SOUTHERN CALIFORNIA WILDLIFE MANAGEMENT

Part of the Student Research Series

PREPARED BY

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Executive Summary

Wildlife in Southern California is managed by the California Department of Fish and Wildlife (CDFW). However, urban wildlife issues are more often experienced at the local level, and therefore it is important for local governments to be involved in minimizing the unwanted impacts of wildlife. The purpose of this report is to examine urban wildlife issues experienced in cities in Southern California. Coyotes, bears, and peafowl are seen to be the most commonly encountered wildlife in the area, and serve as a guide for recommendations in management.

 The report takes into account these animal control issues while examining the management concerns and methods used/recommended in 187 cities in Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura counties. Analysis of data available on city websites and interviews with several city representatives revealed the following.

Multiagency collaboration exists in the fragmented landscape of Southern California governance. There are many points of interaction between state, local, and nonprofit control.

- 36% of cities operated their own animal services, 56% contracted out, and 8% of cities were part of a Joint Powers Authority for animal services.
- Cities that contracted out their services chose to contract with the county (58%), nonprofits (33%), or another city (9%).
- 57% of cities had wildlife-related information on their websites. 61% of cities that operated in-house or JPA-controlled animal services had information on the city's website, compared to 53% of cities that contracted out their services.
- Only 16% (31) of cities had a wildlife management plan, and of those 29 were coyote management plans. Of those that had management plans, 61% were from cities

with their own animal services department, and 39% were from cities that contracted out animal services.

The variable landscape of state, local, and nonprofit animal management creates a challenge for local governments to act as a bridge between state and local control for residents. Some cities choose to leave wildlife management entirely to state control. However, residents are often the ones affected by wildlife issues. Residents can also have an impact on those issues by their behaviors, and therefore it is important for residents to be involved at the local level.

Different types of stakeholder involvement strategies exist in cities in Southern California. The most common are:

- Wildlife management plans empower residents to play a role in reducing human-wildlife conflict and provide a tool for governments in educating residents and standardizing their response to wildlife incidents.
- Many cities employ a passive-receptive approach, as residents are able to raise concerns with city administration or the city council.
- Some cities encourage residents to share feedback through the city website, or contribute to reporting wildlife sightings.

The following major points are seen in this report:

- Local governments and residents can play an important role in reducing conflict and coexisting with wildlife.
- Wildlife management plans can empower local control over wildlife management issues, and serve as a comprehensive document on city response to incidents, as well as a tool for addressing resident concerns. A coyote management plan template from the Humane Society of the United States is included in the Resources portion of the report.
- Cities that contract out their services can shift control to residents by providing information on their websites or creating management plans.

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Introduction

Southern California is home to many species of wildlife. While the California Department of Fish and Wildlife (CDFW) manages fish and wildlife for the state, Public Trust Thinking (PTT) suggests that these natural resources belong to the public and are held in a trust by the government, which acts as trust administrators for the public (Decker et al., 2015). This means that the state is responsible for the strategic goals and policy associated with managing wildlife for the benefit of all residents of the state. State control of wildlife might invoke images of wildlife thriving undisturbed in state parks and natural areas, needing only oversight from state agencies, but this is far from being the case. Because of extensive urbanization and habitat reduction of many species, wildlife have become accustomed to living in close proximity to human habitations. This does not signify a problem in and of itself, since people have always coexisted with wildlife. However, there are instances when human behavior and habits can lead to wildlife becoming habituated and losing their innate fear of humans, which can create problems.

In a fragmented, federalist system of governance in Southern California, it is therefore important for local governments and communities to take action in preventing wildlife conflict. Many cities are already implementing strategies for reducing or preventing conflict, including resident education and involvement in wildlife management, such as providing information for residents on city websites and posted signs and brochures in city parks and buildings. Some cities also conduct workshops and town halls. Several cities have also compiled a number of their wildlife management and conflict prevention strategies to create wildlife management plans. In Southern California, these are usually coyote management plans, since cities are more likely to grapple with problems created by coyotes due to their widespread and resilient populations.

This report examines the wildlife species that cities in Southern California may struggle with, along with an analysis of data collected from 189 cities regarding the problems and management strategies associated with wildlife. The report also includes a review of

literature on wildlife management methods for different species, as well as stakeholder involvement strategies and best practices.

Wildlife in Southern California

Coyotes

Coyotes are widespread in California, currently inhabiting most of the state. Their adaptability allows them to adjust and survive in most habitats, including those in close proximity to humans. Coyotes are nocturnal and omnivorous, eating primarily small mammals such as mice, rats, and squirrels, but also fruits, insects, and birds as well. (Zeiner et al., 1988-90). Because of their ability to adapt to environmental changes, coyote removal and population reduction efforts have been shown to be unsuccessful. Some research suggests that removing coyotes from a smaller area might lead to a proliferation of coyotes over a larger area (Windberg & Knowlton, 1988, Draheim et al., 2019). Prior research has also pointed to some success of intensive coyote removal from a limited area with some results, but those results are not permanent (Conner et al., 2008). Because of the resilience of the species and the cost of continuous efforts to remove coyotes, most cities do not dedicate resources to coyote removal, focusing instead on human education and efforts to prevent human-coyote conflict. Targeted removal of problem coyotes is a necessary step to reduce conflict. However, misconceptions about the effectiveness of non-targeted lethal control can lead to some residents favoring this approach (Draheim et al., 2019).

Coyotes are normally wary of people, and will stay away so long as they do not become accustomed to humans. Some behaviors, such as intentional and unintentional feeding of coyotes and not hazing coyotes that are seen engaging in "out of ordinary" behaviors, can lead to coyotes becoming problem coyotes and showing aggression towards humans and pets. The pattern of aggressive behavior will escalate gradually, and the only way to resolve it is the lethal removal of the problem coyote (UCANR, 2007). However, not all coyote sightings are problematic. Nocturnal coyote sightings, especially in open nature areas, as well as wild animal predation are normal coyote behaviors. However, a coyote approaching people and pets during the day is a sign of a habituated coyote, and needs to be addressed to stop the escalation. Educating the public about these coyote behaviors is a necessary step cities can take to prevent coyote conflict (Draheim et al., 2019).

Bears

Black bears are widespread throughout many parts of California, particularly in the North Coast Ranges, Cascades, Sierra Nevada, parts of the South Coast Ranges, and in the San Gabriel and San Bernardino Mountains (Zeiner et al., 1988-90). Bears are omnivorous and seasonal eaters, and will eat anything from fruit, nuts, and grasses to human refuse and

carrion, depending on the season and abundance of natural food sources. During times of scarce natural food, bears in human-adjacent areas will supplement their diet with human refuse. Bears who become accustomed to this particular food source can become habituated and turn into problem bears (Marley et al., 2016). Many cities take precautionary measures to prevent human-bear conflict that can result from habituated bears, which can endanger the safety of humans and bears. Per California Fish and Game Code Section 4181, habituated bears that cause property damage can be lethally removed by any property or land owner by applying for a depredation permit.

Human-bear interaction (HBI) is most common in suburban or rural neighborhoods adjacent to natural areas (Merkle et.al., 2011, Marley et al., 2016). In those areas, human education is a common practice to prevent instances of HBI. As with coyotes, hazing can be used to prevent bears from becoming accustomed to humans. However, this is of limited use in the case of bears, because hazing during times of natural food scarcity is ineffective as long as the existence of an abundant and easily obtainable food source outweighs its cost for the bear (Lewis et al., 2015). Once bears become comfortable with visiting residential areas and obtaining food, it will be difficult to change this behavior. Bear-resistant garbage containers are a crucial step in preventing bears from accessing food waste, but this will not be effective if containers are not properly secured by residents. A study found that bears visited homes with secure garbage bins, because in many cases containers were not secured and bears were able to access their contents (Lewis et al., 2015).

In terms of management methods, this means shifting education efforts from hazing to ensuring that bears do not equate residential neighborhoods with an accessible source of nutrition. In bear-adjacent areas, especially, the most effective method of preventing HBI is to educate residents about waste management (Marley et al., 2016). This includes education about bear-proof containers and the importance of properly securing containers, as well as education about other bear attractants such as fruit trees and bird feeders. In areas of highest risk, medium-density suburban areas adjacent to wild land areas, management efforts should also focus on enforcing proper waste disposal and eliminating bear attractants (Merkle et al., 2011).

Peafowl

Peafowl are not considered a wildlife species, but rather domestic birds, but the number of feral peafowl in Southern California has created a need for certain cities to take action and implement peafowl management strategies. Indian blue peafowl (*pavo cristatus*) are native to India and Sri Lanka (Fowler, 2011) but are considered an introduced species in some areas of Southern California. They were imported to Santa Anita Ranch from India in 1879, when it was popular for wealthy landowners to have exotic species on their properties. A part of the Santa Anita Ranch is currently the Los Angeles County Arboretum, which is the residence of some 200 peafowl (Los Angeles County Arboretum & Botanic Garden, n.d.). The Arboretum peafowl are not physically confined to the space, and have been observed in adjacent cities of San Marino, Pasadena, and Sierra Madre. A separate population of peafowl also resides on the Palos Verdes Peninsula, with a similar history of being introduced as a gift exotic species (Rancho Palos Verdes Peafowl Management Plan, 2015).

Indian peafowl's colorful plumage makes them a pleasant bird to view in the wild, but several factors contribute to them being a nuisance species when they choose residential areas as their habitats. Indian peafowl are considered one of the largest flying birds, and their calls are extremely loud and disruptive (Fowler, 2011). This may cause controversy in

some neighborhoods, as some residents welcome peafowl in their neighborhoods, and others are concerned about the noise pollution and possible damage to their gardens, properties, and vehicles.

The California Department of Fish and Wildlife (CDFW) considers peafowl to be a domestic species, therefore there are no specific regulations about relocation of peafowl. CDFW will also not respond to service calls about peafowl, therefore it is up to cities to respond to issues related to these birds. Cities where peafowl reside have specific regulations about feeding peafowl, since feeding them can lead to unwanted visits from other wildlife such as coyotes. Educating residents also includes strategies for minimizing peafowl damage to properties and gardens, such as planting vegetation that deters peafowl (Rancho Palos Verdes Peafowl Management Plan, 2015). Another peafowl management method is the trapping and relocation, which was undertaken by cities of Rancho Palos Verdes and San Marino. However, cities must be aware of regulations not just from CDFW, but other agencies. In this case, California Department of Food and Agriculture required all poultry in Los Angeles County and parts of San Bernardino and Riverside counties to be quarantined due to a virulent Newcastle disease virus (VND) starting in February 2019. This affects all poultry owners, and peafowl, which are not a wildlife species, would fall into the category of domestic poultry owned by the city.

Research Methods

To explore wildlife management concerns and methods in Southern California, data from 189 incorporated municipalities within the Southern California Council of Governments (SCAG) were examined. They include cities from six different counties in Southern California – Imperial (7), Los Angeles (88), Orange (32), Riverside (28), San Bernardino (24), and Ventura (10). The data were collected from city websites and Census data, and corroborated when necessary by interviews with city representatives. The collected data included the following information:

- City size and location
- The agency responsible for animal control in the city
- City department responsible for animal control in the city
- The existence of wildlife-related information on city website
- The existence of a wildlife management plan

Of the 189 cities examined, 187 included this information on the official city website. The information collected included whether the city's animal control services were provided by the city or another agency. Whenever animal control services were provided by the city, the appropriate department information was recorded from the city website. Contracting animal control agency information was also recorded whenever the services were provided by the County or a nonprofit animal control agency. Wildlife-related information was collected from city websites by navigating through the animal control department webpage or performing a keyword search for coyotes, bears, wildlife, and management plans.

The report also includes information from several interviews conducted in person, over the phone, or through email. The purpose of the interviews with cities was to understand the process of creating a management plan and the possible benefits and challenges. Interviews were conducted with the City of Rancho Palos Verdes, City of Calabasas, and the San Gabriel Valley Council of Governments (SGVCOG). Two more interviews were

conducted with the California Department of Fish and Wildlife (CDFW) regarding the Wildlife Watch program.

Urban Wildlife Management Methods

Multi Agency Collaboration in Wildlife Management

Urban wildlife management is a complex and multifaceted issue, with responsibility being shared between federal and state wildlife agencies, local governments, contracted nonprofit and for-profit animal control and welfare agencies, and the public. *Public trust thinking (PTT)* suggests that natural resources such as wildlife are held in a trust, with trust administrators being elected and appointed officials, and beneficiaries being the public (Decker et al., 2015). In this system, trust administrators carry the responsibility for representing the interests of all stakeholders. While broad decision-making is possible in PTT, where trust administrators balance the interests of all stakeholders and take a broad perspective, *good governance (GG)* principles call for beneficiary participation in order to build trust and represent the interests of various stakeholders (Decker et al., 2015). This collaborative relationship ensures that stakeholder needs are met, and the public can participate in making decisions that affect them directly. In management terms, this means the added challenge of creating a bridge between state wildlife agencies and the public, and keeping the public informed of decisions that affect them. Decker et al. (2016) task the public with the responsibility of being knowledgeable and willing to participate in wildlife governance in order to have their needs recognized and hold wildlife trust administrators accountable. Local governments play an important role in helping their residents be informed.

In Southern California, wildlife and animal management varies greatly across different jurisdictions. Of the 187 independent jurisdictions that provided this information, cities either contracted out their animal services (56%), operated their own animal services (36%),

or formed a Joint Power Authority (JPA) for animal control (8%). Of those that contracted out their animal services, 58% contracted with their respective counties, 33% contracted with nonprofits, and 9% contracted with another city.
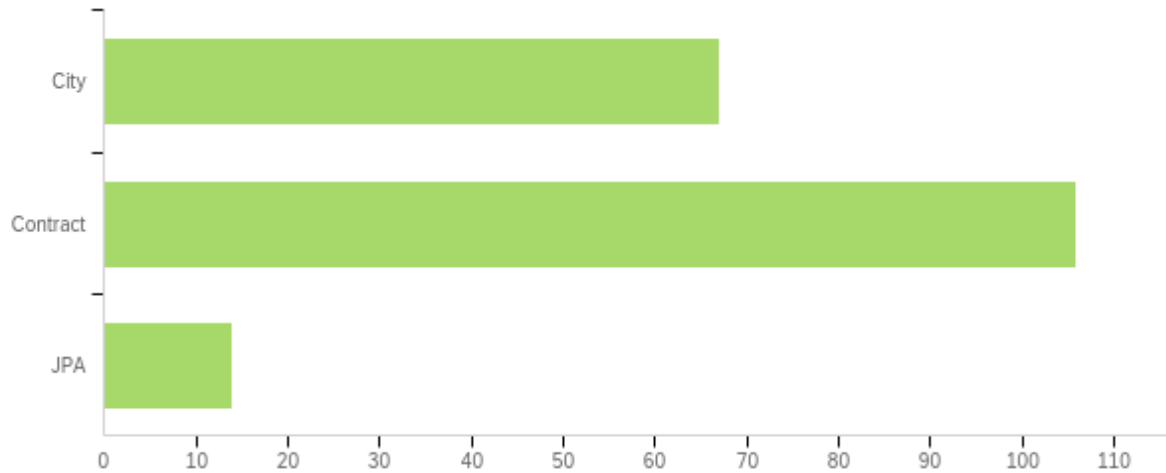

Fig. 1 Animal services management by agency

Regardless of whether cities contracted their animal services, many had wildlife-related information and educational material on their website, meaning that the city still focused on involving residents in wildlife safety. A somewhat higher percentage of cities that operated animal services in-house or through a JPA had information on their websites on coyotes, general wildlife, or multiple animals (61%), compared to cities that contracted out animal services (53%). Contracting agencies, like county animal control departments and various nonprofits may offer wildlife-related information on their websites, but this information is not readily available on the city's own website. The information included in city websites showed a mix of city-created materials, along with educational materials provided by CDFW, humane societies, or other organizations. For the purposes of this research, all sources of information posted on a city's websites were treated the same.

For cities that managed animal services in-house, there was also a great deal of variation between departments that operated animal services. Of the 71 cities that did not contract out their animal services or manage it through a JPA, most (38, 54%) managed animal

services and all related matters within the police or public safety departments. The next most common solution for cities was to have a separate animal control department, not managed by any other municipal "department" (12, 17%). The remainder of cities managed animal services through code enforcement (8, 11%), the community development department (4, 6%) or public works (2, 3%).
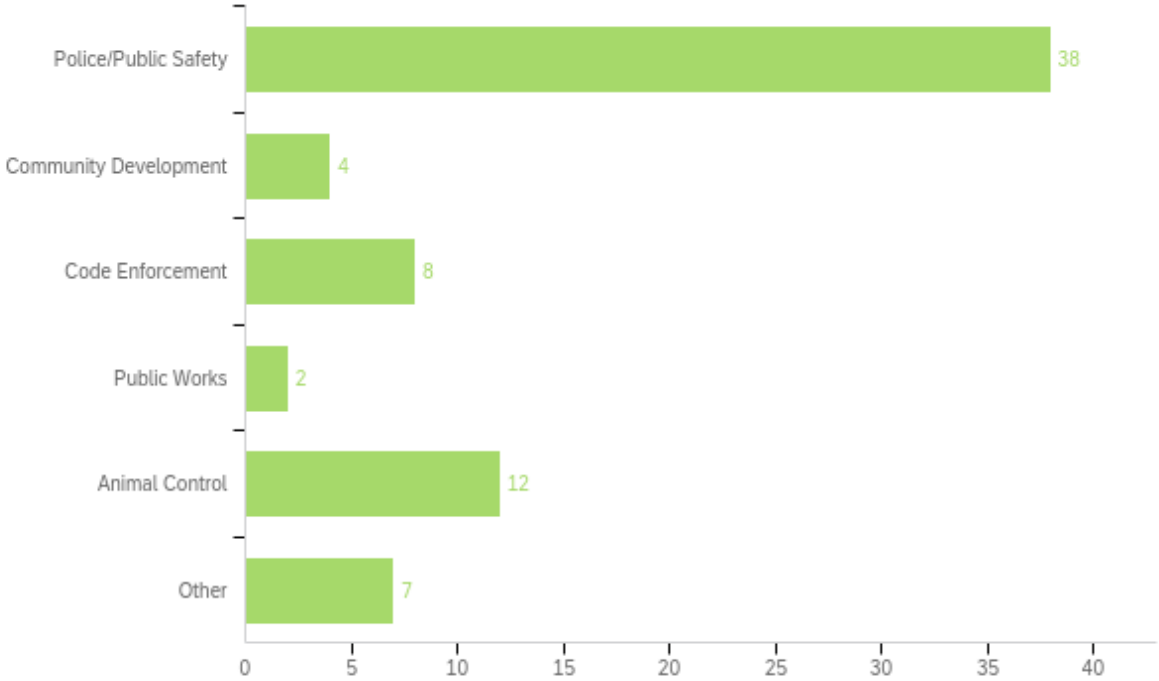

Fig. 2 City animal services operations by department

Wildlife Management Plans

Wildlife management plans are another method cities utilize to address wildlife management issues. Whether they deal with a specific animal or general wildlife issues, management plans provide a framework for city staff and residents to understand wildlife behavior and conflict mitigation methods, as well as outline the city's response to problematic wildlife behavior. They provide an action plan as well as serving as an educational method for city staff and residents. Thirty one cities in the survey area had a wildlife management plan, while 156 did not have a management plan. Of those 31 cities,

29 had coyote management plans, one had both coyote and peafowl, and one had a general wildlife management plan that covered more than one species.

The Humane Society of the United States provides a free template coyote management plan, based on plans created by several cities in the U.S., including the City of Calabasas (see Resources at the end of report). Several cities in Southern California have modified the template for their needs. The template outlines coyote behaviors and ecology and provides a sample response plan based on classifications of coyote behaviors. The strength of the plan is its prioritization of human safety and easy adaptability to the needs of different cities. The template also includes a sample incident report form, which cities can use to gather information from residents about coyote activity.

Typically, management plans include the city's goal or mission for managing the particular species of wildlife, an overview of wildlife behavior and habitat, and human dimensions of wildlife such as resident perceptions of the wildlife species and behaviors

> **"Cities can use management plans to communicate to residents about the impact of their actions on wildlife interactions."**

that attract or deter wildlife. Coyote management plans also include coyote habituation behaviors and levels of city response that will be implemented in response to different behaviors. This information is useful for residents because it can clarify behaviors that are normal and ones that need to be addressed. Wildlife management plans can outline resident education and engagement methods, and provide guidelines for education.

Wildlife management plans can be a useful bridge between the city and its residents, while empowering both sides to play a role in reducing wildlife conflict. Residents prefer to have some local control over wildlife-related issues as it impacts them directly (Chase et al., 2002). Cities can use management plans to communicate to residents about the impact of their actions on wildlife interactions. This will ensure that residents are informed and able to make decisions to reduce the risk of negative wildlife interactions (Fleegle et al., 2013). This is important because even though CDFW exercises management over wildlife-related

issues, cities are the first point of contact for residents. Management plans also empower cities to answer questions from concerned residents, such as the city's position on whether or not to trap and remove coyotes from an area, thus reducing staff time dedicated to informing residents,

Cities With Wildlife Management Plans		
City	Population	Type of Animal
Arcadia	58,610	Coyote
Bellflower	77,131	Coyote
Calabasas	23,954	Coyote
Carson	91,909	Coyote
Culver City	39,214	Coyote
Downey	112,269	Coyote
Long Beach	467,354	Coyote
Montebello	62,632	Coyote
Norwalk	105,120	Coyote
Palos Verdes Estates	13,404	Coyote
Rolling Hills Estates	8,141	Coyote
Rosemead	54,412	Coyote
San Dimas	33,982	Coyote
San Gabriel	40,335	Coyote
West Covina	106,311	Coyote
West Hollywood	36,854	Coyote
Whittier	86,064	Coyote
Anaheim	352,005	Coyote

Buena Park	82,421	Coyote
Costa Mesa	113,615	Coyote
Cypress	48,958	Coyote
Fountain Valley	55,814	Coyote
Garden Grove	172,646	Coyote
Huntington Beach	200,641	Coyote
La Habra	62,183	Coyote
Santa Ana	332,725	Coyote
Seal Beach	24,119	Coyote
Yorba Linda	67,787	Coyote
Cerritos	50,462	Coyote (Long Beach)
Rancho Palos Verdes	41,928	Coyote, peafowl
Pasadena	141,371	Wildlife

Fig. 3 Cities with wildlife management plans

Cities that contract for their animal services were less likely to have a management plan than other cities. Of the 31 cities that did have a management plan, 19 (61%) were from cities that did not contract out their services, and 12 (39%) were from cities that also contracted out their services to a nonprofit or the county. For cities that contracted their animal services, the management plans were instituted by the city itself, independent of the contracting agency. Although many times cities contract out services due to a lack of staff time, it is especially helpful for cities that contract out their animal services to have a management plan as a bridge between the city and its animal control agency in order to streamline and coordinate their response (Smirl, K., 2020, personal communication). Management plans also help cities plan for long-term mitigation of wildlife conflict, thus ensuring that the city and its residents have control over the mission and objective of wildlife management.

Stakeholder Involvement in Wildlife Management

Although the state has more jurisdiction over wildlife management than individual cities, it is up to cities and residents to address local issues. Management plans, local community meetings and workshops, and volunteer teams are methods cities can employ to get residents to act on wildlife management issues. Since most actions that result in wildlife conflict or its prevention are taken at a local level, local empowerment is encouraged by the CDFW. The Wildlife Watch program created by CDFW aims to provide local governments with tools necessary to increase resident engagement in preventing wildlife conflict.

Although collaborative approaches to governance are more widespread in all areas of government, especially in the fragmented local government system in Southern California, the question that emerges is that of relinquishing expert control to residents who have no prior training and knowledge of issues. This is especially relevant in contentious cases such as trapping and relocation of wildlife, where expert opinions can diverge from those of the general public (Draheim et al., 2019). The stance of CDFW on this issue is that local involvement and leadership are crucial in reducing human-wildlife conflict (CDFW, n.d.). Fleegle et al. (2013) also believe that professional expertise is not reduced but augmented by citizen involvement, since professionals can communicate to residents the effects of wildlife interactions, who then will be more informed in their actions and thus make better decisions.

Stakeholder Involvement Methods

There is a wide range of stakeholder involvement approaches, and cities can select those that match their objectives. The objectives can include a need for stakeholders to provide input, make decisions, or implement actions (Chase et al., 2002). Although the last two need a more involved approach that necessitates sharing of control between the agency and stakeholders, all methods work to improve management climate (Chase et al., 2002).

Stakeholder involvement improves management and can lead both to a better relationship with the city and improved decision-making in wildlife interactions, but it does not suggest that one approach is better than others, or that cities should strive for co-management.

Cities can decide which approach or mix of approaches will be most beneficial and feasible for their jurisdiction. The decision will depend on resources available to dedicate to stakeholder involvement, the complexity of the issue to be addressed, and the desire and availability of stakeholders to be involved. Cities that decide on a management approach that would require frequent in-person meetings from residents without accurately gauging resident interest and availability might face the issue of not enough engagement, or disproportionate involvement from a small but outspoken interest group (Fleegle et al., 2013). Thus, choosing a method that best suits the collaborative capacities and goals of the organization is an important first step to stakeholder involvement.

Type of Approach	Stakeholder Involvement	Locus of Control	Local Examples
Authoritative	Little to none	Management agency	Information shared on City website
Passive-receptive	Open to comments from stakeholders	Management agency	Residents free to go to City Council meetings and share concerns
Inquisitive	Input solicited from stakeholders	Management agency	Surveys, public meetings
Transactional	Direct involvement in decisions	Shared	Task forces
Co-management	Participate in management	Shared	Boards and commissions
			Adapted from Chase et al., 2002

Fig. 4 Stakeholder involvement methods

The cities surveyed for this research showed some degree of stakeholder involvement, mainly in the forms of authoritative, passive-receptive and inquisitive approaches. Authoritative approaches included information on city websites about steps residents can take in reducing wildlife conflict. Many cities also engage in passive-receptive approaches, as residents are free to take their concerns to the city administration or City Council. This can at times prompt the city to further study the issue and take appropriate action to address it.

The passive-receptive approach is one that many cities choose to rely on for lack of staff time and resources necessary, and as long as the issue is minor enough not to warrant immediate action. For small cities that have yet to face a significant issue, this approach makes sense, since it might seem unnecessary to dedicate resources to address an issue that does not exist. However, one problem with this approach is that in the dense and fragmented reality of Southern California jurisdictions, wildlife problems can quickly evolve and move across jurisdiction lines. Thus, a city that did not face significant wildlife problems and therefore chose not to take any action might start experiencing issues if an adjacent jurisdiction starts experiencing problems with habituated wildlife. Another problem with the passive-receptive approach is its possible negative effects on resident trust (Knackmuhs & Farmer, 2017, Lute & Gore, 2014). The one-sided communication nature of the passive-receptive approach can mean that alternate sources of information may influence resident opinions and undermine trust in government, especially when the issue is contentious and emotional, such as trapping wildlife (Knackmuhs & Farmer, 2017). Even as cities scramble to gather information and begin addressing the issue as first complaints begin to surface, there is a likelihood of negative media coverage and resident belief that the issue needs to be escalated by means of petitions in order for the city to take prompt action.

> **In the dense and fragmented reality of Southern California jurisdictions, wildlife problems can quickly evolve and move across jurisdiction lines.**

The inquisitive approach is more prevalent for cities that have already begun to take action on wildlife-related matters. Cities surveyed for this research that already have information on wildlife on their websites or instituted a management plan solicit input from residents as a means of gathering information or understanding resident needs. Some cities, such as Costa Mesa, conducted town hall meetings in preparation for creating a coyote management plan (City of Costa Mesa Police Department, 2018). Many other cities solicit resident input on coyote sightings, which are often displayed on city websites. This helps cities monitor coyote activity with the help of residents. This information is essential for cities to keep track of coyote trends and make informed decisions in management efforts. The information also helps residents to be aware of coyote activity in their area, which might help them take action to remove coyote attractants. Some examples of this are the San Gabriel Valley Council of Governments Coyote Hotline and the City of Anaheim coyote reporting online form and map. A different approach to resident-reported sightings is working with researchers at universities to install cameras, an example of which is the Culver City Critter Cams, a collaborative effort between Loyola Marymount University and the Culver City Police Department to monitor and track coyote movement patterns. Another example of collaboration is the University of California Division of Agriculture and Natural Resources Coyote Cacher (see Resources). It makes it easier for residents to report coyote encounters, which are then mapped and searchable by address and zip code. This can make it easier for cities to monitor coyote activity without having to create their own coyote reporting form.

Transactional and Co-Management Approaches to Stakeholder Participation

The transactional and co-managerial approaches are less frequently seen in Southern California city governments. One example is The City of Los Angeles Board of Animal Services Commissioners, who are appointed by the Mayor and have influence in general policy decisions, rather than their implementation. Statewide policies regarding the

strategic mission of wildlife management, as well as those that deal with conservation and hunting may be more appropriate for direct stakeholder involvement and the co-managerial approach. This is indeed seen at the state level, but less often in local government, where there are fewer opportunities for policy-making that would benefit from co-management. The following sections will discuss in more depth types of stakeholder involvement and education strategies that can be used in wildlife management at the local government level.

Resident Education Programs

Resident education in the management of wildlife such as coyotes and bears can be a helpful method of ensuring that communities can participate in not only reducing wildlife attractants but also institute practices that will deter habituated wildlife (Bonnell & Breck, 2017, Lewis et al., 2015, Chase et al., 2002, Marley et al., 2016). Resident education can take the form of posting informational material on city websites, conducting educational workshops, and posting signs around parks and wilderness areas with known wildlife sightings. More than half of cities surveyed (105, 56%) had some information about wildlife safety on their website, whether this included information from the city or linked to outside information from other sources, such as the Humane Society of the United States or the California Department of Fish and Wildlife. A majority of these cities (69, 66%) had information only about coyotes, while 34 others (32%) had information about multiple animals, including coyotes.

Most coyote-related information on city websites included strategies for hazing coyotes. Hazing in this context includes behaviors meant to scare away the animal and instill a fear of humans, without harming the animal. Those can include waving arms, making loud noises, and throwing objects without hitting the animal. The information can be a useful tool for educating residents, but it cannot be assumed that residents would be willing to engage in hazing behaviors when encountering a coyote, due to fears of hurting the animal, attracting aggression from the animal, or being unsure if hazing is the most effective method of deterring the animal (Bonnell & Breck, 2017). However, hazing can be

ineffective if performed only in a reactive fashion once the animal's behavior becomes aggressive. The effectiveness of hazing is contingent on consistency and ensuring that coyotes that are engaging in non-normal behaviors are hazed immediately and consistently until the behavior stops (Draheim et al., 2019).

Cities can ensure that hazing is more effective by taking a more hands-on educational approach through workshops and community meetings. Several cities surveyed for this research have held such workshops on coyote awareness, such as Long Beach, Yorba Linda, and cities within the SGVCOG Neighborhood Coyote Program. Bonnell and Breck (2017) found that in-person educational methods were more effective than posted signs in helping residents feel more at ease with hazing and to understand the nuances of hazing. This is because there are some instances where hazing can be less effective, such as the existence of a nearby den site with pups, or the presence of dogs, which they believe can cause coyotes to be more aggressive and less likely to leave due to hazing.

Volunteer and Citizen Science Programs

Resident education can be made more effective with targeted and collaborative approaches such as volunteer and citizen science programs. This approach calls for more engagement, but it may also be more efficient in reducing conflict. This kind of community-level hazing is useful for training individuals in specific effective hazing methods and empowering residents to deal with conflict animals (Bonnell & Breck, 2017). Citizen science and volunteer programs provide groups of interested residents with more in-depth training in hazing techniques, and ensure consistency in hazing problem coyotes that will reinforce the effects of hazing. This would also help in creating a more coordinated effort as those volunteers can go into neighborhoods and train others in hazing techniques.

This approach may also be useful in bear education. The best approach in deterring bears is to ensure the proper storage of garbage consistently, so bears do not get accustomed to visiting streets with unsecured garbage containers (Lewis et al., 2015). In this case, community-level action will be more efficient in ensuring compliance throughout neighborhoods, since one resident's negligence in securing a garbage container will make

others' efforts less effective in preventing habituated bears. One drawback of this kind of program is that it can be significantly more expensive than passive educational programs such as one-time workshops or posted signs and flyers, because these programs require more staff time in recruiting and training volunteers. In Southern California, one example of a volunteer program is the City of Downey's Coyotes Out Of Downey (C.O.O.D.) program, which is a group of volunteers who help educate their neighborhoods in coyote hazing, as well as reporting on coyote sightings.

Citizen Advisory Committees

Governments or wildlife agencies can use citizen advisory committees (CACs) as a form of more direct stakeholder involvement, especially to resolve contentious issues where there are divided or opposing interests (Fleegle et al., 2013), or when a government is considering a policy change (Koontz, 2005) . CACs can include groups of stakeholders that are appointed for a period of time to reach a consensus and give a recommendation on a course of action (Fleegle et al., 2013). The managing agency can then choose to take the committee's advice or pursue another course of action. CACs require more time and direct involvement from stakeholders, therefore it is advisable for governments considering this option to conduct surveys and adequately gauge stakeholder interest and willingness to dedicate time to serve on the advisory committee (Fleegle et al., 2013).

Conclusion

Wildlife management at the local level might be a grey area for many cities. State wildlife agencies such as the CDFW control the state's wildlife. However, impacts from urban wildlife are seen at the local and community level, and it is up to local governments and residents to employ strategies for coexistence with wildlife. Some cities already opt for an increased local control by creating wildlife management plans and offering educational materials for residents. It is evident from the research that several cities created management plans to address resident concerns about increased wildlife encounters, or to battle the city's pre-existing management method. However, cities that do not currently

have a management plan can benefit from creating one to outline the city's overall strategy and act as a resident education tool and a guide for unified response to wildlife issues.

Wildlife-related issues affect residents, and can be exacerbated or improved by their behaviors. Therefore, wildlife management plans and stakeholder involvement are useful strategies for addressing wildlife issues at the local level. This report outlined the different stakeholder involvement methods observed in the literature on the topic, and examined their existing application in cities in Southern California. It is apparent that many cities are already using strategies to involve residents in preventing wildlife conflict. Both cities that managed animal services in-house or through a contract agency, many cities provided educational materials or workshops to residents, or involved them further by encouraging resident participation in reporting of coyote sightings.

Resources

Humane Society of the United States Coyote Management Plan

https://www.humanesociety.org/sites/default/files/docs/coyote-management-coexistence-plan.pdf

University of California Division of Agriculture and Natural Resources Coyote Cacher

https://ucanr.edu/sites/CoyoteCacher/

Project Coyote

http://www.projectcoyote.org/

City of Calabassas

http://www.cityofcalabasas.com/coyotes.html

CDFW Wildlife Watch

https://wildlife.ca.gov/wildlife-watch

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Acknowledgments

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