Urban Wildlife Research Project

Status, Signals & Data Gaps:

The California Gray Fox

A synthesis of researcher outreach, published literature, and fifteen years of field observation at the Palo Alto Baylands Preserve

May 5, 2026

Contents

I

Introduction

The Urban Wildlife Research Project (UWRP) set out to describe what is currently known — and not known — about the status of the gray fox (*Urocyon cinereoargenteus*) in California, and to identify where meaningful data gaps exist as of spring 2026.

UWRP asserts that California currently lacks the monitoring infrastructure to know whether the gray fox populations are healthy and thriving or stressed and declining.

The immediate catalyst for this inquiry was a body of recent research and action from the Midwest. Across Iowa, Indiana, Ohio, and Illinois, rigorous studies involving collared animals, camera surveys, disease testing, and long-term harvest data have documented sharp gray fox declines over the past two to three decades. Canine distemper has emerged as a primary documented mortality driver. Habitat simplification — the loss of brushy fencerows, woodland understory, and edge structure — has reduced the cover gray foxes depend on. Coyote pressure, while regionally variable, appears to compound these effects, particularly where dense shrub cover has been lost.

Those findings prompted a straightforward question: does California have comparable data? The answer, based on conversations with more than a dozen researchers, agency staff, and conservation practitioners, is no. Not yet. What California has instead are localized observations, fragmented datasets, and a monitoring gap stretching back more than forty years. That gap is itself a finding worth documenting.

UWRP has conducted long-term gray fox research at the Palo Alto Baylands Preserve for more than fifteen years. Our own observations — including a complete population collapse in 2016 and the failure of that population to recolonize nearly a decade later — raise questions we cannot answer from a single site. This inquiry was an attempt to understand whether others are asking the same questions, and what tools exist to begin answering them.

.

II

A Species Without a Scorecard

The charismatic, tree-climbing gray fox is California's most widely distributed native fox, occupying a broad range of habitats from coastal scrub and oak woodland to urban edges and riparian corridors. It is not listed as threatened or endangered. Gray fox are classified as a furbearing mammal under California law — neither a game species with active population management objectives nor a species listed under the California Endangered Species Act. A regulated hunting season exists, but hunters face no mandatory harvest reporting requirement. It is not a focal species in any current statewide monitoring program.

That institutional invisibility has a practical consequence: California has not conducted a systematic statewide assessment of gray fox populations since 1984, when the species was still managed primarily as a fur resource. (For a more detailed discussion of California data, see Appendix A: California's Gray Fox Data Record). That study examined harvest data and age structure across 29 counties, grouped into eleven regional populations.[i] It found healthy populations under harvest rates that in some areas exceeded 20% of the estimated local population. It did not include any geographic unit representing the San Francisco Bay region or the Palo Alto Baylands. In the four decades since, trapping has nearly disappeared as a management activity, but no monitoring framework has replaced it.

The California Department of Fish and Wildlife (CDFW) monitors game species and those listed under the California Endangered Species Act. Gray fox fall into neither category. As a CDFW spokesperson confirmed the department does not actively track gray fox populations statewide.[ii] [iii] The species exists in an institutional gap — present enough to be taken for granted, unmonitored enough to be invisible.

This is not a failure of attention or will. California's wildlife agencies operate under chronic resource constraints, managing an extraordinarily diverse and geographically complex state with monitoring obligations that far exceed available capacity. Non-listed, non-game species like the gray fox fall naturally to the bottom of an already overwhelming priority list. Understanding that structural reality is essential context for any conversation about how the gap might be addressed — and for identifying where partners outside government can most usefully contribute.

Dr. Justin Brashares, the G.R. & W.M. Goertz Professor of Environmental Science, Policy and Management at UC Berkeley, identified what may be the central framing problem.

> *"Gray foxes are assumed to be widespread and abundant — but those are not the same thing, and we're conflating them. Widespread describes where a species can occur across the landscape. Abundance describes how many animals are actually there. One tells you about habitat potential. The other tells you about population health. For gray fox in California, we have a reasonable picture of the first and almost no picture of the second."*
>
> — Dr. Justin Brashares, Professor *and G.R. & W.M. Goertz Chair*, UC Berkeley

That distinction matters because abundance — not just presence — is what population health assessments require. A species can persist across a wide geographic range while declining sharply in actual numbers, and standard detection methods may not reveal that decline until it is well advanced.

The bobcat offers an instructive parallel. Long assumed to be stable and common across California, bobcats attracted serious scientific and policy attention only after sustained advocacy prompted the California Fish and Game Commission to mandate a statewide bobcat management plan and fund the research to support it.[iv] That multi-year effort — still ongoing — demonstrated that a non-listed, widely distributed species can move from assumed stability to systematic study when the case for monitoring is made clearly and the right institutional partnerships are in place. Gray fox have not yet had their bobcat moment. Whether they need one — and how urgently — is precisely what this inquiry was designed to begin examining.

III

What the Midwest Is Teaching Us

The gray fox decline documented across the Midwest did not emerge from a single study or a single state. It converged — independently, across multiple research teams, using different methods, over different timeframes — toward a remarkably consistent set of findings. Understanding how that happened, and what it found, is useful context for California.

The Studies: Precipitous Decline

Beginning in 2020, Indiana became the first of four states to launch a formal gray fox study, partnering the Indiana Department of Natural Resources with Luther College and the Wildlife Ecology Institute.[v] Researchers collared 26 foxes, achieving an annual survival rate of approximately 68%. Of 13 documented deaths, the majority were attributable to canine distemper, with vehicle collisions as the second leading cause. Notably, genetic diversity among Indiana's foxes appeared good — suggesting the decline was not primarily a genetic bottleneck story, at least not yet.

Iowa followed, with the Iowa Department of Natural Resources partnering with the Iowa Wildlife Federation on a collaring program that began in 2022.[vi] The program struggled initially — three years passed with almost no captures despite a $400 bounty for live animals and active public recruitment. Iowa's harvest records tell their own story: for the first time since record-keeping began in 1930, no gray fox pelts were reported during the 2023 fur harvesting season. In recent years, fewer than ten individuals have been confirmed statewide.[vii]

In Illinois, a camera-based occupancy study compared detection rates from 2008–10 with those from 2022–23.[viii] The results were stark. Naïve occupancy — the simple rate at which cameras detected gray fox — dropped from 20% of sites to just 6%. The best-fitting occupancy model predicted an overall decline of roughly four-fold across 99% of the study area over that period.[ix] The authors concluded that gray fox numbers in the Midwest have suffered a “precipitous decline” substantially and that the situation warrants urgent conservation attention.

Ohio's work, conducted through the Ohio Coyote Project in partnership with Ohio State University, began collaring foxes in 2020 and has been examining the relationship between coyote presence and gray fox persistence — a question that lingers.

What the Data Show

Across these studies, three factors emerge consistently as drivers of decline, though their relative importance varies by region and remains incompletely understood.

Canine distemper is the most clearly documented mortality cause. More than other canids, gray foxes appear to have little immunological buffer against the disease — field researchers describe animals as either naïve (unexposed) to distemper or dead from it, with little evidence of survivors carrying protective antibodies. The raccoon population, which has expanded dramatically across the Midwest over the same period, is widely suspected as a reservoir amplifying transmission. As Iowa DNR veterinarian Dr. Rachel Ruden has noted, canine distemper is not the only species that can carry and shed the virus — infected coyotes, raccoons, skunks, and unvaccinated domestic animals all contribute to its circulation.[x]

Habitat simplification is the second recurring theme. Historically, gray fox in the Midwest occupied woodlands with dense understory. Following European settlement, old farmsteads and brushy fencerows continued to provide shrubby and dense cover. Decades of agricultural consolidation have removed much of that structure — farmsteads cleared, fencerows eliminated, maturing woodlands thinned and became isolated. The result is a landscape with fewer of the edge and refuge habitats that gray fox depend on. Harvest data reflect this: the all-time peak Iowa harvest of 3,093 gray fox in the 1979–80 season has given way to single digits and then zero.[5]

Competition in the form of coyote pressure is the third factor, though its role is regionally variable and mechanistically complex. Research in North Carolina found that gray fox in rural areas used the same sites as coyotes at roughly the same times — but only where sufficient tree cover existed.[xi] Without it, gray fox avoided recently coyote-used areas or shifted to later nocturnal activity. As that study's lead author noted, habitat structure and coyote pressure likely interact, rather than operating independently. While coyote effects appeared in Illinois, in Iowa and Indiana direct predation was not detected as a primary driver.

Dr. Dawn Reding, a wildlife geneticist at Luther College whose laboratory led the disease and genetics work for the Indiana study, offered a framing that runs through all of these findings:

.

> *"It's likely multiple interacting syndromes, not a single driver — and regional variation is significant. Iowa is not Indiana is not the Carolinas."*
>
> — Dr. Dawn Reding, Professor, Luther College

From Data to Action

What distinguished the Midwest response was not just the quality of the science but the institutional pathway it created. In Illinois, the confluence of published occupancy data, long-term hunter and archer survey trends, and broad stakeholder engagement produced both scientific consensus and the political will to act.

Stan McTaggart, furbearer biologist with the Illinois Department of Natural Resources, emphasized that the outcome depended as much on relationships as on data. Hunters and trappers had been observing gray fox declines for decades before formal studies confirmed them — their long-term, field-level knowledge was an asset, not an obstacle. Building trust with those communities early, and treating their observations as scientifically meaningful, helped create the stakeholder agreement that made administrative action possible. The Illinois experience suggests that gray fox conservation is not a story of science dictating practice — it is a story of science and practice arriving at the same conclusion together.

That process — data first, stakeholders early, policy last — culminated in the passage of HB 3760, which established a designated gray fox hunting season in Illinois and gave the state's wildlife director authority to adjust its length based on population data.[xii] The director used that authority to close the season indefinitely, until the species recovers. It is one of the strongest precautionary actions taken by any state for a non-listed species in recent memory, and a notable one given the current political climate around wildlife regulation.

Ryan Smith, Executive Director of the Iowa Wildlife Federation and a partner in Iowa's gray fox collaring program, drew a broader lesson from the Midwest experience. Coalition breadth matters, he emphasized — engaging across the political spectrum, and across sectors including educators, scientists, agricultural interests, and conservation organizations, produces durability that narrower coalitions cannot. Gray fox, as a charismatic, native species with an unusually engaging ability — tree-climbing— are well suited to building the kind of broad public engagement that sustains coalitions. He cautioned, however, against letting advocacy outpace knowledge. "Be conservative in public claims. Don't overstate certainty. Less is more."

IV

California: Signals Without Synthesis

If the Midwest story is one of data leading to action, California's gray fox story is one of signals that have never been assembled into a picture. The signals exist. Researchers have noticed them, field biologists have documented them, and agency staff have acknowledged them — often in the same breath as acknowledging that no system exists to connect them. What follows is not a population assessment. It is an inventory of what is known, where it came from, and what it cannot tell us.

Gray fox family group, Palo Alto Baylands, 2014. Photo: Bill Leikam / The Fox Guy.

A Baseline That Never Was

The most recent statewide assessment of California's gray fox population was conducted in 1984, when the species was still managed primarily as a fur resource[xiii]. That study examined harvest data and age structure across 29 counties, grouped into eleven regional populations. It found healthy populations under harvest rates that in some areas exceeded 20% of the estimated local population. It did not include any geographic unit representing the San Francisco Bay region or the Palo Alto Baylands. In the four decades since, trapping has nearly disappeared as a management activity, but no monitoring framework has replaced it.

As a CDFW spokesperson confirmed in 2025, the department "does not study or monitor" gray fox populations[xiv]. The species exists in an institutional gap — present enough to be taken for granted, unmonitored enough to be invisible.

Dr. Ben Sacks, a wildlife geneticist at the UC Davis Mammalian Ecology and Conservation Unit whose laboratory has conducted foundational genomic work on California's fox species, offered an important caution about importing Midwest findings to California. Research by Dr. Sophie Preckler-Quisquater, Dr. Sacks, and colleagues confirmed that California gray foxes belong to the western gray fox lineage, which diverged from the eastern lineage approximately one million years

ago — a genetic separation far deeper than their outward similarity suggests, and as deep as that between recognized sister species.[xv] To put that timeframe in perspective, the gray fox as a species is believed to be about 10 million years old and has been called a "living fossil" because the species has remained unchanged for so long. In comparison, modern wolves are believed to have evolved 300,000 years ago and dire wolves, saber tooth cats and the woolly mammoth all went extinct about 10,000 years ago, a fraction of the time since eastern and western gray fox diverged.

.

> *"California questions have to stand on California data. These are not the same animals."*
>
> — Dr. Ben Sacks, Professor and Director of the Mammalian Ecology and Conservation Unit , UC Berkeley

That divergence does not mean California gray foxes are immune to the pressures documented in the Midwest. Canine distemper susceptibility appears to recur across lineages — it is one of the few threads that crosses regional boundaries. But it does mean that Midwest population trends cannot be directly extrapolated westward, and that California's monitoring gap represents a genuine scientific problem, not merely an administrative one.

The Baylands: A Case Study in Local Collapse

UWRP's research site at the Palo Alto Baylands Preserve offers the most detailed long-term gray fox dataset in the Bay Area — and its story is cautionary. Bill Leikam, UWRP's founder, began documenting gray fox behavior at the Baylands in 2010 and over subsequent years came to know four skulks, approximately 17 individuals, well enough to name them. In hindsight, he observed early warning signs — eye discharge, unusual behavior in cubs, signs of inbreeding including floppy ears — before the collapse became apparent.

.

> *"It was like a black wind swept through the area and infected all of them," Leikam said. "They're all gone now."*
>
> — Bill Leikam, "The Fox Guy" Co-Founder and Board President , Urban Wildlife Research Project

State wildlife veterinarian Dr. Deana Clifford confirmed canine distemper as the cause, describing the scale as "unfortunately very typical of a localized outbreak" that can "dramatically reduce the number of animals in an area and even make it seem like they've disappeared altogether for a while."[xvi] All told, 17 carcasses were recovered by year's end. All 25 foxes documented by UWRP across four social groups were gone.[xvii]

What has followed is nearly as striking as the collapse itself. Nearly a decade later, gray foxes have not recolonized the Baylands Preserve. The site that once supported 25 individually documented animals across four social groups remains largely unoccupied. Whether this reflects ongoing disease pressure, corridor fragmentation preventing recolonization, coyote competition, or some combination of these factors is not known. No systematic monitoring has been conducted at the site since the collapse.

David Johns of the Wildlands Network, commenting at the time of the die-off, identified the underlying vulnerability directly: "You have this small population, they're often very genetically similar, and very easy to wipe out if they are susceptible. That's why connectivity is so important — it's a reach for these foxes to find other populations that are bigger and wilder and that might bring in some new genes.[xviii]"

Disappearances Without Documentation

The Baylands collapse is the best-documented local event, but it is not the only one. Laurel Serieys, a wildlife ecologist working under the auspices of the National Park Service, documented approximately 50 gray fox captures in Malibu Creek and Topanga State Parks in the Santa Monica Mountains between 2008 and 2010. Individual markings in gray fox can be too subtle for camera identification, making the number of unique individuals among those captures unknown. The volume of captures across routinely moved traps, however, suggests high local abundance at that time. When she returned to a site near San Jose in 2017–18 planning to collar ten gray foxes, she found almost none — catching only one animal at a nearby site. Foxes that had been present on camera in the study area a few years earlier were no longer detectable. Disease was posited as a possible explanation, but this was speculation rather than a confirmed finding. The event generated no formal report, no agency response, and no entry into any statewide record. This pattern — local collapse, short timeframe, prior presence confirmed, disappearance unrecorded — is precisely what a monitoring gap looks like from the inside. Something can happen locally, quickly, and quietly, without triggering statewide awareness. Whether the Baylands and the San Jose site represent isolated events or early signals of a broader pattern is, at present, unknowable.

What Current, Localized Monitoring Can and Cannot Say

Several research programs operating in the Bay Area and Southern California detect gray foxes incidentally — as one species among many in camera grids designed primarily for other purposes. Their findings are informative, but they share common limitations.

A research program at the University of California, Berkeley has operated approximately 100 cameras across the East Bay and San Francisco since 2022, primarily designed to study urban carnivore dynamics. Gray fox detections from this ongoing, unpublished work by the UCB Schell Lab are described as preliminary and infrequent — appearing more commonly in hill areas than along shoreline in the East Bay and sporadically throughout San Francisco, based on early and incomplete analysis. No population estimates or trend analyses are available yet from this dataset[xix].

In Southern California, Dr. Niamh Quinn, a UC Cooperative Extension advisor whose laboratory tracks urban coyotes across Los Angeles, reports that gray fox rarely appear in her data. In years of coyote trapping, her team has captured only one gray fox — in the foothills of northern Los Angeles County near Glendora. Her general impression is that gray fox are not present in Southern California in meaningful numbers, though she notes this warrants further investigation.

The most structured regional monitoring effort identified in this inquiry is NatureCheck[xx], a formal ecological health assessment published in 2022 by the East Bay Stewardship Network — a partnership of five public agencies managing nearly 225,000 acres, roughly 25 percent of land in Alameda and Contra Costa Counties. Through NatureCheck, gray fox is designated as a formal indicator species for the region, with a published baseline and a commitment to repeat assessment on a regular cycle, with an update anticipated by the end of 2026. That designation matters: it means gray fox status in the East Bay is now tracked intentionally, not simply noticed.

What NatureCheck can and cannot yet tell us about gray fox reflects the program's current stage. The camera data underlying the mesocarnivore assessment were drawn from studies designed primarily for other purposes — carnivore research and kit fox monitoring — and processed as binary presence or absence per park unit rather than as population data. Two limitations follow from this. First, cameras cannot distinguish individual animals: a series of detections may represent many foxes or one fox many times, making it impossible to estimate how many animals actually use an area. Second, the methods were not designed to support population estimation, which requires either mark-recapture protocols, structured occupancy modeling with defined sampling effort, or distance/transect sampling — none of which the current dataset provides. The program acknowledges both constraints directly. What the data do show is worth noting. Gray fox was

detected in all three subregions of the NatureCheck area of focus. In the East Bay Hills and Mt. Hamilton subregions, detection rates met the threshold for "Good" condition. In the Mt. Diablo Range, detection in only three of nine monitored lands produced a "Caution" rating — a finding that warrants follow-up to determine whether it reflects genuine low presence or gaps in monitoring coverage. Reproductive confirmation remains unknown across all subregions as evidence of cubs or family groups was not documented in the underlying camera data.

Beyond the new data, NatureCheck is nonetheless notable for what its partnership structure makes possible. Five agencies sharing a standardized indicator framework across a quarter of two Bay Area counties represents monitoring infrastructure that most of California lacks entirely for this species. Whether that infrastructure could be connected to broader regional efforts, including the Urban Wildlife Information Network's standardized occupancy transects, remains an open question that this inquiry was not able to resolve.

Taken together, these datasets confirm presence. They cannot confirm abundance, trend, or reproductive health. The data that exist were not designed to answer the questions that now matter most.

The Detectability Problem

One reason California's monitoring gap is particularly consequential is that standard detection methods may systematically misread gray fox presence — producing unreliable data in either direction. Cameras may undercount foxes that are present but behaviorally suppressed, making it impossible to distinguish a stressed but present population from a genuinely absent one.

Dr. Madeleine Zuercher, whose dissertation research examined gray fox behavior in wildland parks in Los Angeles and Ventura Counties, found that domestic dog presence strongly suppressed gray fox investigative behavior — animals appeared to be more cautious and were less likely to consume bait or investigate surroundings when dog scent was present. A preliminary analysis of camera data by Luke Benson found that in one high dog-use park, gray fox activity shifted from primarily nocturnal to crepuscular on weekends, clustering at dawn and dusk when human and dog activity was lower.[xxi] As Zuercher notes, this means apparent absence from detection should not be confused with actual absence of the species: "Behavioral suppression is not the same as absence. The system may be stressed in ways our tools are not designed to detect."

This detectability problem compounds the monitoring gap. Not only does California lack a baseline, but the methods most commonly used to establish one may also produce unreliable readings under the very conditions most likely to stress gray fox populations.

V

Recognized Pressures, Unquantified Effects

California does not lack hypotheses about what threatens gray foxes. Across every conversation UWRP conducted during this inquiry — with academic researchers, agency staff, field biologists, and conservation practitioners — the same pressures recurred with remarkable consistency. What is missing is not awareness of these pressures. It is any systematic effort to measure their effects on gray fox at a population scale in California.

Disease: Canine Distemper

Disease, especially Canine distemper virus, is the most consistently documented mortality cause across every region where gray fox have been studied carefully. The Baylands collapse of 2016 was confirmed as distemper by CDFW. Laurel Serieys documented a disappearance near San Jose — but that documentation existed only in field records. Such events generate no formal agency reports, no official response, and no entry into any statewide record. East Bay gray fox populations may have increased during 2018, when residents documented elevated sightings particularly in urban Berkeley and the flatlands near the Ohlone Greenway. Local reporting at the time noted foxes venturing into neighborhoods in unusual numbers, with experts suggesting juvenile dispersal and dry conditions as possible explanations for increased urban movement.[xxii] In the Midwest, distemper accounted for the majority of documented deaths in both the Indiana and Iowa studies.

Gray foxes appear to have an unusually limited immunological response to the virus. Research from the Midwest describes foxes as either naïve to distemper or dead from it, with little evidence of survivors carrying protective antibodies. When the virus enters a gray fox population it can move through it rapidly and completely, as the Baylands event demonstrated.

The raccoon population is widely implicated as a reservoir amplifying transmission. Raccoon numbers have expanded substantially across California's urban and suburban landscapes, increasing the frequency of interspecies contact at food sources, water features, and denning areas. Infected raccoons, coyotes, skunks, and unvaccinated domestic animals all shed the virus through respiratory droplets, saliva, urine, and feces. In fragmented urban landscapes where multiple species concentrate around anthropogenic food subsidies, the conditions for transmission are consistently present.

California has no statewide system for tracking canine distemper mortality in gray foxes. Carcasses are sometimes submitted to CDFW's Wildlife Investigations Lab, and individual die-off events have been confirmed. But these records are not aggregated, not publicly synthesized, and not connected to any population monitoring framework. Disease events that do not generate public attention or a formal carcass submission go entirely unrecorded.

Habitat Fragmentation and Structural Simplification

Habitat loss is commonly understood as the conversion of natural land to developed uses. For gray foxes, the more consequential threat may be subtler: the structural simplification of habitat that remains.

Gray foxes, as climbers, are structurally dependent animals. Research in California's chaparral systems has found high fox densities in areas dominated by dense shrubs and manzanita — habitat that allows foxes to move agilely, escape coyotes, and exploit their unusual capacity for semi-

arboreal movement. When that structure is disturbed — through shrub removal, thinning, vineyard conversion, or development — foxes lose not just cover but the functional refuge that allows them to persist alongside larger predators. As Dr. Justin Brashares has characterized it, structural simplification, not land use change per se, is the core habitat concern for gray fox in California.

Fragmentation compounds this problem in a second, equally important way. Isolated populations cannot recover from local collapse. The Baylands event illustrates this directly: nearly a decade after distemper eliminated the local population, gray foxes have not recolonized the preserve. Even though the preserve itself remains, the creeks and riparian corridors that historically connected mountain populations to baylands habitats have been channelized, culverted, and interrupted by roads and urban development. Even where gray foxes persist in surrounding areas, the pathways that would allow dispersing animals to reach and reestablish at the Baylands are compromised.

Roads represent a particularly acute barrier. Gray foxes are large enough to range widely but face serious mortality risk crossing California's heavily trafficked roads and freeways — infrastructure that was not designed with their movement in mind and that wildlife crossing programs have not yet systematically addressed.

The genetic consequences of long-term fragmentation are an additional concern. Dr. Dawn Reding, whose laboratory work spanned the Iowa and Indiana studies, noted that eastern gray fox populations show lower genetic diversity than western populations — and raised the possibility that reduced diversity may increase disease vulnerability, even if genetics alone do not fully explain distemper susceptibility. Research by Sacks and colleagues examined population structure and genetic diversity of gray foxes across California and the adjacent Desert ecoregion, finding that California populations belong to the broader western lineage — which extends from California to Texas — and showing relatively continuous gene flow within the state, with northern California populations reflecting particularly ancient and stable ancestry. Whether current habitat fragmentation is affecting that connectivity, or whether localized disease epizootics pose cumulative regional risk, has not been assessed at a population scale[xxiii]. Whether fragmentation is producing genetic bottlenecks in some California gray fox populations is not currently known, because no one has looked.

Competitive Pressures: An Understudied Dynamic

The relationship between gray foxes and other canids in California — both wild and domestic — is recognized as potentially significant, but remains one of the least documented pressures in this inquiry. What the available evidence supports is not a simple story of predation or displacement, but a more complex picture of behavioral stress, habitat dependence, and regional variation that California has not yet begun to systematically study.

Among wild canids, the North Carolina occupancy study offers the most rigorously documented finding: gray foxes and coyotes use the same sites at roughly the same times in rural areas, but only where sufficient tree cover exists.[xxiv] Without it, gray foxes avoided recently coyote-used areas or shifted to later nocturnal activity. The study's authors concluded that habitat structure and coyote presence likely interact, rather than operating independently — a finding that resonates with California's increasingly fragmented chaparral and riparian landscapes.

Dr. Justin Brashares, drawing on long-term field experience in Sonoma and Mendocino counties, identifies coyote pressure as one of two significant threats to gray foxes in California, alongside canine distemper, and emphasizes that the two likely interact. Where chaparral structure is intact, gray foxes can exploit dense cover and their semi-arboreal agility to largely avoid coyotes. Where that structure has been simplified or fragmented, that refuge disappears.

Dr. Niamh Quinn, whose laboratory tracks urban coyotes across Los Angeles, offered a direct but carefully qualified assessment: even where direct predation is not occurring, some competition between coyotes and gray foxes is likely. Coyotes are among the most adaptable mammals on the

continent — where food is available, they will be present. But she stopped well short of identifying coyotes as a primary driver of gray fox decline in California, noting that the question warrants more targeted investigation.

Notably, the four Midwest studies — which offer the most rigorous population-level data available for this species — found that direct coyote predation was not detected as a primary mortality driver in either Iowa or Indiana, though coyote effects appeared more pronounced in Illinois where habitat simplification was more advanced.

In California, the most directly documented canid pressure on gray fox behavior comes not from coyotes but from domestic dogs. Dr. Madeleine Zuercher's research in wildland parks in Los Angeles and Ventura Counties found that dog presence strongly suppressed gray fox investigative behavior — animals appeared more cautious and were less likely to consume food sources when dog scent was present. This behavioral suppression — distinct from displacement or predation — represents a chronic stressor whose population-level effects have not been assessed.

Whether competition for prey between gray foxes and other mesocarnivores contributes to population stress in California is an additional question that none of the researchers consulted in this inquiry were able to address from data. It remains an open and understudied thread.

A mystery — because the data do not exist — is how these competitive pressures combine, interact, or compare in magnitude to disease and habitat loss in the California complex. That absence is itself part of the monitoring gap this report documents.

Rodenticides: A Threat Reduced, Not Eliminated

California has taken stronger action on anticoagulant rodenticides than any other state in the country — and the gray fox, as an urban and peri-urban carnivore in the same food web as the mountain lions and bobcats that drove legislative attention, is an incidental beneficiary. Beginning with AB 1788 in 2020, and completed with AB 2552 in 2024, California has progressively banned most uses of both first and second-generation anticoagulant rodenticides statewide, with exemptions for agriculture and public health.[xxv] The legislation was catalyzed by documented exposure rates of 80–90% in tested mountain lions, bobcats, and raptors — a body of evidence built over years by CDFW, the National Park Service, and university researchers, and advanced by sustained NGO advocacy.

Whether these regulatory changes have meaningfully reduced rodenticide exposure in gray foxes specifically is not known, because gray foxes were not among the focal species in the monitoring that drove the legislation, and no targeted post-regulation assessment has been conducted for this species. Dr. Justin Brashares has noted that sublethal exposure and ecological stress effects may persist even as acute mortality from the most toxic compounds declines. Researchers at Ohio State University are now examining rodenticide exposure alongside disease as possible interacting contributors to gray fox mortality in the Midwest — a methodological approach worth tracking as California's own regulatory changes mature.

California's rodenticide legislation represents a meaningful model: sustained monitoring of a recognizable flagship species — the mountain lion — combined with NGO advocacy and legislative will, produced the strongest statewide anticoagulant restrictions in the nation. It is worth asking whether gray fox could serve a similar catalytic role for the monitoring infrastructure they currently lack.

The Synthesis Gap

What is striking about this inventory of pressures is not that they are unknown. It is that they are known individually, in isolation, without any framework connecting them across California's landscapes. Canine distemper events are confirmed locally but never aggregated. Habitat fragmentation is documented at specific sites but never assessed for its cumulative effect on gray fox

connectivity. Coyote and domestic dog dynamics are studied intensively in some regions and not at all in others. Genetic health has not been assessed at a population scale. Rodenticide exposure has not been measured in gray foxes directly.

Right now, California does not have that data. What it has are fragments — locally meaningful, regionally disconnected, and collectively insufficient to determine whether the pressures documented here are producing population-level effects. That is the condition this inquiry was designed to document.

VI

What Would It Take to Know More

The preceding sections document a monitoring gap, not a management crisis — at least not yet. But the Midwest experience suggests that by the time a crisis is visible, the window for precautionary action has already closed. What follows is not a prescriptive research agenda. It is a synthesis of what this inquiry found to be the most promising and proportionate first steps toward closing California's gray fox knowledge gap.

Know What Already Exists

Before new data collection begins, a clearer picture of what already exists would itself be valuable. Several datasets of direct relevance to California gray fox status have already been identified through this inquiry. The Brashares Lab at UC Berkeley has operated a continuous camera grid at the Hopland Research and Extension Center in Mendocino County since 2016, generating more than 500,000 images across oak woodland savanna habitat — including gray fox detections spanning multiple years before and after the 2018 Mendocino Complex Fire[xxvi]. That dataset represents one of the most sustained California gray fox camera records currently known to exist, from a site characterized by high gray fox densities in intact chaparral structure. Camera programs in the East Bay, behavioral studies in Southern California, carnivore monitoring in the North Bay and Santa Monica Mountains, and long-term field observations at the Palo Alto Baylands each contribute additional fragments of the picture. These are the datasets this inquiry was able to identify. There are likely others — held by university researchers, county agencies, tribal wildlife programs, and private land managers — that have never been surfaced in a shared context.

A focused data-holders convening — a working session among researchers and agency staff who hold relevant datasets, designed to clarify what exists, in what form, and where the most consequential gaps lie — would be a productive and proportionate first step. Its output, a knowledge inventory, would build a shared understanding of the California gray fox data landscape that currently does not exist and be a basis for deciding what monitoring investments would be most useful.

The Urban Wildlife Information Network (UWIN) offers a complementary opportunity. UWIN operates standardized wildlife transects across urban-to-wildland gradients at sites across the country, generating comparable occupancy data that could support population modeling far more analytically powerful than incidental detections alone. Whether existing UWIN transect data include sufficient gray fox detections, and whether data sharing protocols would permit their use, are questions worth pursuing. Connecting local California observations to a national standardized dataset could give this work analytical reach that no single site study could achieve independently.

Disease and Mortality Surveillance

Better visibility into disease events is a second priority. California's Wildlife Investigations Lab receives carcass submissions and has confirmed canine distemper in gray foxes on multiple occasions. But submissions are opportunistic, records are not aggregated publicly, and there is no mechanism connecting individual mortality events into a regional disease picture.

The most immediate step would be determining what necropsy and disease records already exist within CDFW — whether those records are accessible, and whether they reveal any temporal or geographic patterns in gray fox mortality. This is a data retrieval question before it is a research question. It requires no new fieldwork, no new funding, and no new institutional commitments. It requires only the will to ask.

A pending bill — SB 1135, the California Wildlife Coexistence Act — would, if enacted and funded, establish a Wildlife Coexistence Program and Technical Advisory Committee that could potentially create a framework for the kind of species-level mortality reporting that currently does not exist for gray fox. The bill passed the Senate Natural Resources and Water Committee in April 2026 and is currently before the Senate Appropriations Committee[xxvii].

Acoustic Monitoring

For presence and distribution data, passive acoustic monitoring offers a practical, low-cost entry point well suited to gray fox. Gray fox vocalizations are distinctive enough to allow automated detection and analysis using widely available software. Passive acoustic recorders can be deployed across a network of sites with minimal infrastructure, maintained by volunteers or citizen scientists, and downloaded periodically for analysis.

A pilot deployment at a site with known historical gray fox presence — such as the Palo Alto Baylands, where UWRP has existing research infrastructure and long-term baseline knowledge — could establish proof of concept, generate data relevant to recolonization questions, and demonstrate the method's feasibility before any larger network deployment is attempted. Longer term, a regional citizen science acoustic network — engaging landowners, park managers, and conservation volunteers across the Bay Area and beyond — could produce a distributed baseline dataset at a fraction of the cost of conventional monitoring.

Genetic Assessment

The genetic health of California's gray fox populations — their diversity, connectivity, and vulnerability to inbreeding — has not been assessed at a population scale. Whether the habitat fragmentation documented across the Bay Area and Southern California is producing measurable genetic bottlenecks, or severing the gene flow that would allow local populations to recover after collapse, is not currently known.

Scat-based DNA sampling offers a non-invasive method for assessing genetic connectivity across a landscape without capturing or disturbing animals. A study spanning the Santa Cruz Mountains, Diablo Range, SF Baylands, and urban areas of Silicon Valley would directly address the connectivity questions raised by the Baylands collapse and the corridor fragmentation UWRP has documented over fifteen years of field observation. UC Davis holds existing California fox genetic datasets that would provide a valuable analytical foundation — and that already suggest relatively continuous gene flow within the state, a finding that frames the connectivity question as precautionary rather than urgent.

The Bobcat Blueprint

California has demonstrated that it can move from assumed stability to funded, systematic study of a non-listed, widely distributed species — when the evidence is clear and the advocacy is sustained. The California Fish and Game Commission's decision to mandate a statewide bobcat management plan and fund the research to support it, began not with a crisis but with a credible articulation of what was unknown and why it mattered[xxviii]. That is exactly the kind of argument the California gray fox data gap supports.

Gray fox are not bobcats. They occupy a different institutional position, generate different levels of public recognition, and face a distinct set of data challenges. But the underlying logic is the same: a species does not need to be listed or in freefall to warrant systematic attention. It needs a clear

demonstration that the absence of monitoring is itself a risk — and a proportionate, credible first step that gives agencies, funders, and researchers a reasonable place to begin.

> *"Habitat fragmentation and disease outbreaks are putting some populations at risk. More research is needed to understand the big picture for this canid's conservation needs."*
>
> — Greg Kerekes, Co-Founder UWRP & Executive Director, Urban Wildlife Research Project

VII

An Invitation

This inquiry began with a simple question: does California have the data to assess whether the pressures now documented in the Midwest are present here? The answer is no. But the process of asking that question — speaking with researchers, agency staff, and conservation practitioners across California and the Midwest — revealed something equally important: the people best positioned to begin closing this gap are already in the field, already collecting relevant data, and already asking related questions. What is missing is not expertise or motivation. It is coordination.

The Midwest experience demonstrates the power of regional data. Researchers working independently in four states, using different methods and asking different questions, arrived at convergent findings — and that convergence created the scientific foundation for meaningful action. That convergence did not happen quickly or easily. It required years of fieldwork, sustained institutional partnerships, and the willingness of agencies, NGOs, and academic researchers to work across organizational boundaries toward a shared understanding. Critically, that understanding included the public and decision-makers. The result was not just better science. It was the political and institutional foundation for the strongest precautionary action any state has taken for this species.

California is at an earlier moment. The signals are present. The researchers are engaged. The data, fragmented as it is, points consistently toward the same conclusion:

> *the current absence of monitoring is not a neutral condition, and the cost of continued invisibility is unknowable precisely because no one is looking.*

UWRP is a small organization with a long field record and a genuine commitment to the careful, non-advocacy approach this inquiry has tried to model. We do not have the resources to close California's gray fox knowledge gap alone. We do believe we have helped map it — and that mapping it is the necessary first step toward addressing it.

Public agencies responsible for wildlife management in California are not indifferent to these questions — they are stretched. The monitoring gap documented here reflects resource constraints and competing priorities, not a lack of scientific awareness or institutional concern. Independent research organizations, universities, NGOs, and tribal wildlife programs each have a role to play in supporting the work that agencies cannot currently resource. A collaborative model — with public agencies as essential partners rather than sole responsible parties — is both realistic and, as the Midwest experience demonstrates, effective.

We are extending an open invitation to researchers, agency staff, funders, tribal wildlife programs, and conservation partners who share an interest in California's gray fox and the broader questions of urban carnivore ecology, habitat connectivity, and wildlife disease that gray fox illuminate. We welcome conversation, collaboration, data sharing, and the kind of sustained partnership that the Midwest experience suggests is the only path to genuine understanding.

The fox is still out there. We just don't know how many, or for how long. That is reason enough to look.

Appendix A

California's Gray Fox Data Record — What Existed and What Replaced It

Understanding California's gray fox knowledge gap requires distinguishing between two things that are easy to conflate: the *existence of data* about a species, and the existence of a *monitoring program* for that species. California has had the former, sporadically. It has never had the latter.

A monitoring program, as the term is used in wildlife management, implies a recurring institutional commitment: defined methodology applied at regular intervals, a designated agency responsible for its continuation, and enough temporal depth to detect population trends over time. A one-time population study, however rigorous, is a snapshot. Harvest records compiled as a byproduct of license administration are an administrative artifact. Neither constitutes a monitoring program.

What California had: two imperfect data sources

Furbearer Kills or Removal. Gray fox in California are classified under state law as *furbearing mammals* — a legal category that includes pine marten, fisher, mink, river otter, raccoon, beaver, badger, and muskrat, among others. This classification is distinct from *game species* — deer, bear, elk, and waterfowl — which are subject to active population management, mandatory harvest reporting, and regular population assessments tied to regulated take. Furbearers historically generated monitoring data through a different mechanism: the trapping license system, which required licensed trappers to report their annual harvest as a condition of license renewal. That data was never designed as a population assessment. It measured kills — not abundance, reproductive health, or trend. Wildlife law renders this as 'take,' a term that obscures what the data actually recorded: how many animals were killed. As CDFW's own reporting acknowledged, catch-per-unit-effort figures are influenced by trapper skill, local landscape characteristics, and regulatory changes, not just species density. What the harvest record offered was a rough, geographically uneven signal of relative presence over time. It was the only systematic statewide record that existed for gray fox, and it is now gone.

The last population study: 1984. In 1984, the California Department of Fish and Game conducted what remains the most recent systematic statewide assessment of gray fox populations, examining harvest data and age structure across 29 counties grouped into eleven regional populations. It found healthy populations under harvest rates that in some areas exceeded 20% of the estimated local population. It did not include any geographic unit representing the San Francisco Bay region. No comparable study has been conducted since — not because a law ended the requirement, but because no law required continuation, and without listing obligations or commercial pressure to justify the investment, none was undertaken.

Two legislative changes that ended the harvest record. What remained after 1984 — the harvest data stream from licensed trappers — was itself progressively curtailed by two legislative actions:

- **In 1998**, California voters passed Proposition 4, banning the use of body-gripping traps for recreational and commercial fur trapping.[xxix] Trapping license sales dropped 42% in the first year and continued declining. The remaining harvest data became increasingly thin: by

the final season, just three trappers were targeting gray fox statewide, all operating in Los Angeles County.[xxx]

- **In 2020,** AB 273 — the Wildlife Protection Act of 2019 — ended recreational and commercial fur trapping entirely[xxxi]. The final trapping report documented 83 gray fox taken, representing 95% of the total furbearer harvest that season.[xxxii] All were unsold. No lawful recreational trapping harvest has been recorded since.

Unregulated hunting. Gray fox hunting continues under a regulated season (November 24 through the end of February, statewide), but unlike game species — for which mandatory tag reporting generates annual harvest data used in population management — gray fox hunters face no reporting requirement. The hunting season generates no population data while allowing unlimited kills of gray fox.[xxxiii]

What this means. The result is a species for which California has no current data source of any kind on population trends. The absence is not a neutral condition. Harvest data, even at its most limited, provided a rough signal of presence and relative abundance across a broad geographic area over time — the kind of long-term baseline that makes it possible to detect change. That signal is gone, and nothing has replaced it. Whether gray fox populations in California are stable, declining, or locally collapsing is, at present, unknowable — not because the question is unanswerable, but because no institution has yet built the tools to answer it.

A current opportunity. A pending legislative development may begin to address one part of this gap. SB 1135, the California Wildlife Coexistence Act, introduced by Senator Catherine Blakespear, passed the Senate Natural Resources and Water Committee in April 2026 and is currently before the Senate Appropriations Committee. If enacted and funded, the bill would establish a Wildlife Coexistence Program and a Technical Advisory Committee charged with guiding CDFW's coexistence efforts — and could potentially create a framework for the kind of species-level mortality reporting that has been absent for gray fox since commercial trapping ended. Whether nuisance trapper reporting — currently unregulated despite trappers holding state licenses — would fall within the TAC's scope remains to be determined. The bill represents the first legislative opening in decades for the kind of institutional infrastructure California's gray fox monitoring gap requires

Appendix B

Acknowledgements and Attribution

This report would not have been possible without the generosity of the researchers, agency staff, and conservation practitioners who shared their time, knowledge, and field experience. The author is grateful to the following individuals for their contributions:

- Dr. Justin Brashares, G.R. & W.M. Goertz Professor of Environmental Science, Policy and Management, University of California, Berkeley
- Dr. Ben Sacks, Director, Mammalian Ecology and Conservation Unit, University of California, Davis
- Dr. Dawn Reding, Wildlife Geneticist, Luther College
- Dr. Laurel Serieys, Wildlife Ecologist
- Dr. Niamh Quinn, UC Cooperative Extension Advisor, University of California
- Dr. Madeleine Zuercher, Wildlife Ecologist
- Neville Taraporevala, PhD Student, Department of Environmental Science, Policy, and Management, University of California, Berkeley
- Ryan Smith, Executive Director, Iowa Wildlife Federation
- Stan McTaggart, Furbearer Biologist, Illinois Department of Natural Resources
- Natalie Reeder and Tammy Lim, East Bay Regional Park District, and the East Bay Stewardship Network — a coalition of five public agencies managing nearly 225,000 acres across Alameda and Contra Costa Counties.

The author also acknowledges the broader community of researchers, agency staff, and field observers whose conversations over many years shaped the questions this report asks.

Authorship: This report was researched and written by AnMarie Rodgers, Board Member and Policy Lead: arodgers.uwrp@gmail.com, Urban Wildlife Research Project. AnMarie Rodgers conducted all interviews, source selection, synthesis, and analysis. Claude (Anthropic) provided editorial and drafting support throughout the writing process. All research judgments, characterizations of contributor statements, and conclusions reflect the author's independent assessment.

Photography: by Bill Leikam, “The Fox Guy” and Co-Founder UWRP.

Special thanks to Bill Leikam, Co-founder and Board President of the Urban Wildlife Research Project, whose fifteen years of field observation at the Palo Alto Baylands Preserve form the empirical foundation of this inquiry; to Greg Kerekes, UWRP Co-Founder and Executive Director, for his organizational support and partnership throughout this project; and to the UWRP Board for their encouragement and approval of this work.

Endnotes

[i] California Department of Fish and Game. (1984). Nongame Wildlife Investigations: Age and Sex Structure of Gray Foxes in California. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=169979

[ii] Kellum, K., California Department of Fish and Wildlife spokesperson, quoted in: "Why Californians are becoming obsessed with this thriving predator." SF Gate, September 21, 2025. Available at: https://www.sfgate.com/centralcalifornia/article/california-gray-foxes-thriving-21055435.php

[iii] Kellum, Krysten. Information Officer, California Department of Fish and Wildlife. Email communication with AnMarie Rodgers, January 5, 2025

[iv] California Department of Fish and Wildlife. "Why is CDFW doing a statewide bobcat study?" *California Outdoors Q&A*. Available at: https://wildlife.ca.gov/COQA/why-is-cdfw-doing-a-statewide-bobcat-study. See also: California Fish and Game Code section 4158.

[v] Indiana Department of Natural Resources, Luther College, and Wildlife Ecology Institute. Gray Fox Research 2020–2024. Indiana DNR Division of Fish & Wildlife. Available at: https://www.in.gov/dnr/fish-and-wildlife/files/wmr/fw-grayfox-report-2020-2024.pdf. See also "Factors Affecting Gray Fox Populations and Distribution in Indiana (2020-2025)": https://www.wildlifeecology.org/grayfox_indiana.html

[vi] Washburn, L. "IWF Partners with Iowa DNR on Gray Fox Study." Iowa Wildlife Federation, December 10, 2024. Available at: https://iawildlife.org/blog/iwf-partners-with-iowa-dnr-on-gray-fox-study/

[vii]ibid. *See endnote 5 (Washburn, 2024).*

[viii] Larreur, M.R., Nielsen, C.K., Lesmeister, D.B., and Bastille-Rousseau, G. "The precipitous decline of a gray fox population." Global Ecology & Conservation, 2025. Available at: https://www.fs.usda.gov/pnw/pubs/journals/pnw_2025_larreur001.pdf

[ix] Larreur et al., 2025.

[x] Washburn, 2024, op. cit.

[xi] Parsons, A. et al. "The effect of urbanization on spatiotemporal interactions between gray foxes and coyotes" Ecosphere, March 2022. Available at: https://esajournals.onlinelibrary.wiley.com/doi/10.1002/ecs2.3993

[xii] Illinois HB 3760. "An Act concerning wildlife — gray fox hunting season." Illinois General Assembly. Available at: https://legiscan.com/IL/bill/HB3760/2025

[xiii] Gould, Gordon I., Jr. *Age and Sex Structure of Gray Foxes in California.* Job Final Report, Project W-65-R-1, Job I-6. California Department of Fish and Game, Wildlife Management Branch, 1984.

https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=169979

[xiv] Kellum, Krysten. Information Officer, California Department of Fish and Wildlife. Email communication with AnMarie Rodgers, January 5, 2025.

[xv] Preckler-Quisquater, S., Kierepka, E.M., Reding, D.M., Piaggio, A.J., & Sacks, B.N. (2023). "Can demographic histories explain long-term isolation and recent pulses of asymmetric gene flow between highly divergent grey fox lineages?" Molecular Ecology, 32, 5323–5337. https://doi.org/10.1111/mec.17105

[xvi]Kurhi, Eric. "Palo Alto: Gray foxes decimated by disease in December." Mercury News, January 4, 2017. Available at: https://www.mercurynews.com/2017/01/04/palo-alto-gray-foxes-decimated-by-disease-in-december/

[xvii] Leikam, W., UWRP field records and December 2016 Gray Fox Report, personal communication, April 2026.

[xviii] Kurhi, 2017, op. cit.

[xix] Taraporevala, N., University of California, Berkeley, Department of Environmental Science, Policy and Management. Personal communication, January 2026.

[xx] East Bay Stewardship Network. "NatureCheck: Understanding Wildlife Health on East Bay Lands in Alameda and Contra Costa Counties", 2022. https://www.ebparks.org/natural-resources/naturecheck

[xxi] Zuercher, M., Personal communication, April 2026. Dissertation Chapter 1. Available at: https://escholarship.org/content/qt36j5x89r/qt36j5x89r.pdf. Behavioral dataset available at: https://doi.org/10.6084/m9.figshare.29992648

[xxii] Rauch, K.D. "Foxes venture into urban Berkeley." Berkeleyside, November 5, 2018. Available at https://www.berkeleyside.org/2018/11/05/fox-the-critters-venture-to-urban-berkeley

[xxiii] Sacks, B.N., Statham, M.J., Serieys, L.E.K., & Riley, S.P.D. (2022). "Population Genetics of California Gray Foxes Clarify Origins of the Island Fox." Genes, 13, 1859. https://doi.org/10.3390/genes13101859

[xxiv] Parsons et al., Ecosphere, 2022. See endnote 10.

[xxv] California AB 1788, California Ecosystems Protection Act of 2020. Signed September 29, 2020. Available at: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB1788. See also: California AB 2552, Poison-Free Wildlife Act, signed September 25, 2024.

[xxvi] Calhoun, K.L., Goldstein, B.R., Gaynor, K.M., McInturff, A., Solorio, L., and Brashares, J.S. (2023). "Mammalian resistance to megafire in western U.S. woodland savannas." *Ecosphere*, 14(7), e4613. https://doi.org/10.1002/ecs2.4613

[xxvii] California Legislature. SB 1135: California Wildlife Coexistence Act. 2025–2026 Regular Session. Introduced by Senator Catherine Blakespear. Currently before the Senate Appropriations Committee (as of May 2026). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202520260SB1135

[xxviii] California Department of Fish and Wildlife. "CDFW Begins Statewide Bobcat Monitoring Project". https://wildlife.ca.gov/Science-Institute/News/cdfw-begins-statewide-bobcat-monitoring-project May 14 2021.

[xxix] California Secretary of State. *Proposition 4: Prohibition on Trapping — Initiative Statute.* California General Election, November 3, 1998. Available at: https://vigarchive.sos.ca.gov/1998/general/propositions/4.htm

[xxx] California Department of Fish and Wildlife. *2019–20 Furbearer Harvest Report.* Wildlife Branch, Nongame Wildlife Program. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=189048

[xxxi] California AB 273, Wildlife Protection Act of 2019. Signed October 12, 2019, effective January 1, 2020. Available at: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB273

[xxxii] California Department of Fish and Wildlife, 2019–20 Furbearer Harvest Report, op. cit.