

Seattle Urban Carnivore Project

March 2025 Progress Report

In 2018, Woodland Park Zoo (WPZ) and Seattle University collaborated to develop a new project to explore how mammalian carnivores, such as coyotes, foxes, raccoons, bobcats, and even cougars and bears live and interact with people across urban and suburban areas in the Seattle region. The program fully launched in 2019 and includes both a successful camera monitoring program and a public online platform for individuals to upload carnivore sightings (Carnivore Spotter; <u>www.carnivorespotter.org</u>). These initiatives engage volunteers in community science across King County and support human-wildlife coexistence through sharing our research in the media and via community presentations.

We continue to collect data that helps us to better understand the carnivores with which we share the Northwest landscape. This progress report shares updates on our project efforts through early 2025 (but, due to a time lag of data processing, shares data results only from 2019-2021).

The primary goals of the study are to:

- Document the mammalian carnivore species that inhabit the greater Seattle area.
- Determine the factors that affect the presence of different carnivorous species.
- Collaborate with other projects to explore regional and global patterns in urban wildlife ecology.
- Work with the community to improve coexistence with these species.

Description of methods

Camera traps

Since April 2019, we have deployed cameras at up to 52 locations each month along two transects, and in a selection of off-transect locations (including Bainbridge Island and Issaquah) throughout central King County and on Bainbridge Island (Figure 1). Each transect follows an urban-to-rural gradient, running from Seattle's city center to more rural areas. Cameras are installed and active at sites year-round (or, at select sites, for a minimum of one month in each season - January, April, July, and October). Each camera is locked to a tree, and the cameras are triggered by motion of any animal that moves in front of it. Camera management includes monthly visits to the camera location to ensure the camera is functioning properly, exchange batteries, retrieve digital cards (SD cards), refresh scent lures, and complete and upload the data for each visit. Camera management is completed by trained community science volunteers, staff or volunteers of partner organizations, Seattle University undergraduate students or project staff.

Collaborations - Urban Wildlife Information Network

The Seattle Urban Carnivore Project is a partner of the Urban Wildlife Information Network (UWIN), a worldwide initiative led by Chicago's Lincoln Park Zoo in which researchers from zoos, universities and other conservation organizations use wildlife monitoring protocols to understand the ecology of urban species, learn why animals in different cities behave the way they do, and determine what patterns hold true around the world.

Collaborations - Snapshot USA

Each fall, SUCP installs around 10 additional wildlife cameras (adding cameras in other areas of parks that already host SUCP camera stations) to contribute data to the Snapshot project. The Snapshot project, which incudes all 50 states in the US plus several European countries, is a large-scale, collaborative effort to sample mammal populations with camera traps, stratified across habitats and development zones (suburban / rural / wild / urban). Snapshot is coordinated by The Smithsonian Institution, the North Carolina Museum of Natural Sciences, Euro Mammals, and the Max Planck Institute of Animal Behavior.

Local Collaborations and Partnerships

We work closely with area land managers to gain permissions for camera trapping on their properties and to share our data and findings with them to support land management decision-making: Seattle Parks, King County Parks, Issaquah Parks, City of Redmond, City of Kirkland, Renton Parks, Tukwila Parks, and City of Duvall. We have long-standing partnerships with Oxbow Farm & Conservation Center, SHADOW Lake Nature Preserve, Bloedel Reserve and Delridge Neighborhood Development Association, which monitor camera trap stations on their property and/or in their communities. The camera trapping effort in Issaquah, in collaboration with Issaquah Parks, launched in April 2019 as part of a separate grant program in place at the time – Coexisting with Carnivores funded by The Institute of Museum and Library Services (IMLS). As part of that effort, students in middle schools across Issaquah were also engaged in camera trapping on their school grounds. Additionally, on Bainbridge Island, volunteers associated with Bainbridge Island Land Trust properties and staff and volunteers of Bloedel Reserve support a camera trap station on Reserve property (launched in April 2021 and run through March 2025) on Land Trust properties and staff and volunteers of Bloedel Reserve support a camera trap station on Reserve property (launched in April 2023).

Bioacoustic Devices

In 2021, the Seattle Urban Carnivore Project was part of a pilot project, led by the Urban Wildlife Information Network (UWIN), for deploying bioacoustic devices—"AudioMoths"—at several camera locations along the west end of the north transect (Kirkland to Duvall). AudioMoths are about the size of a deck of cards and are an affordable new device that can record in audible and ultrasonic wavelengths. In 2021, AudioMoths were placed during the months of April and July, and the devices set to focus on monitoring bird presence and activity (recording only in early morning hours). The acoustic data obtained were submitted to UWIN staff for processing; a table of results is included below.



Figure I: Map of approximate Seattle Urban Carnivore Project transect and offtransect camera locations

Analysis methods

In 2021, we transitioned from our former data management platform, <u>eMammal</u>, to a new data management platform, <u>Wildlife Insights</u>. Because of this transition causing a backlog of data processing, this report only presents camera trap data from January 2019 through the end of 2021.

For our analyses, we measured the number of **detections** of each species at each camera site. A detection is a single group of photos of the same species in close succession. However, there can be multiple detections of the same animal, so the number of detections should not be taken to represent the number of individuals of a particular species in a particular area. It is important to note that the results of these analyses reflect only whether a species was present within a park and should not be mistaken to represent where the animals live, how many there are, or how often they occur within the area.

During 2022-2023, SUCP staff organized and uploaded our camera trap photos from 2021 into Wildlife Insights in preparation for tagging. Staff worked with a graduate student from Oregon State University to develop the workflow for photo tagging and materials needed to train volunteers to help with the tagging process. Our first group of photo tagger volunteers joined us in fall of 2023 to begin working through our 2021 photos. During 2024, two more sessions of photo tagging with eager and adept volunteers allowed us to complete tagging of all of our 2021 photos. During 2025 we plan to work through additional years of photo data, getting us closer to being able to process our data during the year when the photos are collected.

Results

Seattle Urban Carnivore Project Summary 2024-2025 Camera Trapping Season Effort

Number of locations monitored (parks & greenspaces)	44 locations (31 on-transect locations, 5 Seattle- area off-transect locations, 3 Issaquah, 5 Bainbridge)	
Number of cameras	53 (some locations have more than I camera)	
Number of volunteer teams (camera trapping)	32 teams	
Number of community volunteers for the season (camera trapping + photo tagging)	173 (144 + 29)	
Total volunteer hours for the season (camera trapping + photo tagging)	More than 1390 volunteer hours	

Region-wide camera survey results

Across all survey locations, we have documented more than 49,000 animal visits to camera traps from April 2019 through December 2021. The table and chart below (Table 2 and Figure 2) represent the number of detections of each of the project's target species (plus domestic dogs and cats) and what percent each species makes up out of those detections.

Species	# of Detections	% of Detections	
Domestic Dog	4,665	31.77%	
Coyote	3,385	23.06%	
Northern Raccoon	3,752	25.56%	
Domestic Cat	1,482	10.09%	
Virginia Opossum	1,036	7.06%	
American Black Bear	202	1.38%	
Bobcat	156	1.06%	
River Otter	2	.01%	
Cougar/Mountain Lion	2	.01%	
Red Fox	0	0	
TOTAL	14,682	100%	

Table 2: Number of detections of target species (plus domestic dogs and cats	5).
April 2019 - December 2021	



Figure 2: Percent of detections for each focal species (plus domestic cats and dogs). April 2019 - December 2021.

From our camera trap detections, we are able to examine species activity across the year (Figure 3) and hours of the day and night (Figure 4).



Figure 3: Total number of detections for each focal species (plus domestic cats and dogs) by month. Note that the y-axis reflects different scales, based on total detections of each species. April 2019 - December 2021.



Figure 4: Total number of detections for each focal species (plus domestic cats and dogs) by hour of the day. Note that the y-axis reflects different scales, based on total detections of each species. April 2019 - December 2021.

Carnivore Spotter Results

Since Carnivore Spotter's launch (August 12, 2019) through the end of 2024, we have received nearly 14,000 reports. The chart below (Figure 3) shows the percentage of reports of each species from August 2019 through December 2024. About 1 in 5 reports includes a photo or video that allows us to verify the species reported, but the proportion of species for all reports closely follows that of only the verified reports, so all reports are included in the figure.



Figure 3: Carnivore Spotter - Percent of total observations for each species

Bioacoustic Device Results (Bird Detections)

In 2021, the Seattle Urban Carnivore Project was part of a pilot project, led by the Urban Wildlife Information Network (UWIN), for deploying bioacoustic devices—"AudioMoths"—at several camera locations along the west end of the north transect (Kirkland to Duvall). The following table (Table 3) includes results from 5 sites (from Kirkland east to Duvall) during the period April 4 - May 7, 2021 (recording only in early morning hours).

	# of		# of
Common Name	Detections	Common Name	Detections
American Robin	308	Mallard	3
Black-capped Chickadee	193	Wild Turkey	3
Pacific Wren	187	European Starling	3
Pine Siskin	128	Trumpeter Swan	2
Song Sparrow	96	Western Tanager	2
Dark-eyed Junco	93	Greater White-fronted Goose	2
Bewick's Wren	52	Chipping Sparrow	2
Anna's Hummingbird	45	American Goldfinch	2
Brown Creeper	44	Belted Kingfisher	2
Golden-crowned Kinglet	34	Common Yellowthroat	2
Spotted Towhee	30	Orange-crowned Warbler	1
Evening Grosbeak	23	Common Loon	1
Northern Flicker	19	House Sparrow	1
Steller's Jay	18	Common Raven	1
Chestnut-backed Chickadee	18	Northern Harrier	I
House Finch	14	Wilson's Warbler	I
Hutton's Vireo	13	Canada Goose	I
Red-breasted Nuthatch	10	Wood Duck	I
Yellow-rumped Warbler	10	Bufflehead	I
Warbling Vireo	9	Hermit Warbler	I
Brown-headed Cowbird	7	Varied Thrush	I
Downy Woodpecker	6	Brewer's Blackbird	1
Ruby-crowned Kinglet	6	Northern Rough-winged Swallow	I
Purple Finch	5	Black-billed Magpie	I
Mountain Chickadee	5	Common Merganser	1
Great Blue Heron	4	Snow Goose	1
Red-tailed Hawk	4	Bushtit	I
American Crow	4	American Kestrel	1
Hairy Woodpecker	4	Red-breasted Sapsucker	1
		Grand Total	1,431

Table 3: Number of detections for each bird species.April 4 - May 7, 2021; 5 sites from Kirkland east to Duvall.

Community Engagement & Coexistence

Community science engagement

To launch our sixth camera trapping season in early 2024, we engaged returning volunteers and recruited new community science volunteers from various zoo audiences (e.g., current zoo volunteers, zoo staff, zoo members, and zoo program participants), project partner audiences and university students - a total 144 volunteers participated during this 2024-2025 season.

Project staff hosted a virtual and in-person volunteer training in March 2024. This training format was well received by volunteers, and we plan to continue blending online and in-person volunteer training opportunities in the future. Throughout the camera trapping season, continuing education and skill-building trainings are offered to project volunteers. In addition, project staff accompany teams in the field as needed to support the team in assessing changing site conditions and addressing equipment issues.

By managing Seattle Urban Carnivore Project camera stations, our volunteers are actively participating in wildlife research and increasing their understanding and awareness of research methods, local carnivore ecology, and coexistence practices. Participants have also demonstrated that they develop community among their team members, a connection with their local site over the changing seasons and empathy for local wildlife species. For some participants, participating in the project provides them opportunities to learn career-relevant and leadership skills. Project staff provide support to those volunteers seeking to gain professional skills and networking from their volunteer experience, helping to develop future conservation leaders.

Conservation mentorship

In 2021, WPZ began working with a graduate student at the University of Washington to conduct the first study of coyote diet in Seattle using a cutting-edge, non-invasive approach. The University of Washington collaborated with Woodland Park Zoo and Seattle University to develop a community science scat collection program to document coyote diet using genomic metabarcoding. Project results are still being published (as of early 2025), but the project hypothesizes that coyotes may benefit native species by controlling introduced and invasive prey populations (e.g., cottontail rabbits and rats).

Miami University's Advanced Inquiry Program (AIP) is a master's degree that combines web-based Miami graduate courses with experiential learning and field study with zoological, botanical, and wildlife conservation institutions around the US, including Woodland Park Zoo. In spring 2022 and spring 2024, the Seattle Urban Carnivore Project collaborated with an AIP student as part of their mentored studies. Each AIP student worked with SUCP staff to compile and summarize the observations shared to date with Carnivore Spotter and to prepare documents to share these results.

We are grateful to our volunteers, interns, partners and donors for supporting our data collection on carnivores and their behavior in urban and suburban areas in the Seattle region.

Human-carnivore coexistence

By engaging local communities, the Seattle Urban Carnivore Project helps people inhabiting urban and suburban areas better understand the needs and behaviors of local carnivores in an effort to build empathy and ultimately support coexistence with wildlife. To increase proactive public action to foster coexistence with urban carnivores, the project develops educational flyers, social media toolkits and posters with coexistence behavior change messaging, available on our Coexisting with Carnivores web page at https://www.zoo.org/coexisting. In 2023, with support from Snoqualmie Tribe, SUCP collaborated with the Communications & Public Engagement team at the Washington Department of Fish and Wildlife (WDFW) to develop additional materials available in multiple languages; these materials were distributed widely throughout 2024. The Seattle Urban Carnivore Project also shares coexistence information through public and community group presentations. These presentations are often at the request of, and co-developed and presented with, members of communities around the region who are seeking to support human-wildlife coexistence.

Communications

The Seattle Urban Carnivore Projects shares its research and coexistence messages with visitors to Woodland Park Zoo, through popular media, via academic publications and through conference and community presentations. Conference presentations in 2024 and academic publications through early 2025 are listed below:

Scientific conference presentations in 2024

Remine, K. and Widner, B. (2024). Keeping an eye on urban biodiversity. Zoos & Aquariums Committing to Conservation. Salt Lake City, UT.

Scientific research publications through January 2025

- Burton, A.C., Beirne, C., Gaynor, K.M. et al. (2024). Mammal responses to global changes in human activity vary by trophic group and landscape. *Nature Ecology & Evolution*. <u>https://doi.org/10.1038/s41559-024-02363-2</u>
- Cove, M. V., Kays, R., Bontrager, H., Bresnan, C., Lasky, M., Frerichs, T., Klann, R., Lee, T. E., Jr, Crockett, S. C., Crupi, A. P., Weiss, K. C. B., Rowe, H., Sprague, T., Schipper, J., Tellez, C., Lepczyk, C. A., Fantle-Lepczyk, J. E., LaPoint, S., Williamson, J., ... McShea, W. J. (2021).
 SNAPSHOT USA 2019: a coordinated national camera trap survey of the United States. *Ecology*, *102*(6), e03353. <u>https://doi.org/10.1002/ecy.3353</u>
- Fidino, M., Sander, H. A., Lewis, J. S., Lehrer, E. W., Rivera, K., Murray, M. H., Adams, H. C., Kase, A., Flores, A., Stankowich, T., Schell, C. J., Salsbury, C. M., Rohnke, A. T., Jordan, M. J., Green, A. M., R Gramza, A., Zellmer, A. J., Williamson, J., Surasinghe, T. D., ... Magle, S. B. (2024). Gentrification drives patterns of alpha and beta diversity in cities. *Proceedings of the National Academy of Sciences of the United States of America*, 121(17), e2318596121. https://www.pnas.org/doi/10.1073/pnas.2318596121
- Haight, J. D., Hall, S. J., Fidino, M., Adalsteinsson, S. A., Ahlers, A. A., Angstmann, J., Anthonysamy, W. J.
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- Kays, R., Cove, M. V., Diaz, J., Todd, K., Bresnan, C., Snider, M., Lee, T. E., Jr, Jasper, J. G., Douglas, B., Crupi, A. P., Weiss, K. C. B., Rowe, H., Sprague, T., Schipper, J., Lepczyk, C. A., Fantle-Lepczyk, J. E., Davenport, J., Zimova, M., Farris, Z., ... McShea, W. J. (2022). SNAPSHOT USA 2020: A second coordinated national camera trap survey of the United States during the COVID-19 pandemic. *Ecology*, *103*(10), e3775. https://doi.org/10.1002/ecy.3775
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- Kreling, S. E. S., Reese, E. M., Cavalluzzi, O. M., Bozzi, N. B., Messinger, R., Schell, C. J., Long, R. A., & Prugh, L. R. (2024). City divided: Unveiling family ties and genetic structuring of coyotes in Seattle. *Molecular Ecology, 33*(14), e17427. <u>https://doi.org/10.1111/mec.17427</u>
- Magle, S. B., Fidino, M., Sander, H. A., Rohnke, A. T., Larson, K. L., Gallo, T., Kay, C. A. M., Lehrer, E. W., Murray, M. H., Adalsteinsson, S. A., Ahlers, A. A., Anthonysamy, W. J. B., Gramza, A. R., Green, A. M., Jordan, M. J., Lewis, J. S., Long, R. A., MacDougall, B., Pendergast, M. E., & Remine, K. (2021). Wealth and urbanization shape medium and large terrestrial mammal communities. *Global Change Biology, 1.* <u>https://doi.org/10.1111/gcb.15800</u>
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Future directions

In 2025, WPZ will continue to build on the past successes of the Seattle Urban Carnivore Project. Project staff will continue to oversee the camera trap network, engage volunteers and partners in carnivore research, and will aim to involve more communities in sharing carnivore sightings using the Carnivore Spotter tool. Because we know that Carnivore Spotter is not reaching many parts of the region, we will continue to engage in outreach in areas that have been underrepresented in wildlife conservation research. We continue to share our results and work on research publications with the Urban Wildlife Information Network (UWIN).

Our project staff would be happy to deliver a presentation about the project, our results and how this information can help to promote human-wildlife coexistence to your staff, volunteers and/or community stakeholders. Please contact us at seattlecarnivores@zoo.org if you would like to schedule a presentation.

Acknowledgements

The lands that we monitor on are the lands of the Tribal signatories of the Treaty of Point Elliott (1855), whose stewardship of the waters, plants, land and animal relatives in the Northwest has continued since time immemorial. We acknowledge this stewardship, the sovereign rights of the Tribal signatories, and our responsibility to join with these Tribes to inspire and advance the restoration of relationships between humans and the living world around us.

The Seattle Urban Carnivore Project would like to thank the many organizations, agencies and people who make this program possible:

All of our camera trapping volunteer team leaders, volunteer team members, and contributors of sightings to Carnivore Spotter Bainbridge Island Land Trust City of Duvall Public Works City of Issaquah Parks City of Kirkland / Green Kirkland Partnership City of Redmond Parks & Recreation City of Renton Parks City of Seattle Parks & Recreation City of Tukwila Parks & Recreation **King County Parks** Port of Seattle Delridge Neighborhood Development Association Forterra / Green Cities Partnerships **Oxbow Farm & Conservation Center** Progress Animal Welfare Society (PAWS) SHADOW Lake Nature Preserve Washington Department of Fish & Wildlife

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- Bainbridge Community Foundation
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- Snoqualmie Tribe
- Wilburforce Foundation
- Wildlife Forever Fund

Further information

For more detailed information about the project, please contact a member of the project staff listed below.

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A selection of Seattle Urban Carnivore Project camera trap photos



American black bear (Ursus americanus) – peering at the camera



Northern raccoons (*Procyon lotor*) – five raccoons exploring a tree trunk



Coyote (*Canis latrans*) – pouncing on something under the snow



Coyotes (*Canis latrans*) - two young pups



Cougar / mountain lion (*Puma concolor*) - female followed by two kittens



Bobcat (*Lynx rufus*)



Virginia opossum (*Didelphis virginiana*)



North American beaver (Castor canadensis)



Black-tailed deer (Odocoileus hemionus columbianus)