



THE LION'S SHARE

HOW TOGETHER WE CAN SAVE THE REMNANT POPULATIONS OF MOUNTAIN LIONS IN SOUTHERN CALIFORNIA



Photo Credit: UC Davis Wildlife Health Center

PRE HISTORY

Mountain lions, cougar, catamount, or puma, and their ancestors have been here a very long time, roaming this continent when the first humans crossed the Bering land bridge over 40,000 years ago. The true cats, (family Felidae) appear to have evolved in the Miocene about 20 million years ago. In the middle Miocene, felids began branching into the great sabertooths. The sabertooths, like *Smiladon fatalis*, and other cats with large conical canines, became extinct about 10,000 years ago worldwide, at the end of the last glacier period. Sabertooths roamed Southern California and the fossil record is forever preserved at the La Brea tar pits in Los Angeles, along with golden eagles (the most numerous of fossils found at the tar pits), giant sloths, bear, condors, dire wolves, and many others.

However, more modern cats were evolving, such as the Mountain Lion. There is disagreement about where cats came from and an ongoing debate over how to classify the 37 species of cats that exist today. Our cougar's scientific name is *Puma concolor*, which means cat of one color, in the Family of Cats: Felidae. Scientists generally divide the cat family (Felidae), into two groups, or genera: *Panthera*, the large roaring cats, and *Felis*, the smaller purring cats. The ability to roar depends on the structure of the hyoid bone, to which the muscles of the trachea or windpipe, and larynx (voicebox), are attached. Examples of the roaring cats are tiger, leopard, jaguar, and African lion. Members of *Felis*, possess the ability to purr or make high-pitched sounds. These include bobcat, lynx, margay, ocelot and of course our Mountain Lion or Puma. **Our Cougar is the largest of the purring cats!** (*Cougar, The American Lion, K. Hansen*)



Though *Smiladon fatalis* is more famous for its large upper canine teeth, which are the source of its common name of saber-toothed cat, the scientists at the La Brea pits recently excavated this lower canine. It is shown here compared to a cast of a complete lower jaw.

The puma is the fourth largest cat in the world. Lifespan is hard to determine in the wild, however in captivity they have lived to 21 years, probably half that in the wild. It is dangerous work hunting prey larger than yourself. The oldest mountain lion captured in the region by the UC Davis study was 12 years and average was 3 years. (Vickers, et al 2015)

Historically, pumas have had the broadest geographic distribution of any terrestrial mammal in the Western Hemisphere, except...for humans. Pumas ranged from northern British Columbia to Patagonia and from the Atlantic to the Pacific coasts (Young 1946). Pumas have occupied practically every type of biogeographic zone, including boreal foothills, temperate mountains and forests, tropical rainforests, grasslands, and deserts. (Desert Puma, K. Logan & L. Swenor)

But Homo sapiens in the form of European immigrants to the Americas since the 1500s is unravelling millions of years of the evolution that brought us today's amazing puma species. Fear, settlements, farming, hunting,

habitat loss, extirpation of prey, highways and freeways fragmenting their original territories, all add up to the eastern populations extinct or almost so, with just a fragmented population in Florida (subspecies Puma concolor coryi). Our western populations are severely diminished, habitat has been lost and what is left is dissected by highways. Pumas are persecuted, and still trophy hunted in many western states.

Humans organized extermination campaigns sanctioned by state and federal governments with the intent to protect livestock and big-game animals. Carnivores were killed by any means possible, including shooting, trapping, and poisoning (Brown 1984, 1985). Wolves were extirpated from the Southwest by about 1925 (Brown 1984), followed by jaguars in about 1930 (Findley et al. 1975, Hoffmeister 1986), grizzly bears in about 1935 (Brown 1985). Pumas survived this onslaught probably because of their solitary, highly cryptic nature and their propensity to inhabit the most rugged terrain, but even so, puma populations declined. (Desert Puma: K. Logan & L. Swenor 2001)

CALIFORNIA LEGAL BACKGROUND TIMELINE

1500's

Jesuit priests in Southern California offer a bounty of one bull to Native Americans for every mountain lion killed.

1907-1963

Lions were bountied predators in California; federal and state agencies paid hunters to kill these "pest" animals.

1968

Mountain lion populations plummeted to an estimated 600 individuals, resulting in a coordinated action of wildlife organizations and state official. Sen. John Dunlap(D-Napa) promoted wildlife conservation with the first legislation in the US to protect mountain lions from hunting.

1969

Mountain lion status switched to "game animal", requiring people to buy a hunting license from California Department of Fish and Game. (now Fish and Wildlife)

1971

Governor Reagan became convinced that a moratorium of hunting and killing pumas was the necessary step to protect California's last cougars from extinction.

1990

Prop 117: California Wildlife Protection Act was passed, designating mountain lions as "specially protected mammals"-a distinction rarely given even to endangered species. Even though mountain lions aren't going extinct on a continental scale, in California they face "local extinction" or extirpation.

2013

Senate Bill 132 signed into law by Governor Jerry Brown. This groundbreaking legislation (effective January 1, 2014), protects lions that accidentally wander into human-populated areas. Law Enforcement and Wildlife Officers can only kill a lion if it is posing an imminent threat to human life: exhibiting aggressive behavior towards a person that is not due to the presence of first responders.

Since 1907 (the first year data is available) through 2013 an estimated 15,951 mountain lions have been killed by humans in California.

This figure does not include:

- lion deaths from road accidents
- secondary poisoning
- kittens or injured adults euthanized by Cal Dept Fish & Wildlife
- death by unknown causes
- poaching
- "shoot-shovel-and-shut up" practice espoused by some

Proposition 117: California Wildlife Protection Act

In 1990 the voters of California approved Proposition 117, the California Wildlife Protection Act (CWPA). The Act accomplished two things: it prohibited the sport hunting of the California Mountain Lion, and it required that California spend no less than \$30 million a year on conservation and wildlife habitat protection and a significant portion on “deer/lion” shared habitat. Some local lands, such as Santa Ysabel Preserve East, Rutherford Ranch/Volcan Mountain, the Sycamore Canyon Preserve North, Mission Trails Regional Park, have received grants from this Wildlife Protection Act fund, to help augment habitat and corridors. It also prohibits use of poisons, leg-hold traps, or metal-jawed traps and snares.

You can see what each county in California has received and for which projects at the CWPA website. Much is used to purchase habitat. Although it seems like San Diego agencies need to apply more often, some other counties are getting the “Lion’s share”. This is one area where we can find extra funding if we citizens support and encourage our government agencies to apply.

Even though since 1971 hunting has been banned in California, our pumas are still stressed by habitat loss, poisoning, vehicle collisions, and depredation permits i.e. (killing permits by Wildlife Services if they eat

your poodle or llama) As you will discover, despite “no hunting” in California, the population is declining: the number one cause of death of our pumas in San Diego County WEST of I-15 is vehicle collisions, the number one cause of death of our pumas EAST of I-15 is through your tax dollars funding a government agency “Wildlife Services” through depredation permits. (see page 14 article on Wildlife Services)

Mountain lion field research and population estimates have come a long way in the last few decades. So just how many Mountain Lions are in Southern California? In San Diego County? Not as many as you might think.

Many now agree that our average lion population density is 1.7 lions per 100 square kilometers of suitable habitat. In California which has approximately 185,000 square kilometers of habitat, that figures out to approximately just over 3000 resident lions for the entire state. Biologists agree, and California Fish and Game admits, that the population is smaller than it was 10 years ago and still dropping. This is attributed to decreased habitat, vehicle collisions, depredation permits, and hunting policies in surrounding states. In less than 200 years, Puma distribution is now one-half of what it historically was. The larger question is “Are we willing to give this amazing predator a chance to survive in our region’s ecosystem?”

“Rules” of Depredation Permits: Section 4804 of Prop 117

In order to help ensure that only the depredating mountain lion will be taken, the following conditions are attached:

- (a) The permit shall expire 10 days after issuance.**
- (b) The permit shall authorize the holder to begin pursuit not more than one mile from the depredation site.**
- (c) The permit shall limit the pursuit of the depredating mountain lion to within a 10-mile radius from the location of the reported damage or destruction.**

It was impossible to tell if these conditions were being enforced or honored.

Despite Freedom of Information Act requests, information is not forthcoming from Wildlife Services.

Wildlife education, support, training, and guidelines for police and wardens were lacking and tragic mistakes were happening such as 4 month old cubs being mistaken for adult Mountain Lions and killed. The report on this incident, conducted by Fish and Wildlife, found the cubs were only 4 months old and weighed 13-14 pounds, the size of a house cat. Their stomachs were empty and they were in poor condition when they were gunned down while huddling under a porch on the outskirts of downtown Half Moon Bay. Hence the need for SB 132.

GOOD NEWS: Senate Bill 132 in 2013 added Section 4801.5 to Prop 117, requiring nonlethal measures to be used to resolve public safety situations when a lion is not acting aggressively or aggression stimulated by human authorities on the scene. This is a big step to keep us from killing our lions for no good reason. **Several incidents in 2014 have shown our wardens showing great restraint and common sense in handling lion interactions with humans.**

The Study Data

GOOD NEWS: WE HAVE FACTS SO WE CAN ACT!

We are fortunate that the common myths of “there are so many Mountain Lions in our State” , “plenty in San Diego County, “we see them all the time”, “they kill so many cattle”, “they are everywhere” are finally being dispelled by real facts and real data. We Californians may have seen pumas “all the time” when we were growing up, a few decades ago, but things in Southern California and habitats in our region have changed dramatically in those same few decades. We now have facts and statistics that have come to us from the very hard and dedicated work of Puma biologists such as Dr. Paul Beier, a wildlife ecologist in California. Dr. Beier embarked on the first study of near-urban mountain lions in the nation in 1988. Dr. Beier found and monitored pathways the mountain lions used to navigate roadways and parkland in 800 square miles of the Santa Ana Mountains (south of Disneyland). Over the course of five years (1988-1993) Beier and colleagues radio-collared and monitored 32 mountain lions, including adults and kittens.



Photo Credit: UC Davis Wildlife Health Center

This UC Davis Southern California Project under Walter Boyce began in 2001 with Ken Logan and Linda Sweanor , and continues on with Lead Researcher and Associate Veterinarian, Dr. Winston Vickers.

The next important research area began through UC Davis Wildlife Health Center with Walter Boyce, DVM, and experienced Puma researchers Ken Logan and Linda Sweanor in the Cuyamacas in San Diego County and Julian area from 2001-2003. Logan and Sweanor have dedicated their lives to puma research and completed a 10-year study of Pumas in New Mexico before their work in the Cuyamacas. Continuing on this study through UC Davis is the most recent, very intensive study by Winston Vickers, lead researcher and an associate veterinarian. I am grateful to Mr. Vickers who has provided us with much of the current research data, maps, and photographs so we can be advised of these facts. There are many biologists studying pumas and doing great work, but I focus on those that work in the geographical area in Southern California.

The current research focus with Dr. Vickers is in four main areas:

1. Landscape connectivity: wildlife travel corridors and barriers to movement within these corridors
2. Genetics, health, disease/toxins
3. Exposure: minimizing conflicts between people, cougars, and domestic animals
4. Studying interactions between Bighorn sheep, deer, bobcat, and cougar

SOME BASIC BIOLOGY OF OUR MOUNTAIN LIONS

- Short, squat musculature, long, lithe frame
- Powerful posterior, heavy tail
- Narrow shoulders for maneuverability
- Average weights:
Females 70 – 90 pounds
Males 130 – 160 pounds
- Lifespan:
up to 12 years in the wild, and 25+ in captivity (oldest in Vicker's study is 12 years, average 3 years)
- Litter size 2 – 4 kittens, spotted
- Kittens surviving to adulthood 1 – 2
- Kittens stay with mother to ~1 ½ years of age
- Energetic needs:
Adult cougar needs one deer every 16 days, a female and three 3-month olds, needs one deer every nine days. (Ackerman, Utah State)



Photo Credit: Linda Sweanor

1. ECOSYSTEMS NEED PREDATORS

Top predators are essential regulators of ecosystems – preventing overpopulation of deer as well as regulating coyotes and smaller carnivores. Without apex predators to take down big game such as deer, or elk, herds linger in one area, trampling and chewing flora that a wide variety of other animals need to live as well as disrupting the balance of riparian areas.

Research over the past decade suggests that predators help maintain plant communities by regulating herbivores. Reintroducing wolves in Yellowstone in the mid-1990s, led to a rebound of cottonwoods, willows and other riparian species by keeping elk numbers in balance.

Their role as top predators has a significant effect on their ecosystem. Similar to wolves, mountain lions affect vegetation by regulating ungulate species that browse the all-important riparian habitat. For example, the loss of mountain lions in Yosemite National Park has been linked with a decrease in black oak recruitment. Similarly, in Zion National Park, the absence of mountain lions has led to a reduction in cottonwood trees. These changes in the plant communities have led to greater stream erosion and a decrease in the number of terrestrial and aquatic species including wildflowers, butterflies, reptiles, and amphibians. (*Ripple, W. J. and R. L. Beschta. 2006*). Linking a cougar decline, trophic cascade, and catastrophic regime shift in Zion National Park. *Biological Conservation* 133: 397- 408

While conservation biologists increasingly recognize the ecological importance of large carnivores (*Terborgh et al. 1999*), the management of mountain lions over most of their range in the United States continues to be dictated by hunting-driven management philosophies rather than by conservation (*Torres 2001*).

2. HUMANS WANT MOUNTAIN LIONS

“The majority of citizens favor continued presence of pumas”, (*Vickers, 2007*), and due to low annual survival rates and genetic restriction, some southern California puma populations appear to be “at risk for demographic collapse”, *Vickers et al. 2015*.

3. PUMAS HAVE AN INHERENT RIGHT TO EXIST

We need to accept depredation on domestic animals as part of the price of a rural lifestyle and an intact ecosystem. You can maximize your personal safety and your animals’ safety by appropriate behaviors and precautions.

PUMAS IN THE STUDY

- Over 140 mountain lions were sampled for their DNA, disease, and toxins from blood samples, and fecal samples.
- 93 mountain lions were captured, 80 of which were radio-collared, with 79 Global Positioning Systems (GPS) and, 1 VHF system.
- Data from 3 mountain lions GPS collected by USGS personnel also contributed to the study.
- Cameras were also used to document collared and uncollared pumas attracted to bait stations.
- GPS allows the scientists to track not only movement but behavior.
- 260 total mortalities analyzed 30 years of data.

CAUSE OF MORTALITY IN STUDY AREAS FROM 2001-2013

- 30 of 56 (54%) of the collared cougars in the study and 1 captured but uncollared cougar are confirmed to have died while circulating in the wild.
- Over half of the mortalities of cougars while circulating in the wild were directly related to humans, suggesting similar impacts are likely in the rest of the cougar population.
 - ✓ Car strikes: 20%
 - ✓ Depredation permits: 20%
 - ✓ Disease confirmed or likely: 17%
 - ✓ Illegal shootings: 13%
“Shoot, shovel, and shut up”
 - ✓ Fire-human set: 6%
 - ✓ Shootings deemed legal: 3%
 - ✓ Another cougar: 3%
 - ✓ Unknown but trauma suspected: 3%

But why worry too much about pumas in southern California? Isn't hunting banned?

- Mean annual survival rate is 56%
- Survival rate is lower than in a hunted populations in other states.

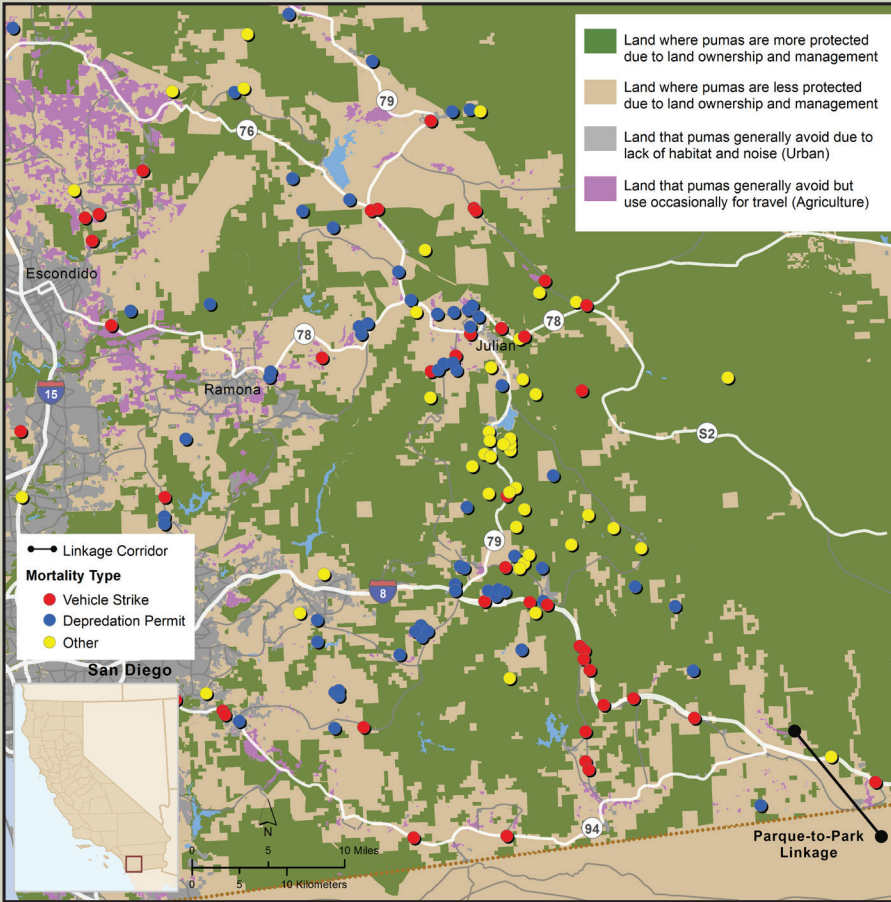


Fig. credit: Vickers et al., 2015

MAP above shows DEPREDATION PERMITS, and data points CENTERING IN Julian and Descanso

The yellow data points show M56 dispersal crossing from Santa Anas to the eastern Peninsular Range and then killed on a depredation permit for inadequately protected sheep.

What is the cost of a sheep versus loss of this lion and his rare genetics. This is the question we collectively have to ask ourselves. The most recent loss of a lion in the area was due to killing of chickens.

“This population has one foot on the banana peel and one foot on the edge,” Winston Vickers says of Santa Ana mountain lions. “Whatever we can do, we should do. Other populations are going the same direction, they’re just not as far down the road.”

Mortalities due to depredation permits jumped up in 2014 to five or more in San Diego County alone. Most were in Julian and Descanso. If pumas can’t even survive and be tolerated in the backcountry their outlook is bleak. Can we change our tolerance to better serve the regions’ ecosystem, and not just our personal backyards, ranch boundaries, and property lines? If we lose a hobby animal or sheep, we have to ask ourselves: Have we provided enough protection? Should we blame wildlife for our lack of proper stewardship?

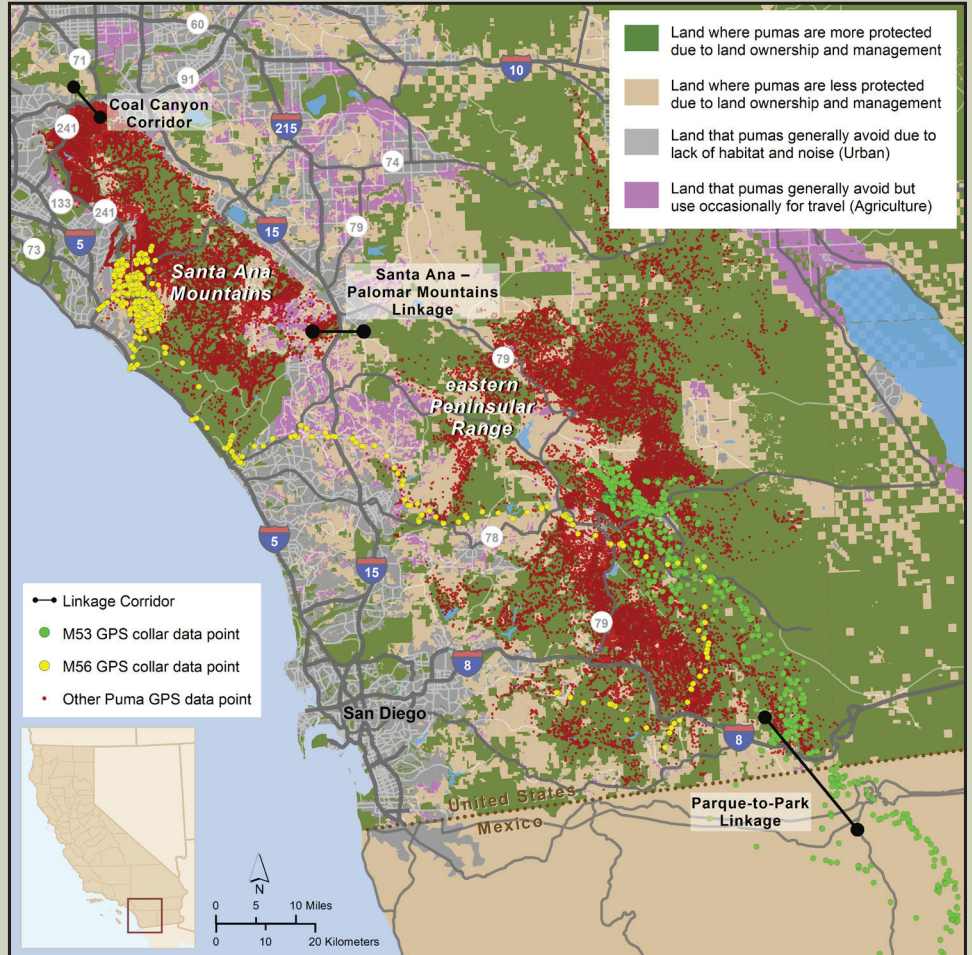


Fig. credit: Vickers et al., 2015

SHOULD THEY BE HUNTED TO REDUCE LIKELIHOOD OF ATTACK?

Research points to no; trophy hunters want the large males and this has shown to be disruptive to the population balance. Researchers in Washington State have found that killing of the adult resident males increases the number of young males in the area as they try to fill the void left by the older male. These young, wandering males are more likely to be involved in livestock depredations and incidents with humans, and they also kill more cougar kittens in the area in order to breed with the females. Quality genetic balance is disrupted and territories are disrupted. Biologists are also finding evidence that hunting can drive evolutionary changes in target species, selecting for smaller body size and earlier sexual maturity. Hunters select for the large trophies, leaving genetic imbalance.

HABITAT USE IN SOUTHERN CALIFORNIA:



Photo Credit: Winston Vickers

Cougars are cryptic and normally undetected by humans even when close by

- Cougars utilize wildlands even at the edges of suburban development, including golf courses, as well as trails used by humans, but typically from dusk to dawn, and are rarely seen.
- Deer and other wildlife prey of cougars can be attracted to these areas because of water sources and other food such as planted vegetation and pet food left outside
- A survey of residents of San Diego County showed that respondents favor the continued presence of mountain lions, but that nearly half of owners of domestic animals in lion habitat do not currently adequately protect their animals at night (Vickers, et al)
- Use of habitat near human development appears to increase cougar exposure to anticoagulant rodenticides, and possibly disease transmitted by domestic cats or bobcats attracted to food sources associated with humans.

RISK PERSPECTIVE



Photo Credit: Winston Vickers

- **Approximately 4 cougar attacks occur yearly in all of North America (includes Canada!)**
- 14% have been fatal (Logan et al. 2011)
- In California there have been 4 attacks in the last 10 years, 1 fatal (CDFW website)
- In the United States (R.L. Langley 2012):
Dog Attacks: 4.5 million bites, 300,000 emergency room visits, 9,500 people hospitalized, 30 people die yearly in US from dogs
- Horse-related deaths: 25 people per year
- Deer-vehicle collision deaths: 200 people per year
- Cow-related deaths (yes, cow): 28 per year

BOTTOM LINE:

You are more likely to be killed by a cow than a puma.

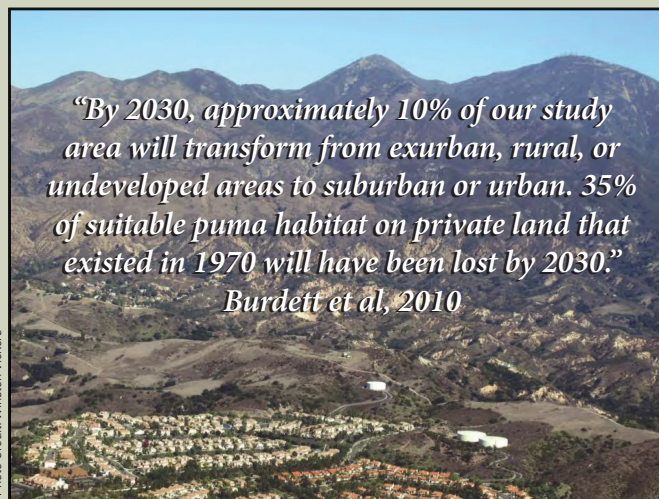


Photo Credit: Winston Vickers

Most of mountain and foothill areas of Southern California are, and were, cougar habitat, but much is fragmented and current quality varies widely

“By 2030, approximately 10% of our study area will transform from exurban, rural, or undeveloped areas to suburban or urban. 35% of suitable puma habitat on private land that existed in 1970 will have been lost by 2030.”
Burdett et al, 2010

Wildlife Crossings

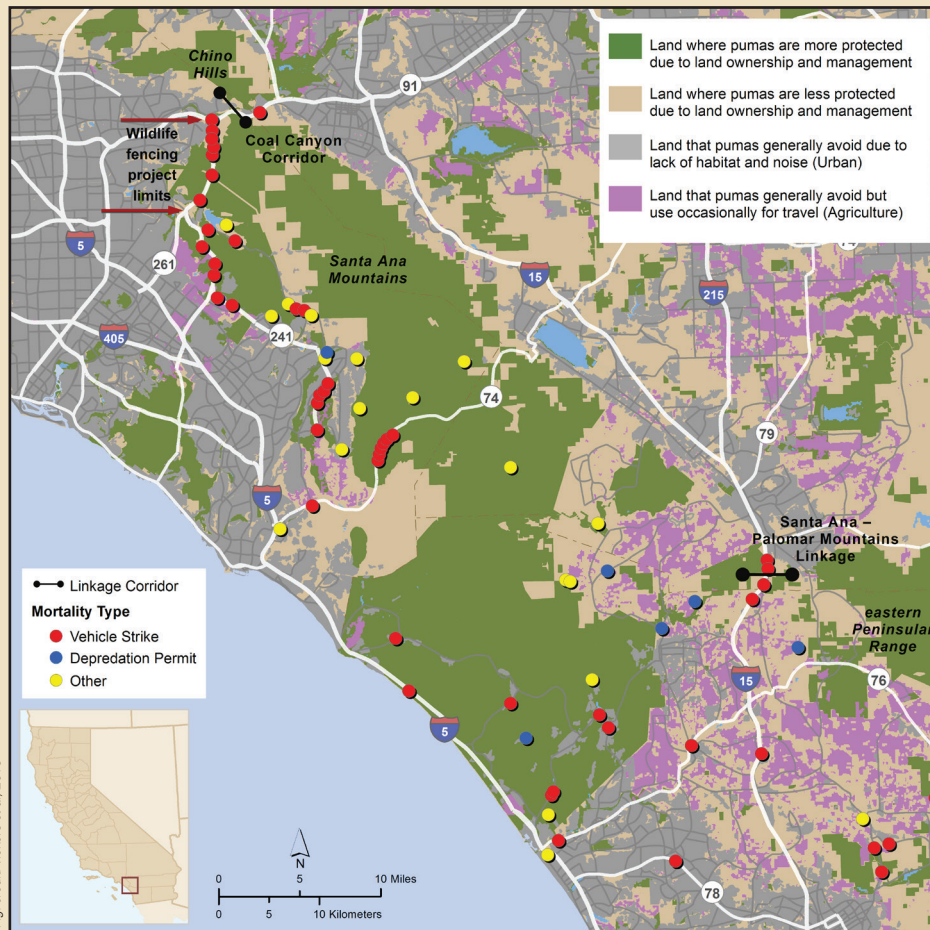
RISKS TO SOUTHERN CALIFORNIA COUGARS

HIGHWAY BLUES

Exacerbating our problem in San Diego County is interstate highway, I-15, a major thoroughfare connecting San Bernardino, Riverside and San Diego counties that Vickers' research has proven nearly impossible for the mountain lions to cross. It bisects the UC Davis study area, which stretches from Orange County, south to the Mexican border and east to the Salton Sea. Crossing the interstate, especially for the animals of breeding age, is important for this population's declining genetic diversity. Our lion populations are in a vise, their habitat being squeezed between the greater Los Angeles, Orange County

“Nowhere in the US, outside of the endangered Florida panther, have mountain lion populations been documented that are this cut off and with survival rates this low,” says lead author Winston Vickers.

“This means that the odds of an individual animal making it across I-15, surviving to set up a territory, successfully breeding, and then their offspring breeding so the genes are spread throughout the population is harder to have happen naturally than one would expect.”



and San Diego County areas. The habitat fragmentation is complicated by the restriction of genetic flow between the last remaining viable habitats. In the Santa Anas, fragmentation and genetic restriction are compounded by unusually low survival rates. This raises significant concerns about the mountain lions' future. During the 13-year study, researchers detected only one mountain lion that made it across I-15 moving east to west, the direction needed to improve genetic diversity for the Santa Ana Mountains population. That male lion, M86, successfully bred and produced at least four offspring before he died likely from a vehicle collision. Of those four, one was poisoned, one was hit by a car, and another was taken into captivity for being too familiar with people. The fourth lion (F92) produced kittens, two of which she raised to adulthood (F126 & F127), and one of which, F126, is known to still be alive.

- **Freeways like 241, I-15 and the 91 Freeway have very few remaining suitable passages that allow wildlife like mountain lions to cross safely**
- **Mountain lions (including a number of study lions) are killed regularly while trying to cross these and other roads and freeways**
- **The Mexican border with its extensive fencing and human presence creates a different kind of barrier to wildlife movement**



Photo Credit: UC Davis Wildlife Health Center

F92, F126, and F127

developing means to connect the population more naturally is preferable, Vickers says, such as by creating safe crossings along targeted highways.

Highways that bisect habitat or divide remaining “conserved” habitat, and associated ongoing development, threaten to further subdivide this already fragmented puma population and increase threats to survival. This study highlights the importance of combining demographic and genetic analyses, and illustrates that in the absence of effective measures to reduce mortality and enhance safe movement across highways, translocation of pumas, such as was done with the endangered Florida panther (*P. c. coryi*), may ultimately be necessary to prevent further genetic decline and ensure persistence of the Santa Ana Mountains population. (Vickers *et al* 2015)

“So all the genetic hopes of this population may be pinned on this one animal, F126—a female we know is circulating,” Vickers says. “Given the odds of that one female producing kittens, and those kittens producing kittens, it will take generations and generations to see if his effort, M86’s, in crossing the road was worth it.”

The situation for mountain lions in the Santa Anas, particularly, has become so dire that translocation—such as was done for the endangered Florida panther—may be necessary to prevent further genetic decline, the study warns. However,

A new bill, **AB 498**, was introduced in February 2015 by Marc Levine (CA Assemblymember District 10), requiring the Department of Fish and Wildlife to administer the “Significant Natural Areas Program”, to develop and maintain systems that identify areas that are most essential for habitat connectivity, including wildlife corridors and habitat linkages.

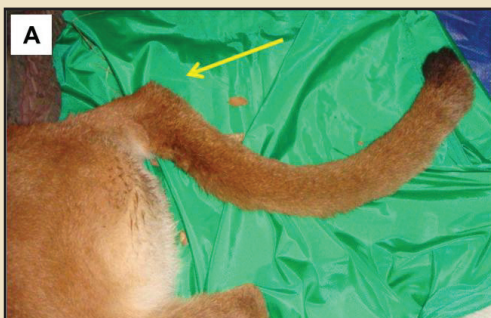
“This bill would declare that it is the policy of the state and all state agencies, with regard to a project proposed in an area identified as a wildlife corridor, to encourage the project proponent to consult with the department, and, wherever feasible and practicable, take steps to protect or restore the functioning of the wildlife corridor through various means, as applicable.”

It’s a start, it’s just a bill, and it only “encourages”...but it puts these important connectivity issues on the radar. We all need to implement community wildlife corridor advocacy to help with this “encouragement”.

Genetics

GENETIC ISSUES DUE TO HABITAT “ISLANDS”

Lions in Santa Ana Mountains showed the greatest genetic isolation among the 8 subpopulations studied in California. These include DNA samples from multiple studies across the state including Winston Vickers’ and Paul Beiers’ research.



Photographs of kinked tails of pumas F95 (a) and M96 (b). Arrows indicate kink sites.

A: Puma F95 had tail kink at base of tail and

B: Puma M96 had a tail kink near distal tip of tail

These two pumas had among the lowest genetic diversity measures in this study.

(Ernest *et al*, *Conservation Genetics*, 2003) and Ernest *et al*, 2014

Photo Credit: UC Davis Wildlife Health Center



Photo Credit: UC Davis Wildlife Health Center

Roads And Barriers To Puma Movement

WILDLIFE CROSSINGS LINKAGES TO CORRIDOR HABITATS ARE THE KEY TO SURVIVAL

Paul Beier, Dan Majka, Shawn Newell, Emily Garding,
Northern Arizona University January 2008

KEY LEARNINGS FROM WILDLIFE CROSSING RESEARCH

A functional wildlife crossing will (1) reduce roadkill after construction, (2) maintain habitat connectivity and allow target species to be present on both sides of the right-of-way, and (3) allow continued genetic interchange. If everyone reads the various reports, studies, research, we can all learn to make informed decisions and help encourage, guide, and push our politicians and government agencies to make wildlife crossings a priority before it is either more expensive or too late to save viable puma populations



Example of a wildlife crossing overpass in Europe and Canada. Notice how you have appropriate habitat on either side of the crossing. Suitable habitat for species should occur on both sides of the crossing structure (Ruediger 2001; Barnum 2003; Cain et al. 2003; Ng et al. 2004). This applies to both local and landscape scales. On a local scale, vegetative cover should be present near entrances to give animals security, and reduce negative effects of lighting and noise (Clevenger et al. 2001; McDonald & St Clair 2004). Suitable habitat must be present throughout the linkage for animals to use a crossing structure.

IF YOU BUILD IT WILL THEY ALWAYS USE IT?

Even though openness is preferred, there should still be vegetation within the crossing to provide cover for smaller prey species. Mountain lions may stay in one location for several hours assessing the area prior to entering the passageway or crossing the road (Beier 1999).

A very important characteristic of functioning crossings and wildlife corridors in urbanized areas is the absence of artificial lighting in the remaining fragmented natural areas. Water guzzlers can be constructed near dry crossings or in wildlife corridors with limited water sources to encourage wildlife use of the corridor and passageway (Edelman 1991).

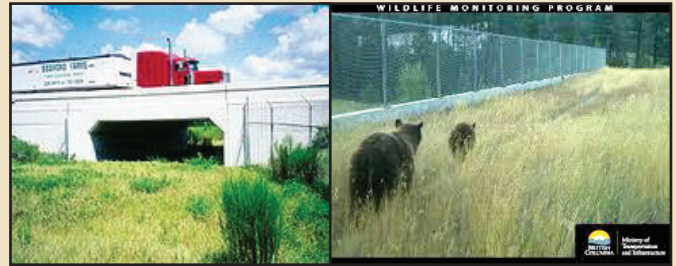


Photo on right Caption: Notice use of fencing to funnel wildlife safely to underpass or overpass.
Photo on left: Underpass in Florida: Underpasses have proven to be a vital link in preventing roadkill of the federally endangered Florida panther (*Felis concolor coryi*) (FHWA 2000d).

A wide variety of animals can and will use a well-designed wildlife crossing. There must be sufficient habitat on both sides of the transportation right-of-way to support a population of the target species. The crossing should be placed within a wildlife corridor, a location where animals are known to cross naturally or in an area of extensive high quality habitat. The wildlife crossing must be wide



Culvert 50 meters from where F50 was struck by car. One of 3 within a half mile stretch of the site. No tall fencing present to funnel wildlife into safe passages.

enough to meet the habitat and cover preferences of the target species. A minimum width of a wildlife crossing would be 152 meters (500 feet). Passageways, ideally, should be “high and wide.”



Photo Credit: Winston Vickers

Fencing should direct animals towards crossing structures (Yanes et al. 1995; Gagnon et al. 2007)



Although studies show pumas prefer more open box culverts, if an underpass connects appropriate habitat in the cat's normal travel pattern, has fencing or other geographic features to funnel them within their territory, they will use a pipe culvert also.

Photo Credit: UC Davis Wildlife Health Center



Bridge underpasses are preferred over pipe or box culverts (Beier 1995). In Beier's (1995) study, the majority of the transportation right-of-way crossings by dispersing juvenile mountain lions traveled under bridges.

Another report, “Wildlife-Vehicle Collision and Crossing Mitigation Measures” was created 8 years ago! The information to act is available, we just need to make wildlife crossings a priority. This thorough report was created in cooperation with the US Department of Transportation and the Federal Highway Administration in May 2007 and prepared by Western Transportation Institute, Montana State University-Bozeman. The authors are: M. P. Huijser, A. Kociolek, P. McGowen, A. Hardy, A.P. Clevenger, and R. Ament.

COSTS OF WILDLIFE-VEHICLE COLLISIONS:

There are substantial costs associated with wildlife-vehicle collisions. Recent research (Huijser et al., in prep.) estimated the average costs for each deer collision at \$8,015. Agencies and citizens coming together now, solutions planned now, funding found early, will save us money in the long run.

- Estimates are 725,000-1,500,000 collisions deer-vehicle in the US alone
- Animal-vehicle collisions result in 200 human fatalities a year
- 29,000 human injuries in animal-vehicle collisions
- State Farm estimates 1,000,000 animal-vehicle insurance claims per year, steadily increasing by about 50% between 1990-2004
- Total animal-vehicle collisions costs per year estimates range into the billions of dollars. In 2012 the estimated cost was exceeding \$4 Billion! We could build lots of fence and wildlife crossings with that amount.

The following statement, from Logan and Sweanor, was written in 2001 and now we have even more data results and puma travel patterns in Southern California thanks to the latest research project which spans 2001-2013. If we procrastinate any longer, the corridors will all be gone, habitat more fragmented, more puma populations isolated, and we will be facing extirpation at worst and an inbred population at best.



Photo Credit: Terry Prather, The (Maysville, Ky.) Ledger Independent, via AP

As an umbrella species, the mountain lion habitat requirements would encompass the habitat requirement of many other wildlife species.

By Terry Prather, The (Maysville, Ky.) Ledger Independent, via AP

By permission are the following excerpts from their report:

REAL-WORLD EXAMPLES

Washington State, Arizona, Banff, Germany, The Netherlands are but a few of the places making wildlife crossing a priority in highway construction or highway retrofitting for wildlife.

- In Banff National Park, Canada, grizzly bears, deer and elk tend to use overpasses to a greater extent than underpasses, while black bears and mountain lions tend to use underpasses more than overpasses (Clevenger et al. 2002a).
- 24 underpasses along a 64 km (39.7 mi) long section of I-75 in southern Florida were installed to allow for water flow and animal movements, including the Florida panther (Foster and Humprey 1995).
- In Montana, wildlife underpasses and one wildlife overpass along US Hwy 93 on the Flathead Indian Reservation, and one wildlife overpass across MT Hwy 83 near Salmon Lake are planned, under construction or completed.
- The Netherlands has large underpasses (7-10 m (7.7-10.9 yard) wide) and overpasses (typically about 50 m (54.6 yard) wide) (Kruidering et al. 2005).

“In the West, if self-sustaining, interconnected puma populations are to persist as they do today, then wildlife managers need to immediately identify, map, and conserve present puma habitat and landscape linkages. Already state and federal wildlife agencies have baseline information to begin the mapping process. There is statewide information on the distributions of pumas, puma harvest, depredation incidents, and puma-human encounters to help identify occupied puma range and potential landscape linkages. Wildlife agencies can also tap into the expertise of their own local biologists, landowners, hunters, and naturalists regarding puma activity. And they can rely on the intuition of puma biologists who have studied behavior, habitat use, and movement patterns to help them identify potential links. There is no better source than the pumas themselves.”

Logan, K., and L.L. Sweanor. 2001. *Desert Puma: Evolutionary ecology and conservation of an enduring carnivore*. Washington, D.C.: Island Press

Our point in citing all these reports is two-fold. First, to inform us on these great information resources to enhance our understanding of what our options are and secondly, it is less expensive if we start now. Great studies have been done...It is time to fund solutions. The UC Davis study works with counties, Caltrans, etc. on the corridor conservation and road crossing improvement.

There is not that much good habitat left, so deducing where to put linkages should become obvious and the researcher and agency working group are looking for solutions. We must continue efforts to make funding mitigation of highway issues a priority, IF we want to support puma populations.

Southern California Mountain lion populations may soon be considered remnant populations, and as such will be in serious and immediate need of conservation attention. Fencing, combined with wildlife underpasses and overpasses offer safer crossing opportunities. It is always cheaper to find solutions before species are endangered.

PARTNERSHIPS ARE KEY

PARTNERING WITH TCA TOLL ROAD

Thanks to the findings of the 12-year puma study carried out by researchers from UC Davis Wildlife Health Center, the Foothill/Eastern Transportation Corridor Agency is spending \$10 million to erect 10-12 foot tall “wildlife (and human driver) protection” fencing. This will curb mountain lion deaths on one of the deadliest wildlife corridors, Hwy 241 toll road, in the Santa Ana Mountain range. In total, the fencing project on 241 from the 91 freeway, will include 6.5 miles and will direct animals to the existing undercrossings.

According to the agency’s director of environmental services, Valerie McFall, “this is going to be one of the most robust wildlife fences in all of California. We’re looking to provide an example for other states and transportation projects.”

PARTNERING WITH CALTRANS

HOW DOES CALTRANS FIGURE IN THE SOLUTIONS?

Caltrans new planning tool: “CTP2040” does incorporate environmental stewardship goals into its’ policy. Two strategies listed are “avoid and minimize habitat fragmentation” and “implement the **California Essential Habitat Connectivity Project**” which was a two-year study with Caltrans and numerous other state agencies

to develop a statewide wildlife habitat connectivity map. The goal being to provide a framework to protect what is left of California’s natural heritage.

We are fortunate to have these specific data from the Vickers study and yet there is even more detailed information available that our agencies can glean from to enact policy and procedures and to work on solutions.

In 2009 Caltrans released its’ **Wildlife Crossings Guidance Manual**. The manual also seeks to help Caltrans staff to meet regulatory requirements by integrating regulatory considerations in to the wildlife crossing evaluation process.

In it, the Caltrans Manual states that animals are being killed and/or unable to cross thereby dividing a formerly single population into two or more isolated segments. Their guidelines further state that “environmental regulations compel transportation professionals to reduce or eliminate these effects on special status species and habitats.” Project Managers, Engineers, and Planners are mandated (SAFETEA-LU Section 6001), “that wildlife crossings be taken into account early in the transportation planning process... to reduce impacts on special status species and reconnecting fragmented habitats.”

Moreover, wildlife crossing considerations are also reflected in the **California Comprehensive Wildlife Conservation Strategy** (California Department of Fish & Game, 2006), which lists wildlife habitat fragmentation as one of the biggest threats to the state’s wildlife and suggests as a solution that “***Wildlife considerations need to be incorporated early in the transportation planning process.***” So it is all written, is all codified...we just await detailed planning, funding, and expedited execution.

LEADERSHIP

Caltrans Senior Environmental Planner Barbara Marquez District 7 states we need linkages, to connect two main areas of habitat, allowing wildlife to travel between them. “Without linkages, wildlife populations are in danger of inbreeding, starving, becoming aggressive toward humans and, ultimately, extinction,” she said. “We have an opportunity to make positive improvements because here in southern California we still have wildlife,” Marquez said. “But because of the number of freeways and amount of urban development, we have to make those improvements just to keep the current population levels.” “The real issue for us when it comes to improving

A FIRST IN CALIFORNIA !



This plan calls for a 165-foot wide, and 200-foot long overpass that would cross the 10 lanes of the 101 Freeway at Liberty Canyon in Agoura Hills. The bridge would be covered in vegetation, making it more attractive for wildlife crossing between the Santa Monica Mountains and the Simi Hills according to the proposal released by the California Department of Transportation.

wildlife movement is funding,” said Marquez. “These projects are usually not a priority. But if we don’t try to correct the situation now, there will be less connectivity, less biological diversity, and less wildlife. And once it’s gone, it’s hard to get back.”

Caltrans has applied for a grant to help it establish what might be the state’s first-ever overpass specifically for the use of landlocked mountain lions and other wildlife. We need similar plans along with citizen and Caltrans support for an overpass along Interstate 15 in San Diego region.

We are at the 11th hour, human appropriation of animal habitats has increased with our population explosion, and the existence of highways and interstates are dangerous intrusions into areas that formerly were homes to our wildlife. Our government agencies, city planners, and county supervisors need to protect the remaining corridors and we must mitigate for new roads BEFORE they are built when it is more affordable to do so. New developments must budget for mitigation in every project. Landowners should be given fabulous tax credits and relief from inheritance taxes for preserving wild lands and linkages on their ranches. Wildlife managers have the task of piecing together what open lands and linkages are still available, and learn from the current research such as this UC Davis study and then, immediately map what must be done. Otherwise, we

have simply documented the decline of this great species in Southern California.

These wildlife crossings can begin compensating for that. The **lion’s share** is an expression which refers to the larger part - or most - of something. We can’t give our lion’s that, but we can share.

From

Desert Puma: Evolutionary Ecology and Conservation of an Enduring Carnivore



“Humans have prospered greatly from biologically rich, clean environments. Our spirit to explore and survive in wild environments probably directly affected evolution of our supreme intelligence. We believe that humans still need expansive wild places with big scary mammals that challenge us. By conserving those life forms in their wild environments, we benefit our own survival. If we accomplish that, then we will prove that we have earned our self-given name—sapiens—the wise.”

By Ken Logan and Linda Sweanor Two biologists who have dedicated their lives and research to preserving pumas.

WILDLIFE SERVICES

H.R.2236 - Transparency for Lethal Control Act



When a Wildlife Services “exterminator”, was shown in photographs on Facebook, letting his dogs attack and maul a coyote which had his leg caught in a steel trap, attention was easily drawn to a lingering problem in this secretive agency under the US Department of Agriculture (USDA). Another WS trapper in Arizona was arrested for intentionally snaring a neighbor’s dog in a steel trap. Before it was rescued, the animal lost 17 teeth trying to chew off its’ leg.

Wildlife Services, which has killed 18,700 animals in San Diego County since 2005, works in secrecy. It doesn’t allow reporters to watch its trappers in action and it hasn’t promptly released numerous public documents about the animals killed here, despite a formal request her office filed under the federal Freedom of Information Act.

Rep Susan Davis has introduced a bill HR 2236, the Transparency for Lethal Control Act, which would require Wildlife Services to annually report how many animals it kills in each municipality in the country, as well as the method used to kill them. It would also require Wildlife Services to explain the reasons that each species posed a threat and why killing was necessary. It is still in subcommittee referred to the House Committee on Agriculture.

Davis, a member of the Congressional Animal Protection Caucus, cited the problems encountered getting that basic information from Wildlife Services and said in a statement that vigorous public review is needed to ensure that killing isn’t the government’s routine, reflexive response.

“This lack of transparency and public reporting makes oversight impossible,” Davis said in a statement. “The USDA could be acting inappropriately or recklessly and without this data, we can’t know.”

The legislation has bipartisan support and is co-sponsored by Reps. Jim Moran, D-Va., Peter DeFazio, D-Ore., and John Campbell, R-Irvine. DeFazio and Campbell have previously called for an investigation into Wildlife Services in the wake of the Sacramento Bee investigation of the mauled coyote, and also introduced legislation that would ban the agency’s use of two poisons. In a letter to Inspector General Phyllis Fong, DeFazio and several colleagues wrote: “The WS program is inefficient,

Wildlife Services (WS) has killed more than 1,300 American coots, a small black duck, as part of its San Diego county work.



The agency offered specifics about the reason for killing the ducks in only one report to the county in 2010. The report said they were killed because they were grazing on residential yards, parks and golf courses.
Yes, golf courses!

inhumane and in need of review.” They said that the frequent killings of top predators benefit, “a small proportion of the nation’s private agriculture” and other special interests like golf courses.

Gary Strader, a former Wildlife Services trapper who worked in Nevada and Utah, said coyotes were often killed indiscriminately by the agency, regardless of whether they attacked livestock or posed a threat. He said more animals ended up being killed because federal and local taxpayers were paying for work on private ranches. “If a rancher can get his coyotes killed for free, then he’s going to do it,” Strader said. “But they kill coyotes that aren’t killing. If that rancher has to pay the private enterprise, then he’s not going to call someone until he needs someone to kill them.”



A disgruntled Arizona state wildlife employee takes a grisly photograph of 11 severed mountain lion heads stacked under a tree. The heads represented only one-fourth of the 44 lions killed in Arizona in 1989 by professional hunters working for the U.S. Department of Agriculture’s notorious Animal Damage Control (ADC) program. Several major national magazines and newspapers carried the photograph when it was released to the public the following year.

Unfortunately, the agency also kills native animals, sometimes based only on a homeowner’s or farmer’s perception of a threat, or ignorance of the impacts indiscriminate wildlife killing has on the wider ecosystem.

In the last decade, both Marin County and the city of Davis have terminated contracts with Wildlife Services after concerns were raised there. Davis’ City Council most recently ended its deal after the federal agency killed four coyote pups and an adult coyote at a golf course. A city official said the animals hadn’t posed a threat but were killed anyway.

There is no dispute that WS plays a valuable role eliminating bird issues around many 100s of airports, and works on the feral pig problem in many states, and many other appropriate activities.

But the evidence is stacking up showing a rogue agency with limited accountability, overstepping their mission, and wasting lots of tax dollars. Tax dollars being spent to kill wildlife that the rest of us are working to preserve.

Wildlife Services has existed under various names for over 100 years. The original mandate was to remove dangerous animals, particularly those that threatened western expansion. We all know what that meant. It is time we quit looking at wildlife as “varmints”, but instead as critical links in our web of life.

“When we try to pick out anything by itself, we find it hitched to everything else in the universe.”
John Muir

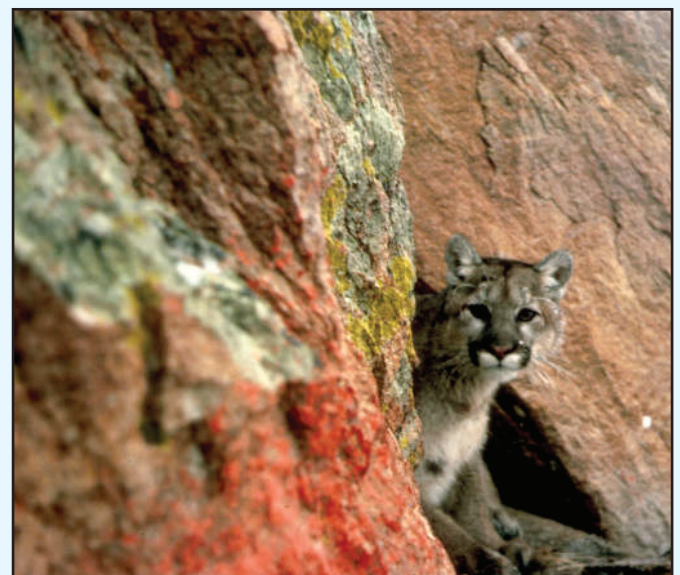


Photo Credit: Larry Moats/US Fish & Wildlife Services

CALL TO ACTION

WE HAVE THE DATA, IT IS TIME TO ACT!

Next Steps: How you can help now that we know about the problems facing our puma populations, and, we know the solutions, all we need are these solutions to become a priority in agency action and agency budgets. To help our agencies have the political power they need, we need to establish a public expectation of linkage protection. It is time to fund the solutions and undo some of the damage our human matrix has forced upon wildlife.

Please send a letter **AND** an email, and make a phone call to the Governor, to Caltans and copy Districts 8, 11, & 12 Environmental Planners, and to our County Supervisors, and Congressional members. When contacting legislators, always let them know you are a constituent and have your name and address very clearly printed. You can ask for a response, which may take longer, but it ensures the various offices will investigate your concerns. Attached is a letter you may use, copy, revise, and give to other friends of wildlife to help make this a priority. We have also posted this letter on our website that you can download. Let's get wildlife crossings on the radar screens of all agencies and public officials. **THANK YOU!**

LET'S WORK TOGETHER TO GET OUR PUMAS OUT OF THE CROSSHAIRS.



Photo Credit: Winston Vickers et al. 2015

GOOD NEWS as of 2015: BOBCAT TRAPPING NOW BANNED IN CALIFORNIA

A bill passed in 2013 (AB 1213, the Bobcat Protection Act) gave the California Fish and Game Commission the option to either draft regulations for bobcat trapping seasons, or to completely ban the fur trapping of bobcats statewide. Thanks to the tens of thousands of people who sent letters, signed petitions and spoke at the hearings, the Commission decided on a statewide ban. The regulations may be effective before the start of the 2015-2016 bobcat trapping season. The California Fish and Wildlife Commission voted 3-2 on August 5 to ban bobcat trapping statewide. Commission President Jack Baylis and Commissioners Anthony Williams and Eric Sklar voted in favor of a statewide ban. Commission Vice President Jim Kellogg and Commissioner Jacqueline Hostler-Carmesin voted against it.



A special thanks to our friends at JPI Printing

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