



# Lessons Learned from Developing Best Management Practices for Urban Tree Care and Wildlife

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**Abstract.** Urban forests create indispensable habitat for declining wildlife populations. The tree care industry is essential to the viability of urban forests and thus the survival of urban wildlife. At the same time, tree care operations such as tree removal and branch pruning present clear threats to urban wildlife and their habitats. Here we describe the development of a grassroots coalition of arborists and wildlife advocates in the Western United States and the process of charting a path to best management practices and professional training to mitigate the impacts of tree care practices to wildlife. In particular, we describe the unique challenges and opportunities that arose through this multidisciplinary process and build a case for the benefits of uniting diverse communities of practice around complex urban ecological problems. We finish by laying out recommendations to the international arboriculture and urban forestry practitioner and research communities.

**Keywords.** Arboriculture; Best Management Practices; Tree Care; Urban Forestry; Urban Wildlife; Wildlife; Wildlife Habitat.

## INTRODUCTION

Wildlife populations are declining, especially for species at risk, at city and regional scales around the world (Seto et al. 2012; Newbold et al. 2015; Rosenberg et al. 2019). In the midst of this biodiversity crisis, urban forests have been shown to serve as important habitat for wildlife, both for migratory and non-migratory populations (Alvey 2006; Pena et al. 2017; Threlfall et al. 2017; Marlès Magre et al. 2019; Wood and Esaian 2020). Yet there is also evidence of declining urban tree canopy and significant threats to urban natural areas across ever-expanding urban areas (Lindenmayer et al. 2012; Nowak and Greenfield 2020). The tree care industry, while vital for maintaining and preserving urban forests in dense urban settings, also engages in many activities, such as pruning, removal, plant health care, pest management, ground maintenance activities, and utility vegetation management, that stand to impact urban wildlife both directly and indirectly. Unfortunately, scientific evidence and industry guidance on the impacts of the tree care industry on wildlife are severely lacking to sufficiently guide practitioners.

In this article, we describe the grassroots development of a coalition of arborists and wildlife advocates

in the Western United States and the process of developing best management practices (BMPs) for wildlife across disciplines of expertise. We present important lessons learned and a call to action for researchers and practitioners, as important shapers of the urban environment, to comprehensively consider their role and impacts on urban wildlife.

## Catalysts for a Working Group

In 2015, arborists and wildlife advocates in California came together after several high-profile instances of arborists coming into conflict with nesting birds in trees they were pruning occurred. These incidents resulted in outrage from local residents and negative articles in local news outlets and in the tree care professionals being subjected to state and federal wildlife laws (Banks 2014; Nicolai 2015). Additionally, several municipalities had begun to release guidelines and even local bans on all tree pruning activities during the breeding season (e.g., City of Poway Urban Forestry Ordinance 2000), which in California lasts roughly from February until September. At the same time, wildlife advocates struggled, as they still do, to address the mounting evidence of the decline in wildlife populations in the face of urbanization and

loss of habitat (Newbold et al. 2015). Gillian Martin, founder of the Cavity Conservation Initiative, a wildlife advocacy nonprofit, and Andy Trotter, Vice President of Operations at West Coast Arborists, Inc., a municipal tree care company, came together to assemble arborists, wildlife rehabilitators, biologists, and advocates to address the impacts from tree care workers to urban wildlife, creating the first Tree Care for Birds and Other Wildlife working group.

From the beginning, the all-volunteer effort sought out project leaders and champions who straddled the lines between the mostly separate wildlife and urban forestry professional and advocacy circles. Though to the lay person environmental fields such as wildlife management and urban forestry seem similar, they are separated by professional silos, a challenge common to other disciplines (Vogt et al. 2016; Vogt 2018). For example, one member frequently described themselves as the “tree person at wildlife meetings and the wildlife person at tree meetings.” While our group’s experience showed initial clashes in the closely held narratives and agendas of two professional communities that both broadly support conservation in urban environments, the group came together as a coalition of voices to navigate several fundamental challenges:

- Tree care workers generally wish to act responsibly around wildlife but were mostly unaware of how to do so.
- Wildlife laws and regulations, such as the Migratory Bird Treaty Act in the United States, were unknown within the tree care industry, putting workers at risk of significant fines and criticism.
- Wildlife, especially nesting wildlife, were vulnerable to direct and indirect impacts from routine tree care operations.
- Simple advice such as “avoid tree care during the breeding season” was often recommended but both failed to protect wildlife who breed outside their region’s typical season and stood to decimate the tree care industry if implemented universally by banning work for as much as 6 or 7 months of the year in some places.

To address these challenges, the growing coalition prioritized the development of wildlife best management practices for tree care professionals to follow based on existing research and expert opinion of wildlife biologists and arborists. The initial effort was focused on the state of California with the intention

to expand efforts to other states and, eventually, internationally.

The initial best management practice development effort was spearheaded by a core team of arborists, wildlife biologists, and advocates, and coupled with an extensive outreach and education process. We sought support and buy-in of the process from the start. Before even drafting the first guidelines for California, our program sought and received endorsement of our collaborative process of creating best management practices and associated training and educational materials from 36 wildlife and tree care organizations and experts. This early outreach process successfully helped to establish awareness and trust in our process and helped to recruit a diversity of experts to inform the guidelines. The educational program included efforts such as presenting and hosting booths at both arborist and wildlife conferences, hosting training courses, publishing magazine articles and blog posts, sharing educational newsletters and updates with a growing email list, establishing a social media presence, and developing an educational website ([www.TreeCareforBirds.com](http://www.TreeCareforBirds.com)). To reach broader audiences, such as homeowners, partnerships were forged with organizations with strong general public outreach arms, such as Audubon Society chapters, to disseminate information on wildlife-friendly tree care practices and hiring qualified arborists.

### **CHARTING A PATH TO BEST MANAGEMENT PRACTICES AMIDST A RESEARCH VACUUM AND COMPLEX PROFESSIONAL IDENTITIES**

The effort to understand how tree care professionals can act responsibly around urban wildlife raised many questions in our group: How should situations where trees pose a public safety risk and contain nesting wildlife be navigated? How much wildlife knowledge should arborists be expected to know? How do wildlife laws apply to tree work, and what are the consequences when wildlife is injured or killed during tree work? How much wildlife is negatively impacted by tree care operations, and how do you weigh those outcomes with the contributions of urban forests to wildlife habitat?

We found very few peer-reviewed articles that addressed the impacts of tree care operations to urban wildlife. In grey literature searches, we found several examples of regional guidelines or educational

materials by organizations such as the City of Portland, Oregon (City of Portland Environmental Services 2017), and the Golden Gate Audubon Society (2017) of San Francisco, California. The majority of academic literature on the connection between the practice of urban forestry and wildlife management centered on the habitat value of urban forests (Strohbach et al. 2013; Wood and Esaian 2020) and on the role of various arboricultural practices, such as pruning practices, in supporting or reducing those habitat values (Kane et al. 2015; Marlès Magre et al. 2019). Conservation and disturbance ecology literature offered useful frameworks to assess direct and indirect disturbances to wildlife, for example through studies of the effects of disturbance from human presence (Lethlean et al. 2017) and anthropogenic noise (Job et al. 2016; Shannon et al. 2016), though the process for matching these effects to tree care operations was difficult. When it came to knowing how tree care professionals should act in the field to mitigate impacts to wildlife, there was little to no information to be found.

A key part of building the best management practices was a policy review of relevant state and federal regulations, to situate the recommendations appropriately within the legal landscape. Despite many known wildlife regulations in the state of California, how and how often these regulations were enforced in tree care operations was largely unknown. At the federal level in the United States, legislation such as the Migratory Bird Treaty Act, Endangered Species Act, and Bald and Golden Eagle Protection Act, enforced by the US Fish and Wildlife Service, can also all be applied to tree care workers should their work result in the injury or killing of the species they protect. These laws tend to be broad and results-based, not focusing on the activities conducted but whether or not the activities result in disturbance, injury, or death of wildlife. The laws also come with serious fines and prison time, depending on the seriousness of the offense, though it is also not widely known if more than threats have ever been levied against members of the tree care industry. Based on the experience of the members of our coalition, tree care workers in the Western US are much more likely to be subject to harsh criticism and negative publicity from the public than to legal consequences.

Another challenge encountered when settling on the scope of our project was whether to focus solely on birds or to widen the scope to include all wildlife

taxa. We had run into the much discussed “bird bias” in urban wildlife discourses. This bias is evident both in the abundance of bird-focused wildlife studies in comparison to other taxa (Magle et al. 2012; Perry et al. 2020), the strength of bird advocacy organizations in the United States, such as the Audubon Society and the American Bird Conservancy, and the number of laws and regulations focused solely on birds, such as the Migratory Birds Treaty Act and the Bald and Golden Eagle Protection Act.

Combined with the desire to set goals that would result in the reduction of impacts to more urban wildlife than solely birds was the tension between the categorization of nuisance wildlife as “bad” and other wildlife, especially native, as “good” (Perry et al. 2020). Should the best management practices advise tree care professionals to act differently near beloved, charismatic, or rare species compared to others? What value framework should the guidelines be based around? As the arborists and urban foresters in our working group discovered these prominent discourses in the urban wildlife world, the wildlife advocates likewise learned of the many shades of opinions around issues such as training, certification, and tree risk management.

Early discussions and research in this project revealed how complex a role tree care professionals occupy in the care of urban nature. Research and public advocacy abounds on the value and benefits of urban forests (Roy et al. 2012; Silvera Seamans 2013; Krajter Ostoić and Konijnendijk van den Bosch 2015). It is also widely held that the health of urban forests relies on a professionally trained workforce (Koeser et al. 2013; Koeser et al. 2016). Strong belief in the benefits of trees and the essentiality of tree care work is also core to the identities of arborists and urban foresters (Young 2010; Vogt et al. 2016; O’Herrin et al. 2020). Despite, or perhaps because of, these positive framings, arboriculture and urban forestry as fields can struggle to integrate negative impacts of the essential practices of the industry into their narratives. For example, though the industry proclaims broadly the importance of urban forests in mitigating climate change, the several studies that have shown the significant carbon emissions from tree care machinery and practices have not yet resulted in broad efforts to reduce the industry’s own carbon footprint (Nowak et al. 2002; Strohbach et al. 2012; McPherson et al. 2015). Ecosystem disservices too continue to be sidelined in urban forest ecosystem

services research (Lyytimäki and Sipilä 2009; Roman et al. 2020). Likewise, it can be difficult for professionals to understand how the actions they take that make it possible for trees to survive in urban areas can simultaneously be harming the wildlife that rely on these trees.

Three years of working group meetings, fueled by small grants from local organizations and generous amounts of donated time from the employers of the project leaders, resulted in the writing and release of *Tree Care for Birds & Other Wildlife: Best Management Practices in California* in 2018. These best management practices were reviewed by 30 experienced professionals during an open comment period, approximately half of whom were arboriculture and urban forestry practitioners and researchers, and half of whom were wildlife biologists, wildlife advocates, and wildlife rehabilitators. The guidelines present a risk management framework for mitigating the impacts to wildlife during tree care. Following the guidelines requires first assessing the breeding season and value of the habitat being worked in, serving to estimate the likelihood of encountering wildlife that would be sensitive to tree care activities. Depending on the results of this assessment, the guidelines outline a hierarchy of expertise necessary to avoid impacts to wildlife under each circumstance, ranging from a simple 15-minute wildlife awareness training to having a qualified biologist on site during work.

Despite the challenges, the knowledge exchange and relationships built during the process of developing the California wildlife best management practices were invaluable. In particular, having expert leadership in our coalition from the wildlife community steered our guidelines in productive directions from the start, bringing in guidelines and frameworks from other professional communities like utility vegetation management, conservation, and wildlife rehabilitation. Additionally, the broad partnership added crucial legitimacy to our products, making them appealing to skeptics and critics. The network built and maintained through the creation of the California BMP then served as a blueprint for expanding to other regions and recruiting new partners.

### **NEXT STEPS: EXPANDING TO NEW REGIONS AND BEYOND**

During the course of releasing the best management practices for California, the project was adopted as an

official program of the Western Chapter of the International Society of Arboriculture (WCISA), the primary arboricultural professional organization for California, Arizona, Nevada, and Hawaii. As the coalition set out to create a new edition of the guidelines to meet the needs of the 3 other member states of the WCISA so that we could successfully share the guidance to a broader tree care professional community, we immediately encountered challenges.

Not only were the regulatory environments in the other states significantly different, but both the ecology and community value systems differed significantly. For example, the first edition of the California BMP relied heavily on designated breeding seasons, a concept that was also heavily enshrined in policies of the California Department of Fish and Wildlife. In Arizona and Nevada, designated breeding seasons were less established and discussed than in California, so we worked with biologists and organizations to define appropriate periods for different wildlife. In Hawaii, the conservation community was relatively uninterested in the topic of the impact of tree care industry practices to wildlife. Their priorities were to conserve endangered and threatened native bird species, which are largely confined to protected areas, compared to the highly disturbed landscapes dominated by introduced and invasive wildlife species where tree care companies work. Local experts had also already created tree care guidelines for the 2 species deemed of highest concern—*Gygis alba* (manu-o-Kū or the white fairy tern) and *Aeolestes semotus* (‘ōpe‘ape‘a or the Hawaiian hoary bat).

The California BMP also recommends that arborists develop relationships with their local wildlife rehabilitators and keep their contact information on hand. However, this is unrealistic as a practice in areas without a thriving wildlife rehabilitator professional community. For example, in Nevada, there are only 6 wildlife rehabilitators licensed by the Nevada Department of Wildlife for the entire state (Nevada Department of Wildlife 2020). We recommended seeking out the resources provided by the National Wildlife Rehabilitators Association when local wildlife rehabilitators are not available.

Internationally, there is evidence that professionals struggle with similar issues, such as in the Arboricultural Association’s (United Kingdom) advice for arborists in relation to tree care practices and the UK’s Wildlife and Countryside Act 1981 (Arboricultural

Association 2015a, 2015b). In Canada, the Province of British Columbia recognizes a Wildlife/Danger Tree Assessor course, where upon completion, “the certified assessor will be competent in [...]: identifying important attributes of wildlife/danger trees; assessing trees for their potential as wildlife habitat; assessing trees for their failure potential; recommending appropriate safety decisions regarding assessed trees” (Wildlife Dangerous Tree Committee of British Columbia 2019). The interest from arborists around the world in considering wildlife during work is also evident in efforts to create and preserve cavities in trees for cavity-dwelling wildlife, especially in Australia (Griffiths et al. 2018). As the international discourse on urban biodiversity and calls for nature-based solutions to urbanization and climate change progresses, we see an imminent need to develop best management practices to mitigate the impacts of tree care operations to wildlife and address the immense research needs to back up such guidelines.

Work is ongoing. The new edition of the best management practices, which underwent a public comment period in April 2021, was developed with the primary goal to be applicable in many regions. The core of the guidelines are being generalized within the original BMP’s risk management framework, with important regionally specific information located in appendices written in collaboration with committees of regional experts. This framework was designed so that other regions, not just in North America but elsewhere in the world, would be able to assemble groups of experts and build their own locally relevant appendix and thus enable practitioners to utilize this BMP.

As this work continues, the network of urban tree and wildlife professionals dedicated to navigating the challenges outlined in this article continues to grow. There is a growing appetite for this knowledge, evidenced in the enthusiasm of attendees of over 60 presentations given cumulatively by the Tree Care for Birds and Other Wildlife program to a total of over 4,000 audience members. Presentation attendees came from diverse groups, such as employees of public and private agencies, tree care companies, local urban forest councils, Audubon and conservation groups, Master Gardeners, and wildlife rehabilitation centers. In 2020, an online workshop series hosted by the Western Chapter ISA trained over 100 arborists to the wildlife trained arborist level laid out in our program. Next steps include not only disseminating the new BMPs to the Western Chapter ISA region, but also

reaching out to other regions who could utilize and adapt these BMPs. Yet, the program continues to face constraints related to the lack of research on the impacts of tree care activities on wildlife and the limited funding for these efforts. Nonetheless, we present the experiences and accomplishments of the Tree Care for Birds and Other Wildlife program as a model and strong case for the advantages of multidisciplinary groups to develop policy and educational solutions to address complex ecological programs.

## A CALL TO ACTION

We propose the following recommendations to the international arboriculture and urban forestry practitioner and research community.

### Researchers:

- Collaborate with biologists and ecologists who are rapidly advancing research on the connection between urban green space and wildlife and connect them with arboriculture and urban forestry research and practitioner communities in order to apply these BMPs in different regions.
- Conduct studies on the impacts of tree care practices and operations on urban wildlife. For example, how often do tree crews disturb active nests? Do our recommended practices reduce wildlife injuries? What practices are most effective in creating and preserving wildlife habitat in urban forests?
- Connect research questions about urban wildlife with actionable information for the practitioner community.

### Practitioners:

- Call on the American National Standards Institute to explore options for a national standard and on the International Society of Arboriculture to explore options for a Best Management Practice.
- Engage municipalities and other organizations to create policies and specifications requiring that in-house and contract tree crews follow wildlife best management practices or another program of policy, education, and training.
- Establish regional working groups of arborists, urban foresters, wildlife biologists, and wildlife rehabilitators to connect skills and create locally relevant resources, such as a region-specific appendix to the new BMP, about sensitive

species and habitats as well as inventories of local regulations and policies.

- Contribute to resources for the general public on wildlife and tree care.

We cannot emphasize strongly enough the imperative to work collaboratively across disciplinary boundaries to succeed in this work. The issue of mitigating impacts to wildlife during urban tree care is mired in a complicated ecological, ethical, and legal landscape. The Tree Care for Birds and Other Wildlife program of the Western Chapter ISA is one example of the benefits of bringing together wildlife biologists, arborists, urban foresters, and community advocates to address a complex urban ecological problem.

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**Conflicts of Interest:**

Dr. Cecil Konijnendijk van den Bosch, AUF Editor-in-Chief, is a co-supervisor of Corinne Bassett's PhD at the University of British Columbia. This manuscript is not related to the corresponding author's PhD research.

**Résumé.** Les forêts urbaines constituent un habitat indispensable pour les populations fauniques en déclin. Les professionnels de l'entretien des arbres sont essentiels à la prospérité des forêts urbaines et par conséquent, à la survie de la faune urbaine. En parallèle, les interventions arboricoles tels l'abattage des arbres et l'élagage des branches présentent des menaces évidentes à la faune urbaine et à ses habitats. Nous décrivons ici le développement d'une coalition de base d'arboriculteurs et de défenseurs de la faune dans l'ouest des États-Unis et le processus de constitution d'une approche vers les meilleures pratiques de gestion et de formation professionnelle afin d'atténuer les impacts des interventions arboricoles sur la faune. Pour ce cas précis, nous décrivons les défis et les opportunités uniques qui sont apparus au cours de ce processus multidisciplinaire et nous démontrons les avantages de l'unification des pratiques de diverses communautés autour de problèmes écologiques urbains complexes. Nous terminons en formulant des recommandations à l'intention des communautés internationales de praticiens et de chercheurs en arboriculture et en foresterie urbaine.

**Zusammenfassung.** Städtische Wälder sind ein unverzichtbarer Lebensraum für die rückläufigen Wildtierpopulationen. Die Baumpflegeindustrie ist für die Lebensfähigkeit der städtischen Wälder und damit für das Überleben der städtischen Wildtiere von entscheidender Bedeutung. Gleichzeitig stellen Baumpfleßmaßnahmen wie das Entfernen von Bäumen und das Beschneiden von Ästen eine eindeutige Bedrohung für städtische Wildtiere

und ihre Lebensräume dar. Hier beschreiben wir die Entwicklung einer Basis-Koalition von Baumpfleßern und Naturschützern im Westen der Vereinigten Staaten. Außerdem beschreiben wir den Prozess der Erarbeitung von optimalen Bewirtschaftungsmethoden und professionellen Schulungen, um die Auswirkungen von Baumpfleßmaßnahmen auf Wildtiere zu verringern. Wir beschreiben insbesondere die einzigartigen Herausforderungen und Möglichkeiten, die sich aus diesem multidisziplinären Prozess ergaben, und zeigen die Vorteile auf, die sich aus der Zusammenarbeit verschiedener Berufsgruppen bei komplexen ökologischen Problemen in Städten ergeben. Abschließend formulieren wir Empfehlungen für die internationale Baumpfleß- und Stadforstpraxis und -forschung.

**Resumen.** Los bosques urbanos pueden crear un hábitat favorable para la disminución de las poblaciones de vida silvestre. La industria del cuidado de los árboles es esencial para la viabilidad de los bosques urbanos y, por lo tanto, para la supervivencia de la vida silvestre urbana. Al mismo tiempo, las operaciones de cuidado de árboles, como la eliminación de árboles y la poda de ramas, presentan claras amenazas para la vida silvestre urbana y sus hábitats. Aquí describimos el desarrollo de una coalición de base de arboristas y defensores de la vida silvestre en el oeste de los Estados Unidos y el proceso de trazar un camino hacia las mejores prácticas de manejo y capacitación profesional para mitigar los impactos de las prácticas de cuidado de árboles en la vida silvestre. En particular, describimos los desafíos y oportunidades únicos que surgieron a través de este proceso multidisciplinario y construimos un caso para los beneficios de unir a diversas comunidades en torno a problemas ecológicos urbanos complejos. Terminamos formulando recomendaciones a los profesionales internacionales de la arboricultura y la silvicultura urbana y a las comunidades de investigación.

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