Holistic construction: building better landscapes from the perspective of zoophysiology.

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Since the dawn of human civilization, animals have been a core component in our daily lives. From beasts of burden such as bulls and horses to the pets we keep at our side every day, animals influence how we interact and view the living world. But what of the animals that we don't notice; the wildlife that stalks in the shadows of night, showing their faces for a captured moment before disappearing into the infinite brush? What of the birds, frogs, and insects who, in their own language, sing the background song of a suburban summer ensemble? We often fail to see these animals even if they appear everywhere. We become so accustomed to their presence that they become little more than set pieces to us and therefore fail to consider them when we construct our cities and towns. But even if we may not see it, the choices we make impact these creatures.

Through our research, we will identify ways in which holistic construction (infrastructure such as roads, trails, bridges, etc. which were built with animal species in mind) influences the patterns of animal populations within southern Illinois. This research will be conducted within the parks of Edwardsville, Illinois and will utilize trail cameras to monitor how wildlife (animal species) interact with infrastructure. Over a 60-day period, our team will document the variety of species present as well as how said species travel within the research area. With this, we will then utilize urban infrastructure practices designed by animal welfare specialists to observe how the animals' movement patterns change. Utilizing both qualitative data and quantitative observational research, we will develop new strategies to push forth animal welfare efforts.

Although our project is limited to Edwardsville, Illinois, the research we have based our procedures on is based in general zoophysiology (the study of animal patterns). There is not enough relevant data conducted within this region to base our experiment on, therefore we must utilize broad-stroke data to conduct said experiment. However, this does not mean that knowledge is absent on indevisiual species that live in this region, with said knowledge being considered. In addition to this, an understanding of the habbitat of the Southern American Bottom (the geographical region which Edwardsville resides in).

To accurately record species' movement, we will set up numerous trail cameras throughout the research area. These cameras will run a live 24/7 feed, with the footage being saved on numerous computers. Through the use of motion detection software, we will be able to accurately sift through the footage; recording species yield (how many of one species there are),

species qualities (traits such as age and health status), and the movement patterns. This data will be recorded and graphed, with said species data either supporting our hypothesis or causing us to redraft a new one.

What is the relationship between native animal populations and urban architecture with respect to animal behavioral patterns?

This question looks at how the qualities of urban environments, such as green space, air and water pollution, and habitat connectivity affect the presence, diversity, and health of native animal species. It is testable because these environmental factors can be measured, and the number and condition of native animals can be observed and compared across different areas.

If the urban environment is in better ecological condition, meaning it contains more green space, cleaner air and water, and lower levels of pollution, then a greater number of native animal species are expected to be present, and those animals are likely to exhibit better overall health.

If the urban environment is in poorer ecological condition, characterized by higher pollution levels, more habitat destruction, and limited access to green space, then fewer native animal species are expected to live there, and the animals that are present are likely to show signs of poorer health.

These hypotheses are both testable and falsifiable because researchers can gather measurable data on pollution levels, habitat quality, and the physical condition of animals. The results of this data collection can then be used to determine whether the evidence supports or contradicts each hypothesis.

Review article

Aronson, M. F. J., Lepczyk, C. A., Evans, K. L., Goddard, M. A., Lerman, S. B., MacIvor, J. S., Nilon, C. H., Spotswood, E. N., & Warren, P. S. (2023). Urban biodiversity and ecological networks: Perspectives and tools for understanding cities as ecological systems. *People and Nature, 5*(4), 1010–1025. https://doi.org/10.1002/pan3.10604

This article looks at human tolerance for animals within urbanized environments. Their research was conducted within Atlanta, Georgia where researchers conducted a survey to gather data related to the interactions between people within the city and their relationship with animal species. The article places an emphasis on the human aspect of human-wildlife interactions. There findings were that most people were tolerant towards more common animal species, such as raccoons, opossums, squirls, etc. However, they were apprehensive when presented with snake species, bobcats, and coyotes.

The information seen within this article is critical to forming a understanding of the levels of acceptance urban settings have when referring to animals; with some animal species being favored over others. With this research, we can better understand how to address our research topic and avoid potential issues that may arise from introduced native species.

This source is focused on human acceptance of animal species, focusing on a sociological perspective over a biological and ecology focused strategy, With that, this article is uniquely beneficial as it provides a unique perspective on this topic.

One of the main strengths of the article is that the article is recent, as it was published in 2024. Due to the nature of the article, the recency of it is incredibly important as it is a direct reflection on current opinions on ecology within urban communities. One of the weaknesses of the article is the lack of citations, as the paper has only been cited 3 times. However, as previously mentioned the article is relatively new, so this may explain the lack of citations.

The source fits into our research as it directly states the opinions urban populations have when referring to animal species. It discusses not only the “what”, but also the “why” when discussing

these opinions. Due to this, we can utilize this research to narrow down the scope of our project, producing a better outcome through our work.

Review article – Eriel johnson

Lerman, S. B., Narango, D. L., Andrade, R., Warren, P. S., Grade, A. M., and Straley, K. (2021). Wildlife in the city: human drivers and human consequences. In P. Barbosa (Ed.), *Urban Ecology: Its Nature and Challenges* (pp. 37–66). CABI Publishing.

This article appears as a chapter within an edited academic book published by CABI, a well-known scientific publisher. CABI books undergo editorial and scholarly peer review before publication, meaning the chapter is a peer-reviewed scholarly source. The publisher's website confirms that chapters in edited scientific volumes are reviewed by experts in the field before acceptance.

The authors aim to understand how wildlife survives, adapts, and changes within urban environments. They focus on the ecological and behavioral responses of animals to human-modified spaces, with special attention to how human decisions about landscaping, infrastructure, and city design shape the presence, behavior, and health of wildlife species.

Because this is a review article rather than a single experimental study, the authors do not offer one formal hypothesis. Instead, their purpose is to synthesize existing research to show that human behavior and city planning strongly influence wildlife outcomes. They propose that examining human actions as ecological drivers can explain patterns of species diversity, habitat use, and ecological resilience in urban areas.

As a review chapter, the authors use a synthesis-based method. They gather and analyze large bodies of previously published ecological studies on urban wildlife. Their approach includes comparing findings across different cities, species, and ecological contexts. They look at research involving birds, insects, mammals, and plants to evaluate how human behavior shapes ecological patterns. The design tests their central purpose by using evidence from multiple independent studies to reveal consistent patterns across urban ecosystems. By comparing studies with different methods, species, and scales, they are able to evaluate whether human decisions consistently act as ecological forces that structure wildlife presence and diversity.

The authors highlight that wildlife presence in cities is deeply tied to human choices. They show that landscaping decisions at the household level, such as planting native versus ornamental species, dramatically influence the number and types of animals that can survive in a neighborhood. Studies summarized in the chapter demonstrate that insect abundance, bird

breeding success, and small mammal habitat use all respond strongly to the vegetation humans maintain around homes and public spaces. Human behavior becomes a powerful ecological filter.

They also discuss large-scale patterns showing that urban wildlife communities differ significantly from those in rural areas. Urban areas favor generalist species that tolerate disturbance, while specialists often decline. The authors present evidence that cities create novel ecosystems that require new ways of thinking about conservation. For example, research shows that artificial lighting, noise, and pollution reshape animal behavior, sometimes forcing species to alter feeding times, vocalizations, and reproductive patterns. These adaptations highlight urban environments as selective landscapes.

Another major conclusion from the evidence reviewed is that socioeconomic patterns influence biodiversity. Wealthier neighborhoods often contain more green space and higher native plant diversity, producing higher species richness. Lower income areas, by contrast, may experience habitat fragmentation and environmental stressors that reduce wildlife presence. The authors show that these patterns are supported by multiple studies across the United States and internationally. This demonstrates that social systems and ecological systems are tightly connected in cities.

The authors further explain that as humans engage more directly with local wildlife through backyard bird feeding, pollinator gardens, or habitat enrichment, they become influential ecological agents. These actions shape community dynamics and influence population trends. The review shows that human participation in conservation within cities can meaningfully shift biodiversity outcomes, which supports their broader claim that people act as ecosystem engineers in urban environments.

The authors conclude that humans are central drivers of urban biodiversity. Human decisions about landscaping, habitat structure, and city planning shape the types of species that survive and thrive in urban environments. Urban wildlife patterns cannot be understood without examining human social systems, behaviors, and preferences. They argue that urban ecosystems are complex, dynamic, and heavily influenced by the ways people manage and interact with the environment.

The authors propose future research that continues integrating ecology with social science. They recommend studying how cultural values, economic resources, and community habits influence ecological outcomes. They also call for more direct engagement with city residents to promote conservation practices such as planting native vegetation, reducing habitat fragmentation, and creating wildlife-friendly spaces. They suggest that future work should focus on designing cities that support both human needs and healthy wildlife communities.

This article provides strong evidence that urban environmental qualities directly shape wildlife presence, diversity, and health. It shows that green space, native plants, pollution levels, and human landscaping choices all play major roles in determining which species can survive in a city. This connects directly to your question because it supports the idea that healthier urban

environments lead to stronger and more diverse native animal populations. The review also explains that human behavior acts as an ecological force, meaning changes in habitat structure or environmental quality can be measured and compared across different areas, just like in your proposed study.

Primary Research Analysis – Lindell Blount

Schmit, J. P., Johnson, L. R., Baker, M., Darling, L., Fahey, R., Locke, D. H., Morzillo, A. T., Sonti, N. F., Trammell, T. L. E., Aronson, M. F. J., & Johnson, M. L. (2025). The influence of urban and agricultural landscape contexts on forest diversity and structure across ecoregions.

This article studies how the urban landscape affects the health of forests. They compared forests by cities to forests around other forests. The main goal was to understand how urban area development affects the number of native trees the presence of non-native trees and the size and health of trees. The researchers wanted to learn how changing the land affects nature and the animals that live there.

The researchers studied over 3,000 forest plots in different regions Baltimore, Washington DC, Philadelphia, Chicago and New York. They collected information on types of trees, tree size, native and non-native trees. They looked at the type of land around the forest like urban areas, farmland, or other forest. This allowed them to test how the urban landscape environment connects to forest health. By comparing forests in different places the researchers could determine if urban areas have a negatively effect on forest diversity and structure.

The results showed forests around other forests had more native animals and healthier trees and they had better large trees. Forests near cities or farms had more non-native trees. Many of the trees were not healthy smaller, and weaker. These results showed the researchers that urban areas or planning can hurt forest ecosystems. This research also says that forests that are around urban areas that are not healthy not going to provide habitats for animals which affects wildlife populations.

The researchers says that the landscape around forests has a big effect on forest health and diversity. They say that protecting forests from urban planning is important for keeping ecosystem healthy. This article is useful for our research question because it shows that Native

animal habitats are affected by biodiversity in forests around urban environments. This helps our group because it tells us how urban landscapes is bad for native animal populations.

Primary Research Analysis – Lindell Blount

Mark J. Jordan , Robert A, Long , Rachel Mueller, Katie Remine , Laura R Prugh Yeserin Yildirim, Chaz Hyseni, Frank Johansson & Christopher J. Schell "Landscape Connectivity and Genetic Structure of Animal Populations in Urban Ponds."

This article studies how the structure of urban ponds affects the health and genetic diversity of animals that live there. Their main goal was to find out if animals in ponds that are close together are healthier and more genetically diverse than animals in isolated ponds. They wanted to see how anything that stops animals from moving between ponds like roads, buildings and bridges. The purpose of this study is important for keeping environment healthy because genetic diversity is a sign of a healthy population. Populations with low diversity will get sick or disappear that shows that urban environments can impact native animals.

The researchers studied many animal species living in ponds in Stockholm, Sweden. They got DNA samples from animals in different ponds and used genetic analysis to see how related the animals is to each other. They also saw how connected the ponds were geographically and measured how far animals could move between them. This allowed the researchers to test if ponds that are more connected have healthier and many different animal populations.

The results showed that animals in connected ponds had higher genetic diversity and stronger populations and animals in isolated ponds had lower genetic diversity made them weaker and easier to get diseases. This study also found that animals that could not move easily between ponds were more likely to have inbred populations. This article says that keeping connections between habitats in cities is important for the health of native animal populations.

The researchers research concluded that urban areas could harm native animal populations by reducing genetic diversity. They say that urban planners should focus on keeping habitats connected by creating a safe passage that let animals to move safely through the area. Researchers want to study more types of animals in different cities to see if the same patterns happen in other urban areas. This article connects to our research question because it shows how urban landscapes affect native animal populations by showing that connecting ponds is more healthy and stronger than isolated ponds.

Primary Research Analysis – Lindell Blount

Hentati, Yasmine, Charles O. Estien, Zachary Hawn, Maria L. Garcia, and Thomas K. Nguyen. “Environmental Contamination Predicts Mammal Diversity and Mesocarnivore Activity in the Seattle-Tacoma Metro Area.” 2025.

This article studies how pollution affects wild mammals living in urban areas. Their main goal was to see if areas with more contamination had less kinds of mammals or if pollution changed how animals behaved. The researchers wanted to understand how environmental health affects native animals in cities. This study is important because it shows how human activity like pollution can harm animal populations and harm ecosystems.

The researchers placed cameras at 74 different locations around the Seattle-Tacoma metro area. They recorded which mammals appeared at each spot and how often they were seen. They also measured pollution levels and compared them to the number and behavior of animals. This method allowed the researchers to test if contaminated areas had fewer species or if animals acted differently in those areas. By collecting field data they could see how pollution directly affects wildlife in urban environments.

The results showed that areas with higher pollution had less types of mammals. Coyotes was not often seen in these areas, raccoons appeared more often, and opossums' activity stayed about the same. This study also found that pollution affected animal behavior with some animals avoiding

certain spots. The article pointed out that when the environment is unhealthy it harms native wildlife and can reduce biodiversity. The researchers also noted that understanding these patterns is important for urban planning and conservation.

The researchers says that pollution has a negative effect on native mammals in urban areas. They suggested that cities should work to reduce contamination to protect wildlife and keep ecosystems healthy.

This article is relevant to our research question It provides evidence that unhealthy environments such as polluted areas lead to less native animals and changes in their behavior. This shows that keeping a healthy environment is important for supporting wildlife in cities and helps our group understand the connection between environmental health and native animal populations.

Primary Research Analysis – Eriel Johnson

Niesner, C. A., Blakey, R., Blumstein, D. T., & Abelson, E. S. (2021). *Wildlife affordances of urban infrastructure: A framework to understand human–wildlife space use*. *Frontiers in Conservation Science*, 2, 774137 https://www.frontiersin.org/journals/conservation-science/articles/10.3389/fcosc.2021.774137/full

Introduction to the Review

The purpose of this paper is to develop a conceptual framework for how urban infrastructure (i.e., built structures, roads, buildings, green infrastructure) creates "affordances" for wildlife meaning, how features of the built environment provide opportunities or constraints for animal behavior and space use. The authors argue that understanding these affordances is critical for predicting how wildlife uses urban space and for designing cities that better support biodiversity.

They propose a new framework (affordance-based) that integrates infrastructure design and wildlife behavioral ecology, shifting from the traditional view of built environment as merely a barrier or disturbance. They argue that many urban structures, though made for human use, can be co-opted by wildlife (for nesting, perching, movement, foraging), and that these affordances should be explicitly considered in conservation planning. The authors emphasize that not all structures are equal in their affordance; they categorize infrastructure based on

how various species can exploit them (e.g., for refuge, movement, resource access). They push for multi-disciplinary collaboration: urban design, ecology, conservation biology, and behavior science should work together to identify how infrastructure can be designed or modified to better support wildlife.

The article begins by noting that urban infrastructures (roads, buildings, walls, utility lines, green infrastructure) are not purely negative for wildlife many species make use of them. The authors point out that traditional urban ecology often treats infrastructure as a kind of barrier or source of mortality, but they suggest this is too simplistic. Instead, they draw on affordance theory (from ecological psychology) to argue that built features offer different opportunities (or constraints) depending on the species. For example, a building ledge may afford perching for birds, while a sewer grate might afford refuge or movement for small mammals. They define infrastructure affordances as the functional characteristics of human-built structures that animals respond to. The authors categorize these affordances into types according to how animals use them: e.g., refugia (safe places to hide), movement corridors (structures that facilitate travel across the city), resource provisioning (water, nesting), or landmarks (which animals might use for navigation). They underscore that affordances are not fixed: they vary by species, by life-stage (young vs adult), and by context (time of day, season). The authors review empirical and observational evidence showing that wildlife already uses urban infrastructure in these ways. For instance, certain bird species use the nooks and crannies of buildings for nests, bats roost in building cavities or under bridges, and small mammals or insects may exploit cracks or wall crevices. They also review how wildlife responds to linear infrastructures: power lines, fences, and railways can act as movement paths for some species (or barriers for others). The paper also cites studies where animals exploit water infrastructure (e.g., drainage systems, gutters) in cities. To make their framework actionable, the authors propose integrating this affordance perspective into urban planning and conservation. They discuss how planners and ecologists can map affordances in existing infrastructure, and how future infrastructure development could intentionally incorporate structures that benefit wildlife (without compromising human functionality). They also note potential trade-offs for example, creating more “wildlife-friendly” infrastructure could increase human wildlife conflicts, or encourage species that are not

desired in certain areas. They call for more empirical studies to test how different species use specific infrastructure types, and how design modifications could enhance positive affordances.

The authors conclude that an affordance-based framework is a powerful way to reimagine urban infrastructure: not just as a challenge for wildlife, but as a resource. They emphasize that collaboration between ecologists, urban designers, architects, and city planners is critical: designing infrastructure with wildlife in mind can lead to better coexistence. Next steps include mapping affordances in real cities, conducting field studies to validate which affordances are used by which species, and testing design interventions (e.g., retrofitting structures) to see their effects on wildlife use. They also call for more work on quantifying the costs and benefits of infrastructure affordances from both ecological and human perspectives.

This article gives you a conceptual tool (the affordance framework) for thinking about how built structures influence animal behavior. Rather than treating architecture as just a barrier, it shows that infrastructure can shape behavioral patterns (where animals go, how they move, where they rest or feed) The affordance concept helps explain why animals behave the way they do around structures: e.g., perching, nesting, traveling, hiding all behaviors tied to the physical form of the built environment. Native species implications: You can apply this framework to native animal populations in your study area, analyzing which types of urban architecture facilitate or hinder their ecological behaviors. The article gives you theoretical and practical justification for proposing design or architectural interventions in cities (or neighborhoods) to make them more wildlife-friendly, helping native species maintain or adapt behavioral patterns in urban contexts.

Hansen, Christopher P., Roland Kays, and Joshua J. Millspaugh. “From Backyard to Backcountry: Changes in Mammal Communities Across an Urbanization Gradient.”

This article studies how mammal populations change across areas from wilderness to suburban and urban environments. They main goal was to see if urban areas have lesser species of mammals, changes in

population sizes, or differences in animal activity. The researchers wanted to understand how urban environmental health affects native animal communities. This study is important because it shows that as cities grow, the makeup of mammal communities often changes, which affects the balance of ecosystems.

The researchers set up 178 motion-activated cameras in different areas around Missoula, Montana, from May to October in 2019 and 2020. They placed the cameras in wild, rural, and suburban areas to study mammals that weighed more than 150 grams. They counted how many different species there were, how often animals appeared, and when they were active during the day. They looked at how these things changed in places with more houses. This helped them see how cities and towns affect wild animals and their behavior.

The results showed that places with more houses had fewer kinds of mammals. Big animals stayed away from city areas but raccoons were more common there. Some animals was more active at night when there were more people around. The study showed that building more neighborhoods can decrease the number of animal species and change how they act, which hurts the environment. The researchers said it's important to understand this for better city and wildlife planning. The researchers found that cities expansion harms native animals. They said city planners should protect wild areas, connect green spaces, and stop breaking up animal habitats. They suggested doing more studies year-round to learn how city life affects animals health.

This article is relevant to our research question It provides evidence that more human development lessens native animals and changes behavior. This shows that keeping healthy environments with connected green spaces is important for supporting wildlife in cities and helps our group understand how urbanization affects native animal populations.

c. Science Communication Article Analysis (2 articles)

The article selected for this analysis is *"Making wildlife welcome in urban areas"* by Travis Gallo and Mason Fidino, published in *eLife Digest* in 2019. The citation is: Gallo, T., and Fidino, M. (2019). Making wildlife welcome in urban areas. *eLife Digest*. https://elifesciences.org/articles/41348?utm_source. This online resource summarizes a scientific study in accessible language and is designed for public understanding of science, offering a clear link to the original research.

The purpose of the article is to explain how urban environments influence wildlife behavior and habitat use, and how city design affects the ability of animals to survive within human-dominated spaces. The authors aim to communicate the core findings of a scientific study examining mammal communities in two U.S. cities, focusing on how different levels of urbanization shape species presence and behavior. The article presents information about how mammals respond to features like vegetation structure, housing density, and green-space design, emphasizing the idea that urban areas can support diverse wildlife if designed thoughtfully. It also describes the broader ecological implications of creating wildlife-friendly cities and how small design decisions can influence animal movements and habitat choices.

The intended audience for this article is the general public, students, and individuals interested in urban ecology or wildlife conservation. The writing style is accessible and avoids technical jargon, showing that the goal is education and public engagement rather than academic debate. It is informative rather than persuasive, meaning the authors focus on explaining research results rather than arguing for a specific policy position. As science communicators summarizing a peer-reviewed study, they translate scientific data into everyday language in a way that allows non-experts to understand how mammals interact with urban environments.

The article describes how researchers used camera traps across Washington, DC, and Raleigh, North Carolina to record the presence and activity of urban mammals, including raccoons, foxes, deer, and opossums. The camera traps allowed scientists to compare species across a gradient of environments from highly urban to more natural areas. This method produced a large dataset showing how different mammals select habitats within cities and how they navigate human structures. The summarized results reveal that wildlife species use urban spaces differently depending on vegetation complexity, green-space connectivity, and human presence. For instance, some species, such as raccoons and foxes, were more adaptable and frequently

appeared in residential and moderately urban spaces. Others preferred areas with more natural vegetation, showing the importance of habitat structure even in city environments.

The article also highlights how green spaces play a crucial role in shaping mammal behavior. It explains that urban biodiversity is not simply determined by the amount of green area but by its quality. Trees, shrubs, water sources, and the continuity of vegetation are all factors that improve habitat value for native species. The authors describe how fragmented or overly manicured spaces may not support animals as effectively as more naturalistic landscapes. Through these insights, the article emphasizes how planning decisions influence animal movement patterns and resource use, shaping their daily behavior within urban areas.

A key theme in the article is the adaptability of urban wildlife. Some animals exhibited behavioral changes in response to human activity, such as shifting their active hours or altering movement routes to avoid people. This demonstrates that urban architecture and land use patterns create behavioral pressures that animals must respond to in order to survive. By summarizing these findings, the article shows how city environments act as behavioral filters that reward generalist species while limiting others.

The information presented in the article is grounded in scientific evidence. Although the article itself is a summary, it describes the data collection methods used in the original research and directly ties conclusions to observations from the camera traps. The authors do not show clear bias, nor do they push a particular political or ideological stance. Instead, they rely on evidence from the study to explain how wildlife respond to varying levels of urbanization. Any recommendations for improving urban design are framed as conclusions drawn from research rather than personal opinion, suggesting that the article is both credible and evidence-based.

This article is relevant to the research question about the relationship between native animal populations and urban architecture, especially regarding animal behavioral patterns. It presents new information showing that urban design affects when and where animals move, forage, and seek shelter. The findings emphasize that architectural decisions, such as the layout of green spaces or the continuity of vegetation, directly influence animal behavior. For a question focused on how built environments shape wildlife presence, diversity, and behavior, this article provides strong evidence that behavior is context-dependent and shaped by the structure of the city itself. It supports the idea that healthier, well-connected urban habitats lead to more stable and diverse wildlife populations and more natural behavioral patterns

Scicomm article – Eriel johnson

Bullard, G. (2016, April 20). *Animals like green space in cities and that's a problem.* National Geographic. Retrieved from https://www.nationalgeographic.com/animals/article/160420-green-cities-design-animals-architecture-urban0?utm_source

This article explores the paradox that while people increasingly welcome nature into cities through parks, trees, and green roofs these very efforts can create unintended risks and conflicts for wildlife. The purpose is to highlight how human efforts to "green" urban architecture attract animals into cities, but without thoughtful design, the built environment can become dangerous for wildlife. It presents examples of common urban wildlife encounters (such as bird collisions, highway crossings, and coyote wanderings) and explains how city dwellers and designers are beginning to adapt to share space with animals. The article aims to raise awareness of the need for "cross-species diplomacy," urging people to rethink how cities are built so that both humans and animals can coexist safely.

The information presented includes real-world incidents (e.g., birds hitting glass in buildings, a snowy owl struck by a bus), insights from urban planners and ecologists, and practical architectural solutions (like wildlife corridors, turning off lights, and green roofs) to reduce conflicts. It also discusses the benefits of wildlife presence in cities for both people (mental health, connection to nature) and conservation.

The article is clearly intended for a general, educated audience interested in nature, urban design, and environmental issues. As a piece in *National Geographic*, it blends scientific insight with storytelling. It is informative and educational rather than opinionated, though it does advocate for better planning. Gabe Bullard, the author, is a science communicator and journalist rather than a research scientist; he draws on quotes and data from experts planners, ecologists, and policymakers to back up his points.

Much of the content revolves around specific vignettes that illustrate broader themes. One vivid example is the Thurgood Marshall Federal Judiciary Building in Washington, D.C., where birds repeatedly crashed into the atrium glass. The simple solution turning off building lights at night demonstrates how minor changes in urban architecture can significantly reduce wildlife mortality. This illustrates the behavioral pattern of birds being drawn toward light and reflective surfaces, and how design interventions can mitigate risk.

The article also covers how green roofs and native plantings help attract wildlife into cities. Green roof designers (like Susannah Drake) are quoted, explaining how deeper soil beds on rooftops support invertebrates, which in turn attract birds. These "stepping stones" of green infrastructure create connectivity across urban landscapes and reduce the danger wildlife face when trying to move across the city. The ecological benefits are discussed alongside architectural strategies bringing together behavior, conservation, and design.

Another key point is how corridors work in cities: streets and neighborhoods are not just barriers but pathways for wildlife. Urban planner Stella Tarnay is quoted saying "everything is a corridor for wildlife," meaning that animals use gardens, roadsides, even tunnels, to move between green spaces. This highlights how animal behavioral patterns (movement, foraging, migration) depend strongly on how human infrastructure is laid out, and how urban design can accommodate those patterns rather than obstruct them.

Finally, the article argues for "cross-species diplomacy." This means not just designing wildlife-friendly buildings but educating people about the risks and realities of sharing space with animals. For example, people need to understand that some animals may collide with windows or that even green spaces can host predators or other hazards. The article suggests that conservation in cities is not just about preserving green areas, but about changing human culture teaching people how to live responsibly with wildlife in the built environment. This call to action is backed by evidence and expert opinion, making it a credible, evidence-informed piece rather than a purely emotional or speculative one.

In terms of bias, the article leans toward conservation and ecological design but is grounded in real-world examples and expert testimony. The evidence comes from city officials, urban ecologists, planners, and published studies (for instance, the 2006 study on green roofs in Switzerland). There's no sensationalism; instead, the article emphasizes practical solutions and shared responsibility. Because it draws on expert voices and documented cases, its perspective is informed and balanced, rather than purely ideological.

This article contributes directly to the question *"What is the relationship between native animal populations and urban architecture with respect to animal behavioral patterns?"* by offering concrete examples and insights. It shows that urban architecture influences animal behavior in multiple ways: lighting and glass affect bird mortality, vegetation design affects species

movement and habitat use, and built corridors (streets, green roofs, tunnels) shape how animals navigate the city.

The article underscores the importance of design in shaping native animal populations not just existing green spaces, but the structure and connectivity of those spaces matter. It also provides evidence that human behavior (such as turning off lights or supporting wildlife corridors) can mitigate negative interactions. This supports the idea that urban architecture doesn't just passively host wildlife; it actively shapes their behavioral patterns.

Moreover, by promoting the idea of "cross-species diplomacy," the article helps illuminate how changing human culture and infrastructure can align with wildlife conservation goals. This is directly relevant to understanding how healthy urban environments are not just good for people, but essential for sustaining native animal behavior and populations in the long term.

5. Proposed Experiment

1. Independent Variable

The independent variable in this proposed experiment is the **level of green-space connectivity in urban architecture**. This includes how connected parks, native plant patches, and habitat corridors are within an urban area. Sites would be grouped into low, medium, or high connectivity.

2. Dependent Variable

The dependent variable is **native animal response**, measured through:

- Species richness
- Relative abundance
- Behavioral patterns such as foraging activity and nocturnal vs. diurnal behavior

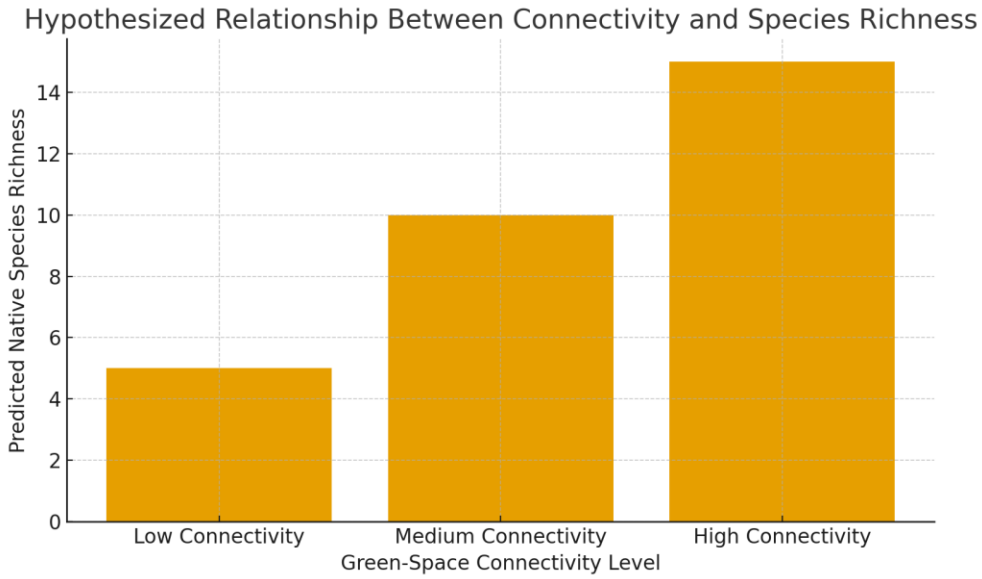
These are the outcomes expected to change in response to different levels of connectivity.

3. Control

A natural peri-urban site (or the lowest-connectivity urban sites) serves as the control. These areas represent minimal architectural influence and provide a baseline for what native wildlife behavior looks like without strong urban modification.

4. Proposed Results Figure

The graph you see above represents **hypothesized results**, not real experimental data. The expected trend is that species richness increases from low to medium to high connectivity. This visual predicts that more connected green space allows native animals to move more easily, maintain natural behaviors, and persist in higher numbers.



6. Summary and Reflections

As I reviewed the scientific and science-communication articles for my project, I was able to fully answer my research question about the relationship between native animal populations and urban architecture and how those environments influence animal behavior. The findings consistently showed that the way humans design and maintain cities has a direct and measurable impact on how wildlife behaves, survives, and moves. From green space quality to building shape and lighting choices, urban features act as behavioral filters that either support or hinder native species. I found that healthy, well-connected landscapes promote natural behaviors like foraging, nesting, and migration, while poorly designed infrastructure can disrupt animal movement or even lead to injury and death. This helped me confirm that urban architecture is not separate from ecology; it is an active part of the habitat that shapes behavioral patterns in important ways.

Across all the sources, several major conclusions stood out to me. One is that wildlife behavior changes depending on the opportunities and dangers created by city design. For example, birds are attracted to green roofs and native plants, which help them feed and breed, but they may also collide with windows or be confused by artificial lights at night. Mammals use human-created corridors like streets, tunnels, and connected vegetation to travel, showing that cities can act as functioning ecosystems if the layout is supportive. Another major conclusion is that human behavior is just as important as physical architecture. Something as simple as turning off building lights or planting native vegetation can completely change the level of risk or support wildlife experiences in the city. I also saw that socioeconomic factors play a role because neighborhoods with more resources often have more vegetation and wildlife-friendly infrastructure, showing how social patterns shape ecological patterns.

Thinking about next steps, I believe more research should focus on designing cities that intentionally support wildlife rather than accidentally harming them. For my specific question, it would be valuable to collect local data from different neighborhoods to see how specific architectural choices like window types, lighting, or vegetation structure affect the presence and behavior of native animals in real time. Future studies could also include community engagement to see how residents perceive wildlife and how public choices influence urban biodiversity. Expanding research to more species and more cities would help strengthen these patterns and guide better urban planning.

During this research project, the most interesting and surprising thing I learned was how much small design decisions matter. I never realized that a simple architectural feature like a reflective window or a strip of native plants could completely change animal behavior. Learning how species adjust their daily activities, movement patterns, or even migration routes based on city layout made me see urban areas as living ecosystems instead of just human spaces. I was also surprised by how much agency humans have through planting choices, lighting, and design. It made me realize that humans and wildlife interact far more than we tend to notice.

This project changed my idea of science and how scientists approach questions. I saw that scientific research often builds on many smaller studies rather than relying on one big experiment. The review article showed me how scientists pull together evidence from many different places, compare patterns, and use that to answer big ecological questions. I learned that science isn't just about experiments in labs; it's also observation, city planning, social patterns, and even public behavior. I now see research as a long, collaborative process instead of something done in isolated work.

I do think it's important for the public to understand these science processes because people are shaping wildlife habitats every day without realizing it. If more people understood how design choices affect animal survival, they might make better decisions or support policies that protect native species in cities. Public awareness can lead to better coexistence between people and wildlife.

Through this project, I gained a lot of useful research skills that will help me with future questions. I learned how to evaluate evidence, identify bias, understand the difference between scientific and sci-comm articles, and connect multiple sources to answer one clear question. I also learned how to summarize complex information and interpret ecological patterns. These skills will help me think critically and ask better questions in future research.

Now that I've completed this project, I find myself wondering how climate change will interact with urban architecture to reshape wildlife behavior even more. I'm curious how rising temperatures, shifting habitats, and increased city development will affect species that are already trying to adapt to human environments. I also wonder what new designs or technologies cities will create to better support native wildlife. Overall, this project made me appreciate both the resilience of animals and the responsibility humans have in shaping the environments we share.

7. Reference Page

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