

## *Revised 5th DRAFT*

Opinion of the El Dorado County Fish and Wildlife Commission on Human/Cougar Conflict in El Dorado County

### CONCLUSIONS

1. Cougar/Human conflict, defined as depredation of livestock and or attacks on humans by cougars, has dramatically escalated in El Dorado County since 2023 with depredations increasing from a 12-year average of 35 per year to near 100 in 2023 and near 100 the first 6 months of 2024. Statistically the change is greater than 14 standard deviations and appears to be not due to chance.
2. From 2019-2023 El Dorado County, with 166 depredation permits (lethal and non-lethal), had more cougar conflict (17% of statewide permits) than any other county in California. No other county was even close. Five contiguous northern Sierra Counties; Nevada, Placer, El Dorado, Amador and Calaveras Counties had 37% of the depredation permits issued statewide and the 8 Sierra foothill counties have nearly half the state's depredation permits (49.4%).
3. In July 2020 changes were made to the California Department of Fish and Wildlife policy on cougar depredation permits decision process. The policy now permits hazing after the first kill but requires two kills on the same parcel prior to possibly issuing a lethal depredation permit, but regional managers have discretion to not issue a lethal permit.
4. Scientific literature suggests lions that have received food rewards are more resistant to hazing. While hazing can work, the 2020 changes in California Department of Fish and Wildlife policy on cougar depredation permits acknowledge that sometimes it does not work which is why there are multiple depredation events happening at the same location.
5. There is a lot of uncertainty in Cougar population management in the high conflict counties of California. Research is needed on effective proactive methods to better reduce human/cougar conflict in El Dorado County, and counties like it, consistent with existing state law.

## RECOMMENDATIONS

1. Since 2023 the California Department of Fish and Wildlife has reduced the number of employees assigned to resolving and preventing wildlife/human conflict. Managing conflict with wildlife is one of the most important functions of the California Department of Fish and Wildlife. The county should appeal to the State for a reversal of this policy with more conflict biologists assigned to El Dorado County in particular and rural high conflict counties in general.
2. El Dorado County is excellent habitat for cougars and shares the settlement patterns and landscape characteristics that set the stage for human/cougar conflict, which is a problem to continuously manage not to ever “solve”. El Dorado County shares this characteristic with many other rural counties. We recommend that El Dorado County reach out to other rural counties, particularly the contiguous northern Sierra counties where cougar conflict potential is high, to combine with those counties in a united voice to seek changes at the state level in cougar depredation policy for their conflict prone landscapes. The county should also support and encourage cougar/conflict research program by CDFW and or others.
3. El Dorado County has a problem with people feeding wild deer populations, potentially changing the distribution and abundance of deer to bring them closer to residential populations of humans and livestock. Feeding deer potentially increases the risk of conflict with the apex predator on that deer population. While feeding deer is illegal (California Code of Regulations: Title 14. Natural Resources Section 251.3), deer blocks can easily be purchased throughout El Dorado County at local feed stores. Deer feeding is a conflict risk factor and must be discouraged by the county in an educational campaign and as already recommended by this commission, the changing of County Ordinance 4437 section B.
4. Some biologists consider the lack of hound hunting (not harvest) may be leading to increasingly bold lions in human landscapes. A “Tree and Free” strategic hazing of lions near residential zones like the project being conducted in the state of Washington could possibly reduce conflict by conditioning lions to avoid humans. Such an effort should target high conflict areas of El Dorado County (not the National Forest for example).
5. The expansion of the three strikes rule to the entire state should be considered an experiment that has failed in high conflict counties as depredations have increased. A return to managing conflict differently between high and low conflict landscapes seems warranted coupled with a commitment to reducing conflict and promoting coexistence. This may include educating humans toward improving husbandry techniques as well as simultaneous conditioning of lion behavior with proactive hazing in the Sierra foothills. A long-term commitment to coexistence with cougars must involve an adaptive approach supported by research, education and technical assistance in husbandry

## BACKGROUND

- The State of Washington Fish and Wildlife Commission conducted a formal and rigorous review of the scientific literature on human/cougar conflict in 2022<sup>1</sup>, examining how the scientific literature could answer 8 questions about the conflict. The EDC Fish and Wildlife Commission recently reviewed this work. The review by Washington State found equivocal and conflicting findings on five of the questions: Do cougar removals effect conflict, do growing cougar populations increase conflict, does the abundance of natural prey effect conflict, does increasing human population increase conflict, does new technology and human wariness increase sightings of cougars, and does competition with other large carnivores affect conflict.
- The Washington State review found spatial ecology to be the best understood facet of cougar conflict. Notably conflict is enhanced in exurban or rural residential settings because these habitats provide both abundant native prey and stalking cover or they retain enough native landcover, connectivity and prey to support cougar use but with a human presence at a level that does not deter cougars. This perfectly describes much of El Dorado County and indeed all Sierran foothill counties. Current state policy on depredation seems more in tune with protecting urban cougars that live in isolated natural lands surrounded by urban development than the high conflict rural landscape of El Dorado County and other rural counties.
- Kertson and Keren (2021)<sup>2</sup> yielded two key takeaways relevant to the question of cougar abundance: 1) a growing cougar population does not necessarily translate into a greater number of interactions because the increased growth rate manifested primarily as subadults with a propensity to emigrate outside of the residential/wildland interface study area to the larger wildland matrix rather than recruiting to the study population and. 2) the effects of cougar population size or trajectory are likely mediated or mitigated by other ecological and anthropogenic factors (e.g., the distribution and abundance of people and prey). However, these questions should be considered:
  - - Is the local carrying capacity for cougars being supplemented with hobby livestock,
    - Are deer being concentrated through supplemental feeding by the public?
    - Are migratory deer population declines at higher elevations occurring in El Dorado County, creating conditions for a larger denser cougar population with smaller territories in the rural and exurban foothills?

Unfortunately, these are not questions which have been adequately researched either globally or locally.

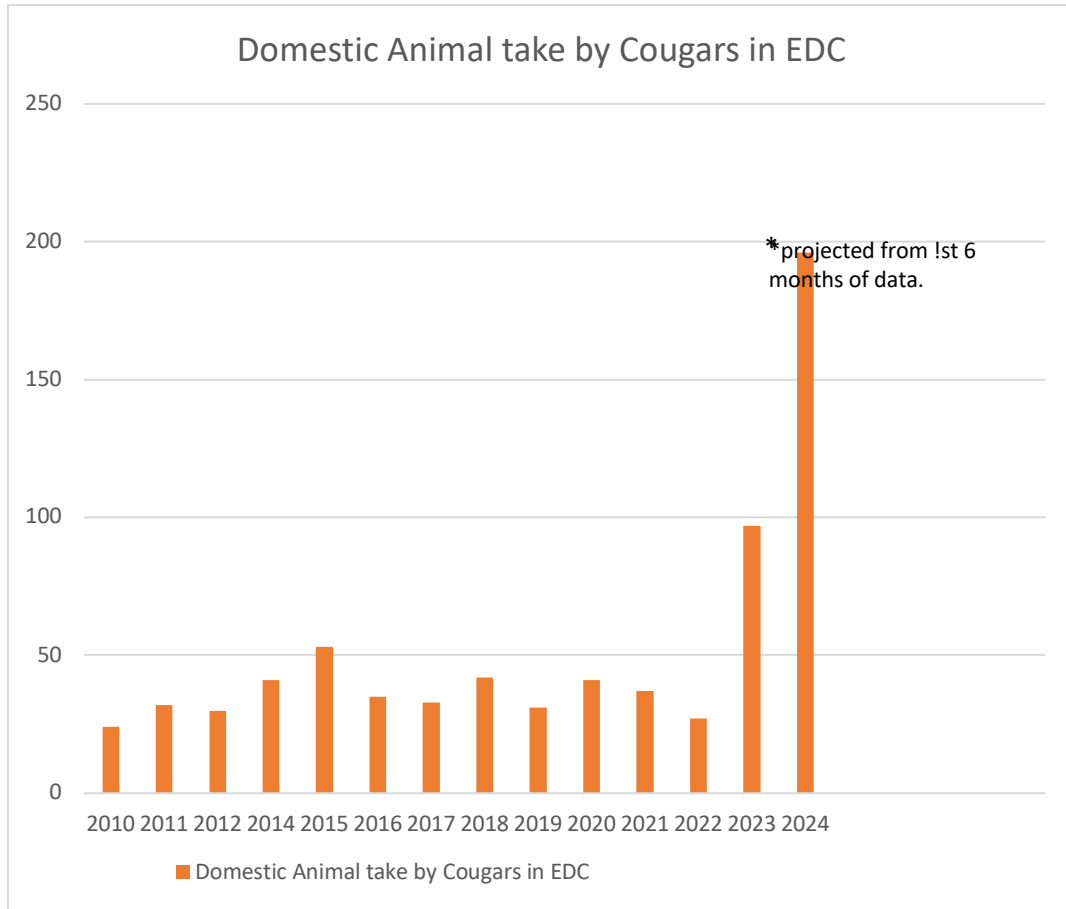
- Alldredge et al. (2019) found important logistical considerations for hazing of cougars. Specifically, they concluded aversive conditioning needs to be proactive not reactive to

be effective and occur before rewards are gained by an individual cougar to be most effective on that animal. Other research found flashing lights to be an effective hazing technique to deter cougar predation of Alpacas.<sup>3</sup> A very recently published study by Randolph et al, (2024) compared two great basin study areas, one in Nevada where cougars are hunted and one in northern California where cougars were protected from hunting. This research found that “juvenile mountain lions in the hunted site avoided developed landscapes whereas the juveniles dispersing from the protected site did not select for or against developed landscapes”.<sup>4</sup> We conclude that the increased conflict with cougars arises in part from their protected status, their increased lack of fear of humans and an ineffective and reactive non-lethal hazing policy. Some lion biologists believe that the lack of hound hunting of lions (not harvest of lions) has led to an increase in depredation in those states which have banned hound hunting.<sup>5</sup> See: ([https://youtu.be/\\_mgPMXK3w20?si=ol4NHE-7HESVB-mh](https://youtu.be/_mgPMXK3w20?si=ol4NHE-7HESVB-mh))

- How many cougars are there in California or El Dorado County? A recently completed seven year study not yet published and peer reviewed has produced three population estimates of the number of cougars in California with three different methods.<sup>6</sup> The count was conducted by state and university scientists who used GPS collar data and genetic information from scat samples to model population densities. One estimate suggests there are 4,511 cougars and the other two estimates suggest the number is roughly 3,200. The lead author of this paper has greater confidence in the higher number as it incorporates not only the scat data but telemetry. (Justin Dellinger, personal communication, Sept 19, 2024). Most California cougars were found to live either in the coastal forests of Humboldt and Mendocino counties or in the Sierra Nevada. The high uncertainty around California Cougar population estimates is a result of the indirect methods being used. Other states with hunted populations take a different approach. The Montana Mountain Lion Monitoring and Management Strategy produces lion population estimates every 6 years based on 2 winters of field data collection across 2 trend monitoring areas. The field data allow for direct population size estimation in the TMAs (Trend Monitoring Area) via a spatial capture-recapture (SCR) methodology. The SCR method also estimates the relationship between habitat quality and lion density. This relationship is used to extrapolate lion density from the TMAs to the full ecoregion utilizing a model of habitat quality. The ecoregional population estimate is then used as an input to an integrated population model (IPM) which helps FWP estimate the impact of past and future harvest prescriptions. In addition to the periodic ecoregion population estimates, the IPM uses lion demographic rates obtained from past research in Montana (MTFWP 2019) and a population reconstruction method based on harvest data. Combining these 3 sources of information, the IPM estimates lion population size in years between ecoregional estimates. Critically, the IPM provides a tool for FWP staff to estimate harvest prescriptions necessary to achieve population objectives in each ecoregion, which are recommended by citizen working groups composed of diverse stakeholders and set by the Montana Fish & Wildlife Commission.<sup>7</sup>

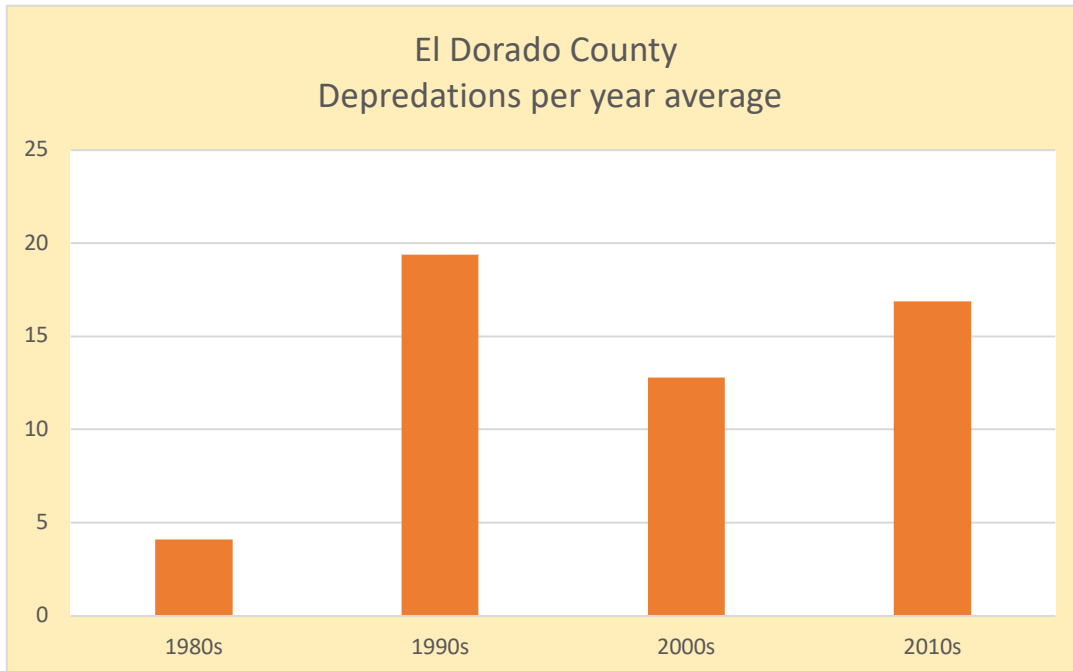
- In El Dorado County It is not actually known how many cougars there are or even whether their population is growing, decreasing or stable. Dr. Justin Dellinger, however, has conducted telemetry studies of lions in El Dorado County and he believes the foothills are a population sink and have a younger lion population structure. He found survival rates of lions in the national forest to be 90% while survival in the foothills was 40% with most mortality being related to contact with humans. Juvenile males are thought to be more involved in depredation so this could be a negative feedback loop as foothills may be recruiting them with a higher mortality rate. If depredation permits are proportional to the number of cougars, then El Dorado County, with 17% of the depredation permits, would have between 544 and 721 cougars, but we can't confidently conclude that, because there are multiple variables affecting relative depredation rates besides just the actual size of the cougar population. For context, during the 57 year bounty hunting period in California (1906 – 1963) bounty hunters took on average 224 cougars on average statewide each year totaling 12,580 over the duration of the bounty system.<sup>6</sup> It is thought this bounty hunting put the state cougar population into a severe decline, with cougar numbers finally recovering by the mid 1990s and stabilizing or possibly still growing in some areas after the year 2000.<sup>8,9</sup>
- The most significant and policy relevant data we may have on cougars of any kind in El Dorado County, is that pulled together by the County Agriculture Commissioner, LeeAnne Mila and presented to the County Board of Supervisors on July 16 2024.<sup>10</sup> This data is summarized in the figure 1 below. The data presented by Commissioner Mila shows that the average number of confirmed domestic animals killed by cougars between 2010 and 2022 was 35.5 with a standard deviation of 7.9. In 2023 there were 97 domestic animals killed by cougars and in the first six months of 2024 there were 98. Double that for a full year and you have a projected kill of 196 domestic animals in 2024. Also, quite tragically, we had one human fatality and one human mauling by a cougar in March of 2024. The average number of domestic animals killed per year in 2023/24 is 146.5 if you double the first half of 2024. Generally statistical significance is achieved when differences between two group averages exceeds two standard deviations. Statistical significance means the differences between two groups are not due to chance alone. The 23/24 mean of domestic animals killed per year is 14 standard deviations greater than the 2010-2022 average. Unless there have been sudden changes in the frequency with which folks report depredations, beginning in 2023, we can say something has changed with human/cougar conflict in El Dorado County in the last two years and this change is both dangerous and NOT due to chance. The EDC agriculture commissioner is not aware of any reason for changes in depredation reports, other than a change in the rate of depredations.

Figure 1.



Data from El Dorado County Agriculture Commissioner.

- These depredation levels are also much higher than the historic numbers from the California Department of Fish and wildlife. Since the hunting moratorium began in 1972 in California depredations have gradually increase along with the lion population. In the 1980s the average depredations per year in El Dorado County were only 4. Dellenger et al ( 2021)<sup>10</sup> found a positive relationship statewide at the county level between the level of depredation and the suitability of lion habitat. They also found that mountain lion depredation rates increased 9% for every mountain lion removed on a depredation permit the previous year.<sup>11</sup> Interestingly, the high mortality population of lions in western El Dorado County is actually the one with the highest depredation rates. This is consistent with the findings of Dellinger et al (2021).



Data provided by Dr. Justin Dellinger from CDFW records.

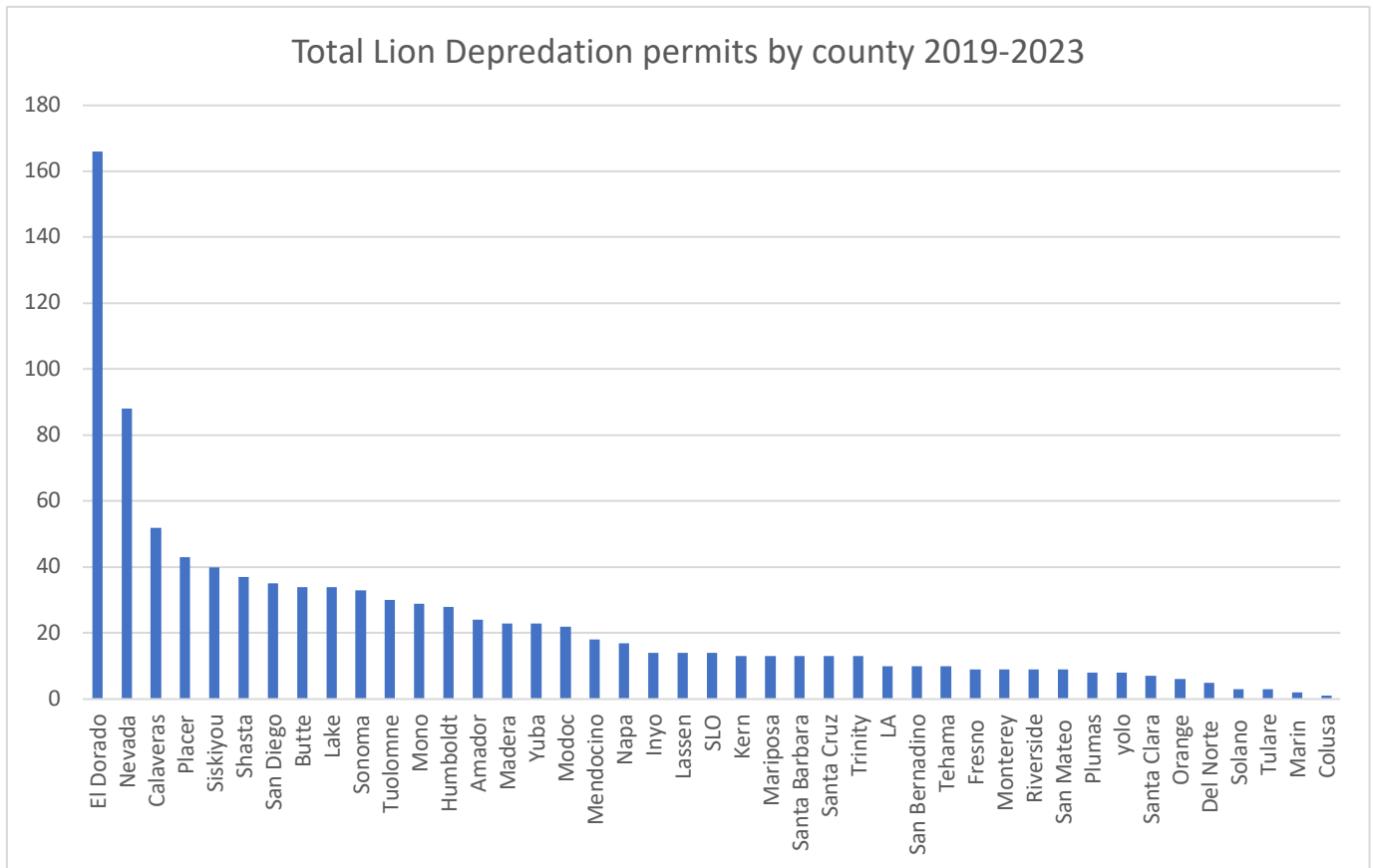
- What has changed that might explain the 2023 dramatic increase in conflict? Habitat fragmentation, increased awareness and reporting of cougars, increasing human populations in El Dorado County and rural development have all happened gradually over the last several decades. These changes however have been gradual and by themselves cannot account for a sudden increase in conflict. In 2020 the California Department of Fish and Wildlife initiated an aggressive statewide program with an expansion of conflict biology positions. These were term positions due to hiring restrictions by law. Simultaneously they changed the policy on cougar/human conflict to emphasize non-lethal hazing as a response to depredation by cougars. Due to a crisis in the state budget and the fact that most conflict biologists were two-year term employees the department's conflict biology program nearly went away in 2023, just as conflict began to escalate. These increase in predation events may not be directly caused by staff reductions but they don't help manage the issue.
- California Fish and Game Code section 4807<sup>11</sup> (current as of 2023) states that: (a) Any mountain lion that is encountered while in the act of pursuing, inflicting injury to, or killing livestock, or domestic animals, may be taken immediately by the owner of the property or the owner's employee or agent. The taking shall be reported within 72 hours to the department. The department shall investigate the depredation, and, if the n cougar was captured, injured, or killed, the n cougar or the entire carcass of the n cougar which has been recovered shall be turned over to the department. Upon satisfactorily completing the investigation and receiving the cougar or the carcass, if recovered, the department shall issue a permit confirming that the requirements of this

section have been met with respect to the particular cougar taken under these circumstances. In July 2020, however, changes were made in California Department of Fish and Wildlife policy on cougar depredation permits to require two kills on the same parcel prior to issuing a lethal permit after a cougar has attacked their livestock a third time.<sup>12</sup> This memo however did not change the rule under section 4807 that “cougars actually encountered taking livestock may be taken immediately by the owner of the property or their agent.”

- One way to assess the relative distribution of cougar conflict is to examine the statewide depredation permit data from the California Department of Fish and Wildlife. Forty-five of California’s fifty-eight counties had depredation permits for cougars issued by CDFW in the last five years. (We are combining lethal and non-lethal permits for this analysis because the decision criteria for a lethal vs a non-lethal permit was changed in 2020 but it should be noted that more depredations are now allowed before a lethal or even non-lethal permit will be issued and so later permits may actually reflect more conflict than earlier permits.) A total of 992 lethal and non-lethal permits were issued between 2019 and 2023. Eight Sierra Counties had nearly half (49.4%) of all depredation permits in this time and the five contiguous northern Sierra counties; Nevada, Placer, El Dorado, Amador and Calaveras, had more than a third (37%) of all depredation permits. El Dorado County was the leader by far in depredation with 166 permits issued in this time frame. EDC with 1% of the state’s land area had nearly 17% of the depredation permits. Another way to look at the data is to examine the number of depredation permits per capita per county. Los Angeles county, with more than 10 million people had 10 depredation permits issue in this time frame giving a ratio of 1 permit per million people. El Dorado County with a population of 191,185 had a ratio of one permit per 1,151 residents. The result is a resident of El Dorado County has about a 1000 times greater chance of a negative interaction with a cougar than a resident of Los Angeles. This certainly in part explains differences in public perception about the threat cougars pose in rural locations and possibly even support in rural counties for their continued conservation.



Figure 3.



- The case can be made that a zonal approach to cougar management in California is appropriate, as a one size depredation policy does not appear to fit all parts of California. We are not, in this opinion, promoting a return to bounties or even the sport harvesting of cougars, but research is needed in high conflict zones to assess the effectiveness of a variety of proactive hazing techniques in reducing conflict with cougars to promote a more peaceful coexistence with these magnificent animals. Assistance to residents on effective husbandry techniques to reduce depredation could also be beneficial. We are concerned a three strike or two strike policy that conditions cougars with food rewards prior to hazing may be conditioning cougars to approach human environments with less fear and thus may could be increasing the frequency of depredation, as well as the potential for conflict and may lead to a decrease in support for cougar conservation. This policy should be revised for counties where conflict is high and increasing.

## Citations

1. Human-Cougar Interactions Science Review Team. 2022. Human-Cougar Interactions: A Literature Review Related to Common Management Questions. Washington Department of Fish and Wildlife, Olympia, Washington, USA. 78 pp.
2. Kertson, B. N. and I. N. Keren. 2021. Cougar use of residential areas and interactions with people in periods of population stability and growth. *Journal of Mammalogy*: <https://doi.org/10.1093/jmammal/gyab145>.
3. Alldredge, M.W., F. E. Buderman, and K. A. Blecha. 2019. Human–Cougar interactions in the wildland–urban interface of Colorado's front range. *Ecology and Evolution* 9: 10415- 10431.
4. Randolph, J.F., Young Julie K., Stoner, David C., and Garcelon David K. Impacts of management practices on habitat selection during juvenile Mountain Lion dispersal. *Ecology and Evolution*, July 2024
5. Living With Lions, a video of an ongoing study with Bart George on strategic hazing to alter lion behavior. [https://youtu.be/\\_mgPMXK3w20?si=ol4NHE-7HESVB-mh](https://youtu.be/_mgPMXK3w20?si=ol4NHE-7HESVB-mh)
6. Sahagun, Louis, LA Times, Jan. 7, 2024. California Mountain Lion population is thousands fewer than previously estimated.
7. Northwest Mountain Lion Ecoregion Population Estimate Report, 2019-2021, Montana Fish Wildlife and Parks, January 31, 2022.
8. Mansfield, T., and R. Weaver. 1989. The status of Mountain Lions in California. *Transactions of the Western Section of the Wildlife Society* 25:72-76.
9. Dellinger, J.A., and Torres, S.G. 2020. A retrospective look at Mountain Lion populations in California (1906-2018). *California Fish and Wildlife* 106(1):66-85.
10. Leanne Mila, El Dorado County Agriculture Commissioner presentation of historical county Agriculture Department depredation data to ECD Board of Supervisors, July 16, 2024.
11. Dellinger, JA, Macon, DK, Clifford, DL, Torrres, SG, 2021. Temporal trends and drivers of mountain lion depredation in California, USA. *Human-Wildlife Interactions* 15(1).
12. <https://codes.findlaw.com/ca/fish-and-game-code/fgc-sect-4807/>
13. State of California Department of Fish and Wildlife Memorandum to Regional Managers from Stafford Lehr, Deputy Director Wildlife and Fisheries Division and David

Bess, Chief Law Enforcement Division on Statewide Mountain Lion Depredation Approach, July 10, 2020. (Supplemental document)