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USDA APHIS Wildlife Services (WS) Evidence Standards for Determining Livestock Depredations by Mexican Wolves in Arizona and New Mexico

WS' determination of depredation by Mexican wolves relies solely on the physical evidence available at the time of the investigation. WS documents the physical evidence in the investigative report. Timeliness of carcass discovery affects the quality and availability of physical evidence. WS makes all reasonable efforts to timely investigate a report of suspected depredation. However, some situations will result in an unknown determination due to insufficient evidence.

Confirmation of Mexican wolf depredations by WS requires that subcutaneous hemorrhage and underlying tissue damage be present on large carcasses. When wolves kill small livestock, however, they often consume much of the carcass, and therefore evidence of subcutaneous hemorrhage no longer exists. The standards below have taken these items into account.

Physical Evidence Specific to Mexican Wolf Depredations

Subcutaneous hemorrhage is the best physical evidence available to field investigators to directly associate a depredation with a direct and lethal attack by a carnivore. It refers to heavy or uncontrolled bleeding from the blood vessels under the skin layer and/or in the muscle tissue. Subcutaneous hemorrhaging is found only if the skin and tissue damage occurred while the animal was still alive. Animals that die from causes other than predation typically do not show external or subcutaneous bleeding.

Bite mark measurements, along with other physical evidence, can help distinguish Mexican wolves from other carnivores after a carcass is determined to have been a confirmed predation. Mexican wolf lower jaw canines generally measure from 28.1 to 43.7mm, while upper jaw canines measure from 31.4 to 49.8 mm. If livestock is killed by wolves, then investigators should be able to identify all four canines in each set of bite marks.

Additional observations that can help distinguish wolf predation from other carnivores include:

- chewed and broken large bones,
- tracks and scat,
- ribs, hide, and muscle are eaten to some degree,
- attacks on the hindquarters and flanks,
- significant damage to underlying muscle,
- crushed skulls, severed spines, and massive tissue damage, and
- multiple kills in one event.

Determination Categories

Confirmed - physical evidence leaves little doubt that livestock was killed by Mexican wolves.

- In large livestock (adult cattle, horses, etc.), confirmation is reached by observing and documenting subcutaneous hemorrhage and tissue damage indicating that livestock was attacked and bitten while it was alive. This hemorrhage and damage can be correlated with other evidence to determine that wolves, and not some other predator, killed the animal. Other physical evidence that WS

investigators may observe and should record in the depredation report (but, alone, is insufficient to confirm predation in adult livestock) may include bite marks or punctures of appropriate tooth spacing for Mexican wolves, feeding patterns on the carcass align with established wolf patterns, wolf tracks that correlate to the time of death, wolf scat, blood stains, and damaged vegetation at the scene.

- In small livestock (calves, sheep, etc.), confirmation can be reached by documenting: 1) subcutaneous hemorrhage and tissue damage; or 2) comingled blood and wolf tracks indicating that the calf was alive when it was killed and moved by wolves. Other physical evidence WS investigators may observe and should record (but, alone, is insufficient to confirm predation), may include bite marks or punctures of appropriate tooth spacing for Mexican wolves, feeding patterns on the carcass align with established wolf patterns, wolf tracks that correlate to the time of death, wolf scat, blood stains and damaged vegetation at the scene.
- For injured livestock, bite marks and/or rake marks with appropriate canine spacing for Mexican wolves, in conjunction with evidence that precludes domestic dogs and coyotes, will be adequate to confirm injuries caused by a Mexican wolf or wolves. A confirmed determination of a wolf kill seeks to prove that the animal was attacked by wolves while alive and subsequently killed. In this situation, the animal has not been killed, but bite marks and/or rake marks prove that the animal was attacked while alive.

Probable - physical evidence suggests that livestock was more likely than not killed by Mexican wolves, but adequate physical evidence is insufficient to support a confirmed determination. Physical evidence that supports a determination of probable may include limited subcutaneous hemorrhaging in mature livestock that does not show adequate evidence to confirm a Mexican wolf attack, bite marks of appropriate tooth spacing for Mexican wolves without the presence of subcutaneous hemorrhaging and tissue damage, attack locations, feeding patterns on the carcass align with established wolf patterns, wolf tracks that correlate to the time of death, wolf scat, or wolf attack scenes with blood stains and damaged vegetation, or other physical evidence.

Unknown - physical evidence is inadequate to suggest Mexican wolf predation as more likely than not the cause of livestock death. Physical evidence of wolf presence may be found on or near the carcass; however, this evidence is inadequate to reach a probable determination. WS does not determine wolf depredation in the case of missing livestock without the presence of any other physical evidence.

Other - physical evidence suggests cause of death from something other than wolves. Examples include depredation from other species, lightning strike, stillbirth, complications from birthing, disease, starvation, dehydration, shooting, vehicle collision, fall from a cliff, etc.