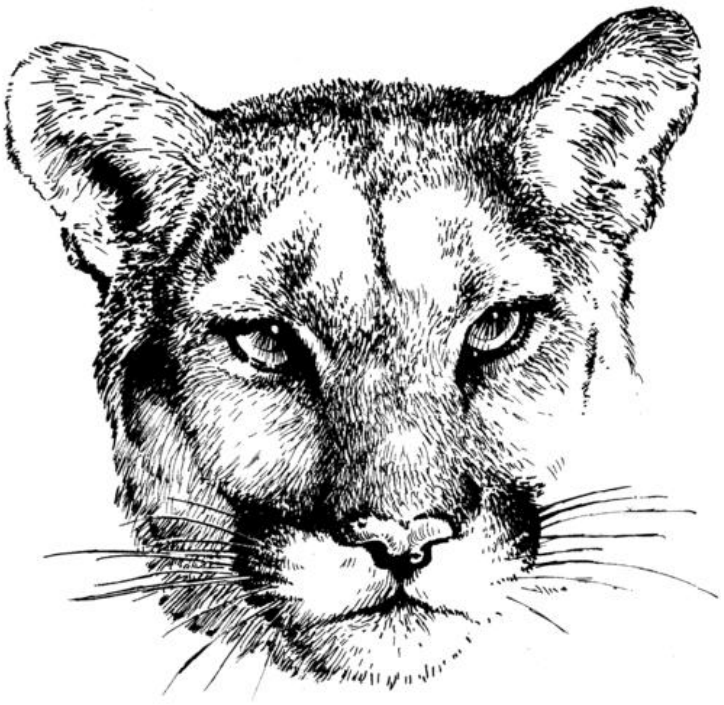
TEXAS MOUNTAIN LION RESEARCH AND MONITORING PLAN 2026–2035



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EXECUTIVE SUMMARY

This plan provides a strategic, science-based framework to guide the Texas Parks and Wildlife Department (TPWD) in fulfilling its responsibility to manage wildlife under Parks and Wildlife Code Chapter 67. This is the first formal statewide approach to mountain lion research and population estimation, and its goals, objectives, and actions are intended to provide the science needed to support decisions that maintain the long-term ecological sustainability of the species, while recognizing the diverse needs and concerns of landowners, recreational users, conservationists, and the broader public, and minimizing conflicts with people and livestock.

Mountain lions in Texas exist in two known genetically distinct breeding populations—South Texas and West Texas—which each face unique challenges. In South Texas, genetic data indicate a declining and increasingly isolated population, which could be at risk of extirpation. In West Texas, human-caused mortality and low adult survival suggest that the population may function as an immigration sink, sustained only through dispersal from neighboring regions. These factors are complicated by a lack of baseline population data, incomplete monitoring infrastructure, and over-reliance on anecdotal reporting.

To address these critical knowledge gaps, the plan outlines five primary goals:

Assess Population Status and Trends – Implement scientifically defensible, repeatable monitoring methods to determine population size, distribution, health, and trend over time.
Build a Modeling Framework – Define biologically and locally relevant Data Analysis Units, set population objectives with input from impacted constituents and build internal infrastructure for consistent monitoring and decision-making.
Maintain Populations Within Objectives – Use adaptive management to balance ecological sustainability with regional needs such as livestock protection, human safety, and native species conservation.
Mitigate Human-Lion Conflicts – Provide technical guidance and education to reduce depredation while ensuring landowners retain the ability to lethally control depredating individuals.
Address Knowledge Gaps – Support applied research—biological, ecological, and human dimensions to fill data voids that would inform management decisions.

Texas is the only state with harvested breeding populations of mountain lions where a science-based system for monitoring and estimating mountain lion populations does not exist. Accurate, comprehensive data, including harvest, are critical for estimating population trends, modeling sustainability, and informing sound management decisions.

This plan focuses on generating the data, modeling, and information needed to understand Texas mountain lion population, distribution, and health, as well as landowner and community priorities. This plan does not propose changes to the legal status of mountain lions, nor does it prevent landowners' longstanding ability to protect livestock. The goals, objectives, and actions are designed to support informed, locally relevant decision-making and to support the Department's efforts as a responsive, science-based fish and wildlife agency.

TPWD affirms that mountain lion management in Texas should be rooted in science, reflect public and private interests, and fulfill TPWD's responsibility to conserve Texas' wildlife conservation and hunting heritage for current and future generations.

ACKNOWLEDGEMENTS

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AGENCY MISSION AND PHILOSOPHY

Mission

To manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing and outdoor recreation opportunities for the use and enjoyment of present and future generations.

Philosophy

In fulfilling our mission, we will: Be a recognized national leader in implementing effective natural resources conservation and outdoor recreational programs; Serve Texans, visitors, and our employees with the highest standards of service, professionalism, fairness, courtesy, and respect; Rely on the best available science to guide our conservation decisions; Responsibly manage agency finances and appropriations to ensure the most efficient and effective use of tax-payer and user fee resources; Attract and retain the best, brightest, and most talented workforce to successfully execute our mission.

PURPOSE STATEMENT

TPWD is charged with managing Texas' native wildlife, which are held in public trust as "the property of the people of the state" (Parks and Wildlife Code Sec. 1.011). Parks and Wildlife Code Sec. 67.002 mandates the development of management programs to ensure the long-term persistence of nongame species. Currently, data on Texas mountain lions (*Puma concolor*) are insufficient to meet our mission of using "*the best available science to guide our conservation decisions*." Stakeholder groups and the Texas Parks and Wildlife Commission (Commission) have encouraged the agency to prioritize additional data collection and monitoring. This plan provides a science-based framework for data collection, and research that TPWD will undertake.

The plan seeks to ensure that data and information are available to make informed decisions about mountain lion populations and that ecological and genetic viability over time is sustained, while also recognizing the importance of balancing a range of public interests and concerns—which include livestock protection, human safety, the persistence of native prey species, and recreational harvest. The goal is to develop an approach that is rooted in the best available science, transparent, and responsive to the diverse values and perspectives of Texans.

The conceptual definition of a sustainable and genetically viable mountain lion population is one that perpetuates itself successfully with: 1) reproductively successful females; 2) a reasonable proportion of older age animals; 3) individuals that are largely free from disease, in suitable body condition, and without deleterious genetic deformities; and 4) genetic variability and connectivity to other mountain lion populations.[1–4]

PARKS AND WILDLIFE CODE
TITLE 5. WILDLIFE AND PLANT CONSERVATION
SUBTITLE B. HUNTING AND FISHING

CHAPTER 67. NONGAME SPECIES

Sec. 67.002. MANAGEMENT OF NONGAME SPECIES.

a) The department shall develop and administer management programs to insure [sic] the continued ability of nongame species of fish and wildlife to perpetuate themselves successfully.

b) In managing nongame species of fish and wildlife, the department may:

1) disseminate information pertaining to nongame species conservation, management, and values;

2) conduct scientific investigation and survey of nongame species for better protection and conservation;

3) propagate, distribute, protect, and restore nongame species;

4) research and manage nongame species;

5) develop habitats for nongame species; and

6) *acquire habitats for nongame species.*

Sec. 67.003. CONTINUING SCIENTIFIC INVESTIGATIONS.

The department shall conduct ongoing investigations of nongame fish and wildlife to develop information on populations, distribution, habitat needs, limiting factors, and any other biological or ecological data to determine appropriate management and regulatory information.

Sec. 67.004. ISSUANCE OF REGULATIONS.

a) The commission by regulation shall establish any limits on the taking, possession, propagation, transportation, importation, exportation, sale, or offering for sale of nongame fish or wildlife that the department considers necessary to manage the species.

b) The regulations shall state the name of the species or subspecies, by common and scientific name, that the department determines to be in need of management under this chapter.

GUIDING PRINCIPLES

- Mountain lions serve an important role in the ecosystem as apex predators and have intrinsic, economic, and recreational value.
- This is a plan to guide actions to be taken by TPWD and partners in cooperation with stakeholders and landowners.
- The plan will be science-based and consistent with the North American Model of Wildlife Conservation.[5]
- The plan will reflect a range of perspectives and interests.
- The plan will emphasize the important role private landowners play in the sustainability of mountain lion populations in Texas.
- This plan will not prohibit the ability to lethally remove lions to protect livestock and property.
- The plan will be adaptive, whereby TPWD may update actions as needed with new information.

Actions have been chosen with cost-effectiveness in mind. However, accomplishing some aspects of this plan will be contingent on available funding.

MEASUREMENTS OF SUCCESS AND REEVALUATION

This plan's elements are designed to follow the SMART criteria, meaning they are Specific, Measurable, Achievable, Relevant, and Time-bound. **Goals** represent the overall desired outcomes. **Objectives** are concrete, actionable steps that help achieve these goals. **Strategies** are broad categories that group related actions. **Actions** are individual, measurable tasks that contribute to meeting objectives and accomplishing goals. Some actions may be

repeated or listed under multiple strategies and objectives because they are important for addressing various parts of the plan; they are recorded in every applicable context for completeness.

The 10-year timeframe of the plan begins upon approval by the TPWD Executive Director (2026–2035). Progress made on Actions will be tracked annually by the State Mammal Specialist. In the fifth year (2031), progress will be assessed and presented to the TPWD Wildlife Conservation Technical Committee and Advisory Committee. At the end of the 10 years, the overall progress of each Goal will be evaluated by the appropriate Technical Committees, Advisory Committees, and Wildlife Division Director and will be presented to the TPW Commission. The Plan will also be formally reviewed and updated by the State Mammal Specialist to make needed changes and updates in accordance with the purpose of the plan.

LEGAL STATUS AND RELEVANT REGULATIONS

Mountain lions are classified as a nongame species. As with other nongame species, a hunting license is required to take mountain lions. There are no closed seasons, harvest limits, or possession/bag limits. Any mountain lion may be hunted or trapped at any time by any lawful means or methods on private property. Reporting of harvest is voluntary; people may report directly to a TPWD biologist or use the TPWD Texas Hunt & Fish app. The app requires the hunter/trapper to enter county of harvest, method of harvest, a measure of hunter or trapper effort, and photos of the carcass to verify the age class and sex of the mountain lion.

Mountain lion harvest reports submitted to TPWD are confidential. In 2025, SB1248 amended Parks and Wildlife Code Chapter 11 § 11.0305 prohibiting TPWD from disclosing information about the person who submitted a report, the wildlife that was harvested, and any specific location information, including photographs, that could be used to identify where the harvest occurred for game species, nongame species, furbearers, and all other species.

Regulations approved by the Texas Parks and Wildlife Commission in 2024 banned canned hunting of mountain lions and established lawful trap check standards [see below; Texas Administrative Code §65.950]. For a summary of past mountain lion policy initiatives, see Appendix A (Excerpts from Mountain Lion Stakeholder Group Final Report, 2024).

TEXAS ADMINISTRATIVE CODE
TITLE 31. NATURAL RESOURCES AND CONSERVATION
PART 2. TEXAS PARKS AND WILDLIFE DEPARTMENT
CHAPTER 65. WILDLIFE
SUBCHAPTER X. MOUNTAIN LIONS
§65.950. Mountain Lions (Puma concolor).

(a) In this section "captivity" means the state of being held under control, or kept caged, penned, or trapped.

(b) No person in this state may:

(1) hunt a mountain lion that is in captivity;

(2) release a mountain lion from captivity for purposes of:

(A) being hunted; or

(B) training dogs;

(3) allow a live mountain lion to be captured in a trap or snare for more than 36 hours; or

(4) conduct, promote, assist, or advertise an activity prohibited by this subsection.

(c) This section does not:

(1) prohibit a person from humanely dispatching a lawfully trapped mountain lion; or

(2) apply to the use of vertically set snares that are fabricated or modified to limit the loop or opening to a diameter of 10 inches or less.

(d) The provisions of subsection (c)(2) of this section do not exempt any person from the provisions of subsection (b)(2) of this section.

In addition to the recent state policy changes, the U.S. Congress enacted the "Big Cat Public Safety Act" in December 2022 making it unlawful for unauthorized private individuals to possess big cats in captivity. The act prohibits private ownership and breeding of big cats, including mountain lions. Congress provided an exception for individuals who owned an animal(s) before the act went into effect if the animal(s) were registered before June 18, 2023. However, individuals approved to retain ownership of captive big cats are prohibited from allowing breeding.

Texas Administrative Code §69.302 [below] requires entities to obtain permits when handling native wildlife for research, using captive wildlife in educational programs, or keeping them at a zoo or rehabilitation facility; however, mountain lions were specifically excluded from the permit requirement. The result is that mountain lions are the only species that do not require a Scientific Research Permit.

TEXAS ADMINISTRATIVE CODE
TITLE 31. NATURAL RESOURCES AND CONSERVATION
PART 2. TEXAS PARKS AND WILDLIFE DEPARTMENT
CHAPTER 69. RESOURCE PROTECTION
SUBCHAPTER J. SCIENTIFIC, EDUCATIONAL, AND ZOOLOGICAL PERMITS
§69.302. General Rules

[For General Rules (a)–(h), see Texas Administrative Code]

(i) The provisions of this subchapter do not apply to mountain lions after September 1, 1997.

BACKGROUND

Note: This review summarizes findings presented in scientific studies. For simplicity, details such as sample sizes and measures of variation in the results are not included here. Readers interested in those important details can find them in the cited sources. There is also a glossary of select terms in Appendix B.

GENERAL BIOLOGY AND ECOLOGY

Mountain lions go by many names including cougar, puma, panther, and catamount, but they are all the same species: *Puma concolor*. The mountain lion has the widest distribution of any terrestrial mammal in the Americas, from Canada to southern Chile.[6] In North America, populations historically occurred from the Atlantic coast to the Pacific coast; however, the species was extirpated from approximately 40% of its range and is now only found in Mexico, western Canada, the western U.S., and a small remnant population in south Florida (U.S.).[7]

The mountain lion is the 4th largest wild felid species in the world and the largest native felid remaining in Texas today.[8] The mountain lion is a large, slender cat with a smallish head and noticeably long tail. Males are larger than females and sizes can vary among populations, but adults in Texas typically weigh between 65 and 140 lbs. Adult mountain lions generally have light tawny brown fur, though there can be some variation in the shade of brown and their coat can appear darker in certain light conditions. There has never been a documented black mountain lion or 'panther' in North America; no one has ever captured, killed, or produced through captive breeding a black mountain lion.[9,10] Kittens have black spots that begin to fade around four months of age and are faint by nine months of age.[3,11,12]

Social Interaction and Reproduction

Mountain lions are generally solitary animals, but recent research suggests they may engage in more social interactions than previously recognized. These interactions primarily occur between mothers and their dependent young, between consort pairs, and less so between individuals engaged in competition or sharing large prey animals such as elk.[13,14] They can breed and birth kittens any time of the year, but seasonal birth pulses have been documented in some regions.[15] Females may breed for the first time at two or three years of age and will generally

breed every two years.[16–18] They typically have two to three kittens per litter that will remain with their mother for approximately 13 months up to two years.[16,18,19]

Dispersal

After leaving their mother, both males and females may disperse but males are more likely to disperse.[20–22] Either sex is capable of traveling long distances, sometimes across multiple states.[19–21,23] Reported dispersal distances across studies indicate males disperse an average of 68 miles (110 km) and females disperse an average of 28 miles (45 km), but the authors removed the extreme long-distance records as outliers.[22] Genetics revealed that a subadult male hit and killed by a vehicle in Connecticut had dispersed over 1,522 miles (2,450 km) from the Black Hills of South Dakota, making it the longest recorded dispersal of a mountain lion.[23] A collared female travelled 833 miles (1,341 km) while dispersing through Utah, Wyoming, then into Colorado.[20]

Home Range Size

Mountain lions require large home ranges; estimates from studies have ranged from 12,355 acres (50 km^2) to over 247,105 acres (1000 km^2).[4,12,24,25] Resident adult home range size varies with prey availability, habitat, sex (males use larger areas than females, likely to increase mating opportunities), and by stages of kitten rearing for females, as well as by season in some regions due to prey movements.[26–28] Males overlap home ranges with multiple females. Adult females exhibit a wide range of home range overlap with other females, including extensive overlap with related females, called matrilines; however, adult male home ranges overlap less so with those of other males and they typically exhibit territoriality amongst each other.[12,14,29,30] There has been some evidence that males will exhibit higher home range overlap in populations that are heavily hunted.[31]

Habitat

Mountain lions are considered a highly adaptable generalist and occur in a wide variety of habitats. For example, they can use high-elevation mountains, thick tropical forests, low-elevation deserts, marsh-shrub-swamps, and even grasslands.[3,12,32,33] However, they need to have landscape features within their habitat that allow them to detect and successfully acquire their prey, such as areas with higher vegetative or topographic cover.[3,12,34] Additionally, habitat connectivity is important for individuals and populations.[35–38] Habitat loss and fragmentation may impact mountain lion prey populations, eliminate structural elements of habitat required for their successful hunting, limit mountain lion movement and dispersal, increase mortality risk, and require higher energy expenditure.[39–43] At a larger scale, habitat loss and fragmentation can reduce or eliminate dispersal and genetic connectivity among populations, which, for small populations that become isolated, can lead to increased risk of extirpation from problems associated with inbreeding.[44–49]

Prey Species

Mountain lions require adequate populations of prey species. Deer (*Odocoileus* sp.) or elk (*Cervus elephus*) are usually their preferred prey but their diet can also consist of a wide variety of other mammal species (e.g., bighorn sheep [*Ovis canadensis*], feral hogs [*Sus scrofa*], Aoudad sheep [*Ammatragus lervia*], porcupines [*Erethizon dorsatum*], coyotes [*Canis latrans*], etc.), reptiles, birds, and fish[12,50–55] [see Texas-specific sections for diets from Texas studies]. Mountain lions exhibit differences in prey selection based on their sex and age class.[56,57] Individuals can also exhibit considerable differences in preference for certain prey, with some selecting for a particular species at a much higher rate than others. Examples documented in the literature include individuals that have specialized on bighorn sheep,[58] beavers (*Castor canadensis*),[59] and feral horses (*Equus caballus*),[60,61] among others. Mountain lions may depredate livestock, typically domestic sheep (*Ovis* sp.) or goats (*Capra* sp.) but also cattle, primarily calves (*Bos taurus*), other livestock, or poultry.[3,62]

Densities

Mountain lions occur at relatively low densities on the landscape due to their need for large home ranges. Across the species' range, the average of published density estimates is 1.83 independent-aged pumas/25,000 acres (1.81/100 km^2).[63] "Independent-aged" refers to adults and subadults that have left their mother, typically around 18 months-of-age. In the northern Rocky Mountains in areas with light hunting pressure, density estimates of independent-aged lions can be considerably higher than the average, such as 4.15/25,000 acres (4.1/100 km^2) in Colorado[64] and medians of 4.55–5.26/25,000 acres (4.5–5.2/100 km^2) in Montana.[65] However, the reported

density from 2017 in the Southern Rocky Mountains ecoregion of north-central New Mexico was 0.85 pumas/25,000 acres (0.84/100 km^2).[66] Their study area was considered high-quality mountain lion habitat compared to much of the desert Southwest.[35,66] Major factors that likely affect the density of lions include prey abundance, competition among lions, competition between lions and other carnivores and humans, and human-caused mortality.[14]

Survival

Generally, mountain lion survival varies by sex and age class; kittens (less than one year old) typically have lower survival rates than adults.[12,42,47,67] Additionally, kittens have lower survival in their first five months versus when they are older.[18] Although some kittens die from human causes (e.g., vehicle strikes), most kitten mortality is from natural causes.[42,67–69] Kittens and mothers with kittens are protected from hunting mortality in all states with regulated hunting seasons—excluding Texas. Researchers have found that survival of the mother during kitten dependence was the most important factor to kitten survival.[18,70] Reported estimates of annual kitten survival vary greatly, from 71% in a lightly hunted population in Washington[68] and 64% in New Mexico[12] to 56% in a highly hunted population in Washington[68] and 32% for endangered Florida panthers.[47]

Adult survival rates also vary. In unhunted populations, reports of survival vary from 69% for males and 83% for females in the Santa Cruz Mountains in California[42] and 77% for males and 86% for females in Florida,[47] up to 96% for males and 86% for females in Colorado.[18] In hunted populations, survival rates vary from 40% for males and 74% for females in Colorado[18] to 86% for both males and females in Oregon. However, the Oregon estimates were collected shortly after the prohibition of hunting with hounds, when hunter success rates were comparatively low.[71]

Many local factors influence the variation among these survival estimates, including impacts of inbreeding in the Florida panther population, impacts of urbanization and habitat fragmentation in California, the presence of heavily trafficked roads, hunted versus unhunted populations, and differences in hunting regulations (e.g., dogs allowed or not allowed). However, some broad trends are apparent. Mountain lion mortality from hunting has generally been found to be additive, meaning those deaths are in addition to what one would expect from natural causes, thereby decreasing survival rates.[17,68,72] Additionally, population trends for hunted mountain lion populations are most sensitive to changes in adult female survival. Logan and Runge[18] found that when adult female survival is at or below 78%, populations generally decline.[18,73] Conversely, when adult female survival is at or above 86%, populations tend to increase.[18] Relatively stable populations, however, have exhibited variable adult female survival rates ranging from 76% to 86%.[18] Researchers in other states have documented cases of mountain lion populations rebounding after high harvest pressure subsided;[2,74] however, many factors influence the outcomes and carefully designed studies, robust estimation methods, and longer-term datasets may be required to fully understand the impacts of harvest.[18,72,75,76]

DISTRIBUTION AND POPULATION STRUCTURE IN TEXAS

Historically, mountain lions occurred throughout Texas; however, by the early 1900's predator control efforts had extirpated the species from most of the state—except in remote and rugged areas of the Trans-Pecos region.[8] Today, two genetically distinct breeding populations have been identified in the state, one in South Texas and one in West Texas.[77–79] The number of confirmed mountain lion reports submitted voluntarily to TPWD by the public, as well as documented road mortalities, generally show this pattern, with the majority of reports coming from areas where the breeding populations occur (Figure 1).

Low numbers of mountain lion reports from counties such as those in the Panhandle, North Texas, and Hill Country (Figure 1) likely reflect the presence of dispersing individuals rather than established resident populations. With sighting reports from the public, it is also possible that a single mountain lion can be reported multiple times by different people. Given the challenges of relying on voluntary and opportunistic reports, as well as limited access on private lands, there may be undocumented instances of small breeding populations elsewhere in the state. Holbrook et al.[79] used genetic samples from 1985 to 2010 and determined that of the individuals sampled outside

the range of the South or West Texas populations, all but two were dispersers from either New Mexico or West Texas. The other two individuals, taken in Kimble and Kerr counties, were either of admixed origin (e.g., New Mexico and West Texas) or from an unsampled population (somewhere other than South Texas, West Texas, or New Mexico such as Mexico).[79] Mountain lions occur throughout parts of Mexico and have frequently been documented crossing the U.S.-Mexico border.[80,81]

The spatial extent of the South and West Texas populations is uncertain; however, TPWD generally defines the counties that comprise each population based on past genetics work and confirmed reports. While the entirety of each county may not include mountain lion range/habitat, county-level distinction is useful for management purposes. Additionally, over 15 years have passed since the genetics study was done and the sample sizes for some counties in the study were small. Due to these uncertainties, TPWD may need to reevaluate range definitions as more data are gathered, and research is performed.

For the purposes of this plan, the South Texas population includes Dimmit, Duval, Kinney, La Salle, Maverick, Uvalde, and Webb counties. The West Texas population includes Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, Pecos, Presidio, Reeves, Terrell, and Val Verde counties. There is no natural geographic barrier separating the West and South Texas populations. The expected levels of natural genetic exchange, between these two populations and neighboring populations in Mexico and New Mexico, has most likely been reduced by habitat fragmentation and human causes of mortality.[77–79,82,83]

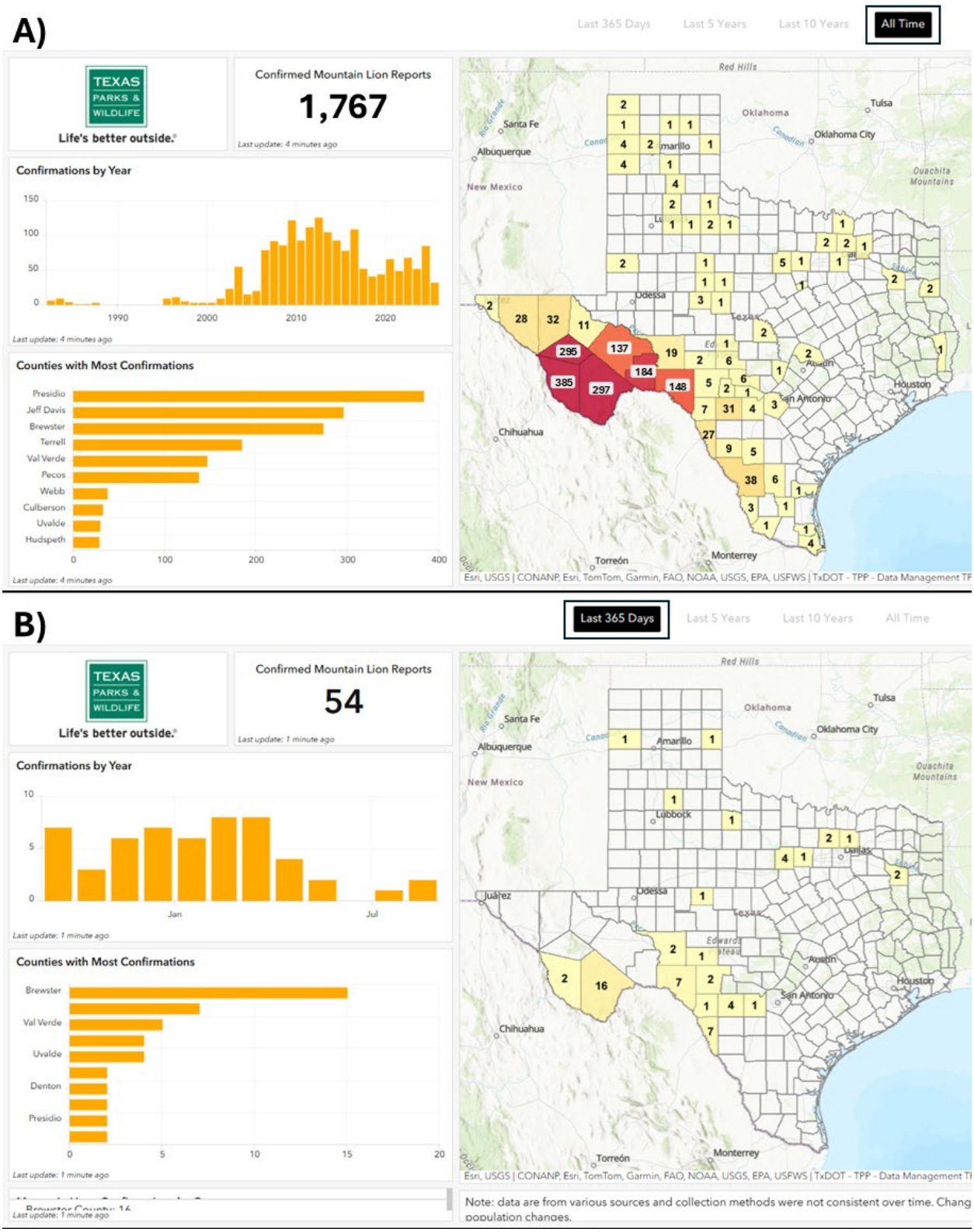

Figure 1. Map of confirmed mountain lion reports submitted to TPWD A) over all time (top; March 1982 to September 2025) and B) within the previous 365 days ending on September 9, 2025 (bottom). Voluntary reports do not represent a random sample or complete reporting of mountain lion sightings in Texas, and do not accurately nor comprehensively indicate the distribution of the species in the state. Public dashboard available at https://arcg.is/qWmO10.

SOUTH TEXAS LION POPULATION – PAST RESEARCH

Past genetic work has indicated that the South Texas mountain lion population experienced a decline in genetic diversity, a greater than 50% decline in effective population size (a genetics term relating to how many individuals effectively contribute genes to the next generation), as well as a 2–2.5 fold increase in genetic differentiation from the West Texas population between historic (1934–1942) and contemporary (1985–2009) times.[83] Overall, the contemporary South Texas population exhibited low levels of genetic diversity, and the genetic structure was comparable to that of other known fragmented or isolated populations.[79,83] This suggests that there was a significant decrease in the South Texas population size as well as a decrease in the number of animals immigrating into and successfully reproducing in South Texas (i.e., the population is genetically isolated).[77,83] The risk of extirpation is increased for small isolated populations due to inbreeding,[46,47,49] random fluctuations in births or deaths, and other detrimental events (e.g., catastrophic storm, disease outbreak, prolonged drought).[84]

The only estimated density estimate for the South Texas population is from 1994–1996 and was done by Harveson et al.[78] They used the number of known adult and subadult mountain lions (radio-collared and harvested individuals) within a polygon drawn around all collared mountain lion locations. This method resulted in a conservative, minimum known population density for the study area. Researchers captured and radio-collared 19 lions total, including kittens, between 1994 and 1996 along the Nueces River. They documented an additional 12 mountain lions that were harvested in the area during the study. The effective area encompassed 1.13 million acres (4,592 km^2) over Duval, La Salle, McMullen, and Webb counties and there were 14 known mountain lions alive in the area in 1994, 13 in 1995, and 10 in 1996 which resulted in an average minimum known density of 0.27 mountain lions/25,000 acres (0.27/100 km^2) over those three years[78]. Differences in methods to estimate density preclude statistical comparisons to other studies, though these results indicate that mountain lions were likely at a low density in this study area.[12,63,66,78]

In the same project on South Texas mountain lions, fates of all collared individuals were recorded and diet examined. Of the 19 mountain lions caught, nine lived to the end of the study (1997).[78] Five mountain lions in the study were harvested from hunting, two from trapping, one died from a natural cause, one from an unknown cause, and one died from a research related capture injury.[78] Annual survival was estimated at 75% for independent mountain lions (14 individuals, subadult and adults combined, but not including kittens).[78]

Mountain lions in the study area selectively killed and preyed on white-tailed deer (*Odocoileus virginianus*) above any other species (37).[85] Other documented kills included peccary (javelina; *Pecari tajacu*; 18), feral hog (9), livestock (six sheep, one calf), mountain lion (two), bobcat (one; *Lynx rufus*), and skunk (one; *Mephitidae* spp.).[85] Scat analysis revealed that the mountain lions also consumed rabbits, hares (*Lagomorpha* spp.), and rodents.[85]

WEST TEXAS LION POPULATION – PAST RESEARCH

Unlike in South Texas, the genetic work by Holbrook et al.[79,83] showed that the West Texas population exhibited relative stability in effective population size and in genetic diversity when compared to historic samples (1935–1955 & 1979–1989), and contemporary samples (2000–2010). There was evidence of genetic differentiation within the West Texas lion population, suggesting that West Texas may contain two sub-populations. Using genetic data from fecal samples collected from 1997 to 2004, Gilad et al.[82] found restricted gene flow between mountain lions in and around the Guadalupe Mountains, and those in other parts of West Texas. The proximity and connectivity to New Mexico mountain lion populations and the somewhat limited natural landscape connectivity across the desert to other areas with resident mountain lions in West Texas likely contributed to the genetic differentiation.[86] However, human-caused mortality outside protected areas in West Texas may have also influenced this pattern.[19,79,82,87]

Harveson et al.[78] published a density estimate for mountain lions in Big Bend Ranch State Park from 1993 to 1997 using the same method described above that they used for South Texas. Data were collected from 16 radio-

collared mountain lions within the ~683,000 acres (2,765 km^2) study area.[78] The researchers documented an additional 21 uncollared mountain lions that were harvested within the area during the study.[78] Resulting densities ranged per year from a high of 0.59 adult and subadults/25,000 acres (0.58/100 km^2) in 1995 (16 known individuals) to a low of 0.25/25,000 acres (0.25/100 km^2) in 1997 (seven individuals) and the average over all years was 0.44/25,000 acres (0.43/100 km^2) in Big Bend Ranch State Park.[78]

Using DNA from scat samples collected while walking transects in 1997 to 2004, Gilad et al.[82] reported an annual average density for an area of approximately 57,000 acres (230 km^2) in Guadalupe Mountains National Park of 3.81 mountain lions/25,000 acres (3.77/100 km^2), with a high of 6.6/25,000 acres (6.5/100 km^2; 15 individuals). However, they documented many transient mountain lions and coarsely estimated that the park could only support 4–6 resident adults.

Throughout all the previous mountain lion studies in West Texas, human-caused mortality was widespread throughout the region. All 16 radio-collared mountain lions in Big Bend Ranch State Park from 1992 to 1997 were eventually harvested on adjacent private lands; 15 were trapped on adjacent private lands (nine males, six females) and one male was shot after the study ended.[78,88] Similarly, humans were the main cause of mortality in a study from 1982–1984 at Guadalupe Mountains National Park; six out of eight radio-collared mountain lions were killed from predator control activities.[89] Mountain lions monitored at Big Bend National Park in the 1980s and early 1990s also were harvested from trapping and hunting outside the park.[87] Twenty-one Global Positioning System (GPS) collared mountain lions in the Davis Mountains, Jeff Davis County, were tracked from 2011–2018, with eight confirmed mortalities due to trapping.[90]

The annual survival rate for mountain lions collared in Big Bend Ranch State Park from 1992 to 1997 was reported by Harveson et al. at 70% for males and females combined.[78] Young et al.[87] analyzed the same data from Big Bend Ranch State Park, but used a different analysis and estimated 70% annual survival for females and 51% survival for males. In a study from 1982–1997 in Big Bend National Park, female annual survival was 68% and male annual survival was 56%.[87]. Harveson et al.[90] used data from 2011 to 2018 and estimated annual survival for males and female mountain lions in the Davis Mountains to be 49%.

Based on an analysis of 15 studies from across the U.S., researchers have found that annual adult female survival rates of 78% or less correspond to a declining population.[18,90] The female survival estimates available from West Texas of 68% and 70% are within this range. While females tend to have higher survival rates than males, the studies that only reported combined male and female survival rates (49%, 56%, & 70%), while less definitive, were also below this threshold. The relatively healthy genetic diversity coupled with high mortality and low survival estimates suggests that immigration of mountain lions into West Texas from Mexico and New Mexico may be augmenting the population and mitigating declines.[79,91]

Adult resident mountain lions in the Davis Mountains and Big Bend National Park occupy large home ranges; Using GPS collar data from 2011 to 2018, Karelus et al.[25] reported the average home range size was 27,182 acres (284 km^2) for females and 266,380 acres (1078 km^2) for males. Mountain lion home ranges were larger than most of the ranches in the Davis Mountains.[25] Individual mountain lions in the Davis Mountains used an average of 18 different private ranches (range: 3–37).[90] The eight confirmed mortalities occurred on just 16% of the ranches. Of the subadults in the study, two females and one male exhibited dispersal movements. The females moved straight line distances of 25 miles (40 km) and 83 miles (134 km) before each was killed (included in the eight reported mortalities) and the male moved 50 miles (80 km) when his collar stopped transmitting locations.[25]

Results from investigations of 200 kill sites by the collared mountain lions in the Davis Mountains, where cows and horses were present on the study site but goats and sheep were likely absent, showed that 80% of mountain lion diet was comprised of deer (*Odocoileus* spp.), elk, feral hog, and javelina.[92] Additional prey included aoudad, bobcat, coyote, gray fox (*Urocyon cinereoargenteus*), rabbits/hares, porcupine, raccoon (*Procyon lotor*), and skunks.[92] Mountain lions in Big Bend National Park switched from primarily preying on deer to primarily preying on javelina when mule deer populations declined likely due to drought in the 1980s.[93]

A list of Texas mountain lion research from 1993–2024 is provided in Appendix C.

DATA GAPS AND FUNDING NEEDS

Since the early 1990s, TPWD has collected voluntary mountain lion sighting and mortality reports from the public and other agencies. These data have proven insufficient for evaluating the mountain lion population in Texas. This plan seeks to establish a data collection strategy that is logistically feasible, cost-effective, and capable of understanding population size and trends over time. Setting population objectives and defining Data Analysis Units (subdivisions used to focus data collection and analysis) requires understanding human community needs, land uses, and mountain lion ecology and population demographics. For example, effective management will require information on how livestock production, wildlife management, community needs, and suburban sprawl interact with mountain lions in a defined area. This section provides a summary of current practices, data needs, and potential methods for monitoring and estimating populations and distribution.

DISTRIBUTION

TPWD actions to monitor the distribution of mountain lions in Texas are currently limited to documenting and confirming voluntary mountain lion reports from the public, mortalities from vehicle collisions, and management actions conducted by TPWD and USDA Wildlife Services reports (Figure 1). If a report includes verifiable evidence of a mountain lion, TPWD staff enter the confirmed report in the TPWD mountain lion database. The TPWD map of confirmed mountain lion reports is available at https://arcg.is/qWmO10 (Figure 1). Evidence is considered conclusive if it contains clearly identifiable: 1) photos/videos of a mountain lion, 2) tracks, 3) confirmed prey kills, or 4) a mountain lion carcass. If the report comes from a location where a sighting would be unusual, a TPWD biologist often conducts a site visit to verify the report. Most confirmed reports are from motion sensitive cameras reported from the public. In situations where a mountain lion carcass is available (e.g., road mortality or when granted voluntary access to a harvested mountain lion), TPWD staff may collect biological samples (e.g., hair, tissue, premolar) and record data from the carcass (e.g., sex, age-class, body measurements).

These confirmed reports provide TPWD with some distribution information. However, voluntary reports represent neither a random sampling nor a complete reporting of lion sightings or harvest in Texas, and do not accurately indicate the distribution of lions in the state (i.e., some occupied areas may go unsampled). Unless a carcass is available, staff are generally unable to determine sex, age class, and breeding status, substantially limiting the value of the data. Individual mountain lions are almost never distinguishable among reports and consequently, multiple reports could also represent the same individual mountain lion. Many sightings also go unreported to TPWD. The number of reports received from the public may also vary due to many unpredictable factors, such as social media attention to mountain lions generating increased interest among the public, or conversely increased apathy or fatigue among the public regarding reporting.

Due to the limitations outlined above, voluntary public reports offer only very coarse data regarding the general distribution across the state and do not provide a complete measure of the status, trends, or health of mountain lion populations. Field surveys and data from other sources could be used to generate additional lion reports, and TPWD staff should encourage researchers to share mountain lion sightings with the Department. Texas Administrative Code 69.302 requires scientific permits and reporting for research activities on native wildlife but excludes mountain lions. This exclusion limits TPWD's ability to identify, coordinate, and synthesize mountain lion research occurring in the state.

POPULATION SIZE AND TRENDS

As of Fall 2025, there are no recent statewide population estimates for mountain lions in Texas. Survival rates and genetic results from past research suggest that both the South and West Texas populations have either declined or

are functioning as sink populations—where mortality is higher than births, but the population is sustained by immigration. However, TPWD currently lacks sufficient data to validate this assessment. Monitoring mountain lion populations and trends at regular, standardized intervals is needed for effective management to occur.

Acquiring population estimates for mountain lions is difficult, expensive, and time-consuming due to their elusive nature, large home ranges, and naturally low densities. Advances in technology (e.g., GPS collars, motion activated cameras, computing power) and statistical methods have enabled researchers to obtain more robust density estimates.[63] Future field studies should estimate population sizes using statistical methods that include measures of uncertainty (e.g., confidence intervals around the estimate), specifically consider the space surveyed (i.e., are spatially explicit), and account for differences in habitat.

Multiple models and study designs will need to be considered when determining how to best estimate mountain lion densities in Texas. One option, known as a *spatially explicit mark-resight model* (SMR), uses GPS collar data in combination with specially designed grids of camera traps and has proven successful in New Mexico.[66]. *Integrated spatial genetic capture-recapture models* using scat detection dogs, DNA from scat to identify individuals, along with grids of camera traps, were effective in Yosemite National Park.[94] Both of these models also can allow density to vary with habitat, which may be crucial for Texas populations. *Time-to-event* or *space-to-event models* are other potential options; using camera trap data, these models estimate density of unmarked animals by evaluating the probability of a mountain lion being photographed over time or across space based on patterns in when or where observations are recorded.[95,96] However *time-to-event* and *space-to-event models* do not currently account for variation in habitat and the expected low density of mountain lions in Texas and the associated low detection rates may preclude use of this method.[97] New variants of existing models, combinations of models and methods, and new study designs or field methods may also be developed. None of these models are able to utilize anecdotal camera trap data.

Field work for any of these methods at the scale of a single biologically relevant Data Analysis Unit requires months or years of field work with teams of trained researchers, technicians, and sometimes a houndsman. Data preparation for analysis requires additional time beyond the field work and varies depending on the amount and type of data collected. The result is that obtaining a single Data Analysis Unit/sub-population estimate could take up to two or three years. Because of the landscape scales required for mountain lion research, it is common practice for state agencies to focus on updating population estimates for one or two units at a time before moving on to another unit.

Due to limitations in funding and staff time, it is appropriate to conduct at least one Data Analysis Unit field survey and corresponding population estimate during this 10-year plan. Estimates from additional areas may come from researchers with outside funding, but TPWD cannot currently cover surveys and statistical estimates for all units in this timeframe. Over the next 10 years, TPWD will work to develop methods and build capacity to monitor population status across the Data Analysis Units. However, to estimate statewide population size in the term of this plan, TPWD would need to rely on extrapolation of estimates from completed field surveys across un-surveyed Data Analysis Units. Extrapolation can help generate a coarse population estimate for a large area but comes with significant uncertainty. To increase accuracy and reduce potential error in extrapolated estimates, models typically incorporate accurate annual harvest and effort data from each Data Analysis Unit. The current system of voluntary harvest reporting is insufficient to be included in such models.

Tracking population trends through time requires estimates to be repeated at regular intervals. However, logistical considerations, time, and cost all limit the frequency at which field surveys can be conducted. Incorporating less expensive sources of data can greatly reduce costs and allow for less frequent field survey intervals, and thus less expensive field research requirements. Incorporating consistently collected data into population models is important because harvest can impact the population in shorter timeframes than is possible to detect by performing large-scale field surveys.

Statistical population reconstruction (SPR) is a robust and cost-effective method used by many states/provinces to monitor their mountain lion populations between field surveys.[98,99] This model estimates abundance using a

combination of complete sex and age-at-harvest data, hunter/trapper effort, and auxiliary data.[100] Hunter/trapper effort is often calculated from individual reports of days spent hunting or trap nights but can be coarsely estimated from other data.[98] Auxiliary data includes a suite of data points often collected concurrently with scientific field surveys (e.g., GPS collar data, survival and reproduction data, estimate of initial abundance from field surveys).

Some states have built their own *integrated population model* (IPM; note that SPR is a specific version of an IPM), which can be tailored to specific needs and data sources.[101,102] The flexibility of IPMs also allows managers to simulate various management scenarios and predict potential impacts to the population.[101,103] IPMs for mountain lions require an initial estimate of abundance and accurate estimates of various annual population statistics such as: birth rates, death rates, survival rates, emigration, and immigration. Some of these factors are comparatively predictable and stable across years, while others, mainly human-caused mortality, can fluctuate drastically from year to year and can significantly impact populations. States typically estimate human-caused mortality through collecting mandatory harvest data and measures of hunter/trapper effort. Some data from field surveys are still used to periodically update and calibrate the models (SPR or IPM), but these surveys can be much less frequent when accurate harvest data are used to track the population in the interim—resulting in significant cost savings. The data obtained from mandatory harvest reports forms the foundation for much of the population monitoring conducted in other states.[98,104–106]

Texas is the only remaining US state that both allows for mountain lion harvest and relies solely on voluntary reporting. Despite several decades of effort and experimentation going back at least to the early 1990's, the voluntary harvest reporting system used in Texas has been unable to produce reliable lion harvest data. This is primarily due to the inability to maintain consistent reporting levels over time and uncertainty regarding the percentage of the total harvest being voluntarily reported.

POPULATION DYNAMICS AND HEALTH

Because past research suggests that the South Texas mountain lion population is relatively small and isolated from the West Texas population, further study is needed to monitor its genetic health and assess potential inbreeding effects, such as reduced survival and reproduction.[79,83] Similar research has been conducted on other isolated populations in Florida and in California.[46,47,84] Research on mountain lion movements between populations in Texas and neighboring jurisdictions could provide valuable information on potential barriers to genetic exchange.[35,45,107]

Researchers have hypothesized that the West Texas mountain lion population acts as a compensatory immigration sink,[37,73,91,108] whereby the mortality rates are higher than the birth rates but the population size is sustained by continued immigration from Mexico and New Mexico. Additional research is needed to evaluate these conclusions.[78,79,82,87,89,90] Smaller scale source-sink dynamics may also exist within Texas,[109] and identifying such areas could provide valuable insights for managing the larger population. Determining source-sink dynamics typically requires information on local vital rates, population trends, lion movements, and genetics; however, much of these data can also be used for monitoring population size and trends. All of these data will be necessary to determine whether the Texas populations are sustainable and for determining minimum viable population size.

DATA ANALYSIS UNITS

Texas is a large, culturally and ecologically diverse state, and consequently, effective management of mountain lions will require an approach that recognizes regional differences in mountain lion populations as well as differences in local human perspectives and land uses. Monitoring and management should be done at biologically and locally relevant scales.[18] For example, Logan and Runge[18] determined that the appropriate scale for mountain lion management in their study region in Colorado should be approximately 3 million acres (~12,300 km^2). For context, Brewster County in West Texas is just under 4 million acres (16,040 km^2). Given what is known at this time about mountain lion space use in Texas and given that counties are a convenient and easily understood unit, it is

appropriate to use counties or groups of adjacent counties as preliminary Data Analysis Units. Grouping counties with known mountain lion populations (Figure 1) into roughly 3–4-million-acre (12,000–16,000 km^2) areas results in approximately 2–3 Data Analysis Units in South Texas and 3–6 Data Analysis Units in West Texas. However, these preliminary Data Analysis Units may change as more data becomes available on mountain lion movement and distribution, habitat, land uses, and local human dimensions.

Within Data Analysis Units, TPWD will work with communities to understand local perspectives, impacts from depredation, and other conflicts to inform the establishment of mountain lion population objectives (e.g., a goal for population size that balances the need for sustainable mountain lion populations with stakeholders' interests and values).[3] Voluntary management strategies within data analysis units could then be tailored to local human needs. Furthermore, engaging with local communities through working groups, public meetings, education & outreach, and technical guidance can help TPWD build a program that is responsive to local needs while building a greater understanding of mountain lions among the public.[110]

FUNDING NEEDS

The TPWD Nongame Mammal Program does not currently have dedicated funding allocated specifically for conducting mountain lion monitoring or field work. Federal funds are sometimes available to TPWD for awarding grants to researchers to perform research projects, though these research funds are sought after by multiple programs and for multiple species within the agency and there is no guarantee that a mountain lion project will be selected for funding. This plan was written with cost-effectiveness in mind so that funds and resources are used as efficiently as possible. However, limited access to sufficient funding may preclude many of the strategies and actions listed in this plan. For this plan to succeed, TPWD will need to identify and allocate resources for this purpose and for future mountain lions monitoring.

TIMELINE

Activities anticipated to occur in the first five years (2026–2030):

- TPWD will fund at least one field study in one Data Analysis Unit that will generate critical population demographics including mountain lion density, individual movement, survival, reproduction rates, and potentially genetic health.
- The TPWD State Mammal Specialist will coordinate the development of population models.

Activities anticipated to occur in the second five years (2031–2035):

- Determine Data Analysis Unit and develop population objectives using population models, human dimensions data collected, and input from staff, researchers, and stakeholders.
- Refine population models once TPWD has sufficient data to do so.

Throughout the tenure of this plan (2026–2035):

- Program and regional staff will work together to determine the most efficient and effective timing for local public meetings and other outreach and education efforts.
- State Mammal Specialist will coordinate discussions with TPWD staff, researchers, and stakeholders regarding Data Analysis Units and population objectives (at Technical Committee meetings, Advisory Committee meetings, and ad hoc meetings). Such discussions will span the lifetime of the plan.
- TPWD staff will continue collecting lion sighting and mortality data from the public and from staff activities.

GOALS, OBJECTIVES, STRATEGIES, AND ACTIONS

GOAL A: DETERMINE STATUS OF MOUNTAIN LION POPULATIONS AND INITIATE AN ONGOING MONITORING PROGRAM

Science-based assessment of mountain lion populations is crucial for making informed management decisions.

OBJECTIVE A.1: MAINTAIN UP-TO-DATE DATA OF MOUNTAIN LION DISTRIBUTION

STRATEGY A.1.1: On an ongoing basis, compile confirmed mountain lion reports to monitor broad-scale presence.

ACTION A.1.1.1: Continue documenting confirmed reports in the TPWD Mountain Lion Database, including public sightings reports, vehicle-mountain lion mortalities, reports from TPWD Game Wardens, county/local officials, Law Enforcement, TPWD state properties, and USDA APHIS Wildlife Services, etc.

ACTION A.1.1.2: Continue using the Texas Hunt and Fish app for public reporting of county-level harvest to track counties where mountain lions have occurred. Note: Texas Parks and Wildlife Code Chapter 11 Sec 11.0305 requires TPWD to keep mountain lion harvest reports confidential.

STRATEGY A.1.2: Develop fine-scale distribution maps based on mountain lion space-use data in one or more Data Analysis Unit in each South and West Texas population.

ACTION A.1.2.1: Fund a study to investigate mountain lion space use, movement patterns, and local range, and to map the fine-scale distribution or potential distribution of mountain lions within one or more preliminary Data Analysis Units.

ACTION A.1.2.2: Work to incorporate data from external mountain lion research projects to map space use in one or more preliminary Data Analysis Units.

STRATEGY A.1.3: On an ongoing basis, document evidence of reproduction to monitor the range of populations.

ACTION A.1.3.1: As part of the study in Action A.1.2.1 and/or in collaboration with researchers performing mountain lion work, investigate potential denning by females to document reproduction.

OBJECTIVE A.2: MONITOR MOUNTAIN LION POPULATION SIZE AND DEMOGRAPHICS

STRATEGY A.2.1: Develop at least one estimate of subadult and adult mountain lion abundance for each of the South and West Texas populations.

ACTION A.2.1.1: As part of the study in Action A.1.2.1, estimate population density and abundance in at least one preliminary Data Analysis Unit.

ACTION A.2.1.2: Incorporate data from external mountain lion studies into abundance estimate(s) for the respective preliminary Data Analysis Unit.

ACTION A.2.1.3: Build an Integrated Population Model (IPM) that incorporates multiple mountain lion data sources to estimate population size (e.g., from field studies and harvest/effort data).

ACTION A.2.1.4: Determine appropriate and realistic field methods and time intervals for TPWD to repeat field surveys in the future.

STRATEGY A.2.2: Determine mountain lion population vital rates (e.g., survival, reproduction, etc.) and factors influencing those vital rates in at least one Data Analysis Unit in both South and West Texas, either through studies coordinated by TPWD or other researchers.

ACTION A.2.2.1: Determine cause-specific mortality rates (e.g., harvest, death from vehicle strike, intraspecific aggression, natural causes), local birth rates, and sex- and age-class specific survival rates in each population along with factors influencing survival through the study in Action A.1.2.1 or collaborations with external partners.

ACTION A.2.2.2: Estimate rates of immigration and emigration in the South and West Texas populations through the study in Action A.1.2.1 or collaborations with external partners.

STRATEGY A.2.3: On an ongoing basis, monitor population trends for each of the two populations, South and West Texas.

ACTION A.2.3.1: Use harvest and effort data [A.2.1.4] and best available data on vital rates in the IPM [A.2.1.4] to track population trend. Note: Expert analyses have been unable to identify any feasible alternatives to comprehensive (i.e. mandatory) harvest reporting for determining ongoing harvest rates.

ACTION A.2.3.2: Plan for repeating field surveys into the future as determined in A.2.1.4.

STRATEGY A.2.4: On an ongoing basis, evaluate the impacts of various factors on population trend (decreasing, stable, or increasing) for each South and West Texas population.

ACTION A.2.4.1: Build into the IPM in A.2.1.3 the ability to test different management actions, environmental events, and projected levels of habitat loss and fragmentation that could impact populations; run the IPM to determine the magnitude of impacts and to determine which factors have the largest effect on the population trend.

OBJECTIVE A.3: MONITOR GENETIC AND PHYSICAL HEALTH

STRATEGY A.3.1: Opportunistically check for signs of genetic isolation.

ACTION A.3.1.1: When a live animal or carcass is in-hand by TPWD, check for and document any physical abnormalities associated with inbreeding (e.g., kinked tail, heart defect if a necropsy is performed, etc.) and collect genetic samples (e.g., scat, hair, tissue when a live animal or carcass is hand, etc.). Collection of samples from harvested animals on private land occurs only with hunter/trapper consent.

ACTION A.3.1.2: As part of TPWD management activities or projects (e.g., study in Action A.1.2.1) and in collaboration with researchers performing mountain lion research, determine genetic status within each population.

STRATEGY A.3.2: Investigate connectivity within and among Texas populations and among neighboring populations in one or more Data Analysis Unit in the South and West Texas populations.

ACTION A.3.2.1: As part of the study in Action A.1.2.1, and/or work with collaborators performing mountain lion research, map habitat connectivity, movement corridors, and determine the barriers to mountain lion movements within and among the South and West Texas populations.

ACTION A.3.2.2: As part of the study in Action A.1.2.1, and/or work with collaborators performing mountain lion research, investigate genetic connectivity among populations in Texas and with surrounding populations when possible (e.g., Mexico, New Mexico).

GOAL B: DEVELOP A DATA MANAGEMENT AND STAKEHOLDER ENGAGEMENT FRAMEWORK

During the life of the plan, the data collected under Goal A will be used to develop this section.

OBJECTIVE B.1: DEFINE BIOLOGICALLY AND LOCALLY RELEVANT DATA ANALYSIS UNITS WITHIN EACH POPULATION

STRATEGY B.1.1: Use county lines, data on mountain lion distribution, movement and space use, habitat, as well as socio-economic factors that may lead to differences in mountain lion management, to define Data Analysis Units – Update as new information is learned.

ACTION B.1.1.1: Use individual or multiple counties as preliminary units until enough data are available to define Data Analysis Units. Use mountain lion data from research as well as socio-economic factors to define biologically and locally relevant Data Analysis Units.

OBJECTIVE B.2: DETERMINE POPULATION OBJECTIVES FOR EACH DATA ANALYSIS UNIT THAT CONSIDER POPULATION SUSTAINABILITY, REGIONAL MOUNTAIN LION HABITAT, LIVESTOCK PROTECTION, HUMAN SAFETY, IMPERILED NATIVE SPECIES MANAGEMENT, AND RECREATIONAL HARVEST

STRATEGY B.2.1: Determine the number of subadult and adult mountain lions required for each population to sustain itself.

STRATEGY B.2.2: Use the IPM [A.2.3.1 and A.2.4.1] to project Texas mountain lion populations 25 years into the future and determine viable population sizes for each population. Incorporate local human dimensions, land-use practices, mountain lion habitat and source-sink dynamics and other factors within each population (e.g., other imperiled native species range) to inform population objectives within each Data Analysis Unit.

ACTION B.2.2.1: Fund a study and collaborate with researchers and communities to understand perspectives of private citizens, hunters, trappers, houndsmen, and landowners; identify preferred mountain lion population sizes; and develop models that incorporate relevant factors to inform population objectives for each Data Analysis Unit. Assess landowner preferences for approaches to prevent or address lion depredation on livestock.

OBJECTIVE B.3: ADDRESS TPWD INTERNAL NEEDS FOR MOUNTAIN LION DATA MANAGEMENT AND COLLECTION

STRATEGY B.3.1: Update internal data organization and management processes.

ACTION B.3.1.1: Update the TPWD Mountain Lion Database to include fields relevant for monitoring (e.g., age, sex, reproductive status).

ACTION B.3.1.2: Improve internal communication and policies regarding mountain lion management on state lands.

STRATEGY B.3.2: Build internal capacity to perform monitoring work.

ACTION B.3.2.1: Identify and pursue funding for monitoring and avenues for hiring or contracting personnel to perform monitoring work consistently into the future.

OBJECTIVE B.4: FACILITATE COLLABORATION AND COMMUNICATION BETWEEN TPWD AND TEXAS MOUNTAIN LION RESEARCH COMMUNITY

STRATEGY B.4.1: Increase TPWD's awareness of studies occurring in Texas.

ACTION B.4.1.1: Examine the benefits of removing the exclusion of mountain lions from scientific permit requirements in Texas Administrative Code §69.302. As is currently the case, landowner permission will be required for any scientific research study.

STRATEGY B.4.2: On an ongoing basis, foster communication and collaboration among TPWD and mountain lion researchers.

ACTION B.4.2.1: Request TPWD Wildlife Division Director create a TPWD Mountain Lion/Large Carnivore Technical Committee, led by the State Mammal Specialist, to increase communication and collaboration within TPWD.

ACTION B.4.2.2: Create an annual Large Carnivore Symposium, organized by the State Mammal Specialist, for TPWD and researchers to discuss and share research in Texas, to be held in concert with a Mountain Lion Technical Committee meeting [B.4.2.1].

OBJECTIVE B.5: ESTABLISH A PROCESS FOR CONTINUED STAKEHOLDER INVOLVEMENT IN MOUNTAIN LION MANAGEMENT AND ENGAGING LANDOWNERS

STRATEGY B.5.1: Create a formal process for regularly meeting with stakeholders of varied perspectives and balancing a range of public interests and concerns.

ACTION B.5.1.1: Hold one or more meetings per year with stakeholders who collectively represent the range of the diverse values and perspectives of Texans.

STRATEGY B.5.2: On an ongoing basis, hold meetings with local stakeholders at the scale of Data Analysis Units.

ACTION B.5.2.1: Coordinate with TPWD staff and external partners (e.g., USDA-APHS Wildlife Services, Texas Wildlife Association, etc.) to hold local public outreach/stakeholder meetings or speak at local events within Data Analysis Units.

GOAL C: MAINTAIN MOUNTAIN LION POPULATIONS IN EACH ANALYSIS UNIT WITHIN DEFINED OBJECTIVES

This goal cannot be addressed until TPWD knows the status of the population in a Data Analysis Unit (Goal A) and until TPWD has determined a population objective for that respective Unit (Goal B). It will be some time before those goals are accomplished, potentially beyond the timeframe of the current version of this plan. However, the ideas outlined here are important for future planning, accountability, and transparency.

OBJECTIVE C.1: WHEN THE POPULATION OF MOUNTAIN LIONS IN A DATA ANALYSIS UNIT EXCEEDS THE MAXIMUM POPULATION OBJECTIVE, IMPLEMENT VOLUNTARY ACTIONS TO RETURN THE POPULATION TO DESIRED LEVELS

STRATEGY C.1.1: Identify best actions and take steps to help reduce the mountain lion population in the respective Data Analysis Unit.

ACTION C.1.1.1: Within the respective Data Analysis Unit, increase education and outreach to provide materials outlined in Objective D.1.

OBJECTIVE C.2: WHEN THE POPULATION OF MOUNTAIN LIONS IN A DATA ANALYSIS UNIT FALLS BELOW THE MINIMUM POPULATION OBJECTIVE, IMPLEMENT VOLUNTARY ACTIONS TO RETURN THE POPULATION TO DESIRED LEVELS

STRATEGY C.2.1: Identify best actions and take steps to help increase the mountain lion population in the respective Data Analysis Unit.

ACTION C.2.1.1: Within the respective Data Analysis Unit, increase education and outreach about non-lethal methods for reducing mountain lion conflict, such as livestock guardian animals. Provide educational and outreach materials on the best available science that reveals why the mountain lion population might have declined and prospective actions that might reverse the trend.

GOAL D: MITIGATE HUMAN-LION CONFLICT

Ensure landowners can continue to remove lions to protect their livestock.

OBJECTIVE D.1: MAINTAIN MINIMAL LEVELS OF LIVESTOCK DEPREDATION

STRATEGY D.1.1: On an ongoing basis and using a regional approach, provide technical guidance and public education on methods to prevent and/or reduce conflict.

ACTION D.1.1.1: Develop relevant educational materials, including a guide on best practices for protecting livestock, guidance on how to choose the best available resources, recommendations on finding well qualified trappers or houndsmen, mountain lion diet, and information on how to identify depredation by a mountain lion.

ACTION D.1.1.2: Distribute materials from D.1.1.1 via TPWD channels (website, social media, YouTube) and in-person outreach (local meetings, town halls, partner organizations), coordinating with partner agencies and organizations (e.g., USDA-APHIS Wildlife Services, Texas A&M AgriLife Extension) as appropriate.

OBJECTIVE D.2: BUILD AWARENESS AMONG THE GENERAL PUBLIC IN REGARD TO MOUNTAIN LIONS

STRATEGY D.2.1: On an ongoing basis, educate the public on safely living and recreating in mountain lion range.

ACTION D.2.1.1: Develop relevant educational materials.

ACTION D.2.1.2: Distribute materials from D.2.1.1 via TPWD channels (website, social media, YouTube) and in-person outreach (local meetings, town halls, partner organizations), coordinating with partner agencies and organizations (e.g., USDA-APHIS Wildlife Services, Texas A&M AgriLife Extension) as appropriate.

STRATEGY D.2.2: On an ongoing basis, respond to active mountain lion cases in high human-use areas.

ACTION D.2.2.1: TPWD Biologists, Game Wardens, and/or State Park staff will respond to the situation, as outlined in the Mountain Lion-Human Interaction Response Procedure.

ACTION D.2.2.2: Publish a press release(s) and use social media to alert the public in the area if needed. Note: If an incident occurs on private land, public communications will not disclose property identity or details without landowner consent unless necessary for immediate public safety.

OBJECTIVE D.3: EVALUATE SUSTAINABLE HUNTING OPPORTUNITIES THAT RECOGNIZE MOUNTAIN LIONS AS A POSITIVE RESOURCE FOR PRIVATE LANDOWNERS

STRATEGY D.3.1: Build relationships with qualified houndsmen and outfitters that showcase examples of sustainable recreational harvest.

STRATEGY D.3.2: Promote recreational hunting opportunities for mountain lions.

GOAL E: AS NEEDED, IDENTIFY AND PRIORITIZE ADDITIONAL KNOWLEDGE GAPS

Research and Monitoring needs identified in Goals A and B are first priorities; however, other important knowledge gaps may be identified that should be addressed as funding allows.

OBJECTIVE E.1: IDENTIFY KNOWLEDGE GAPS REGARDING MOUNTAIN LIONS IN TEXAS

STRATEGY E.1.1: On an ongoing basis, assess knowledge base and potential gaps in knowledge that could be important for successful management of mountain lion populations.

ACTION E.1.1.1: The State Mammal Specialist will stay informed on mountain lion research and management outside Texas (e.g., publications, scientific meetings, communications with managers) and seek input from state and federal agencies, non-governmental organizations, academic professionals, and stakeholders.

OBJECTIVE E.2: PRIORITIZE NEW PROJECTS TO FILL KNOWLEDGE GAPS AND CONDUCT/FACILITATE PROJECTS

STRATEGY E.2.1: On an ongoing basis, prioritize projects to fill identified knowledge gaps and conduct/facilitate projects.

ACTION E.2.1.1: Consult with TPWD staff [e.g., Objective B.4] and relevant stakeholders [e.g. Objective B.5] to prioritize identified research from Objective E.1.

ACTION E.2.1.2: Generate requests for proposals and facilitate funding opportunities for research as appropriate considering priorities in Goals A and B of this plan and other department wildlife conservation priorities.

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APPENDICES

APPENDIX A: EXCERPTS FROM MOUNTAIN LION STAKEHOLDER GROUP REPORT 2024

Texas Parks & Wildlife Department. 2024 Mountain Lion Stakeholder Group Report. PWD W7000-2071 (1/24). 55pp.
The full report is available at
https://tpwd.texas.gov/publications/pwdpubs/media/pwd_rp_w7000_2071_mountain_lion.pdf

Executive Summary

Texas Parks and Wildlife Department (TPWD) formed a Mountain Lion Stakeholder Group (MLSG) to advise the Texas Parks and Wildlife Commission (TPW Commission) on 6 charges related to how TPWD should manage mountain lions in Texas. Former TPW Commission Chairman Joseph Fitzsimons chaired the effort and led 5 meetings in 2023. MLSG members focused on "seeking to understand before seeking to be understood." In this vein, the MLSG did not try to force consensus on the 6 charges. Instead, they focused on understanding the nuances of various positions related to different policy options and management approaches. On some issues, the MLSG expressed divergent opinions but found agreement on charges, management philosophies, and management preferences. All members expressing an opinion agreed that mountain lions are an important resource that should persist in Texas.

Several other common themes arose in the group's discussion. First, any changes made to mountain lion rules and regulations lions should apply only to mountain lions, and not "spill over" into other wildlife species, and secondly, that the persistence and success of mountain lions in the future will continue to depend on effective stewardship of Texas's private lands. Texas is unique among the western states in that the majority of mountain lion habitat in Texas is on private lands. The charges and outcomes for the stakeholder group were as follows:

Charge 1 (*Abundance, status, distribution, and persistence of mountain lions in Texas*): The group agreed that the Department lacks sufficient data on the abundance, status, distribution, and persistence of mountain lions in Texas and significantly lags behind other states in these areas.

Charge 2 (*Development of a mountain lion management plan*): The group agreed that TPWD should develop a mountain lion management plan for Texas.

Charge 3 (*Harvest reporting*): The group agreed that TPWD's ability to monitor and manage mountain lion populations suffers from a lack of harvest data. They agreed that harvest reporting is important and that current levels of reporting are insufficient. Members agreed that the Department should modify their harvest reporting app to collect lion harvest reports; however, the group was split on whether harvest reporting should remain voluntary or changed to mandatory.

Charge 4 (*Trap/snare check standards*): Nearly all members expressed a personal ethic that emphasizes the importance of checking traps often. Many members also expressed a desire to protect trapping as a tool and a desire to protect the public perception of trapping. However, members did not reach agreement on whether to recommend trap check requirements for mountain lions.

Charge 5 (*Harvest/bag limits*): The group agreed that Texas lacks sufficient data to inform or justify new harvest limits but disagreed on how to manage the lion population in the absence of those data.

Charge 6 (*"Canned" hunts*): The group agreed that canned hunting should be prohibited in Texas.

View the full report at
https://tpwd.texas.gov/publications/pwdpubs/media/pwd_rp_w7000_2071_mountain_lion.pdf

APPENDIX B: GLOSSARY OF TERMS

Additive versus compensatory mortality – Additive mortality occurs when a source of death adds to natural deaths, increasing total mortality. Compensatory mortality occurs when one source of death replaces another, so total mortality does not increase.

Connectivity

Genetic connectivity – The exchange of genes between populations through movement and breeding, which maintains healthy levels of genetic diversity.

Landscape connectivity – How well the physical environment (habitats, land cover, geography) supports the movement of species and ecological processes across a region.

Movement connectivity – How easily animals can travel across the landscape to meet their needs (food, mates, shelter, migration routes).

Corridor – A strip of habitat that connects larger habitat areas, allowing wildlife to move safely between them.

Data Analysis Unit – Sub-units within a population that are at a biologically appropriate and locally relevant scale for analyzing data and monitoring the respective subpopulation status

Depredation – Damage caused by wildlife to crops or livestock, often leading to conflict with humans.

Dispersal – The movement of animals from the area where they were born to new locations where they may establish territories or breed.

Effort data [harvest effort] – Information about how much time and energy hunters or trappers spend in the field (e.g., days hunted, trap nights), used to understand harvest pressure and population trends.

Gene flow – The transfer of genetic material between populations when individuals move and breed, helping maintain genetic diversity.

Genetic diversity – The variety of genes within a population, which supports adaptability and long-term survival.

Home range – The area an animal regularly uses to find food, shelter, mates, and raise young.

Integrated Population Model (IPM) – A statistical model that combines different types of data (e.g., harvest, survival, reproduction, surveys) to estimate wildlife population size and trends.

North American Model of Wildlife Conservation – A guiding framework for how wildlife is managed in the United States and Canada. It grew out of historical conservation movements in the late 1800s and early 1900s, when unregulated hunting and habitat loss had pushed many species to the brink of extinction. The model emphasizes that wildlife is a public resource, managed by governments on behalf of all people, and that science and democratic principles should guide decisions. It is built on seven key principles:

1. *Wildlife as a public trust resource*
2. *Elimination of markets for game*
3. *Allocation of wildlife by law*
4. *Wildlife should only be killed for a legitimate purpose*
5. *Wildlife is considered an international resource*
6. *Science is the proper tool for discharge of wildlife policy*
7. *Democracy of hunting*

Together, these principles form the foundation for modern wildlife management agencies and practices, ensuring the conservation and sustainable use of wildlife resources into the future.

Recreational harvest – The legal hunting or trapping of wildlife for sport, subsistence, or personal use, rather than commercial purposes.

Reproductively successful female – a female that has reared offspring that survive to the age of independence

Source-sink dynamics – A population process where some habitats ("sources") produce surplus individuals that disperse to other habitats, while other areas ("sinks") cannot support themselves without immigrants.

Space-use – How animals use and move within their habitat, including patterns of activity and resource selection.

Stable population – A population in which births and immigration balance deaths and emigration, so total numbers remain relatively constant over time.

Statistical Population Reconstruction (SPR) – A model that uses harvest, survival, and effort data to estimate population size and trends, often between field surveys.

Viable population size – Refers to either a population or subpopulation that contains an adequate number of individuals appropriately distributed to ensure a high probability of long-term persistence of the population or subpopulation, despite natural fluctuations in numbers and without significant human intervention.

Vital rates – The key measures of population dynamics: birth, death, immigration, and emigration rates.

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