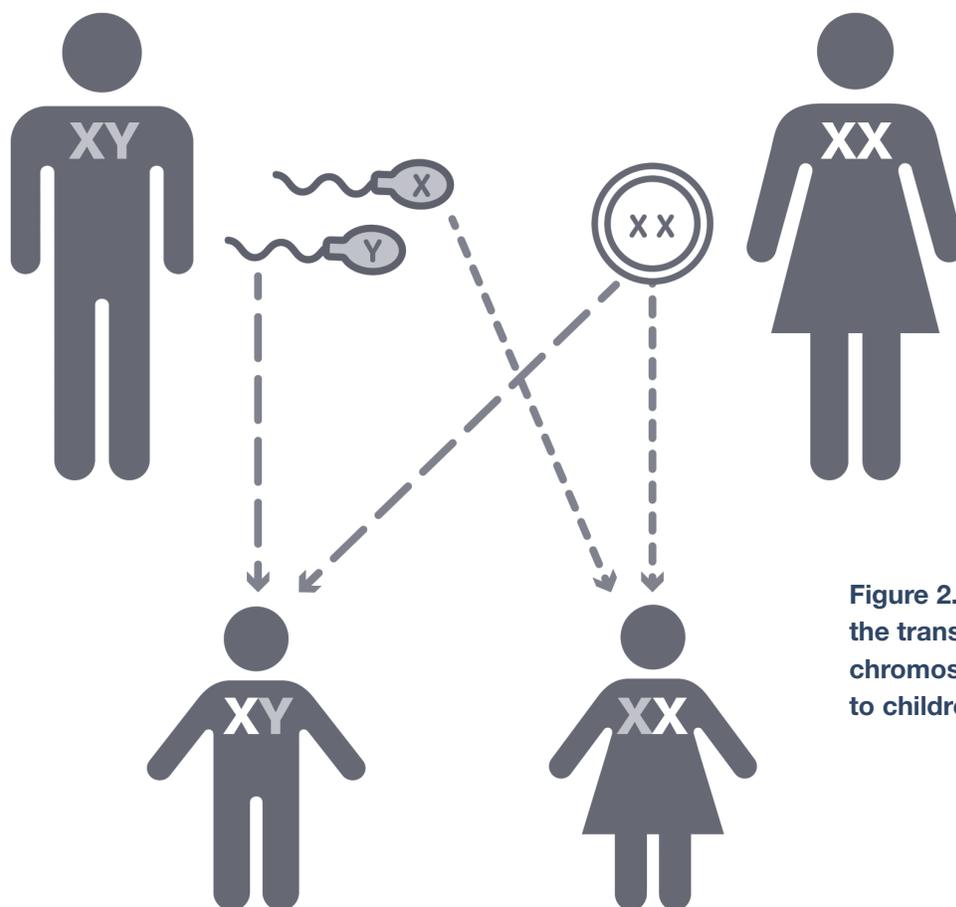
A basic understanding of the science behind forensic DNA typing and testing can help law enforcement professionals make more informed decisions and pose meaningful questions about biological evidence.

Rather than comparing the entire genome—the whole set of a person’s genetic information—forensic testing targets specific genetic markers: shorter sections of DNA that vary among individuals. There are a variety of genetic markers used to differentiate or characterize individuals for forensic identity testing purposes. The markers most commonly used to differentiate individuals fall into two general classes—short tandem repeats (STR) and single nucleotide polymorphisms (SNP).

A person’s genome contains both genes—sequences of DNA that encode instructions for building proteins—and large stretches of non-coding DNA between them. Some of this non-coding DNA has other functions, but much of it is so-called “junk DNA,” which does not have any apparent function. Non-coding DNA is highly variable among individuals: Because changes in the DNA sequence—mutations—of non-coding regions have little or no effect on an individual’s well-being, they are more tolerated and can be passed on more readily to subsequent generations than mutations in genes. This increased variability makes markers residing in non-coding DNA regions highly useful for distinguishing individuals.

STRs are short sequences in the non-coding DNA that repeat a number of times. They are currently the predominant markers used in crime laboratories worldwide for identity testing. As many as 15 to 30 STRs are processed and typed simultaneously. The compilation of these genetic markers from a person constitutes a DNA profile.

It is easier to exclude a person than to confirm them as the source of a genetic sample. Genetic differences between two samples generally indicate that they came from different people, while similarities increase the probability of the samples originating from the same source. While every human being has an overall unique genome, each human being also has large portions of that genome in common with many other people. A



**Figure 2. A family showing the transmission of the sex chromosomes from parents to children.**

match between sampled DNA and a known individual on one or a few genetic markers does not rule out the possibility that the match is coincidental and that the sample may have come from another person who happens to share those genetic markers with the known individual.

Most DNA testing employs multiple genetic markers to reduce the chance of an adventitious match. The more genetic markers two samples have in common, the less likely it is that they arose from different people. The commercial testing kits used today enable discrimination powers approaching or equal to individualization—that is, it is unlikely that samples from two unrelated individuals would produce the same genetic profile when tested. In fact, the standard battery of STRs used in forensic genetics are highly effective in including or excluding a person of interest as a potential contributor of a forensic sample.

STR typing is also applied specifically to analyze DNA from the Y chromosome. The Y chromosome and the X chromosome are the sex chromosomes in humans; the combination of these chromosomes determines the biological sex of an individual.

Aside from in certain rare genetic conditions, people have two sex chromosomes, one received from each parent: Female humans carry two X chromosomes, and male humans carry one X and one Y. A mother can pass on only an X chromosome, while a father has a 50 percent chance of passing on a Y chromosome or an X chromosome. Figure 2 illustrates how, as a result, on average half of human children are biologically female and half are biologically male.

Because the entire Y chromosome is inherited paternally, i.e., from father to son, all paternal male relatives will carry the same Y-chromosome DNA profile. While

this sharing of the Y chromosome may seem to be a limitation for identifying a source of biological evidence, it also can be beneficial for developing investigative leads, as even quite distant male-line relatives will share the same Y-chromosome profile. Genetic markers on this chromosome can be used to associate samples from unknown male persons with reference samples from any of their male paternal relatives.

For example, a bone sample from male human remains suspected to belong to a particular missing person can be compared to DNA samples from the missing person's father, son, brother, paternal grandfather, paternal uncle, paternal male first cousins, and so on. Y STR profiles of known descendants of Thomas Jefferson were used in this way to confirm the lineage of descendants of his unacknowledged children (Foster 1998).

Y STR typing can also be used in sexual assault and other violent crime cases when a victim and assailant are of different sexes. For example, vaginal swabs and fingernail scrapings from victims often contain much more of the victim's own tissues than the assailant's tissues; a DNA profile generated from some of these "mixed" samples may be completely represented from the victim with only a few, if any, genetic markers observed from the perpetrator. In such cases, Y STR markers, however, being male specific may be more readily detected in a female-male mixed sample and yield results for investigative leads regarding the assailant.

From a forensic perspective, the inheritance of X chromosomes is more complicated than that of other chromosomes. A son can inherit his X chromosome only from his mother, while a daughter inherits her X chromosomes from each parent (one from her mother and one from her father.) Some family relationships can be inferred well using X STRs. For example, if a father is accused of committing incest with his daughter and if he fathered his daughter's female child, then

the X chromosome DNA markers can be quite informative in supporting or refuting the allegation: One of the child's X chromosomes will be identical to the father's X chromosome and to the one of her mother's X chromosomes that the father donated to his daughter. Alternatively, if a paternal relative of the alleged father (for example his brother, who would be an uncle of the mother) was the true father, the alleged father and his brother would have different X chromosomes; the differing genetic markers would be informative to exclude one of the male relatives and would support that the other male relative is the true father.

Another class of genetic markers is SNPs. SNPs are variations at single positions in the DNA. While STRs are the predominant marker system used in forensic analyses, SNPs offer some advantages that may make them the preferred marker system in certain situations; foremost of these is their higher rates of typing success for highly degraded DNA samples. SNPs are also better suited for family or relationship (i.e., kinship) analysis, which is the primary genetic approach for identifying human remains.

With the advanced technologies available today, it is possible to analyze hundreds of thousands or even millions of SNPs in one test. The sheer magnitude of the number of SNPs that can be assayed has opened the possibility of solving unresolved cases that were considered unsolvable just a few years ago.

Mitochondria are organelles that reside outside the cell's nucleus and contain their own DNA molecule, much smaller than the nuclear DNA molecule. Several features make mitochondrial DNA desirable for forensic analyses. Mitochondrial DNA is inherited solely from the mother, which means that, just as Y-chromosome DNA can be used to trace a paternal lineage, mitochondrial DNA can trace a maternal lineage: A mother and all of her daughters and sons, a maternal grandmother and her grandchildren, or half-siblings who have the

same mother will all have the same mitochondrial DNA sequence. Distant maternal relatives can serve as reference samples for identifying human remains of either sex (Gill 1994; Coble 2009).

MARKER	EVIDENCE	SUSPECT
D3S1358	15,16	15,16
vWA	17,18	17,18
FGA	19,22	19,22
D8S1179	13,15	13,15
D21S11	29,30	29,30
D18S51	14,15	14,15
D5S818	11,11	11,11
D13S317	11,12	11,12
D7S820	11,11	11,11
CSF1PO	11,13	11,13
TPOX	8,11	8,11
TH01	6,9.3	6,9.3
D16S539	11,13	11,13

**Figure 3. A list of genetic markers and corresponding genetic types form two sample sources.**

The DNA profile is converted to a series of numbers (i.e., types) representing the profile. Displaying the genetic types in this manner facilitates communicating DNA results. The left-hand column shows the names of each STR marker, and the center and right-hand columns are the types from an item of evidence and a reference sample, respectively. Since the types in both columns are the same, the donor of the reference sample cannot be excluded as a possible contributor of the evidence. If some of the types in the two columns were different, then the donor of the reference sample would be excluded as a contributor.

Often when standard DNA typing fails, mitochondrial DNA sequencing can provide meaningful data for identity testing. In fact, the sensitivity of current typing technology is so exquisite that as little as one to two centimeters of a hair shaft can yield a complete mitochondrial DNA sequence.

### *Interpretation*

The methods of DNA profile comparisons generally fall into two categories: direct and indirect. Direct comparisons are made between profiles collected from evidence and reference sample profiles of persons of interest, usually suspects or victims. Typically, these reference samples are collected from either buccal (cheek) swabs, blood, or personal items. Once the reference DNA profiles have been generated and reviewed to ensure they meet certain quality standards, they are compared with the profiles generated from the evidence to determine whether they are sufficiently similar to have come from the same person (figure 3). Direct comparisons can exclude the contributor of the reference sample as a source of the biological evidence if the two profiles are dissimilar. Sometimes the quantity or quality of the DNA in the evidence is too low to render an interpretation of inclusion or exclusion; in these cases, the interpretation is inconclusive.

Some profiles can be complex because they are mixtures—that is, the evidence profile was generated from the DNA of two or more people. Where this is suspected to have occurred, a reference profile can be compared to the evidence profile to assess whether the donor could be a part contributor to the more complex profile.

For direct comparisons in which the interpretation is inclusion (which also may be stated as “failure to exclude,” “match,” or, for mixture evidence, “a possible part contributor” or other similar terminology), a statistical calculation is performed so some

significance can be placed on the association. The stronger that the statistical assessment is, the greater the chance that the reference individual is a source of the biological evidence.

In some missing person cases, there are direct samples available for comparison. In these cases, DNA profiles can be generated using antemortem sources of biological samples that likely derived from the person: Toothbrushes, hairbrushes, baby teeth mementos, and licked envelopes are all possible sources of direct reference samples. While a direct comparison of profiles generated from direct reference samples may provide a strong association for identity purposes, the chain of custody on the antemortem reference sample may be questionable, introducing doubt as to its reliability.

In contrast to direct comparison testing, most missing person identifications are performed by indirect comparisons, also known as kinship testing. Indirect comparisons are based on the premise that close relatives on average share more of their DNA profile than they do with unrelated individuals. For example, a parent and a child have half their DNA in common, while a grandparent and grandchild have approximately 25 percent of their DNA in common—much greater than the amount of DNA shared between unrelated individuals. Thus, relatives are a genetic resource for identifying unknown remains: A comparison with a reference sample provided by a family member may establish that the unidentified individual is highly likely to be related to the provider of the reference sample. The closer the family relationship is, the more genetic marker types

## Case Study: Sayre, Oklahoma

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Jimmy Allen Williams, 16, Leah Gail Johnson, 18, and Thomas Michael Rios, 18, all from the small town of Sayre, Oklahoma, went missing in 1970 after leaving home to attend a high school football game. Johnson was a Native American. They remained missing for more than four decades.

A break in this unresolved case came in 2013 when the police were testing sonar equipment at Foss Lake. That testing led to the discovery of two cars in the lake. One of the cars, a 1969 Camaro, contained human remains consistent with the sexes and ages of the three missing persons. The other car, a green 1952 Chevrolet, contained the remains of three individuals suspected to be John Alva Porter, 69, Cleburn Hammack, 42, and Nora Marie Duncan, 58, who had gone missing in 1969. The medical examiner determined that all the deaths were due to drowning and were accidental.

As the cars were of the correct models and years and the bodies of the correct sexes and ages to match all six missing persons, DNA testing might not seem necessary to identify these remains. However, it was possible that one or more of the people who set out in each car could have been dropped off and others entered the cars before they entered the lake. To ensure a positive identification, DNA samples were collected from the remains of all six individuals, and family reference samples were submitted to the Center for Human Identification at the University of North Texas Health Science Center for kinship testing. The DNA results supported the identity of the six remains, resolving two missing person cases.

(City of Phoenix 2020; CBS News 2013).

there are that may be in common. The more distant the relationship is, the fewer DNA marker types that are in common, making it more challenging to perform kinship associations. Success in this type of DNA comparison depends on having family reference samples available, typically from first-degree relatives, i.e., parents, children, or siblings (especially when using the standard forensic STR markers).

Both indirect and direct methods are limited by the quantity and quality of the DNA recovered from evidence. Overall, robust identifications of human remains or of the sources of other physical evidence such as blood, hair, or semen require reliable DNA profiles from both the unknown and reference samples, systematic and objective interpretation practices, and statistical evaluation of the results.

### *Use of DNA databases*

A DNA database is a collection of DNA profiles from several sources that can be searched by use of computer technology to help identify the sources of biological evidence found at crime scenes, link unsolved cases, and associate missing persons with their families. DNA databases have made DNA typing an extremely useful tool for developing investigative leads; because of this success, the demand for adding more profiles into DNA databases has steadily increased.

CODIS is a database program managed and administered by the FBI Laboratory both directly and via subsidiary state and local systems (pursuant to the DNA Identification Act of 1994, codified at 34 U.S.C. §12592 et seq.). It provides software, database, and networking capabilities to participating criminal justice agencies to store, search, and associate DNA profiles. Because of the governmental structure of the United States, there are three levels to CODIS—the National DNA Index System (NDIS), the State DNA Index System (SDIS), and the Local DNA Index System (LDIS) (figure 4). The DNA data entered into LDIS are uploaded to SDIS, which can then pass the data on to NDIS, which is directly

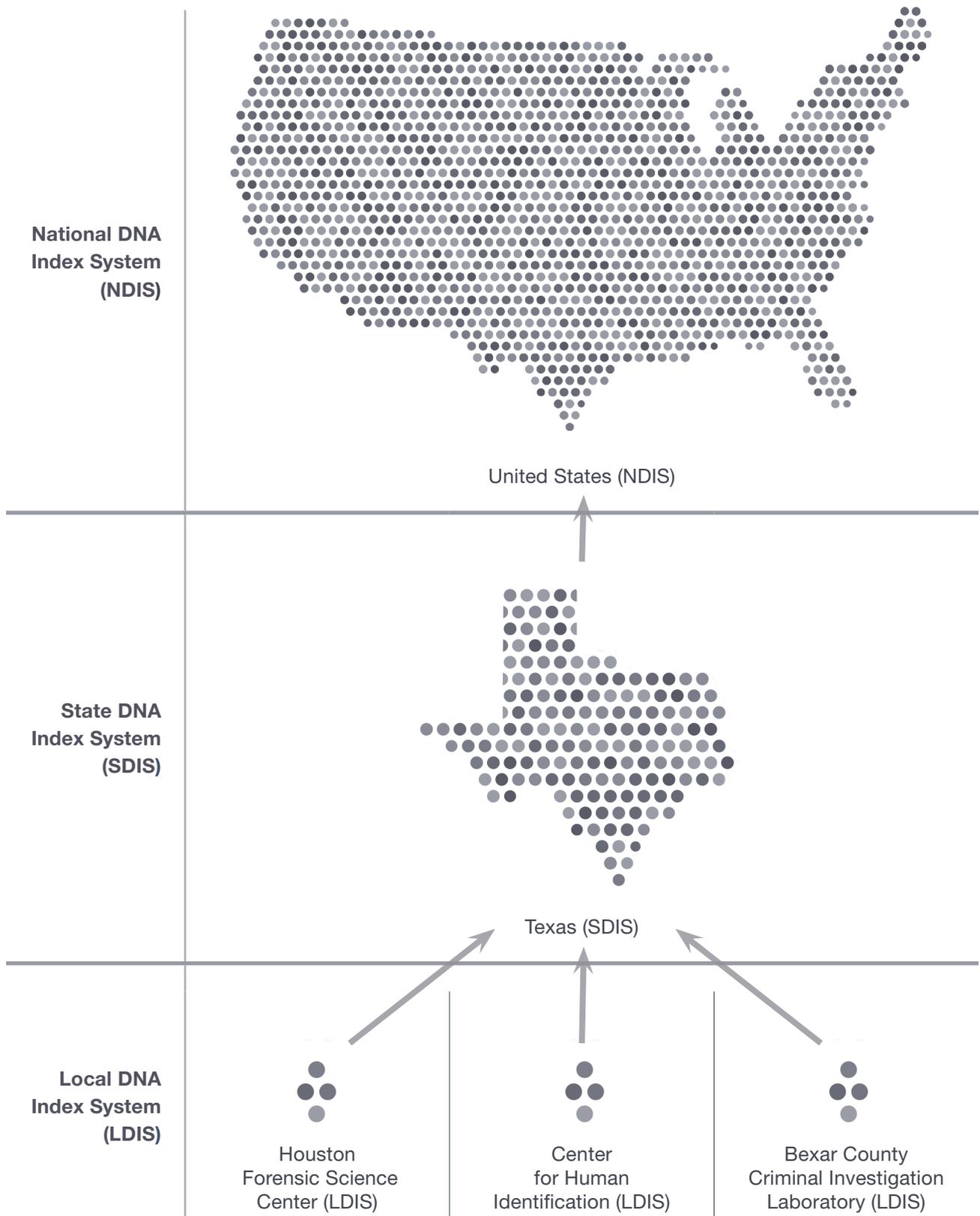
administered and managed by the FBI. NDIS allows for eligible SDIS and LDIS DNA data to be searched nationwide. These three levels form an integrated network that shares and searches DNA profiles to develop investigative leads.

The DNA profiles in CODIS are placed in different indices to facilitate searching and to protect privacy where appropriate. CODIS indices include the following:

- **Convicted Offender Index**, which contains DNA profiles from individuals who have been convicted or pled to particular crimes. This index includes a subcategory for arrestee profiles that may be uploaded to NDIS based on individual state laws.
- **Forensic Index**, which contains DNA profiles of unknown individuals developed from crime scene evidence
- **Missing Person Index**, which contains DNA profiles from direct reference samples (recovered from, e.g., blood or a toothbrush) of missing persons
- **Relatives of Missing Persons Index**, which contains DNA profiles from samples voluntarily provided by parents, siblings, and other relatives of missing persons
- **Unidentified Human (Remains) Index**, which contains DNA profiles of living and deceased individuals whose identities are unknown. Living individuals in this index include individuals with cognitive impairments, nonverbal children, and others who are unwilling or unable to articulate their identities to law enforcement.

Investigators may search DNA profiles from known or unknown persons against all of these indices. For example, a DNA profile from a crime scene sample can be searched in the database of convicted offender DNA profiles; if a match is found, it can serve as an investigative lead potentially connecting the offender to the scene. While CODIS is not linked to other databases

Figure 4. Example of Information Sharing with CODIS Laboratory Locations



around the world, its software is used by numerous law enforcement agencies around the world for creating their own version of a DNA database in their respective countries.

It is important for family members of missing persons to know that their DNA profiles can be uploaded to CODIS only with their express, written consent and that their DNA profiles can only be searched against the Unidentified Human (Remains) Index to search for their missing loved ones (FBI Laboratory 2021). DNA profiles from family members cannot, and shall not, be searched against any other CODIS index.

The National Missing Persons DNA Database, which is part of CODIS, currently contains around 7,000 DNA profiles from human remains discovered across the United States that have yet to be identified. Some of the remains are of Central Americans attempting to cross the border voluntarily or by being trafficked. The Center for Human Identification at the University of North Texas Health Science Center (UNTCHI) has instituted a standalone Humanitarian DNA Database to help identify these individuals. The software to run the database—the same as is used in CODIS—was provided by the FBI (with a memorandum of understanding). This standalone database is not connected to the FBI or any other government agencies. It allows for reference DNA profiles from family members residing outside the United States to be searched against the missing persons DNA database generated at UNTCHI in the hope of identifying these unknown persons. The searches and identifications with the Humanitarian DNA Database are purely for humanitarian efforts; this database is not used for criminal investigations. Similar databases could be established to serve other communities and peoples.

While CODIS is an essential tool for developing investigative leads, it is not always successful. CODIS hit rates per laboratory range between 30 and 50 percent, and approximately one million crime scene samples

in CODIS have yet to be associated with a reference sample. If a CODIS search returns no hits, the donor is most likely not in the database. However, this lack of a result does not mean that the case must remain unresolved. There are ways to develop leads by improving the accuracy of kinship analysis:

- Identify additional family members to provide reference samples—preferably first-degree relatives.
- Increase the number of DNA markers substantially to overcome the limited statistical power of the current STRs. Many cases will have a reference sample from only a single family member. The crime laboratory may not have been able to locate other relatives or to find close relations who would provide the most informative data. In these cases, however, the crime laboratory may be able to improve on accuracy by substantially increasing the number of markers to be analyzed.

Other approaches that combine kinship analyses, database searching, and searching public records have been successful in solving a number of cases. These methods include familial searching, Y STR database searching, and investigative genetic genealogy. All are based on identifying individuals related to the donors of forensic evidence and applying the concepts of kinship testing on a more complex level. All have advantages and limitations that investigators should consider when using these methods to enhance efforts related to unresolved cases.

Familial searching is based on the premise that a relatively high percentage of convicted felons have close relatives who also have been incarcerated (Bureau of Justice Statistics 1999). If a CODIS search does not yield a hit identifying a potential person of interest, it is possible to search the database of convicted and arrestee DNA profiles for any similar, but not identical, DNA profiles (figure 5). These similar profiles are ranked, and the samples of the top candidates are tested further with Y STRs. A subsequent Y STR profile match

MARKER	EVIDENCE	SUSPECT
D3S1358	15,16	15, <b>20</b>
vWA	17,18	17,18
FGA	19,22	<b>21</b> ,22
D8S1179	13,15	13, <b>14</b>
D21S11	29,30	29,30
D18S51	14,15	14, <b>17</b>
D5S818	11,11	11, <b>12</b>
D13S317	11,12	11,12
D7S820	11,11	<b>10</b> ,11
CSF1PO	11,13	11, <b>12</b>
TPOX	8,11	8,11
TH01	6,9.3	6,9.3
D16S539	11,13	11, <b>12</b>

**Figure 5. An STR DNA profile converted to a series of numbers representing the types of each marker.**

STR markers are numbered and listed to facilitate communicating DNA profile results. The left-hand column shows the names of each STR marker. The center and right-hand columns are the types for those markers from an item of evidence and a reference sample, respectively. The types in both columns are not all the same; therefore, this individual is excluded as a possible contributor of the evidence. However, because both samples have the majority of types in common, it is possible that the source of the evidence is related to the donor of the reference profile.

## Case Study: The Samuel Legg Case

An example of a familial search that identified a serial killer is the one that resulted in the arrest of Samuel W. Legg III. He is suspected of killing at least three women, and possibly also his stepdaughter, between 1997 and 2012. The cases were linked in CODIS because the forensic evidence shared the same STR profile; however, there were no hits in the arrestee and convicted offender reference indices, so the cases remained unresolved. Using familial searching software developed by the Center for Human Identification at the University of North Texas Health Science Center, in 2019 a potential relative of the source of the forensic evidence in these cases was identified—a man convicted of a crime unrelated to these cases. This man had a father and two brothers; one brother was considered too young to have committed the unresolved-case crimes. The other brother was Samuel Legg, who worked and lived in areas where the three CODIS-linked murders occurred. Eventually, a reference DNA sample was obtained from Samuel Legg; the STR profile matched the forensic evidence profiles in all three cases.

Source: Yost 2019.

is strong support that the individual in the CODIS familial search list is a close relative (either a father, son, or brother) of the source of the forensic evidence. This type of search is only possible where both the evidence source and the individual identified in the familial search are male. Once a familial search produces a lead, then investigators use other information to identify a suspect, which includes determining whether the candidate in the CODIS familial search list has a close relative and that relative's location, age, etc. Only a highly likely source of the evidence is subjected to the privacy intrusion of collecting a sample and testing; with the two-step process of standard STR typing followed by Y STR typing, the risk of falsely identifying a person of interest is exceedingly low. To date this process has not led to a false association.

Y STRs can also be used as the initial marker in a database search. Because all paternally related individuals share the same or very similar Y STR profile, using Y

STRs can extend the power of kinship testing to identify persons of interest beyond first-degree relatives, readily to second- and possibly up to fourth-degree male relatives. This ability to identify relatives beyond the first degree of kinship without needing any equipment and infrastructure beyond what most crime laboratories possess is an advantage of Y STR typing for indirect analyses. The primary limitation of this type of search is that most jurisdictions do not have established Y STR databases.

Investigative genetic genealogy takes advantage of a new, more powerful DNA typing technology that may benefit many unresolved case investigations through its ability to locate both close and distant family members in existing databases. This technology is based on analysis of hundreds of thousands to millions of SNPs per sample—vastly more markers than the 20 to 30 STRs compared with current methodologies. With so many SNPs, it may be possible to identify relatives of the

## Case Study: The Vaatstra Case

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The Vaatstra murder in the Netherlands is an example of how Y STR searching not only helped solve a case but also provided additional lead value to support more efficient work by law enforcement. Initially the perpetrator was believed to have been from a recent immigrant population. Y STR typing did not support this assertion and instead suggested the DNA evidence had originated from a western European. With this information in hand, the investigation was redirected; local male residents were asked to voluntarily donate DNA samples. Approximately, 6,600 samples were collected. At the time, however, typing so many samples was too demanding for the laboratory, so a decision was made to analyze small batches of 81 samples at a time. In the first batch of samples, there were two individuals with the same Y STR profile as that derived from the evidence, but other information did not connect these individuals to the crime. While they had different family names, public records showed that the two individuals were paternally related. After this discovery, the lab analyzed only the samples of those individuals who shared the family name of either of the two matches, and one of these samples matched the Y STR profile of interest. Because of other investigatory information, that individual became a prime suspect. After obtaining a DNA sample from the suspect, a standard STR profile was generated, and this profile matched the evidence DNA profile. The Y STR search was crucial in narrowing the scope of the investigation.

Source: Kayser 2017.

donor of a crime scene sample up to nine generations distant, substantially increasing the family reference sources for investigative leads—although widening the scope of a search beyond third cousins may be logistically difficult. Once an SNP profile is generated and potential relatives are identified, investigators can use public records to locate a suspect.

Genealogists have been using these searching tools to identify family relationships and to find long-lost relatives for several years. However, the value of investigative genetic genealogy is only just now coming to be realized, sparked by the recent media explosion on the resolution of unsolved cases such as the Golden State Killer, Joseph DeAngelo; the identification of the Buckskin Girl, and others (CBS News 2018). While genetic genealogy greatly expands the number of potential relatives whose profiles an unknown sample can be compared to, it does have some limitations. Reference profiles for some population groups are not widely available. There are a number of privacy issues inherent in using commercial genealogy databases: For example, data of the entire genome expose personal information about health, unknown familial relationships, and other factors; these data are in the hands of private vendors who may not store the data as securely as needed. Also, the technique requires considerable time searching historical records to associate a distant relative identified in a database search with the donor of an evidence sample. Before undertaking an investigative genetic genealogy approach, investigators and other stakeholders should discuss expectations on success rates, requisite human effort, consumption of evidence, search strategies, and costs.

### *Firearms and DNA*

Molecular ballistics combines the technologies of DNA typing and wound ballistics to associate weapons with a person of interest. Typically, DNA on firearms, or on ammunition such as cartridge cases, is collected to identify individuals who may have handled the items.

## **Case Study: The Golden State Killer**

One of the most noted genetic genealogy cases is that of the Golden State Killer. In this case, an SNP profile was obtained from physical evidence left at one of the perpetrator's many crime scenes. The data were uploaded into a commercial DNA database, and many potential relatives were identified. While some were quite distant, some were third cousins or of an equivalent degree of kinship—close enough for a genealogical search of historical records to trace the connections from these potential relatives to a manageable number of potential leads. Together with other information (such as age and location), law enforcement was able to narrow the search to a particular person. Once a suspect was identified, law enforcement collected a DNA sample and generated an STR profile. This STR reference profile matched the profile derived from the evidence and was used in establishing the identity of the Golden State Killer.

Source: St. John 2020.

In addition, DNA from victims may be recovered from firearms. When a bullet strikes a person, backspatter may occur. If the weapon is in close proximity to the victim, that backspatter may deposit on the firearm and even enter the barrel. The DNA in the barrel may be protected from conditions, such as weather and handling, that may dilute or degrade DNA on the outside of a firearm. Thus, biological evidence may persist and be recovered and analyzed even after standard ballistic test fires have been performed with the gun (Euteneuer and Curtis 2021). This analysis can potentially associate a weapon with a victim not identified during biological sampling of the weapon's exterior. It can also assist with identifying decedents in cases of suicide deaths where DNA profiles could not be developed from

## Case Study: Sophie Sergie

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In 1993, Sophie Sergie was found murdered on the University of Fairbanks campus. Sergie was a former student there and hailed from Pitkas Point, a remote Native Alaskan (Yupik) community. This case remains unresolved, but a suspect has been located through investigative genetic genealogy. During the autopsy, sperm evidence was collected; at the time, however, DNA technology was still not widely used for cases in Alaska. Using SNP typing and genealogical investigations, a potential relative of the source of the evidence was identified. This relative lived in Vermont and had no connection to the crime; however, public records showed she had a nephew, a Maine resident, who had been a student at the University of Fairbanks in 1993 and lived in the residential tower where Sergie's body was found. The Maine State Police crime laboratory generated an STR profile that matched the sperm evidence profile, and the individual was arrested. The trial is ongoing.

Source: Miles, 2020.

## Case Study: Peggy Elgo

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In 1983 the Phoenix Police found a woman's body in the Ahwatukee area in south Phoenix, Arizona. After years of investigation, the decedent remained unidentified in 2018, when investigators turned to investigative genetic genealogy, which suggested she was likely a member of the San Carlos Apache Tribe. When this information was shared with local media, family members came forward to report that the deceased woman could be Peggy Elgo, who was last seen aged 20 in Gila County, Arizona, in January 1983. No missing person report had ever been filed for Elgo.

DNA collected from Elgo's family members was compared to the remains using standard DNA kinship testing, and the results excluded the unknown decedent from being Elgo. The investigators then submitted additional family DNA samples to the Center for Human Identification at the University of North Texas Health Science Center for typing and searching against the human remains indices in CODIS. In 2019, this CODIS search matched Elgo to a different set of unidentified remains, also found in 1983 in a remote desert area of Pinal County, Arizona. Elgo was officially identified, and her family was notified of her death. The identity of the body discovered in Ahwatukee remains unknown. This case demonstrates the power of DNA typing to reduce the chances of a misidentification.

Source: City of Phoenix 2020.

remains because of decomposition, if DNA evidence was preserved on the inner surface of a firearm recovered at the scene.

### *Conclusion*

DNA profiling is a powerful tool to identify the missing and support criminal investigations. The technology has advanced substantially and continues to improve, offering exquisite sensitivity of detection and high powers of individualization. Unresolved cases in which biological evidence is available and has not been analyzed should be triaged, and if the evidence is deemed probative, it should be subjected to the most current DNA typing methodologies. The overall cost of a DNA analysis is exceedingly small compared to the investigative lead value that can be obtained.

Law enforcement agencies should consult with their local or state crime laboratory and federal crime laboratories about the best options for analyzing DNA and the best database search strategies applicable to the evidence recovered from the crime scene. Training from subject matter experts on forensic DNA analysis could heighten law enforcement awareness of the types of samples that may yield DNA and the utility of DNA for human identification.

The 2021 Executive Order 14053 includes a directive to assess the use of DNA testing and database services to identify missing and murdered indigenous people and any responsible parties. For tribal law enforcement agencies without access to in-house testing DNA testing services, a database of accredited laboratories is provided by the American National Standards Institute's National Accreditation Board (ANAB) at <https://search.anab.org/>. Most government laboratories provide analyses free of charge for their respective jurisdictions. Agencies can search the ANAB database to locate an accredited laboratory providing services in their area. Some techniques, such as forensic genetic genealogy,

are provided solely by private companies and thus may require outside funding support from the DOJ or private foundations.

### **A brief introduction to the study of fingerprints**

As with DNA, fingerprints (or latent prints and friction ridge skin impressions) can provide leads about who may have touched items at a crime scene—firearms, doorknobs, bottles, windows, etc. Recovered prints, if of sufficient value, can be compared with those from a person of interest, or they can be searched against a database of prints from known individuals to potentially develop investigative leads.

Fingerprint databases present investigators with some of the same limitations—and opportunities—as DNA databases. When renewing investigative efforts on an unresolved case, there is value in searching fingerprint evidence against available databases, even if it was done during the initial investigation. The continual improvement of search algorithms means that a search today may produce new leads that were not uncovered in previous searches of the same database. New individuals will also have been entered into the database since the initial search, both as a result of new arrests and convictions or because older fingerprint records have been newly digitized. Also, at times, reviewing an unresolved case with a fresh set of eyes may identify probative fingerprint evidence that was not considered initially.

As with other forensic evidence, identifying the source of a fingerprint does not necessarily mean that the individual was the perpetrator of the crime; corroborating evidence should be sought to support or refute if the person may be a perpetrator of the crime.

Friction ridge skin impressions have been used as a means of identification for thousands of years and were first used for identification purposes in China as early

as 300 B.C. The first systematic use of fingerprints for criminal justice purposes in the United States began in 1903, when the state of New York began fingerprinting all convicted offenders upon their release from prison. The first U.S. criminal conviction supported by fingerprint testimony occurred in Chicago, Illinois, in 1910, when Thomas Jennings was convicted of murder based in part on fingerprint evidence collected from a porch railing at the crime scene (NIJ 2011). Fingerprints are

*The Fingerprint Sourcebook, a 2011 publication of the National Institute of Justice, is recommended reading for additional information on the anatomy and physiology of friction ridge skin, as well as the history of using fingerprints for human identification.*

now used routinely for pre-employment background screenings, security clearances and access, and all forms of human identification for criminal justice and investigative purposes, such as the identification of criminal suspects and human remains.

Triaging cases is necessary to determine whether fingerprint (or latent print) evidence is available and probative. A basic understanding of the science behind fingerprint evidence can help law enforcement make informed decisions.

### *Friction ridge skin*

Friction ridge skin forms *in utero*, around the third trimester, as the dermal surface develops on the fetus's fingers, palms, toes, and soles of the feet. Friction ridge skin functions universally to increase grip. The patterns and features formed by the ridges are unique to each person—because environment, as well as genetics, plays a role in the formation of friction ridge skin, even identical twins will have different patterns. Barring injury

## **Case Study: Carroll Bonnet**

The FBI summarized the following case resolution, for which two Omaha (Nebraska) Police Department employees received the 2012 Latent Print of the Year award:

In 2008, investigators reexamined the 1978 killing of 61-year old Carroll Bonnet, who had been stabbed to death in his apartment. They ran the fingerprints recovered from the crime scene and from the victim's vehicle, which had been stolen and later found abandoned, through the Integrated Automated Fingerprint Identification System (IAFIS), which did not exist when the crime occurred. The source of the fingerprints was identified as Jerry Watson. Watson was incarcerated on an unrelated burglary conviction and was days away from release when he was linked to the Bonnett homicide through his fingerprints. The association provided by the fingerprint match was further supported by circumstantial evidence found at the crime scene, including a classified advertisement with the name "Jerry W." scribbled on the page, as well as a match between DNA found at the crime scene and reference DNA subsequently collected from the suspect. Watson was convicted and sentenced to life in prison for the murder of Carroll Bonnet.

Source: FBI 2012.

or disease, a person's finger, toe, palm, and foot print shapes are permanent, persisting throughout life and into the early stages of decomposition. This combination of uniqueness and permanence allows fingerprints to be used to discriminate between individuals and assist in identifying decedents.

### Figure 6. Level 1 fingerprint detail

Level 1 detail allows fingerprint patterns to be classified as arches, loops, and whorls.



### *The classification and use of friction ridge skin in criminal justice*

Dactyloscopy is the science of analyzing known and unknown fingerprints to establish identifications. More commonly referred to as fingerprint examination, this process looks at three levels of friction ridge detail to classify and compare fingerprints:

**Level 1** detail refers to the overall pattern formed by the flow of friction ridge skin on each finger. These patterns take the form of three large general groups of patterns: arches, loops, and whorls (figure 6).

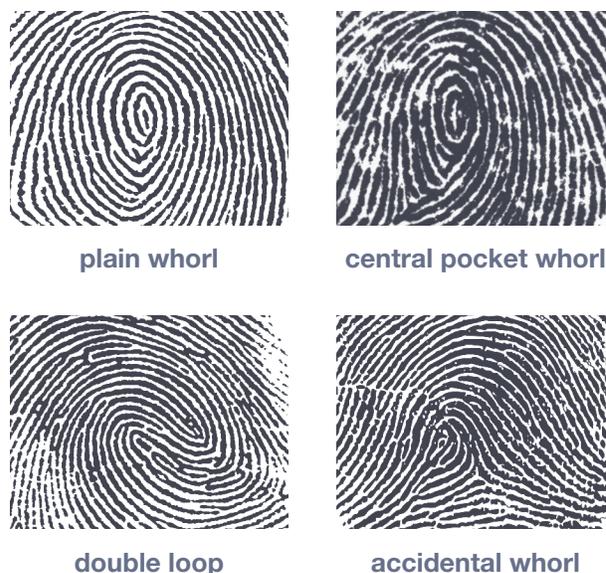
**Arches** are the least common fingerprint pattern, found in approximately 5 percent of all recorded fingerprints (Olsen 1978). As shown in figure 6, in arch patterns the flow of the friction ridge begins on one side of the finger and ends on the other. When the center of the arch is higher or more prominent, the pattern is known as a tented arch; otherwise, it is classified as a plain arch.

**Loop** patterns are found in approximately 65 percent of all recorded fingerprints (Olsen 1978), making them the most common fingerprint pattern. In loops, the flow of the friction ridge pattern begins and ends on the same side of the finger. When the pattern begins and ends on the thumb side, the pattern is known as a radial loop; when it begins and ends on the same side as the pinkie finger, the pattern is known as an ulnar loop.

**Whorl** patterns are when the flow of the friction ridges appears to form a complete or deformed circle and are found in approximately 30 percent of all recorded fingerprints (Olsen 1978). There are four major whorl patterns, which are shown in figure 7: plain, central pocket loop, double loop, and accidental whorls. All whorl patterns have at least two deltas, which are triangular shaped patterns formed where ridges meet.

Plain whorls contain one or more ridges that create a complete circle, with one delta on each side of the circle. If a line drawn between these two deltas does not touch the circular ridges, the pattern is known as a central pocket loop. A double loop whorl contains two loops combined in one print. Last, a fingerprint pattern is classified as an accidental whorl if it contains two or more patterns (e.g., a loop and a whorl), or it does not fit into any other fingerprint classification.

### Figure 7. Four major whorl patterns



**Table 1. Summary of the three general friction ridge pattern groups (arches, loops, and whorls) and the subgroups of each.**

ARCH	LOOP	WHORL
Plain arch	Radial loop	Plain whorl
Tented arch	Ulnar loop	Central pocket loop
		Double loop
		Accidental whorl

Table 1 shows a summary of the three general pattern groups (arches, loops, and whorls) and the subgroups of each of these level 1 detail patterns.

In addition to the overall ridge patterns, level 1 detail includes some measurements, such as friction ridge counting and ridge tracing.

While associations with individuals are not made based on level 1 detail, this information can still be used to include or exclude a known person as the contributor of a latent print collected at a crime scene. For example, a known suspect with a tented arch on their right index finger can be excluded as the contributor of a right index fingerprint displaying a plain whorl. Another suspect whose level 1 detail does include a plain whorl on their index finger will require further comparison of ridge flow, the number of ridges, and level 2 and 3 detail to determine whether they could be the source of the print.

**Level 2** detail is also known as minutia, points of identification, or Galton characteristics. Level 2 detail includes friction ridge formations (such as ridge bifurcations, islands, crossovers, and other individualizing characteristics), some of which are shown in figure 8. The level 2 details and their spatial relationships provide substantial information for individualization.

**Level 3** detail refers to the alignment and shape of each ridge unit, pore shape, and relative pore positions within the friction ridge skin. This detail is used in conjunction with level 2 detail to effect fingerprint comparisons for identifications of suspects and unidentified human remains, as well as to exclude individuals who are not the source of the latent print evidence.

### *Fingerprint examination*

Fingerprint examiners consider level 1, 2, and 3 detail together to describe fingerprints and effect comparisons for identification purposes. An entire complement of the friction ridge detail is highly discriminating; however, as the quality and the quantity of the recovered fingerprints decreases, at some point there may be insufficient detail in a print for comparison purposes. It is uncertain at what point a subset of friction ridge becomes insufficiently detailed to distinguish between potential sources (OSAC 2017). Friction ridge detail may be insufficient for comparison because of factors such as imperfectly reproduced latent print impressions due to distortion or environmental factors, decomposition of friction ridge skin after death, or partial prints that prevent friction ridge counting and tracing.

**Figure 8. Illustration depicting various level 2 fingerprint details that can support individualization.**



The methodology for making fingerprint associations is known by the acronym ACE-V, which stands for analysis, comparison, evaluation, and verification:

**Analysis.** The quality of level 1, 2, and 3 detail is assessed to determine if the latent print (or known print) is sufficient for comparison. This step will include an assessment of the print itself, as well as the surface material from which the print was—or will be—lifted.

**Comparison.** Level 1, 2, and 3 detail of known and unknown prints are compared. Latent prints left at crime scenes by unidentified suspects can be compared to known prints of suspects and offenders or to fingerprint records from civilian job and clearance applicants stored in databases. Fingerprints obtained from unidentified bodies can be compared to prints of missing persons or known people who may not have been reported missing.

**Evaluation.** As an examiner identifies an increasing number of corresponding features, the probability of two fingerprint impressions coming from different sources decreases. The quantity, clarity, and rarity of the friction ridge features are all important factors in discriminating between two sources (OSAC 2017). Based on this evaluation, the fingerprint examiner will determine whether the prints are from the same source (identification) or different sources (exclusion), or that a conclusion cannot be made (inconclusive). Because no two impressions of friction ridge skin are identical, even when collected from the same source, any two fingerprints compared will exhibit differences, and an examiner must determine whether variations are due to normal variations expected from the same source skin or the differences exceed normal variations (OSAC 2017).

**Verification.** After a determination is made by the primary examiner, a second examiner should perform an independent, blind analysis (with no knowledge of the prior examiner's result) of the evidence to reduce bias in the final interpretation.

The OSAC for Forensic Science Friction Ridge Subcommittee recommends standards for reporting fingerprint comparison results, including documentation of the methodologies used to perform the examination, a description of the evidence examined, a statement of any biometric database searches that were conducted, and the conclusions of the examination (OSAC 2017).

### *Considerations related to unidentified decedents*

Decomposition after death can impact the quality and quantity of fingerprint impressions gathered from unidentified deceased bodies or prevent the collection of fingerprints altogether in the case of severely decomposed or skeletonized remains. In cases of unidentified infants, it is critical to collect postmortem footprint evidence, as most hospitals collect only footprint standards from newborn babies and fingerprint exemplars will not exist. In addition, because there is no central database of newborn footprint impressions, footprint evidence will only be of value when investigators have leads indicating the potential identity of a deceased infant.

When the decedent's hands are in reasonably good condition, medicolegal death investigators or other allied forensic professionals can typically collect fingerprints directly from the decedent's fingers using a spoon-shaped tool to collect traditional inked prints or by using newer hand-held live scanning devices. At the discretion of the technician, prints may also be lifted from decedents using silicone casting material (e.g., Mikrosil) or fingerprint powder and lifting tape. Decomposing tissue may require special handling, such as the removal of the friction ridge skin for placement over the technician's gloved finger for printing or the use of photography to prevent further damage to the friction ridge skin. If decomposition is severe, it may not be possible to obtain any friction ridge detail for comparison. However, it is important to note that improvements in collection techniques, recovering friction ridge

impression evidence, and database search algorithms have substantially enhanced investigators' ability to recover and compare fingerprint evidence in new and long-term unresolved cases.

### *Crime scene processing*

As with all forensic evidence, documentation is critical to maintaining the integrity of evidence collection, investigation, and subsequent laboratory examinations. Documentation is also critical to recording all processes, results, and interpretations. Chain of custody should be documented on all evidence from discovery through archival, disposal, or return to the investigating agency. For fingerprint evidence, the following custody situations apply:

**Primary custody** refers to the latent print examiner's custody of fingerprint evidence from discovery through examination. Primary custody occurs when the latent print examiner acts as the crime scene analyst, responding directly to the crime scene, recovering fingerprint evidence from the scene, and transporting the evidence back to the forensic laboratory for examination.

**Secondary custody** refers to situations in which the latent print examiner receives evidence secured by other criminal justice personnel, such as a crime scene analyst. In this scenario, the crime scene analyst would start a chain of custody on the evidence, and the latent print examiner would document his or her custody of the recovered evidence beginning with transfer from the crime scene analyst.

**Tertiary custody** refers to situations in which the fingerprint examiner receives latent prints from other personnel, such as photographs taken by a crime scene analyst, and typically does not see the original surfaces from which the prints were recovered.

Proper evidence handling and packaging are also critical to maintaining the integrity of latent print evidence and resulting forensic examinations. As with any forensic evidence, latent prints should be collected by

trained crime scene personnel using proper evidence-handling procedures to protect the examiner and prevent contamination. These procedures include the wearing of gloves suitable for use with the particular chemicals to be used in the collection (e.g., latex, nitrile, or PVC gloves), as well as the use of masks, protective eyewear, and other personal protective equipment (PPE). Recovered prints should be packaged and transported in a manner that keeps the evidence intact, prevents contamination or degradation, and maintains chain of custody. More detail on proper collection, documentation, and transportation of fingerprint evidence can be found in chapter 10 of *The Fingerprint Sourcebook* (NIJ 2011).

### *Fingerprint databases and best practices*

Contrary to common belief, there is not a single fingerprint database that stores and compares all fingerprint information on a national level. Fingerprint databases exist at the local, state, and federal levels, and those disparate systems do not necessarily overlap in the information they contain or allow users to share and search information across systems. Generically, systems designed to digitally store, search, and compare fingerprint data are referred to as automated fingerprint identification systems (AFIS), but these systems may also be referred to by the names assigned by various commercial vendors (e.g., NEC AFIS; Morpho AFIS; or CAFIS, produced by Cogent) or by the names of overarching biometric systems, such as Next Generation Identification, or NGI.

On the federal level, two fingerprint databases facilitate the automatic exchange and comparison of fingerprint information: NGI and the Automated Biometric Identification System (IDENT).

#### Next Generation Identification

In July 1999, the FBI's CJIS division began operating and maintaining the Integrated Automated Fingerprint Identification System (IAFIS), which facilitates automatic exchanges and searching of tenprint cards (that is,

cards collecting prints of all ten of an individual's fingers) and latent fingerprints. This system also allowed for text-based searches of descriptive information such as scars and tattoos.

In 2011, the FBI deployed the first increment of a fully upgraded system that would ultimately combine enhanced fingerprint searching with other biometric comparisons. This new system, known as Next Generation Identification, or NGI, harnesses new technologies to add facial recognition capabilities, along with the ability to search palm prints and irises. The upgraded fingerprint comparison module of NGI, known as Advanced Fingerprint Identification Technology, or AFIT, includes enhanced algorithmic searching that has increased fingerprint matching from 92 percent to more than 99.6 percent (FBI 2021c).

The success of NGI's enhanced search algorithms is evidenced by a collaboration that began in 2017 between the FBI and NamUs. Over the course of this project, which is still ongoing in 2021, more than 2,600 tenprint cards or latent fingerprint images for unidentified decedent cases in NamUs were securely transmitted to the FBI for searching through NGI. Included in those cases were a significant number of fingerprint records relating to long-term, unresolved cases, which had been previously searched through local, state, and federal fingerprint systems, including IAFIS. The enhanced search algorithms of NGI turned up many new hits: To date, more than 300 identifications have been made, with the oldest case dating back to 1973. Of those identifications, 34 involved homicide victims and another 83 were cases where the cause of death was undetermined, which may also be homicides (OJP 2021).

As of March 2021, the NGI system contained more than 59 million civil fingerprint records, more than 78 million criminal fingerprint records, and more than a

million unidentified latent fingerprints submitted to NGI by local, state, and federal agencies across the country (FBI 2021c). NGI is the largest fingerprint database in the United States. It is important to note that there are fingerprints contained in the IDENT system that are not contained in NGI, and vice versa, so it is important to search fingerprints through both federal systems to increase the chance of making an association.

### The Automated Biometric Identification System (IDENT)

Operated by the U.S. Department of Homeland Security (DHS) through its Office of Biometric Identity Management (OBIM), IDENT is a DHS-wide system for storing, processing, searching, and associating biometric information, including fingerprints, for national security, law enforcement, immigration and border management, intelligence, and background investigations for security clearances (DHS 2012). Contributors to IDENT include federal agencies such as U.S. Customs and Border Protection and the U.S. Department of State as well as foreign government law enforcement, intelligence, and criminal justice agencies and international agencies such as the International Criminal Police Organization (INTERPOL) (DHS 2012).

### Database best practices

Because the NGI and DHS databases contain a much greater number of fingerprint records than local and state systems, they facilitate far more comprehensive fingerprint searches, especially when both are used for unidentified remains investigations. A study conducted by Mulawka and Craig (2011) illustrated the need to ensure fingerprints for unidentified remains are searched through both federal fingerprint databases. In the study, fingerprint records for 109 unidentified decedents at the San Diego County Medical Examiner's Office were submitted for searching through the NGI and IDENT databases. As a result of those searches, 51

individuals (47 percent) were identified through fingerprint hits, with the oldest case resolved dating back to 1979 (Mulawka and Craig 2011). Of the 51 identifications made, 48 were associated through IDENT hits and 15 were associated through NGI hits. (Some fingerprints were recorded in both systems.)

It is important to note that AFIS systems do not replace the role of fingerprint subject matter experts in the ACE-V process. They are tools to develop candidate lists for subsequent manual evaluation. If an association or hit is returned in the candidate list, a fingerprint examiner must follow ACE-V methodology separate from the AFIS hit to determine if they are from the same source, and the primary examiner's conclusion must be verified by a second examiner to follow best quality practices.

## Forensic odontology

### *An overview of forensic odontology*

Forensic odontologists use dental radiographs (x-rays), written treatment records, and associated dental information to determine personal identification. Forensic odontology is one of the three major forensic tools, alongside DNA analysis and fingerprint examination, available to compare known and unidentified persons and to support identifications. Forensic odontology can provide a rapid and cost-effective means of identification and can be effective in certain circumstances in which the other biometric methods may not be useful. For instance, fingerprints may not be obtainable from decomposed remains. Forensic DNA results cannot be obtained if family reference DNA samples are not available for comparison because of the death of close family members or the identity of birth parents being unknown in cases of closed adoptions. When remains are degraded to a point that precludes fingerprint collection or DNA typing, forensic odontology may be the sole source by which remains can be identified.

The use of dental records, radiographs, photographs, and other data in making identifications of human remains begins with the collection, analysis, and completion of a dental profile. Creating a dental profile involves developing a “code” for each of the 32 adult teeth—or, in the case of partial remains, for the total number of teeth available—which can then be compared with the coded profiles of unidentified persons. The coding and analysis process must be completed by a forensic odontologist familiar with NCIC dental coding and must have a means to convert and enhance dental images for effective comparison. The procedures for dental coding in forensic odontology differ from those used by a non-forensic dentist, and improper coding or mounting of radiographs by someone other than a trained forensic odontologist can lead to erroneous exclusions or delayed identifications.

### *HIPAA exception*

The Health Insurance Portability and Accountability Act (HIPAA) places certain protections on the sharing and dissemination of an individual's health-related records; however, 45 C.F.R. § 164.512(f) details the HIPAA Exception for Law Enforcement, and 45 C.F.R. § 164.512(g) details the HIPAA Exception for Medical Examiners and Coroners. These exceptions allow law enforcement, medical examiners, and coroners to obtain a missing person's medical and dental records for the purpose of identification through a court order, warrant, or written administrative request (HHS 2013). Not all dental offices may be aware of this exception, so it may be necessary for law enforcement to cite or provide a copy of 45 C.F.R. § 164.512(f) and (g) to these providers to obtain records. NamUs forensic odontologists (described in the next section) can also assist in explaining and providing HIPAA release information to dental providers.

### *Where to obtain forensic odontology resources*

For agencies that do not have access to forensic odontology resources, the NamUs program may provide these services, completing dental profiles for upload to NCIC and NamUs. All NamUs forensic odontology services are provided at no cost, including shipment of biometric records to and from the investigating agencies or dental service providers.

Once a NamUs forensic odontologist obtains dental records and images, they perform a detailed analysis and review of the records. All pertinent dental records are scanned, oriented correctly, enhanced as needed, labeled, and uploaded to NamUs, where they are available for 24/7 comparisons for potential associations with missing and unidentified persons. The dental upload to NamUs includes the upload of both NCIC and NamUs dental coding, which can also be used for proactive searching for similar dental characteristics. NamUs forensic odontology services also include the following:

- Dental profile comparisons to disposition (sort and evaluate) tips and leads
- The upload of exclusion information into NamUs when a dental comparison determines that a missing and an unidentified person are not the same individual, creating a permanent record in NamUs of the disposition of that particular lead
- Referrals to medical examiners and coroners to review dental data for potential identifications, if the NamUs odontologist determines it may be possible to make an identification based on dental comparisons
- Assistance with the search for dental records, including those of military veterans that may be on file with the National Personnel Record Center

- Assistance explaining and providing HIPAA exception documentation to dental providers to obtain dental records for missing persons
- Case consultations for other matters related to the acquisition, retention, or analysis of dental information

More information and contact information for NamUs forensic odontology services can be found in the NamUs Forensic Odontology service overview booklet (NamUs 2020).

### *Best practices*

Because dental records are not retained indefinitely by service providers, it is important for investigators to obtain missing person dental records early in an investigation. Many states are passing missing persons legislation that includes time frames for the collection of biometric information for missing persons, such as obtaining dental records, fingerprints, and family reference DNA samples once an individual has been missing for 30 to 60 days. If not obtained quickly, dental records may be lost or destroyed, as there is no national record retention policy for individual service providers.

A complete missing person dental record should include all available written treatment records, dental radiographs, dental photographs, dental models of teeth, and any referrals to specialists that may have additional dental records.

Radiographs should be scanned by a trained forensic odontologist, as they require a special transparency scanner and images must be correctly oriented. All analyses of dental information should be performed by a forensic odontologist to ensure high-quality dental entries and proper coding of dental records specifically for NCIC and NamUs.

# Summary

Investigating unresolved cases involving acts of violence is one of law enforcement's more challenging tasks (Davis, Jensen, and Kitchens 2011; Buckley 2012; IACP 2016; NSA 2011). Cases remain unresolved for a variety of reasons. Major impediments to advancing unresolved cases toward a solution include the following:

- Lack of currently actionable leads or forensic evidence
- Lack of use of current forensic resources
- Investigator turnover
- Absence of witnesses
- Reluctance of witnesses to cooperate or testify
- Limitation of resources

Unresolved crimes of violence, long-term missing persons, and unidentified human remains cases bring with them significant emotional trauma for everyone involved (Moran 2021). Despite their adverse impact, resources for unresolved case investigations are extremely limited (Davis, Jensen, and Kitchens 2011; Moran 2021). Such limitations are especially relevant for AI/AN communities that often face significant challenges related to a disproportionate impact of violent crime, under-resourced law enforcement, and lack of victim and survivor service-oriented agencies (Adcock 2021; IACP 2016; VoA; Weyand and McPherson 2021). Nonetheless, most tribal law enforcement agencies should proactively look for routine as well as innovative ways to acquire resources and, if possible, staffing for unresolved case investigations.

Limited resources notwithstanding, there is a general consensus that the decision to maintain a high level of effort investigating unresolved cases should be made systematically and thoughtfully (Adcock 2021; NIJ 2019; PERF 2018; NSA 2011). As a part of a systematic approach, experts recommend prioritizing investigative efforts through the use of solvability factors to better manage the expectations of victims, their family members, and other stakeholders (Adcock 2021; Miami Police Department 2017; NIJ 2019; PERF 2018; NSA 2011). While it is difficult to ignore high-profile cases, other cases that have a higher solvability should be considered for renewed focus, as they are just as important to victims, their families, and their communities. While this kind of reprioritization may be challenging, the end result is a more definitive outcome for an unresolved case, and possible emotional resolution for victims, survivors, family, friends and the community.

In considering solvability factors, use of a standardized solvability matrix or checklist is recommended to triage and prioritize cases and determine the degree of dedicated effort required for reinvestigation, especially when an agency has multiple unresolved cases to consider (Adcock 2021; Miami Police Department 2017; NIJ 2019; PERF 2018; NSA 2011). As resources are likely to be more limited for smaller agencies, even if they have fewer unresolved cases, a solvability matrix can also be beneficial in more effectively focusing a limited investigative capacity. Among other sources, the National Institute of Justice Cold Case Investigation Working Group (NIJCCIWG) (NIJ 2019) offers several specific recommendations for evaluating and prioritizing the continued investigation of unresolved cases.

Unresolved cases with testable evidence should be prioritized above those lacking testable evidence. A number of reasons exist as to why evidence may not have been analyzed at the time of the crime, which include the following:

- The technology did not exist
- The technology has advanced so that results may be obtained where it was previously not possible
- Resources were not available at the time of the crime to pursue the evidentiary lead value
- Investigators may not have been aware of the value of the evidence or the contemporary technology and supporting investigative databases (Adcock and Stein 2013; Davis, Jensen, and Kitchens 2011; Moran 2021)

In particular, one of the most fruitful types of evidence to consider for enhanced efforts in an unresolved case is DNA evidence that was not tested initially (Adcock and Stein 2013; Miami Police Department 2017; NIJ 2019; PERF 2018). This guide includes a primer on the types, characteristics, and possibilities for processing multiple types of evidence, with an emphasis on DNA.

A combination of components goes into putting together an unresolved case investigative team with a high probability of success (NIJ 2019). Foremost is the selection of a highly capable primary investigator. Experienced investigators with a proven track record of success in solving violent and complex crimes are crucial to the success of any unresolved case investigation. In addition to being highly motivated to work unresolved cases, investigators should be culturally competent and empathetic and bring to bear a trauma-informed mindset when interacting with victims, survivors, families, witnesses, and highly invested community members and organizations (Adcock 2021; Moran 2021; NIJ 2019; NSA 2011; Weyand and McPherson 2021). In unresolved cases that cross geographical and jurisdictional boundaries, investigating agencies should consider building an ad hoc team of investigators and partner agencies with interests in bringing the case to a positive conclusion from complementary points of focus (NSA 2011).

It is also important to gain support of prosecutors for each case being investigated (Adcock 2021; Davis, Jensen, and Kitchens 2011; Heurich and Haskins 2019; Miami Police Department 2017). Even if no one is ultimately charged or convicted for the crime under investigation, prosecutors on the tribal, local, state, or federal levels can provide extremely valuable strategic guidance and assistance in the investigative process, including subpoenas and other practical and moral support required to properly pursue a case. Teamwork also promotes the exchange of ideas and leverages resources among the team members. Prosecutors' offices may also be able to provide additional analytical and victim and survivor assistance for the case.

Establishing and maintaining contact with the laboratories responsible for processing and analyzing evidence can enable investigators to be up to date on the possibilities for evidence collection and additional forensic analyses. Using the skills of properly vetted community

volunteers, interns, academic experts, and victim and survivor advocates to enhance the investigation team resources can also be extremely beneficial (Adcock 2021; Adcock and Stein 2013; NIJ 2019; PERF 2018; Weyand and McPherson 2021).

Investigators need to be cognizant of the effect that the reinvigorated focus on the case will have and be prepared in advance to address the personal and interpersonal reactions that will result (NSA 2011). Victim and survivor service professionals should be included in the investigative process to help guide victims and families through their emotions about the renewal of the case, as well as to serve as an information bridge should their relationship with the law enforcement agency become strained (NSA 2011; NIJ 2019). If at all possible, unresolved case investigations should include the engagement of victim advocates. Should victim advocates not be readily available, investigators should properly prepare themselves for the highly emotional interactions they likely will have with victims and their family members. Law enforcement agencies also need to incorporate detailed communications plans tailored to all stakeholders in individual cases as a preliminary step of re-focusing on an unresolved case (Heurich and Haskins 2019; NIJ 2019; NSA 2011).

Effective and efficient file and records management is a key element contributing to the success of unresolved case investigations. Unless an agency has recently completely digitized, consolidated, and updated its records, information, and evidentiary management systems, a recommended initial step for prioritizing unresolved cases is to consolidate all of the components of all of the unresolved cases into one digital or physical space (Adcock and Stein 2013; Heurich and Haskins 2019; Miami Police Department 2017; PERF 2018). Establishing a comprehensive searchable database or spreadsheet is a critical step to building a robust

capacity to conduct unresolved case investigations (Adcock 2021; Heurich and Haskins 2019; PERF 2018; NIJ 2019). As cases advance and time elapses, a robust and comprehensive case management system can provide current and future investigators and vetted stakeholders with the ability to more quickly assess the status of a case and make better-informed decisions about next investigative steps and priorities (NIJ 2019). For agencies without the resources to invest in a digital records management system, a simple case tracking system can be implemented using a spreadsheet.

Executing a solvability and case selection process, building the right team, and establishing an effective case management process are important steps for unresolved case investigations. These steps should be built into a standardized set of unresolved case investigation protocols, regardless of the size of an agency. Unresolved case investigative protocols can be general in nature or specifically based on the type of the crime. Both the NIJCCIWG and Bureau of Indian Affairs – Office of Justice Services (BIA-OJS) offer excellent examples of unresolved case investigation protocols that can be tailored and adapted for individual agencies, investigators, and specific types of cases. Serving as more than just formal checklists, well-reasoned and evidence-based protocols generate substantial benefits for both investigative agencies and investigators. As with the use of a case solvability matrix or checklist to prioritize efforts, the systematic approach to unresolved case investigation is an effective way to more efficiently conduct an investigation and to increase the probability of a successful outcome.

Some law enforcement agencies may prefer an approach more adapted to their unique circumstances instead of a more generalized one-size-fits-all unresolved case investigative protocol (Weyand and McPherson 2021). Regardless, a well-reasoned plan of action has proven

to be a vital component in successfully concluded unresolved cases. Establishing and following such a plan is a signal to victims, survivors, families, community members, and other external stakeholders that the investigative agency fully appreciates its charge to bring about justice and provide safety and security, all in an empathetic way (Adcock 2021; IACP 2016; Weyand and McPherson 2021).

Regardless of the system or protocols employed, all unresolved case investigations need to be approached from a trauma-informed perspective (Adcock 2021; Heurich and Haskins 2019; NIJ 2019; COPS Office 2020; Moran 2021). Especially in the AI/AN context, a trauma-informed approach is crucial to establishing and maintaining trust with victims, families, and other relevant stakeholders.

Garnering and preserving trust requires empathetic and consistent communications and presence (Adcock 2021; NSA 2011; NIJ 2019). Unresolved case investigators may change, and likely will change, over the course of a long-term investigation. Thus, agencies should consider developing specific protocols or strategies to maintain engagement with victims, families, and other relevant stakeholders. The contact need not be frequent but should maintain continuity. In addition, AI/AN cultural mores and practices need to be considered at every step of the investigation, from basic interviews to the disposition of recovered human remains (Adcock 2021; Moran 2021; IACP 2016; Weyand and McPherson 2021). As these mores and practices may vary among tribal communities, unresolved case investigators from outside a particular community should ensure they gain awareness of any unique cultural practices that will impact how to proceed with their investigations.

Unresolved cases significantly impact victims, families, communities, and investigators. To the greatest extent possible, tribal law enforcement agencies should attempt to resolve cases in a way that benefits all stakeholders. A wide variety of measures can be taken to determine which unresolved cases should be prioritized: Organize case information, triage cases, build effective teams, and identify and process or reprocess forensic evidence. All of these actions should be undertaken with open communication and understanding—and, importantly, with empathy for victims, families, and the communities involved (i.e., with a trauma-informed perspective).

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# Appendix A.

## Databases and Other Service Providers

Databases facilitate the automatic exchange of information among users, enabling investigators to share, compare, and analyze criminal justice information on local, state, regional, and national levels. This exchange increases the number of cases resolved while also expediting case resolutions. Databases and service providers detailed in this document include the following:

### 1. The National Missing and Unidentified Persons

**System (NamUs)** provides investigative support and free forensic services to resolve long-term missing, unidentified, and unclaimed person cases. NamUs is accessible to all from [www.NamUs.gov](http://www.NamUs.gov), with some information restricted to registered and vetted criminal justice users. The NamUs database performs automatic case comparisons and allows users to create ad hoc queries to search for unique physical characteristics such as scars and tattoos. NamUs also includes data fields specific to tribal cases.

### 2. The National Center for Missing & Exploited Children (NCMEC)

serves as a national clearinghouse of information related to missing children and child exploitations and offers database technology, case analysis and investigative support, forensic art, and forensic services through partner laboratories.

### 3. The National Crime Information Center (NCIC)

is administered by the FBI and is a computerized index of criminal justice information available to local, state, and federal law enforcement agencies, with additional access to tribal police through the DOJ's Tribal Access Program. Included in the 21 person and property files in NCIC are missing persons, unidentified persons, wanted persons and fugitives, and the National Sex Offender Registry. NCIC performs automatic comparisons between missing and unidentified persons, and users can request ad hoc

queries through offline searches requested through the FBI's Criminal Justice Information Services (CJIS) division.

**4. The National Data Exchange (N-DEx)** is a national, web-based system of the FBI which provides authorized agencies with 24/7 access to criminal justice records such as incident and arrest reports, supervised release reports, calls for service, and corrections data. N-DEx compliments other FBI systems by providing records not contained in NCIC or other national systems.

### 5. The Violent Criminal Apprehension Program

**(ViCAP)** is administered through the FBI's Critical Incident Response Group's (CIRG's) National Center for the Analysis of Violent Crime (NCAVC). ViCAP combines analytical personnel with a nationwide data center designed to collect, collate, and analyze violent crime information, including cases involving missing and unidentified persons, as well as homicides and sexual assaults.

### 6. The National Integrated Ballistic Information

**Network (NIBIN)** is administered through the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) and allows laboratory examiners to upload ballistic images for searching against other evidence from their jurisdiction, neighboring jurisdictions, or cases across the country.

# Appendix B. Comparing the NamUs and NCIC Databases for Missing and Unidentified Person Investigations



**Presidential Task Force on  
Missing and Murdered American Indians  
and Alaska Natives**  
Operation Lady Justice

"Lady Justice" used with permission from DG Smaling, Choctaw Nation

<h2 style="margin: 0;">NamUs 2.0 Database</h2> <p><b>ACCESSIBILITY</b></p> <ul style="list-style-type: none"> <li>• Accessible online 24/7, 365 days per year, with varying levels of access depending upon the registered, vetted user permissions.</li> <li>• All visitors and users have access to all publicly-viewable fields in published cases.</li> <li>• Authorized local, state, tribal, and federal law enforcement officers, as well as medical examiners, coroners, and allied forensic specialists can enter, manage, and view sensitive information.</li> <li>• Public users can make missing person entries, which are vetted with appropriate criminal justice agencies prior to publication.</li> </ul> <p><b>INFORMATION</b></p> <ul style="list-style-type: none"> <li>• Stores records of three case types: missing persons, unidentified persons (living and deceased), and unclaimed remains.</li> <li>• Stores detailed biometric coding/classification (e.g., dental and fingerprint) with associated high-resolution image files (e.g., dental radiographs and 10-print fingerprint cards).</li> <li>• NamUs staff assist with the acquisition and entry of biometric information, including collection of records from the National Personnel Records Center for missing military personnel.</li> <li>• NamUs forensic subject matter experts perform secondary review of all biometric information to ensure accuracy and completeness.</li> </ul> <p><b>CASE COMPARISONS</b></p> <ul style="list-style-type: none"> <li>• Real-time comparison of missing and unidentified person cases in "Comparisons" tab is accessible to all authorized professional system users.</li> <li>• NamUs forensic subject matter experts perform 1:1 comparisons of biometric data to disposition tips and leads.</li> <li>• Identifications and exclusions can be recorded in NamUs files.</li> </ul> <div style="text-align: center; margin-top: 20px;">  </div>	<h2 style="margin: 0;">NCIC Database</h2> <p><b>ACCESSIBILITY</b></p> <ul style="list-style-type: none"> <li>• Accessible 24/7, 365 days a year to over 18,000 authorized federal, state, local, and tribal law enforcement and criminal justice agencies.</li> <li>• All authorized agencies have access through their appropriate state or federal Criminal Justice Information Services (CJIS) Systems Agency (CSA). The access is not available to the public.</li> <li>• Authorized medical examiners/coroners are granted direct access to the Missing and Unidentified Person Files for query, entry, and record modification through their state CSA.</li> </ul> <p><b>INFORMATION</b></p> <ul style="list-style-type: none"> <li>• 21 files (7 property files and 14 person files) which include the Missing and Unidentified Person files.</li> <li>• Stores detailed biographic data which can be associated to biometric systems such as the Next Generation Identification System, the National Dental Image Repository, and the Combined DNA Index System.</li> <li>• Data entered by authorized law enforcement personnel who may coordinate with forensic subject matter experts as needed.</li> <li>• NCIC policy requires all records receive a second-party check, annual validation for accuracy and completeness, and are subject to auditing.</li> </ul> <p><b>CASE COMPARISONS</b></p> <ul style="list-style-type: none"> <li>• Potential matches between the Missing and Unidentified Person files are automatically generated and sent via daily system messages to the investigating agency and record-owning agency. These messages produce investigative leads for missing and unidentified person cases.</li> <li>• Offline search capability and support, which provides information not available through a typical inquiry, to further assist in Missing and Unidentified person investigations.</li> </ul> <div style="text-align: center; margin-top: 20px;">  </div>
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Source: OLJ (Operation Lady Justice). 2020a. Comparing the NamUs and NCIC Databases. Fact sheet. Washington, DC: U.S. Department of Justice. <https://operationladyjustice.usdoj.gov/sites/g/files/xyckuh281/files/media/document/oljnamusncic.pdf>.

# About the COPS Office

The **Office of Community Oriented Policing Services (COPS Office)** is the component of the U.S. Department of Justice responsible for advancing the practice of community policing by the nation's state, local, territorial, and tribal law enforcement agencies through information and grant resources.

Community policing begins with a commitment to building trust and mutual respect between police and communities. It supports public safety by encouraging all stakeholders to work together to address our nation's crime challenges. When police and communities collaborate, they more effectively address underlying issues, change negative behavioral patterns, and allocate resources.

Rather than simply responding to crime, community policing focuses on preventing it through strategic problem-solving approaches based on collaboration. The COPS Office awards grants to hire community policing officers and support the development and testing of innovative policing strategies. COPS Office funding also provides training and technical assistance to community members and local government leaders, as well as all levels of law enforcement.

Since 1994, the COPS Office has invested more than \$14 billion to add community policing officers to the nation's streets, enhance crime fighting technology, support crime prevention initiatives,

and provide training and technical assistance to help advance community policing. Other achievements include the following:

- To date, the COPS Office has funded the hiring of approximately 130,000 additional officers by more than 13,000 of the nation's 18,000 law enforcement agencies in both small and large jurisdictions.
- Nearly 700,000 law enforcement personnel, community members, and government leaders have been trained through COPS Office-funded training organizations and the COPS Training Portal.
- Almost 500 agencies have received customized advice and peer-led technical assistance through the COPS Office Collaborative Reform Initiative Technical Assistance Center.
- To date, the COPS Office has distributed more than eight million topic-specific publications, training curricula, white papers, and resource CDs and flash drives.
- The COPS Office also sponsors conferences, roundtables, and other forums focused on issues critical to law enforcement.

COPS Office information resources, covering a wide range of community policing topics such as school and campus safety, violent crime, and officer safety and wellness, can be downloaded via the COPS Office's home page, <https://cops.usdoj.gov>.



The Missing or Murdered Indigenous Persons movement has brought new attention to the rate of unresolved crime in Indian Country or involving American Indians and Alaska Natives. Tribal law enforcement agencies often face challenges finding the resources—in money, time, and expertise—to investigate these cases. *Unresolved Cases: A Review of Protocols and Resources for Supporting Investigations Involving American Indians and Alaska Natives* compiles best practices and resource guides to assist tribal, state, and local law enforcement agencies in reviewing and investigating unresolved (or “cold”) cases. Protocols for communications, record-keeping, and trauma-informed victim services; databases of personal and ballistic information; and physical evidence including DNA, fingerprints, and forensic dentistry are all detailed.



**COPS**

Community Oriented Policing Services  
U.S. Department of Justice

U.S. Department of Justice  
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To obtain details on COPS Office programs, call  
the COPS Office Response Center at 800-421-6770.

Visit the COPS Office online at [cops.usdoj.gov](https://cops.usdoj.gov)