The Cost of Coexistence: Impacts of Expanding Wolf Populations on California's Ranchers

Tina L. Saitone and Kenneth W. Tate

Gray wolves have returned to California, and populations have expanded quickly. The presence of this apex predator has created direct and indirect costs that are borne by California's ranching community. Herein we discuss these wolf-related impacts and California's pilot wolf conflict compensation program, which is aimed at mitigating wolf-related costs in order to incentivize coexistence.

Following a century of expatriation, gray wolves (*Canis lupus*) have returned to California. Gray wolves are listed as endangered under both the federal and state Endangered Species Acts and are listed as a species of greatest conservation need in the State Wildlife Action Plan. Since a satellite-collared wolf from Oregon (OR-7) first entered California in 2011, and the first known pack was established in Shasta County in 2015, populations have increased substantially, and geographic dispersion has expanded dramatically.

As of July 2023, the California Department of Fish and Wildlife (CDFW) has confirmed that there are seven wolf packs in the state—the Whaleback pack in Siskiyou County, the Lassen pack in southern Lassen and northern Plumas counties, the Beckwourth pack in southern Plumas and Sierra counties, and four unnamed packs located in Lassen, Plumas, Tehama, and Tulare counties. Across these seven packs, CDFW estimates that there are 39 individual wolves.

At this time, only four wolves have been outfitted with satellite-based GPS collars by CDFW (one in the Lassen Pack, one in the Whaleback pack, one in the unnamed pack in northwest Lassen County, and one in the unnamed pack in Plumas County). Collared wolves that have dispersed from Oregon, primarily to Siskiyou County, provide some additional information. Generally, there is still very little known about wolf location and population dynamics in California.

Cost of Wolf-Livestock Conflict

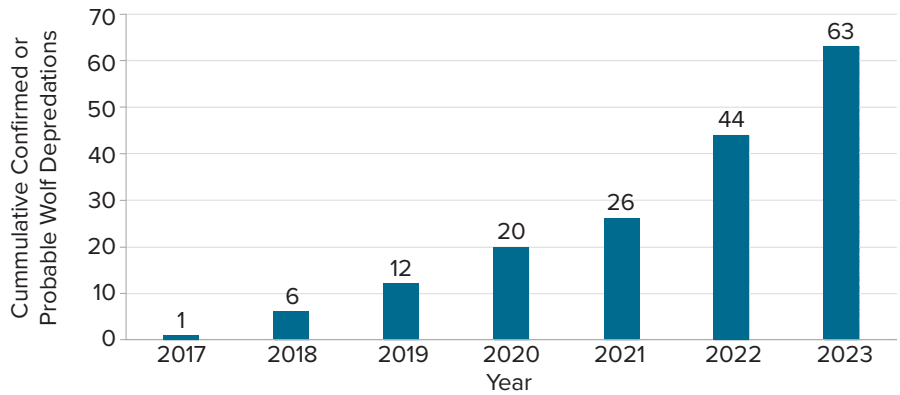
While some consider this increase in wolf population a successful recovery of an endangered species, it has not come without cost. In Northern California in particular, wolves are killing and wounding (such that euthanasia is required) cattle that graze in their home ranges. Figure 1 displays the total cumulative number of wolf kills (i.e., depredations) confirmed by CDFW from 2017 through August 2023. To date, all confirmed depredations have been cows and calves.

As wolf populations have expanded over time, so too have the number of confirmed kills. For example, in 2022, a total of 18 animals were killed, a 200% increase over the number of confirmed kills in 2021. In just the first eight months of 2023, there have been more confirmed kills than in all of 2022. Valuing the confirmed and probable historic depredations at September 2023 prices ($2.69 per pound for calves and $2,700 per bred cow) results in an approximate wolf depredation cost of $123,077 for the 6.75 years for which we have data.

However, these depredation statistics should be interpreted as an absolute lower bound, and, more accurately, as a severe underestimate, of the mortality impact that wolves are having on livestock in California. The process of having an animal's death confirmed as being caused by a wolf is fraught with spatial, temporal, logistical, and staffing challenges that severely limit the number of investigations conducted and confirmations that are possible.

Wolves have been documented to consume prey in accordance with prey species abundance. In California, black-tailed deer populations have been declining for decades, and elk

Figure 1. Cumulative Wolf Depredations in California



Source: California Department of Fish and Wildlife's Depredation Investigation Reports. Available at: https://bit.ly/3rC0mUk.

populations are virtually non-existent. As such, it is not surprising that CDFW's research on the Lassen pack documents that cattle account for 59% of the pack's diet in the summer months when cattle grazing and wolf home ranges overlap.

Direct mortality or injury is only one aspect of the wolf-cattle conflict. Research in the area of animal biology confirms that the presence of predators on the landscape creates long-term stress in animals, which is manifested biologically via elevated cortisol levels. Cows with elevated cortisol levels have been shown to have impaired immune system response, compromised metabolic function, and reduced reproductive success. Calves and yearling cattle, who will later be slaughtered and enter the beef supply chain, may produce lower-quality carcasses if wolf-related stress persists in muscle tissue as they age.

In parts of the United States where wolf-livestock conflict has a longer history (e.g., Montana) research documents that the indirect costs of wolf presence are far more substantial than the direct mortality costs. For example, a study that considered the impact of wolf presence solely on calf weight gain found that the indirect cost of wolf presence was 7.5 times larger than the direct mortality cost.

California's Wolf Compensation Program

In an attempt to mitigate wolf-related conflict, the Biodiversity Conservation Program (SB 170) allocated $3 million of the 2021/22 California state budget to establish a pilot Wolf Compensation Program (WCP). SB 170 required CDFW to develop a grant process to allocate funds to pay for the deterrence of wolf presence near livestock and for verified loss of livestock. This funding and legislative charge has resulted in the development of the most comprehensive livestock loss compensation program in the country—with funding available from September 2021 through June 2026. The WCP has three "prongs" to compensate impacted producers: 1) livestock loss compensation, 2) non-lethal deterrence reimbursement, and 3) pay-for-presence compensation.

The livestock loss prong of the program reimburses producers for the fair market value of livestock that are killed or mortally injured when the predator is classified as "confirmed" or "probably" a wolf. Fair market values are documented by the applicant and can be estimated using contracts or sale receipts for similar cattle or sale/auction reports (e.g., Western Video Market Auction, Superior Livestock Auction). Calves and yearling cattle can be valued at the weight and condition they would have been in the future, at the planned time of sale.

Compensation for loss of livestock to wolves, and some other predators, has been available in some states (e.g., Montana, Wyoming, Colorado) for some time. However, the funding available and expended in other states is rather limited. For example, in 2022, Montana's Livestock Loss Board expended $167,812 on losses of cattle to wolves, mountain lions, and grizzly bears combined. In 2021, Wyoming Fish and Game Department expended $208,124 for livestock killed or injured by wolves.

The second and third prongs of the WCP are novel. The second prong reimburses producers for time and materials used to reduce wolf-livestock conflict. Non-lethal deterrence is a conflict reduction approach favored by wildlife advocates but is costly to producers employing these techniques, especially in extensive-range landscapes. CDFW "supports the use of various non-lethal tools and techniques," which provides producers significant latitude to identify and use techniques that are appropriate for their specific operation. Other states in the United States do not reimburse producers for their non-lethal efforts; in some cases, non-lethal efforts are considered to be in-kind contributions, which are required when applying for direct loss reimbursement.

Pay-for-presence, the third prong of the WCP, is intended to compensate producers for the indirect costs of wolf presence on cattle welfare, productivity, and ranch profitability that are often difficult or impossible to formally document. Eligibility for

Wolf from the Lassen Pack engaging a bull on summer grazing lands in Plumas County. Photo Credit: Tina L. Saitone and Kenneth W. Tate.

compensation is based on the overlap of wolf territories (e.g., core pack area, peripheral area) and livestock grazing on a seasonal basis (i.e., summer, winter) and a specified percentage of each animal's fair market value (FMV).

Cattle inhabiting a pack's core area are eligible for 3% (cows) to 3.5% (calves) of the animal's FMV as defined by the applicant. Cows and calves inhabiting a pack's broader territory are eligible for 2% of the animal's FMV. As an example, consider a herd of 1,000 cows and their calves (700 pounds each) with FMV based on September 2023 prices ($2.69 per pound for calves and $2,700 per bred cow) inhibiting a pack's core area during the summer. This herd would be eligible for $146,905 in pay-for-presence compensation for a single grazing season; $81.00 for each cow and $65.91 for each calf.

An informal survey of ranchers during the 2023 summer grazing season indicates that there are, at a minimum, 10,000 cows and calves currently impacted by wolf presence by just the three packs inhabiting portions of Lassen and Plumas counties (i.e., the Lassen pack, unnamed northwest Lassen pack, and unnamed Plumas pack). Allocating these animals to core and broader wolf territory areas is not possible with the survey data. However, a lower bound estimate (2% FMV on all animals) would suggest that pay-for-presence in just these three packs would exceed $916,600 for a single grazing season (summer 2023) if all eligible producers applied.

While this is nearly a third of the initial five-year funding allocation to the pilot WCP, research on the indirect impacts that wolves have on cattle productivity suggests that ranchers with severe wolf presence are being undercompensated. Estimated severe wolf presence impacts suggest that calf weaning weights would be 10% lower with wolf presence, and cow conception rates would take a 6% hit. At these productivity loss rates, coupled with the number of cattle in wolf territories, we could expect to expend current WCP funds in less than two years.

Wolf-Cattle Conflict Going Forward

Gray wolf populations in California are certain to increase. States where wolf populations have reached a steady state serve as a barometer of what is possible. For example, in 2009, Oregon had an estimated population of 14 wolves, and by 2022 had a minimum population of 178 (4.5 times the number currently in California). As of 2022, Montana boasted a wolf population of 1,138 wolves (29 times the number currently in California). As wolf populations expand, so too does the overlap between livestock grazing areas and wolf territories, setting the stage for increased conflict and cost going forward.

WCP program uptake by impacted producers has been swift, and pilot funds are being expended rapidly. At the time of this article, $1.15 million had been expended just on confirmed kill and nonlethal deterrence applications for 2021 and 2022. A suite of additional applications for those years, including pay for presence, are pending CDFW staff review and approval. As the 2023 summer grazing season comes to a close, we can expect a substantial number of new requests.

While compensation does not solve the conflict, offsetting the direct and indirect costs of wolf presence is a prerequisite to facilitating coexistence. This will not be possible unless additional funding is allocated to WCP on an annual basis. As wolf numbers and conflict grow, annual funding allocations must keep pace with the rising costs incurred by an increasing population of impacted ranchers.

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For additional information, the authors recommend:

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