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**Review of 11 DNR Wolf necropsy cases with radiographic evidence of gunshot to assess whether gunshot injury could be a factor in the wolf's death**

For each case, I reviewed the DNR Wolf Program recorded cause of death (COD), the DNR Wildlife Health database query with core data (causes of death, results of radiographic screen for metal, etc.), and the full final necropsy reports (WH).

The answer to the question “**Could gunshot injury be a factor in this wolf's death?**” is listed with each case below, assigning a simple Yes/No/Maybe/NA. For the cases where the full final necropsy report made this determination possible with significant confidence, quotes directly from the necropsy provide the justification. Those cases where the answer is unclear have a bolded note, explaining the basis of the uncertainty. In a few cases, there are also notes about possible further investigation that could be done that *might* help decrease uncertainty.

**WI-2004-001 MAYBE**

“Very small metal fragments were detected radiographically in the abdomen; because they were not seen on necropsy, it is not possible to determine whether they were all in the GI tract (and therefore could have been ingested ) or whether this wolf was shot. It is also not possible to determine, if it was shot, whether this contributed to the wolf's death.”

**This final report is somewhat incomplete, making interpretation difficult. Additionally, this wolf had evidence of a complex health history – vehicle collision trauma (likely ultimate COD), bite wounds compatible with conspecific or dog trauma, severe mange.....along with the metal fragments suggesting gunshot to the caudal body. If you asked me to assign Yes or No, I would lean towards Yes (based on the fact that most of the**

**GI tract was pretty empty, so it seems unlikely that all the metal fragments were in the GI tract), but it is hard to put together the history of events for this wolf.** (Possible further investigation: review the radiographs again, with this question in mind....but I'm not sure this would add much.)

**WI-2005-043 NA (not applicable) – but this wolf did have a significant (likely debilitating) gunshot injury**

“The right elbow has undergone severe bony remodeling secondary to what appears to have been a previous gunshot wound. The joint was moveable however a limited range of motion exists.”

**This wolf was euthanized during a depredation control trapping event. It had severe damage to the right elbow from a gunshot injury that was likely weeks old. Its overall sub-optimal condition, stomach contents (corn, plastic material, etc.), and maybe even the fact that it was involved in a depredation event, all support that the severe damage to the elbow from gunshot was a significant, perhaps eventually lethal, health problem for this wolf.**

**WI-2007-053 YES**

“The apparent bullet fragments seen on radiographs and healing left shoulder hemorrhage are likely associated with each other, suggesting that this wolf was shot within days before the vehicle collision. The gunshot related trauma appears relatively minor, but it cannot be ruled out that it caused some debilitation of the left foreleg and might have predisposed this wolf to the vehicle collision. The remainder of the trauma is consistent with a vehicle collision.”

**WI-2007-077 YES**

“It seems likely that 2 kinds of previous trauma debilitated this wolf (as seen by its emaciated state) and predisposed it to developing severe mange: chronic severe injury to the foot,

associated with being trapped six months before death, and resolving, but significant injury around the lumbar vertebral column, apparently associated with being shot. “

**The gunshot damage (which includes a chip fracture to a vertebra) was judged to be “perhaps weeks old”.**

**WI-2008-004 YES**

“The chronic gun-shot related trauma to the right elbow likely also compromised the health of this wolf.”

**The damage to the right elbow was pretty severe, including a bone defect and severe fibrosis.**

**WI-2009-040 YES**

“This wolf was euthanized because of a severe deformity of the right rear leg, and consequent severe ongoing damage to the right rear foot. The deformity of this leg originated with a bullet injury to the upper right leg and poor healing of the damaged bones and joints. This wolf also has evidence of a healed shotgun injury -- the multiple pellets embedded in the soft tissues of the neck.”

**In this case, the bullet injury to the leg was not a factor in the COD, it was essentially the COD – the wolf was trapped and euthanized because it was seen so debilitated from this gunshot injury. (The shotgun injury likely was not an active health factor for this wolf.)**

**WI-2009-045 YES**

“The wolf died from severe, blunt trauma to the thoracic spinal column, thorax and right front leg, highly compatible with a vehicle collision. The fracture of the bone in the left front leg looks like it occurred a few days earlier -- maybe evidence of an earlier, non-lethal collision or

accident. Even earlier in time, the wolf had been shot in the head; it is possible that this injury had resulted in neurologic damage, explaining the abnormal behavior reported before death.”

**There was damage to the head that could have been caused by the shot seen, including hemorrhage in soft tissues and around the brain, but obviously this damage also could have been caused by the vehicle collision. (The postmortem condition of the carcass precluded microscopic examination of the brain that might have helped discern whether there was brain damage of an age compatible with the gunshot and severe enough to have caused neurologic deficits compatible with the wolf’s reported abnormal behavior.)**

**WI-2010-006 YES**

“The final cause of death for this wolf was blood loss from thoracic gunshot trauma. Two toxins, ethylene glycol (antifreeze) and the pesticide methomyl, were identified with the deer/ground meat pile at the site where the wolf carcass was found. There was no evidence of damage to the wolf’s kidneys compatible with antifreeze toxicity, and no detectable residues of antifreeze in the wolf’s stomach contents. The results from the screening test done on the wolf for exposure to a pesticide (the brain cholinesterase assay) are somewhat difficult to interpret: The approximately 70% reduction in the brain cholinesterase level is compatible with exposure to a pesticide such as methomyl. However, reductions can also occur with decomposition of the brain sample, which was a factor in this case. There were no detectable residues of pesticides such as methomyl in the wolf’s stomach contents, but this could have been due to the fact that these compounds are volatile. Exposure to a pesticide such as methomyl could very well have occurred and debilitated the wolf sufficiently to enable it being killed by gunshot.”

**This is clearly a gunshot mortality (and that is what is recorded on the final necropsy report; the “and poisoning” diagnosis was added by the wolf team in their database, based on the comment you see above).**

**2010-009 MAYBE**

“The pattern of severe thoracic and cranial abdominal trauma is typical of a vehicle collision. Given the extensive collision trauma in the area of the shotgun pellet in the thorax, it was not possible to evaluate when the wolf was shot, but this could easily have been an old event and just an incidental finding. It is highly possible that the heartworm burden in this wolf was causing some debilitation.”

**On re-evaluation of the necropsy report, it was noted that there was a chip fracture to a rib very close to where the metal shot was detected.....and there was lots of hemorrhage in that area.....so it really is impossible to say whether there was gunshot injury that might have been debilitating and predisposed this wolf to the collision. (This is really a “50-50” case.)**

**WI-2011-005 NO**

An incidental finding of interest is the metal fragment found in the left rear leg. As there was no boney damage, it is likely that the wolf did not receive the full force of impact at the time of the superficial implantation indicating possible ricochet or shrapnel.”

**The radiographic findings suggest possibly 2 separate gunshot events (one involving a bullet, one shotgun). It appears that the likely bullet fragment (alluded to in the quoted comment above) which was below the skin over the left knee, was the result of an old gunshot event and there was no evidence of persisting associated significant injury. The final necropsy report does not contain information about whether the areas were examined**

where the metal shot were detected in the left rear leg and tail, but I contacted the prosecutor for the case, and she shared that the necropsy notes recorded that there was no hemorrhage or other damage at these sites. This suggests that the shotgun event was also old and that these 2 single metal shot likely did not cause significant damage.

**WI-2011-017 NO**

The final necropsy report contains no findings from examination of the head and neck, where the shot were detected radiographically. However, I contacted the prosecutor who did the case, and she reported that the original necropsy notes indicate that there was no hemorrhage or other damage detected at these sites in the head or neck. Therefore, these metal shot likely represent an old gunshot event, and no evidence was detected that there was any residual injury predisposing this wolf to the vehicle collision.