

# VERDICT: GUILTY OF FIRST DEGREE MURDER 3D LASER SCANNING AND GPS ANALYSIS

## New Tools for the Prosecution

On Thursday, Sept. 26, a jury found the 38-year-old Reno man guilty of murder and seven other felonies stemming from a car chase that ended in a hail of bullets from Wallin-Reed's AR-15 assault rifle. Gregory Chad Wallin-Reed will likely spend the rest of his life in prison for the July 2011 shooting death of Rory McGuire.

NBC broadcast a special two-hour Dateline segment about the Gregory Wallin-Reed murder case to a national audience on Friday, Oct. 18, 2013.

PSI's CEO, Craig Fries, testified to the 3D reconstruction and 3D Laser Scanning analysis that showed that the victims were attempting to flee from their assailant at the time they were shot. Plumas County District Attorney David Hollister used the 3D graphics extensively in his closing.

*"But as the prosecutor told the jury, evidence found in the meadow told a very different story. The detectives took us there to show us. Remember how the young men's car hit a rock, cracked open the oil pan? The dripping oil left a distinctive trail.*

*We could see the oil that had been laid down by Rory McGuire's car.*

*Using that trail of oil the prosecutor had an animation created, which showed the car was not heading toward Chad's truck but instead was heading around it, away from Chad.*

*His shot placement was very well placed. It was head height, shooting at the windows of the vehicle. One went low into the rear passenger door, which then went into Smythe's leg but most of the shot placement was high.*

*In other words chad wasn't shooting the disabled car said the prosecutor. The evidence suggested he was shooting to kill the occupants even as they were trying to get away.*

*Was the defendant in imminent fear of death or great bodily injury-- was he in fear? the answer is no."*

**From Transcript of 'Miles From Nowhere' - Dateline NBC**



## PSI CASE EXAMPLE

### CHALLENGE # 1

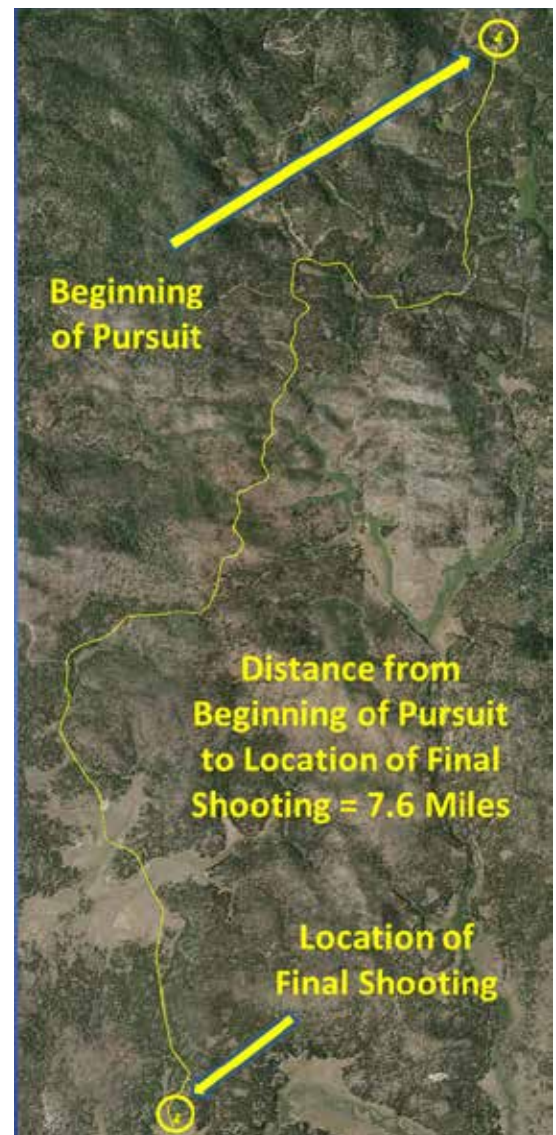
During the 7.6 mile pursuit, multiple pieces of critical evidence were left behind, including numerous spent cartridge casings from different weapons fired by Wallin-Reed from his truck. This evidence not only positioned the suspect and his actions at various points in time, but also was critical in debunking portions of his given testimony regarding the series of events that led to his fatal shooting of McGuire.

The challenge became how to correlate the GPS-marked locations of critical evidence along the 7.6 mile pursuit route to physical locations on the road and Wallin-Reeds given statements.

### SOLUTION # 1

The suspect provided videotaped statements during a drive along the pursuit route that showed his version of where critical events occurred, including where he was when he fired and the victims allegedly fired. This video was correlated in location by comparing the footage with images from Google Earth's "street view" function, providing GPS coordinates for each of the locations identified by Wallin-Reed.

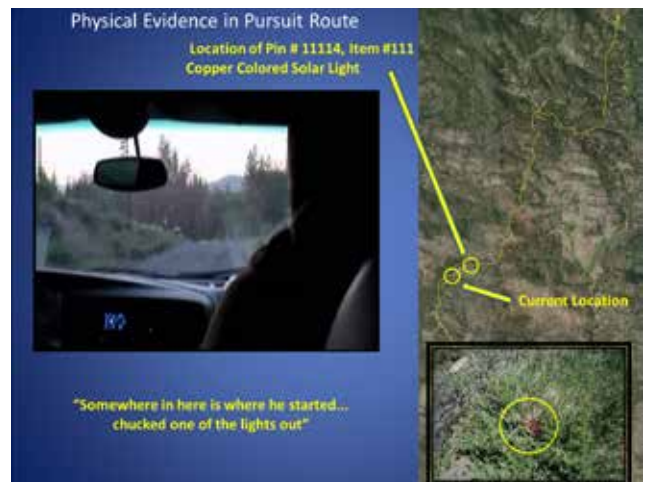
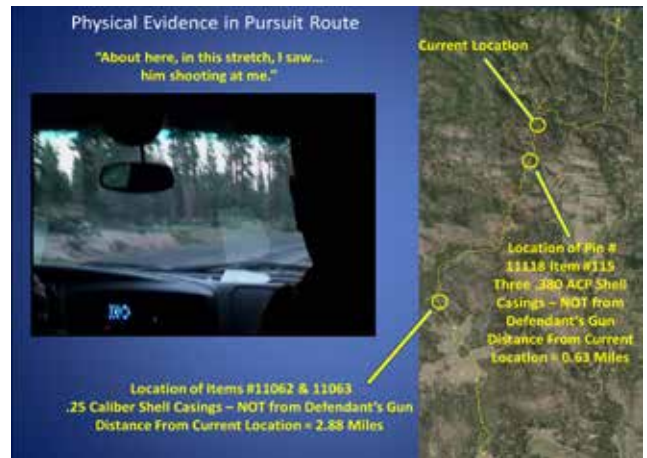
The Plumas County Sheriff's office surveyed the entire route for physical evidence, locating and providing GPS locations for multiple items along the route. These GPS locations were located on an aerial map, and compared to the location provided by Wallin-Reed. The resulting compilation provided a clear illustration to the jury of the location of each piece of evidence and the discrepancies between Wallin-Reeds statements and the physical evidence he left behind.



### Defendant Testimony vs. Physical Evidence GPS-marked Locations

When comparing the critical events Wallin-Reed pointed out during the videotaped drive along the 7.6 mile pursuit route, with the physical evidence and their GPS locations, large discrepancies in the distances where discovered. In order to demonstrate this, PSI created an aerial overview of the map locations. The map showed the entire pursuit aerial view with locations marked showing Wallin-Reed's recollection of the location of events compared directly with each piece of physical evidence found by investigators along the path.

In addition, the presentation showed portions of the videotaped ride along testimony and pictures of the actual physical evidence found in the pursuit path. The discrepancies between Wallin-Reed's testimony and the actual locations of the physical evidence impeached the defendant's recollection of events to the jury.



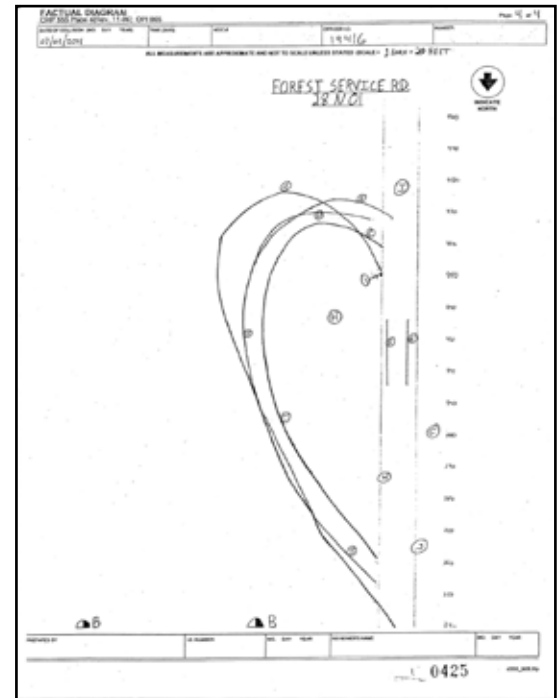
### CHALLENGE #2

How to incorporate all the evidence at the fatal shooting location identified and marked by multiple agencies using multiple measuring systems to develop a single, comprehensive 3D Working Model. Then use this Working Model to determine what happened, and specifically, the relative timing and locations of the victims and Wallin-Reed when he fired the fatal shots into their fleeing vehicle. As Wallin-Reed claimed he fired in self-defense, illustrating their respective locations was critical in assessing his claims.



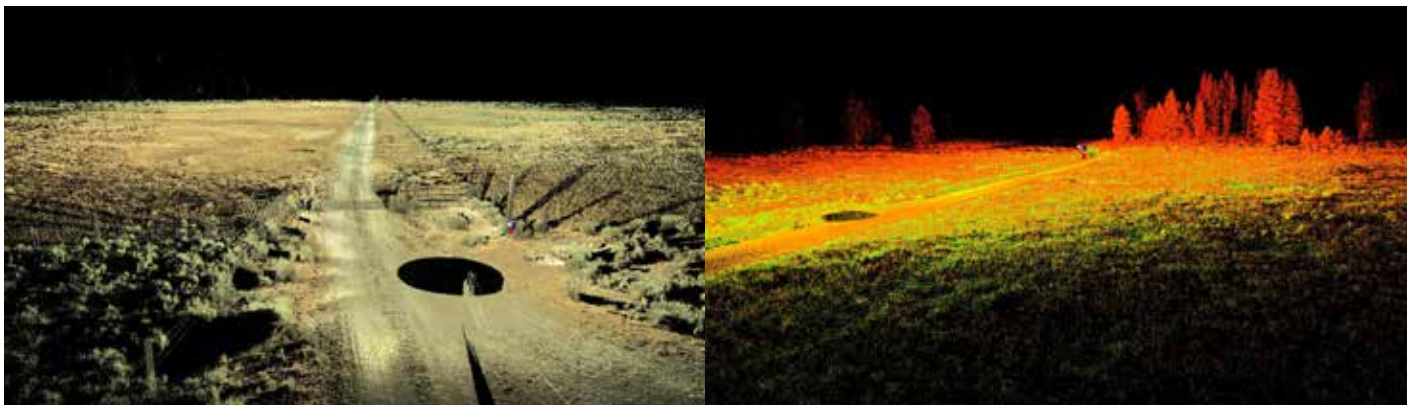
## SOLUTION #2

At the scene, both the California Highway Patrol and the Plumas County Sheriff's Office identified and measured physical evidence left behind by the victims' vehicle and Wallin-Reed. The data were recorded using different techniques and different coordinate systems. By using PSI's 3D Laser Scanning system to document the crime scene, PSI was able to combine all the different data into a single model, creating a virtual model of the crime scene that was accurate and contained all the physical evidence. This model was then used to perform a series of analyses that illustrated that the victims were approximately 50 feet away and fleeing through the nearby meadow when Gregory Wallin-Reed shot them.



### 3D Laser Scanning

In order to thoroughly document the crime scene and provide the most accurate foundation for the 3D Working Model, PSI utilized our Leica 3D Laser Scanning System to capture over 20,000,000 measurements of the meadow area where the fatal shooting occurred. This data-set provided PSI the background over which all the measurements of the physical data could be positioned, thereby allowing detailed analyses that are best performed within the computer as opposed to out in the field at the scene. In addition, the use of the Laser Scanning system provides very compelling and jury friendly visuals that work to meet the jury's need for "CSI" style presentation at trial.



3D Laser Scan "Point Clouds"

## Physical Evidence

As always, the ability to perform insightful analysis depends greatly on the documentation of the physical evidence. In this case, two different agencies responded and took measurements of the physical evidence – the California Highway Patrol and the Plumas County Sheriff's Office. Each agency documented different aspects of the evidence and each used a different technique and coordinate system, complicating the task of getting a detailed picture of all the evidence.

As each agency used a different method to measure the evidence and a different coordinate system, it was necessary to bring the data together in a manner that allowed an “apples to apple” comparison of the data.

### ***Three general classes of data were documented at the scene:***



*Tire tracks and a path of oil leaking from the victims' vehicle as it left the dirt road and traveled through the meadow as they attempted to flee.*



*Shattered auto glass left in the meadow from the victims' car when Wallin-Reed shot the driver's side windows out.*



*A grouping of expended cartridge casings from the shooter's AR-15 found at the edge of the dirt road.*

### Creating the 3D Working Model

Each agency located an origin point in the scene along the wire fencing at the northern edge of the dirt road. This represents the point in the scene from which all the data is measured. Therefore, if a cartridge casing was denoted as being located at “150,100” that means it can be found 150 feet down the fence line and 100 feet away from the fence towards the meadow.

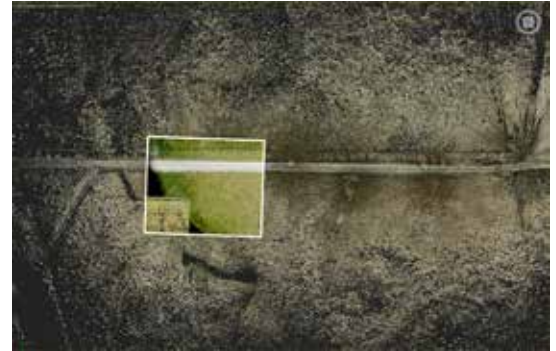
PSI’s 3D Laser Scan of the crime scene provided a critical element for the reconstruction of the event – a spatially accurate model of the scene itself. This allowed PSI engineers to reverse-engineer the physical location of each evidence item taken by each agency, laying out the same measurements as derived by each agency. This allowed the combining of each agencies data sets into a single set, with the 3D model derived by the laser scanner to fill in the background against which the data was found.

Once the 3D Working Model was populated with all the known evidence locations, it was used to illustrate and analyze the relative locations of two critical pieces of evidence – the cartridge casings ejected from Wallin-Reed’s AR-15 and found near the side of the dirt road, and the auto glass from the victims’ car found in the meadow.

The auto glass was located by the Plumas County Sheriff’s Office and photos of the three distinct piles of glass were photographed in place. However, no measurements were taken of their location, requiring an additional step to accurately place them within the Working Model. Photos of the glass piles and their respective evidence markers were provided to PSI.

PSI located the position of the auto glass in respect to the tire tracks by using an easily identifiable point in the photo and data – the intersection of a prominent tire track and the oil path. Because the Working Model contained the known location of this intersection, the auto glass was also located within the model.

With the inclusion of the auto glass into the Working Model, the story of what happened that night began to take shape. It was now possible to visualize the path the victims took as they drove into the meadow, tore the oil pan off the bottom of their car in a desperate effort to escape and were shot at by Wallin-Reed from approximately 50 feet away.



## Ballistics Analysis

In a proper reconstruction, it is desirable to use all the available physical evidence and seek a solution that fits the evidence in its entirety. At PSI, it is always our practice to double check the data and our conclusions whenever possible. In this case, two additional types of data were available for this purpose – the .223 cartridge casings ejected from Wallin-Reed's AR-15 and the bullet holes left in the victims' vehicle.

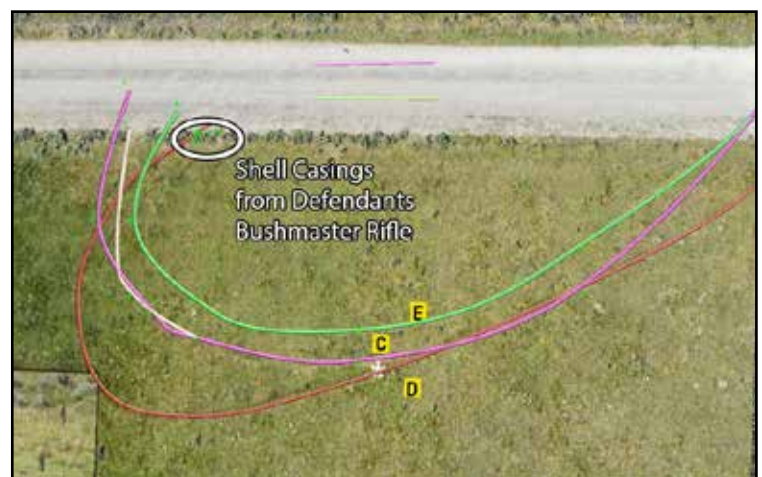
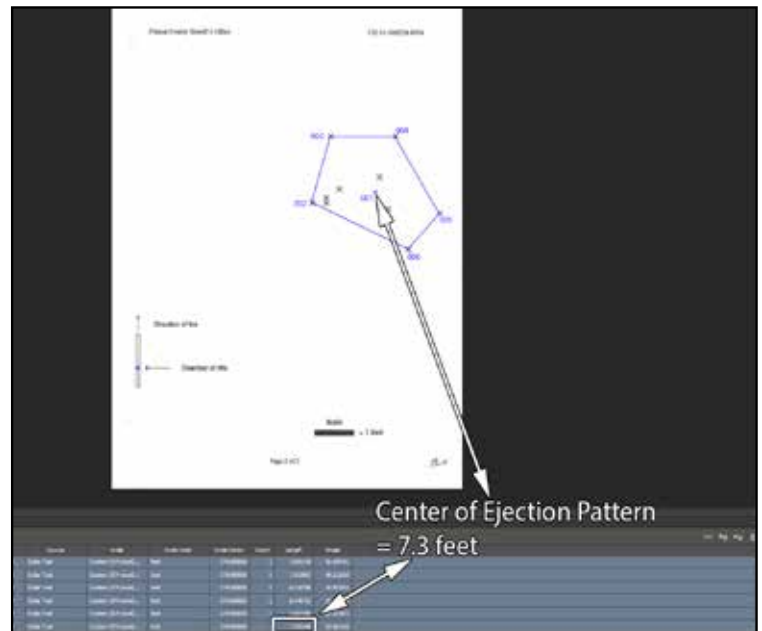
### Cartridge Casing Ejection Testing

The location of the nine spent .223 cartridge casings found near the road edge in the meadow provide indirect clues to the position of the shooter and weapon at the time the shots were fired. Determining where the AR-15 was at the time the casings were ejected (and hence, the shooter's location) requires knowing how far and at what angle the cartridge casings flew from the weapons ejection port. At PSI's request, the DOJ tested the same AR-15 and ammunition used by Wallin-Reed. The DOJ provided PSI with the results in a scale diagram detailing how far and what angle each casing flew. PSI used this data to scale and derive the average flight distance and angle of ejection for .223 rounds ejected from this particular weapon. Wallin-Reed's AR-15, the average ejection was forward and to the shooter's right side, at an average distance of just over 7 feet.

### Wallin-Reed's Story Falls Apart - Victims 50 Feet Away

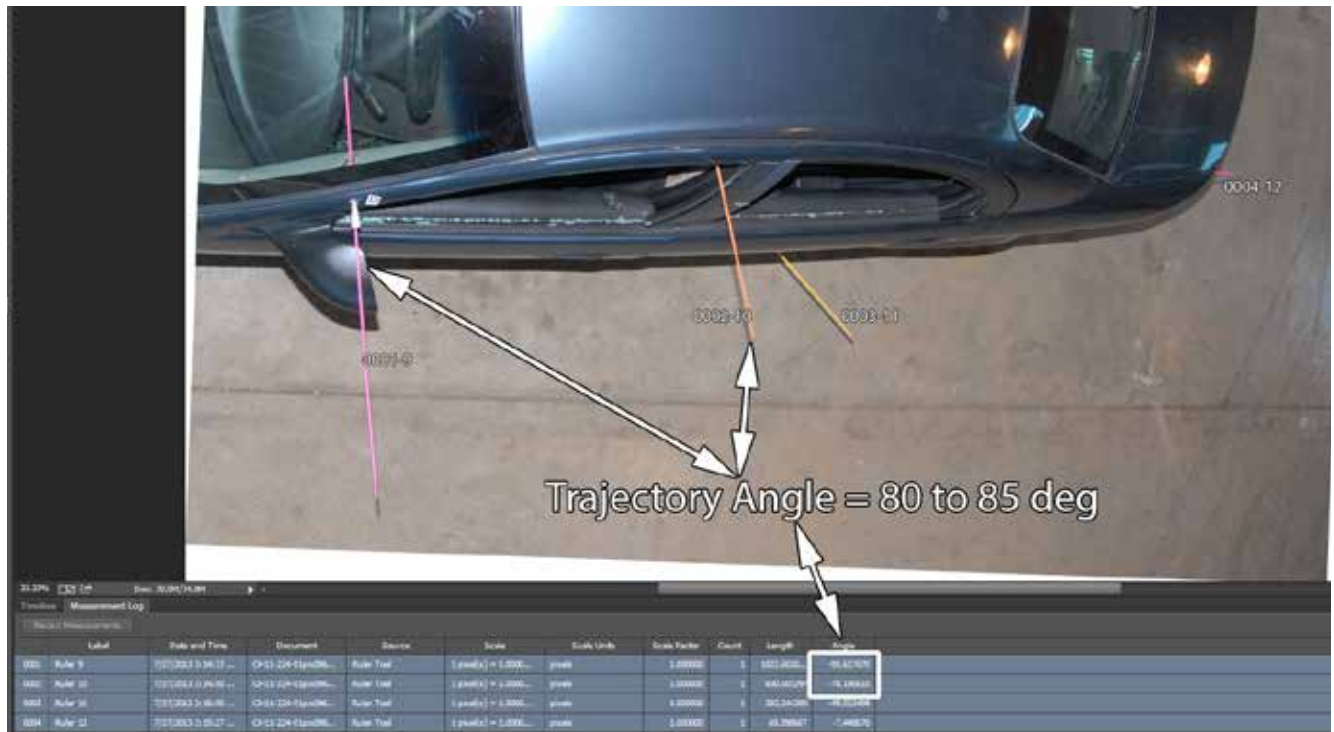
Entering this data into the Working Model, it became clear that Wallin-Reed was either inside his truck or immediately outside near the driver door at the time the shots were fired. This conclusion was consistent with the location of the tire tracks left by Wallin-Reed's truck as he braked to a stop in the dirt road.

With this evidence, the relative locations and distances between Wallin-Reed and his victims were visually clear for the first time. It appeared that, contrary to Wallin-Reed's testimony, the victims were not "nose to nose" with him and did not drive within a few feet of his driver door, charging towards him in an aggressive manner. In fact, quite the opposite was true - the victims were fleeing through the meadow and were approximately 50 feet away when Wallin-Reed fired the fatal rounds. This picture matched what the surviving victims had told police from the very beginning.



### Terminal Ballistic Trajectories

The final piece of data entered into the Working Model was related to the angle at which the rounds fired by Wallin-Reed entered the victims' vehicle. This is critical information to tie the current theory together and provide an important double-check for the analysis. As we have concluded from the previous steps that Wallin-Reed was at or near his driver side door and the victims' vehicle was at the point in the meadow adjacent to the glass fragments to be, we can now calculate the resultant angle of fire and compare it to the bullet strikes found in the vehicle.



Of the multiple bullet strikes found in the victims' vehicle and suitable for trajectory analysis, two entered the driver side window areas. Using photogrammetric techniques on the top down photos provided by the DOJ, PSI determined these two rounds entered the victims' vehicle at approximately 85 degrees – slightly past perpendicular to the shooter. Using the Working Models ability to analyze dynamic positions over time, PSI animated the victims' vehicle through the tire and oil path marks denoting its travel path, watching to see where the dynamically updated angle reached the critical 85 degree point. Once this value was reached, the animation was paused and the resultant vehicle location was compared to the previously determined location that aligned with the auto glass. This comparison would illustrate how close these two independent analyses matched, and ultimately determine how strong a case could be made for having reconstructed the critical elements of this event.



As hard work and good investigation would have it, the two locations were essentially identical – the match was spot on. We now had a reconstruction that maintained fidelity to all the physical evidence and was supported by three separate, independent analyses. It was now time to create a visual presentation that would demonstrate the steps and result of the analyses to the jury in a clear and compelling manner.



## Plumas County News

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# Testimony continues in Wallin-Reed murder trial

Dan McDonald

Managing Editor

9/20/2013

## *Forensic experts differ on origin of gunshot residue found in victims' car*

Forensic experts testifying in the Wallin-Reed murder trial all agreed the car six Susanville men used to flee from the shooter contained gunshot residue.

But, as expected, the experts disagreed on how the residue got there.

## Testimony continues in Wallin-Reed murder trial - continued

A forensic scientist, testifying for the defense, said the residue came from a gun fired by someone inside the car. Experts for the prosecution testified the residue came from bullet fragments fired by Wallin-Reed's AR-15 assault weapon.

Wallin-Reed, 38, of Reno, admitted shooting the AR-15 and a handgun at the car. He is on trial for murder in the shooting death of Rory McGuire.

McGuire, 20, was driving the car on the night of July 2, 2011, when he was shot in the head by Wallin-Reed after an 8-mile car chase. Two passengers were shot in the leg.

The chase began when Wallin-Reed caught the men — aged 19 and 20 — stealing solar lights from the driveway leading to his cabin along the Janesville grade.

The jury trial, which began Sept. 3 in Plumas County Superior Court in Quincy, is expected to last through the end of the month.

“It's safe to assume there was going to be a lot of lead in this car, because it had been shot up,” said Department of Justice criminalist John Brogden.

Brogden was one of 20 prosecution witnesses to testify during the first two weeks of the trial. The witnesses included officers who gathered evidence at and along the 8-mile crime scene. It also included testimony from two of the five shooting survivors, who told the jury they stole solar lights and a sign, but didn't have a gun.

The jury heard testimony from forensic experts for the prosecution who backed up the Susanville men's claim that they were unarmed. Investigators didn't find a gun at or near the crime scene.

Although the prosecution isn't expected to rest its case until later this week, the court allowed a defense witness to testify early because of a scheduling conflict.

Richard Ernest, a forensic scientist from Fort Worth, Texas, said the residue lifted from the door of the car's front passenger seat was consistent with a gun being fired from that spot.

“My conclusion was that a gun was fired from the passenger seat,” Ernest told the jury. “And there is physical evidence to support that.”

Ernest, who was on the stand for the entire Sept. 11 court session, stood behind his opinion during cross-examination from District Attorney David Hollister.

Hollister argued it would have been nearly impossible for the residue to have come from a shooter in the car. He said it was located too far toward the front of the door and under the rear-view mirror. He said that the person in that seat, Cesar Gonzalez, would have been pointing the wrong direction.

## Testimony continues in Wallin-Reed murder trial - continued

He added Gonzalez was shining a spotlight out the window and would have had to use both hands. “Mr. Ernest, I’m going to suggest to you that you are just flat-out wrong,” Hollister said.

Forensic experts for the prosecution later testified that the lead residue came from one of the AR-15’s .223 shells that broke apart after hitting the car.

*A three-dimensional reconstruction of the final shooting scene, provided by Precision Simulations, Inc. CEO, Craig Fries, showed the trajectory of the AR-15’s bullets as they traveled through the car.*

*Using measurements of tire and oil tracks provided by the California Highway Patrol, along with the eight .223 casings found at the scene, Mr. Fries’ reconstruction showed the car had turned around and was traveling in a meadow in the opposite direction of Wallin-Reed.*

*Wallin-Reed told investigators the car was coming directly at him.*

*Fries determined the car was parallel to Wallin-Reed and about 50 feet away when the shots were fired. His 3D reconstruction showed one of the rounds was headed directly to the spot where the gunshot residue was found in the car.*

Pittsburg forensic scientist Thomas Morgan said he agreed with the gunshot residue findings provided by Department of Justice firearms examination expert Don Dunbar.

Dunbar testified he didn’t think the pattern of lead found on the inside of the front passenger door was from the vapor of a gun being fired.

“That’s a classic pattern of particulate gunshot residue from a bullet breaking apart,” he told the jury. Forensic scientist Allison Murtha testified that tests of the Susanville men’s hands showed they did not have gunshot residue on them.

She said gunshot residue consists of a three-component particle consisting of barium, antimony and lead. She said a person with those three particles on him has either fired a gun, been around a person who fired a gun or come into contact with a person who fired a gun.

She testified the men did have two-component and one-component particles (barium and lead, or just lead) on them. She said two-component particles can come from other sources, such as fireworks or brake pad dust. She said one-component particles can come from many sources.

Investigators who combed the road after the shooting testified they found other bullet casings that did not match those from Wallin-Reed’s guns.

## Testimony continues in Wallin-Reed murder trial - continued

Plumas County Sheriff's Sgt. Matt Beatley testified that he led a team along the route four days after the shooting. Deputy Mike Grant said he led a team of six search and rescue officers that searched the 8-mile route for evidence 10 days later.

Grant testified his team searched the roadway and up to 15 feet on each side of the road. He said the search uncovered one of the solar lights the men threw from the car. Grant said the searchers also found a variety of bullet shell casings.

He said the searchers didn't gather casings that had obviously been on the ground for a long time. However, he said a few casings appeared to be newer: In particular, three .380 shells and two .25-caliber shells.

Hollister told the jurors the shells could not have come from the car. He said the .25-caliber shells — which were less than 10 feet apart — were on the wrong side of the road. He said the .380 shells — two of which were 2 feet apart — were too close together to have come from a car traveling 50 miles per hour.

He also argued that none of the shells were found at the location where Wallin-Reed said the men in the car shot at him.

Wallin-Reed's defense team of John Ohlson and Richard Young were expected to begin calling their witnesses next week. They have not said whether Wallin-Reed will testify in his defense.

Plumas County Superior Court Judge Ira Kaufman is conducting the proceedings. The jury is comprised of 10 women and two men.

