California’s Overtime Law for Agricultural Workers: What Happened to Worker Hours and Pay?

Alexandra E. Hill

California’s new overtime law for agricultural workers went into effect in 2019. In the two years following this, I find that the law led to decreases in weekly working hours and earnings for California crop workers. These losses are consistent with employers restricting hours to avoid paying the higher overtime rates.

Hired farmworkers are vital to the success of California’s agricultural industry and the broader agri-food system. Yet workers face many economic, social, and health-related challenges. Nearly two-thirds of California crop workers have household incomes below 200% of the federal poverty level, more than half self-identify as undocumented, and their jobs are regularly ranked among the most dangerous when compared with other industries.

These and other challenges have received growing public attention and have, in part, been attributed to historical discrimination and the resulting exclusion of farmworkers from major federal labor laws, including laws with protections related to youth employment, unionization, minimum wages, and overtime standards. In 2016, California passed legislation to remove overtime exemptions for farmworkers. The law (Assembly Bill 1066) mandates a gradual phase-in of overtime standards that began in 2019. It involves annual reductions in the daily and weekly overtime thresholds, until reaching the norm in other industries of an 8-hour workday and 40-hour workweek. Since then, four other states—New York, Washington, Oregon, and Colorado—have passed similar legislation, and the issue is gaining traction nationally.

Overtime regulations are intended as worker-protection policies aimed at improving worker wellbeing by requiring higher pay for working long hours. However, there is little analytical evidence on their impacts and there are a variety of potential outcomes. For example, at one extreme, if individual worker hours and wages remain unchanged after the laws are implemented, workers would benefit from higher incomes for the same time at work. At another extreme, if employers reduce hours to remain below the new thresholds, worker incomes could fall, making workers who value the extra income more than additional leisure time worse off. In this case, employers would also need to hire additional workers, invest in labor-saving or labor-augmenting technology, or make larger business changes like switching to less labor-intensive crops.

As more states consider and implement policies to extend overtime standards to agricultural workers, understanding their impacts is vital. This article presents early evidence—in the first two years of the law’s implementation—of the effects of the California overtime legislation on the hours and earnings of workers employed in crop agriculture.

California’s New Overtime Law for Agricultural Workers

The Fair Labor Standards Act (FLSA) sets federal standards for overtime pay and other employment conditions. Since its enactment in 1938, the FLSA has required employers to pay 1.5 times an employee’s regular pay rate for work hours above 40 per workweek, so long as the employee is not exempt. The FLSA exempts several
types of workers and industries from overtime standards, including salaried
workers, some commissioned sales employees, and agricultural employ-
ees, but allows states to extend them coverage.

While most states have not extended overtime coverage to agricultural
workers, California has a history of doing so, albeit to a lesser extent than
workers in other industries. Prior to
the enactment of AB 1066, California
farmworkers were entitled to overtime
pay for hours beyond 10 hours per
day or 60 hours per week.

California’s AB 1066 mandated a grad-
ual phase-in of new overtime hours thresholds, implemented at different
times based on employer size. Table 1
shows this phase-in schedule, which
consists of annual decreases in the
daily and weekly overtime threshold
by 0.5 and 5 hours, respectively, until
reaching the standards for non-exempt
industries. This phase-in began for
larger employers (with more than 25
employees) in 2019 and culminated in
2022, whereas the phase-in began in
2022 for smaller employers (with 25 or
fewer employees) and will reach the
final standards in 2025.

Early Evidence on the Effects of California's Overtime Law

Two key questions must be answered
to begin to understand how new over-
time standards will impact agricul-
tural workers: 1) how do they impact
hours and 2) how do they impact
earnings? Unfortunately, few sources
of data capture this information at
the individual worker level, but the
National Agricultural Workers Survey
(NAWS)—a nationally and region-
ally representative survey of hired
U.S. crop workers—does. Because
the NAWS data undergo substantial
preparation and validation prior to
their public release, data are currently
only available through 2020. This
allows me to examine the effects of the
law in its first two years of implemen-
tation. As new data become available,
longer-run impacts should be assessed
to corroborate this early evidence.

To estimate the effects of the overtime
law on hours, I use the hours each
worker reports working in the week
before their NAWS interview. I esti-
mate the change in the probability
that workers report working below
a continuum of hourly thresholds
in the years after the new law went
into effect (2019 and 2020) compared
with prior years (2009 through 2018),
while controlling for a variety of other
factors.

I account for California’s concurrent
minimum wage increases over this
period by controlling the California
minimum wage rate at the time each
worker is interviewed. I account for
potential impacts from COVID-19 by
comparing changes in worker hours in
California with changes in other states
with similar agricultural production,
but that did not implement new
overtime standards over this period
(Washington, Oregon, Idaho, Arizona,
Texas, and Florida). Finally, I account
for changes in worker and job char-
acteristics by controlling for worker
demographics—including age, educa-
tion, years of farm experience, gender,
and legal documentation status—and
employment attributes—including the
crop, task, and payment type.

To present my findings, I construct a
counterfactual distribution of worker
hours by predicting the hours for
each worker interviewed in 2019 and
2020, based on the state, worker, and
employer attributes outlined above,
but removing the estimated effects
from the overtime legislation. I then
compare this counterfactual distribu-
tion with the observed distribution,
that is, the hours workers actually
worked, to demonstrate the effects of
the law.

Figure 1 summarizes my findings.
Figure 1a shows the observed (what
actually happened, in blue) and
counterfactual (what would have
happened without the law, in yellow)
estimates of the proportion of workers
with different weekly working hour
ranges. Figure 1b shows the difference
between these proportions (observed
minus counterfactual) for each weekly
hour range and the associated 95%-
confidence bounds. Positive values
indicate that the overtime law led to
increases in the number of workers
with weekly hours within the indi-
cated range, whereas negative values
indicate decreases. Confidence bounds
that do not contain zero indicate esti-
mates that are statistically significant.

Overall, the results are consistent with
employers cutting hours to avoid
paying the higher overtime rate.
Figure 1 shows that the law caused
a large and statistically significant
decrease in the number of workers
working 56–60 hours a week, hours
just below the old overtime threshold.
The proportion of the workforce that
worked these hours is roughly half
of what we would expect without the
law in place (Figure 1a). Concurrently,
the law caused a large and statistically significant increase in the number of workers working 46–50 hours per week, hours just below the newly mandated overtime threshold in the last year of these data. The proportion of the workforce that worked these hours is more than one-third higher than what we would expect without the law in place (Figure 1a).

Figure 1b offers additional insight into these shifts in hours. Compared with what would have happened without the law in place, there was an 8% decrease in the portion of the workforce with weekly hours in the 56–60 hours a week range, with most workers (6%) experiencing a reduction in their hours to the 46–50 hours a week range. There was also an uptick in the proportion of workers working in the 41–45 hours a week range (4%) and a decrease in the proportion working 31–35 hours (3%). Though these changes were not estimated with enough precision to be statistically significant, they potentially reflect employers’ preparation for the next year’s overtime thresholds and a way to make up for for some workers’ decreased hours by increasing the hours of those who historically worked fewer hours.

This opens the question of whether the law is welfare-improving for the workers it aims to protect. One important consideration is how the law impacted reported weekly pay, although there are many other factors that are important determinants of worker well-being. Following a similar approach as outlined above for hours, I also estimate the implications for workers reporting before-tax, weekly pay on their most recent paycheck. Figure 2 (on page 4) shows the findings from this analysis.

Consistent with expectations based on the hours effects, results indicate that the overtime law decreased worker pay: the share with mid-level earnings (between $400 and $500) increased by roughly one-third (Figure 2a). Overall, the law caused 10% fewer workers to earn between $600 and $700 per week and 5% fewer to earn between $700 and $800 a week, with most of these workers (9%) shifting to lower earnings from $400 to $500 a week and some (3%) shifting to higher earnings, above $800. To put these earnings changes in context, the 2020 California minimum wage for larger employers was $14 per base hour or $21 per overtime hour. This implies that a $100 decrease in weekly earnings would occur with a reduction of seven base, or five overtime, hours in a week.

**Policy Implications**

In 2019 and 2020, the two years following the phase-in of California’s new overtime standards for agricultural workers, the average California crop worker experienced reduced hours and earnings. Fewer workers worked at or just below the prior overtime threshold of 60 hours per week, and more worked at or just below the 2020 threshold of 50 hours per week. These changes in hours are consistent with employers cutting individual worker hours to remain under new overtime thresholds and thus avoiding paying higher rates. This reduction in hours was accompanied with decreases in workers’ weekly take-home pay—fewer workers earned weekly pay...
from $600 to $800, and more earned $400 to $500.

Evaluating the hours and earnings changes at the midpoints of the ranges (for example, assuming mean earnings of $650 for workers in the $600–$700 range), we can translate these findings to construct back-of-the-envelope estimates of the net effects for California’s crop workforce. According to the 2017 U.S. Census of Agriculture, California crop producers employed 340,000 direct-hire workers annually. My estimates and the associated confidence bounds suggest that these workers worked a total of 15,000 to 45,000 fewer hours and earned a total of $6 to $9 million less on their weekly paychecks than they would have without the overtime law in place. However, it is important to note three caveats. First, estimates do not include H-2A workers, who are excluded from the NAWS but comprise a large share of California farm employment. Second, estimates assume workers only have a single farm employer, which is important because some workers may have sought a second job in response to losing hours. Third, estimates do not account for changes in total employment, which may have increased while individual hours decreased.

This early evidence suggests that the law may not be benefitting the workers they aim to protect, but additional research is needed. It is possible that despite these outcomes, workers are better off from the law; workers may be happy to accept the lower pay in exchange for fewer working hours and having more leisure time. Or, workers may benefit from safer working environments, since research suggests longer hours can increase workplace injuries. On the other hand, workers and their families who were depending on this lost income to cover living expenses may now need to seek out second employment opportunities, negating these other benefits and adding the inconvenience of traveling between jobs.

Additional research is also needed to contrast the effects in California with those in other states to understand whether there are more successful versions of the policy. For example, New York’s law includes a refundable tax credit for overtime hours paid by farm employers. Such a model is likely to reduce the financial burden on employers of paying workers for overtime hours and may mitigate the hours and earnings reductions highlighted here.

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California Rice Rebounds After a Brutal 2022

Aaron Smith

In 2022, California rice farmers planted half the number of acres they had planted in 2020. Rice acreage had not been that low since 1958. Acreage has rebounded this year, returning to its 2020 level. Rice acreage dropped in 2022 because of a lack of water stemming from a multi-year drought. Surface water deliveries from the Sacramento River were severely curtailed. Multiple storms this past winter restored the flow of the Sacramento River. Rice growers were thus able to return to normal activities in 2023.

California has experienced two severe droughts in the past decade: 2014–2016 and 2021–2022. These droughts have strained water resources, leading to reduced surface water deliveries, increased groundwater pumping, and reduced production. Droughts are heterogeneous, affecting different parts of the state differently.

Rice has long been a staple crop in the northern Central Valley. Growers rely on surface water deliveries from the Sacramento and Feather Rivers. Growers had experienced some curtailment in the 2014–2016 drought. However, in 2022, low water levels in Lake Shasta dramatically reduced the amount of available water available to them.

Background

During the gold rush, California imported large quantities of rice, primarily to feed immigrants from China who had come to work in the mines. It took several decades for California producers to figure out how to grow rice in the state. Commercial rice production started in the state around 1911. It increased steadily for almost 100 years, before plateauing early this century, as shown in Figures 1a and 1b. In dollar terms, the value of rice production peaked in 1980, before a price decline that persisted for more than two decades. California growers produced an average of $1.1 billion worth of rice in the last 15 years.

California is the second largest rice-producing state behind Arkansas, producing about a billion dollars in production value per year. Most California rice is medium-grain Japonica for use in Asian and Mediterranean dishes such as sushi, paella, and risotto. Other U.S. states produce mostly long-grain rice. In a typical year, about half of California’s rice production is exported. In the 2022/23 crop year, U.S. exports of medium- and short-grain rice were down by about 400,000 metric tons (about 60%) from their average over the prior decade. California rice exports were also low in 2021/22.

Rice cultivation has environmental costs and benefits. Flooding rice fields starves the soil of oxygen, so soil organic matter ferments anaerobically, producing methane, a greenhouse gas. Globally, flooded rice fields contribute an estimated 10% of agricultural greenhouse gas emissions and about 2% of total anthropogenic (human-caused) emissions. Agriculture is not covered under California’s cap and trade programs, so methane emissions from rice are not regulated. However, rice growers can sell offsets for demonstrated reductions in methane emissions through, for example, dry seeding or early drainage. However, state data suggest that no growers have availed themselves of this opportunity yet.

Rice fields also provide habitat to migratory birds. Such habitats have become scarcer over time as wetland area has declined.

Prevented Planting

The U.S. Department of Agriculture (USDA) Farm Service Agency (FSA) is the part of USDA that administers farm programs. The FSA requires

Figure 1. California Rice Production

1a: Planting

1b: Production

1c: Price

1d: Value of Production

Source: USDA. Available at: https://quickstats.nass.usda.gov
Note: Price and value in 2022 U.S. dollars. Figure 1a shows millions of acres of rice plants; Figure 1b shows the amount of rice produced in billions of pounds; Figure 1c shows average inflation-adjusted price received by rice farmers in dollars per pound; Figure 1d shows the inflation-adjusted value of rice produced in billions of dollars.
all farmers who participate in crop insurance, farm credit, or disaster programs to report all cropland use on their farm. It publishes these data each season starting in August and updates them each month until the numbers are finalized in January.

The FSA crop acreage data contain two pieces of information that indicate how the drought affected land use. First, farmers report prevented-planting acres, which is land that they had intended to plant a crop but were prevented from doing so by a natural disaster, such as inadequate irrigation water. Second, farmers report fallowed or idle acres, which is cropland not planted to a crop.

Figure 2 shows that, in 2022, farmers reported 544,000 unplanted crop acres in California, an increase of 124,000 acres from 2021. Total unplanted acreage was about 7% of the state’s cropland, but it remained lower in 2022 than it was in 2014 and 2015 during the previous drought. In 2023, the reported number of unplanted crop acres in California is 280,000, less than half the number from 2022 and back down to 2020 levels.

Prevented planting reduced rice acres by 55% in 2022, a much larger decline than observed in any other crop in recent years. There were almost no 2022 prevented-planting acres in California crops other than cotton or rice. The FSA’s prevented-planting data are a good estimate of how many rice acres the state lost in 2022 because almost all rice farmers participate in FSA programs. Nonetheless, it is possible there were acres outside of the FSA umbrella that were also taken out of production. The FSA acreage numbers are less comprehensive for many other crops, especially perennials such as almonds, grapes, and pistachios, because fewer of those growers participate in FSA programs.

In addition to prevented planting, FSA records both fallow and idle land. Fallow land is an intentional part of a rotation. For example, a farmer may plant tomatoes, cotton, and fallow in a three-year cycle, with the fallow year intended to conserve moisture and increase fertility for crop production in the next growing season. Idle cropland, on the other hand, is just land not planted.

Fallow and idle acres have declined in recent years, perhaps partly due to acres that were formerly in row crops being planted to tree nuts. You cannot temporarily fallow or idle an orchard.

The FSA data report 35,000 prevented rice acres in 2023, which is only 6% of the planned acreage and is down from 300,000 acres in 2022 and 104,000 acres in 2021. Other years with substantial prevented planting in rice were 2015 and 2017 (see Figure 3).

The number of prevented cotton acres has increased to 96,000 this year, many of which are buried under Tulare Lake. Tulare Lake used to be the largest lake west of the Mississippi River. Beginning in the late 19th century, farmers drained it to grow crops. The lakebed flooded in 1969, 1983, and 1997, but otherwise has served as productive cropland. This year, it has flooded again, and farmers may not be able to plant crops in the lakebed until 2025.
Effects of the Drought on Rice

Most California rice is grown in the northern Central Valley, but small quantities are grown as far south as Fresno County. On average in the state, rice growers apply about 5 acre-feet of water per acre (about 1.6 million gallons per acre.) Up to half of this water drains away from the field, much of it re-entering waterways. A small amount seeps into the soil. There is a lot of variation across fields in the water lost to drainage.

Rice is the dominant crop by land area in northern counties such as Butte, Colusa, and Sutter. Aside from rice, almonds and walnuts also have significant acreage in these counties. Similar to rice, almonds and walnuts use 3 to 5 acre-feet of water per year, so there would not be large water savings from growing them in place of rice. Moreover, because almond and walnut trees are perennial, keeping them alive during a drought year would take priority over rice, which is an annual crop planted in the spring and harvested in the late summer.

Figure 4a shows that farmers had planned to plant more than 100,000 acres in each of Butte, Sutter, and Colusa counties in 2022. The drought reduced rice acres more in the western counties than those further east. Colusa County lost 84% of its acreage and Glenn County lost 75%, whereas Butte County lost just 17%, as shown in Figure 4b. Butte County has greater groundwater resources, so it was less affected by reduced allocations from the Central Valley Water Project. Butte County rice growers also received Feather River water, which was curtailed much less than the Central Valley Project water from the Sacramento River.

Price Changes and Crop Insurance Payments

High prices offset some of the 2022 decline in rice acreage. So, although acreage was down by more than half, the value of production was down only 25% from 2020. Some of the losses were covered by crop insurance under the prevented-planting provision.

Crop insurance is administered by the Risk Management Agency (RMA) of the USDA but delivered by private insurance companies. These companies sell the policies and share in underwriting gains and losses. The RMA reimburses insurance companies for their administrative and operating expenses, which add another $1.4 billion per year.

The RMA sets premiums based on a farmer’s production history, with the goal of making the policies actuarially fair. The government now pays about 60% of the premium, up from about 25% in 1990.

Prevented-planting insurance is designed to provide protection based on pre-planting costs generally incurred up to the point of planting the crop. A farmer with revenue insurance who had planned to grow rice in Colusa County but was prevented from doing so by lack of water would get a payout equal to 55% of the guaranteed revenue. California rice farmers received crop insurance payouts (indemnities) of $350 million in 2022 for losses due to failure of irrigation supply.

Conclusion

With the drop in prevented planting, California rice acres in 2023 are back up to the level seen during most of the last decade. The drought did not cause a permanent shift out of rice (this time). Cotton acreage, on the other hand, continues to decline. The growth of almonds and pistachios, along with the increasing scarcity of water, has been pushing crops like alfalfa, cotton, and wheat out of the state. Rice continues to be more resilient.

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Faculty Profile: Brittney Goodrich

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Dr. Brittney Goodrich is an assistant professor of Cooperative Extension in the Department of Agricultural and Resource Economics at the University of California, Davis. She began this position in January 2020. Prior to joining the faculty at UC Davis, Dr. Goodrich served as assistant professor and Extension Specialist in agricultural risk management and economics at Auburn University from 2017–2019. Dr. Goodrich obtained a Bachelor of Science (B.S.) in math and economics at Iowa State University and Master of Science (M.S.) and Ph.D. degrees in agricultural economics at UC Davis. She grew up in a rural farming community in Iowa where uncertainty in agricultural production and marketing influenced family and friends daily. Consequently, she has always been intrigued by the choices farmers make to address risk and uncertainty in their operations. Goodrich’s research and extension programs aim to provide information and decision support tools to help guide decision making in agricultural operations.

Dr. Goodrich is particularly interested in researching how individuals within agricultural supply chains use contracts to manage risk and align incentives. She has focused much of her research on the use of contracts between almond growers and beekeepers in the almond pollination market, where the precariousness of honey bee colony health makes contracting practices important to grower and beekeeper profitability. She is currently conducting research to determine beekeepers’ valuation of contract enhancements to improve honey bee health in almond pollination contracts. She is also investigating the interconnected relationship between honey bee colony strength and stocking densities (hives per acre), bee flight hours during almond bloom, and almond yields.

To disseminate her work on almond pollination markets, Dr. Goodrich has developed the site almondpollination.ucdavis.edu as a resource for growers, beekeepers, and others interested in the almond pollination services market. She has provided information on pollination services to many different clientele groups through presentations at meetings and podcasts. She also regularly publishes an economic outlook for almond pollination in agricultural press outlets such as West Coast Nut and Bee Culture Magazine.

Dr. Goodrich also conducts research on other important topics for California’s agricultural industry, such as investigating how the Pasture, Rangeland and Forage Rainfall Index Insurance program can be improved upon as a risk management strategy for livestock and forage producers. She also has ongoing projects related to pest management using California’s Pesticide Use Reporting (PUR) Database. In one project, she investigates how the spread of citrus greening disease (huanglongbing) in California has increased costs of production for citrus growers, and in another she analyzes how the use of mating disruption in tree nut orchards for navel orangeworm (NOW) control alters growers’ pest management decisions. Using information gleaned in the NOW project, she is also developing an economic calculator to assist tree nut growers with their NOW pest management decisions.

Dr. Goodrich has been directing the UC Davis Agricultural and Resource Economics Cost and Returns Studies Program (coststudies.ucdavis.edu) since October 2021. Through this program, Dr. Goodrich and staff develop enterprise budgets for most of California’s 300+ commodities. These studies are extremely valuable to the agricultural industry in California. They are used to evaluate loans, inform farm production and financial management decisions, among many other uses. For example, the United States Department of Agriculture (USDA) agencies use the cost and returns studies to determine loan rates and reimbursement rates for conservation programs and indemnities and premium rates for federal crop insurance policies.

Outside of her role as a Cooperative Extension Specialist, Brittney enjoys reading, hobby beekeeping, crafting, and spending time with her husband, dog, and two rabbits.

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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...
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
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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