National Survey of Wildlife Viewers:

Understanding Wildlife Viewers across the Urban-Rural Gradient

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Executive Summary

Background

Wildlife viewing (defined as “closely observing, photographing, or feeding wildlife, maintaining plantings or natural areas for the benefit of wildlife, or taking trips to parks or other natural areas to feed, photograph, or observe wildlife”) is one of the fastest growing wildlife-related recreation activities in the United States (U.S.; U.S. DOI & U.S. FWS, 2023). Historically, state fish and wildlife agencies (hereafter, state agencies) have depended on hunters and anglers to fund the state agencies’ conservation efforts, through a system known as the North American Model of Conservation (Price Tack et al., 2018). In recent years, surveys show a plateau or decline in participation in hunting and angling, while participation in wildlife viewing continues to rapidly grow (U.S. DOI & U.S. FWS, 2023). Increasing the focus on wildlife viewers has the potential to significantly aid state agencies in achieving their conservation goals (Association of Fish and Wildlife Agencies [AFWA] & Wildlife Management Institute [WMI], 2019). While hunter-anglers and wildlife viewers are often treated as separate groups, research indicates that interest in wildlife viewing is a common ground for many wildlife recreationists, and that managing for wildlife viewing serves the traditional constituencies of state agencies while also fostering opportunities for broadening constituencies (Cooper et al., 2015; Grooms et al., 2021; Sinkular et al., 2022a). Research has also shown that when wildlife viewers are supported by state agency programming, they are more aware of the state agency, more likely to provide funding to the agency, and potentially more likely to perform conservation actions (Sinkular et al., 2022a). Taken together, this suggests that managing for wildlife viewing will grow the numbers of people engaging with state agencies, donating to agencies, and supporting conservation.

This report builds on the National and Regional Wildlife Viewer Survey, which found that approximately 30% of wildlife viewers lived in a major city, another 50% in a smaller city or suburban area, and the remaining 20% in a rural area (Sinkular et al., 2022a). Given the large number of urban wildlife viewers, state agency wildlife viewing staff at the 2022 Wildlife Viewing and Nature Tourism Academy Recommendations Workshop identified better understanding urban wildlife viewers as a priority. In addition, some state agency staff hold the perception that this group has a weaker relationship with state agencies. Moreover, this report aligns with the Association of Fish and Wildlife Agencies Relevancy Roadmap, which prioritizes reaching broader and previously underserved audiences, including people who live in urban areas (AFWA & WMI, 2019).

In this report, we aimed to better understand urban wildlife viewers by exploring questions about how characteristics of wildlife viewers change across the urban-rural gradient. With input from state agency partners, we focused on how the degree of urbanicity (a measure of how urban or rural a locality is) of the place where a wildlife viewer lives is related to:

1. Ethnoracial identity and income
2. Time spent wildlife viewing in different locations
3. Forms of wildlife viewing
4. Wildlife viewing skill
5. Perception of barriers to participation
6. Relationships with state agencies (i.e., familiarity and experience with state agency programs)
7. Communication preferences

We also incorporated wildlife viewers' ethnoracial identity and household income into our analyses to understand how these factors influence wildlife viewing behavior across the urban-rural gradient. We focused on ethnoracial identity and income because including underrepresented income and ethnoracial groups is a priority in the Relevancy Roadmap (AFWA & WMI, 2019). We also predicted ethnoracial identity and household income differ across the urban-rural gradient and influence wildlife viewing behavior.

Methods

Our analysis was based on the National and Regional Wildlife Viewer Survey (*n* = 17,591 eligible respondents across the combined national and state samples, Pototsky et al., 2022a-f; Sinkular et al., 2022a-f; Sinkular et al., 2023a-c). To take the survey, respondents had to have participated in some form of wildlife viewing (modified from U.S. DOI et al., 2018) in the last five years. Respondents were asked a series of questions about their wildlife viewing experiences. Questions included in this analysis assessed wildlife viewers' viewing location, types of viewing activities, self-reported skill level, barriers to participation, familiarity with state agencies, experience participating in programs, and demographic characteristics.

To assess the degree of urbanization where wildlife viewers lived, we calculated a metric we called *urbanicity* for each ZIP code tabulation area (ZCTA) in the United States. In brief, urbanicity was a metric of the degree of urbanization of each ZCTA, as measured by land cover and population density. We combined impervious surface data from the 2021 National Land Cover Database (Dewitz & U.S. Geological Survey, 2021) and population density data from the 2021 American Community Survey 5 year estimates (U.S. Census Bureau, 2022). This gave us an urbanicity metric that ranged from 0-1, with the most rural ZCTAs having the lowest scores and the most urban ZCTAs having the highest scores.

We performed data cleaning on survey responses, after which we had a total of 16,641 respondents across 6,411 ZCTAs for inclusion in our analyses. For all of our statistical analyses, we compared the urbanicity of the ZCTA where a wildlife viewer lived with their responses to the National and Regional Wildlife Viewer Survey. To assess the relationship between ethnoracial identity and urbanicity, we ran a Kruskall-Wallis test with a post-hoc Dunn's test. For all other analyses, we used a combination of Kendall's rank correlations and generalized linear models with binomial distributions to explore the relationships between survey responses and urbanicity. We also ran additional binomial regression models that included wildlife viewers' household income and whether or not they were Black, Indigenous, or a person of color (BIPOC).

Finally, we generated descriptive statistics of the ethnoracial identity and wildlife viewing characteristics of both urban and rural wildlife viewers. We defined "urban" wildlife viewers as those who lived in ZCTAs in the top quartile of wildlife viewer urbanicity scores, and "rural" wildlife viewers as those who lived in ZCTAs in the bottom quartile.

Selected Findings & Recommendations

Our analyses revealed that the characteristics of wildlife viewers differ across an urbanicity gradient. Between rural areas and cities, there are changes in who is viewing wildlife, how they are viewing, where they are viewing, the challenges they face, and their relationships with state agencies. In this report, we share a selection of recommendations, along with the results of this study that support them, co-developed with state agency wildlife viewing staff.

Focus on urban areas to reach more wildlife viewers from ethnoracial minorities

Overall, we found that areas with higher urbanicity had a significantly higher percentage of BIPOC wildlife viewers than areas with lower urbanicity. In particular, there were more Black or African American, Asian, Native Hawaiian or other Pacific Islander, and Middle Eastern or North African wildlife viewers in more urban areas. Focusing on wildlife viewing offerings in cities will be especially key for serving Black or African American wildlife viewers: 10% of urban wildlife viewers in our study were Black or African American, as opposed to only 3.8% of rural wildlife viewers.

Create programming around activities that urban wildlife viewers prefer

The most popular wildlife viewing activities among urban wildlife viewers were visiting parks to view wildlife (almost two-thirds of urban wildlife viewers participated), photographing wildlife (over half of wildlife viewers), and feeding birds (just under half of wildlife viewers). While the same three activities were also most popular among rural

wildlife viewers, we observed some differences between wildlife viewers who lived in more urban as compared to more rural areas. Wildlife viewers who lived in more urban areas engaged in visiting parks more and feeding birds less than those in more rural areas. Focusing wildlife viewing programming for urban wildlife viewers on these three activities could align well with existing wildlife viewer interests.

Tailor programming in public spaces to urban wildlife viewers

Our analysis revealed that wildlife viewers in public spaces, such as larger green spaces, parks, and lands further from people's homes, are more likely to be from urban than rural areas. There are both more urban than rural wildlife viewers overall (Sinkular et al., 2022a), and urban wildlife viewers are more likely to view in public spaces than rural wildlife viewers. While viewing wildlife around the home was very popular with both urban and rural wildlife viewers (93% and 96% of wildlife viewers participated, respectively), wildlife viewers who lived in more urban areas were more likely than those in more rural areas to participate both away from home and out of state or country. Considering the needs and interests of urban wildlife viewers, as outlined in this report, when designing programming such as signage, events, or interpretation for public spaces could help state agencies better connect with wildlife viewers.

Offer diverse programming for urban wildlife viewers of all expertise levels

Some may believe that urban wildlife viewers have less expertise in wildlife viewing than rural wildlife viewers. However, in our study, urban wildlife viewers were actually more likely to rank themselves as intermediate or higher expertise than rural wildlife viewers. State agencies can offer wildlife viewing opportunities for all different levels of expertise, while still providing important entry-level programming to serve the almost two-thirds of urban wildlife viewers who reported themselves as beginner and novice and attract new people to wildlife viewing.

Reach urban wildlife viewers by creating programming in urban areas, especially parks

Our research showed that around the home viewing is popular among urban wildlife viewers and that urban wildlife viewers enjoy visiting parks to view wildlife. Although wildlife viewers living in more urban areas are more likely to travel to view wildlife than those in more rural areas, almost ⅔ of urban wildlife viewers reported that distance to high quality viewing locations limited their participation at least somewhat. These findings all suggest that state agencies can reach more urban wildlife viewers by focusing on viewing in urban areas like city parks and urban wildlife trails, especially those that are accessible by public transit. Programming specifically focused on these urban green spaces, such as events and festivals held in cities, city-specific wildlife

viewing guides, resources on common urban viewable wildlife, and participatory science events like the City Nature Challenge might help state agencies better serve urban wildlife viewers. Reaching people in places where they already are in cities, like schools, community centers, markets, and non-wildlife-focused events, may help overcome both distance and time barriers. Although state agencies might often prioritize wildlife viewing opportunities where charismatic and/or more uncommon wildlife are found, our analyses show that in order to engage urban wildlife viewers, it is also important to go where wildlife viewers are. In addition, wildlife viewers in more urban areas were more likely to report lack of information about places to view wildlife as a barrier to viewing, with almost half of urban wildlife viewers experiencing it as at least somewhat of a barrier. This suggests that wildlife viewers may also not be aware of opportunities to view wildlife that do exist around them, and that increasing both access to and awareness about wildlife viewing in cities is important.

Utilize more virtual and social media communication methods to share information with urban wildlife viewers

Our study showed that lack of information about places to view wildlife was more likely to be a barrier for wildlife viewers in more urban areas than more rural areas. We also uncovered differences in the ways in which urban and rural wildlife viewers prefer to receive information from state agencies. The same three modes of communication were most popular among both urban and rural wildlife viewers: email, agency websites, and printed materials. However, compared to those in more rural areas, wildlife viewers in more urban areas preferred virtual and social media communication methods, such as blogs, emails, online magazines, podcasts, YouTube, Instagram, TikTok, and Twitter. They also were less likely to prefer physical materials (such as print materials and mailed newsletters) and in person communication with agency staff. Taken together, this suggests that to help overcome the information barrier facing urban wildlife viewers, state agencies could make use of more virtual and social media communication tools. Collaborating with local organizations that frequently offer outreach programs for or communicate with wildlife viewers in urban areas will be key to learning effective strategies.

Use the ParkServe Tool to identify priority locations for expanding access to nature in cities

Our research has shown that developing opportunities for wildlife viewing in cities near where urban wildlife viewers live is key. State agencies may be interested in understanding current patterns of access to nature in cities, and pinpointing priority areas where people have particularly limited access to focus their efforts. To do this, we recommend using a tool developed by the Trust for Public Land called ParkServe® (available at: https://parkserve.tpl.org/mapping/). The ParkServe® database contains

information on every urban park in every urban area (over 15,000 cities and towns) in the U.S. Through their free, interactive mapping tool, users can search a city and instantly generate a map of that city, where parks are currently located, and priority areas for new parks based on distance from other accessible parkland. Each search also generates summary statistics, such as the percentages of different ethnoracial groups, age groups, and income groups, as well as the overall percentage of residents that live within a 10 minute walking distance from a park. An interactive scenario module allows users to change the map of priority areas for developing parks by adjusting prioritization criteria, and users can test out how adding new parks and trails would impact nature access. State agencies could use this tool to identify areas within a city where there is a higher priority for developing wildlife viewing opportunities based on their own criteria, as well as test the impact of new parks and trails. Wildlife viewing opportunities could be developed by creating programming in existing natural spaces, performing habitat restoration to improve natural space quality, or creating new natural spaces. State agencies could also use this tool to draw comparisons between cities in their state to determine which have more or less access to nature overall.

Expand access and outreach for low income and BIPOC wildlife viewers

We found that, after accounting for urbanicity, lower income wildlife viewers were less likely to participate in viewing than higher income wildlife viewers, regardless of where the viewing took place (around home, away from home, out of state or country) or type of activity. The only exception to this was that lower income wildlife viewers were more likely than higher income wildlife viewers to feed animals other than wild birds. Distance to high quality wildlife viewing locations was a barrier to their participation, and they were less likely to be familiar with state agencies or participate in programs than higher income wildlife viewers. In addition, we found that there were fewer low income wildlife viewers in urban than rural areas, suggesting that we may be missing an opportunity to engage low income urbanites. We found that BIPOC wildlife viewers were more likely to experience lack of free time, distance, and knowledge as at least somewhat of a barrier to viewing than white wildlife viewers. State agencies wishing to better serve low income and BIPOC wildlife viewers could both expand outreach to these wildlife viewers and opportunities to view around where wildlife viewers live. These efforts may also help retain BIPOC participation in wildlife viewing, an important consideration given that BIPOC are underrepresented in wildlife viewing as compared to the U.S. population (Jones et al., 2021; Sinkular et al., 2022a). Our research shows that BIPOC wildlife viewers have a high level of participation in wildlife viewing, so emphasizing engaging with existing strengths and interests may be key to successful outreach.

Expand state agency capacity in urban areas through partnerships

State agencies that wish to expand their reach in urban areas may be hindered by lack of capacity, including a lack of staff based in urban areas, a lack of experts in urban outreach, and a lack of urban lands. Partnering with urban-based organizations, including city parks and recreation agencies, zoos and aquariums, and local community groups, represents a key opportunity to expand that capacity and bring programming to where people are. These groups may be stewards of the urban greenspaces where urban wildlife viewers are already going to recreate, including parks, trails, and community gardens, and could partner with state agencies to deliver programming there. In addition, groups with connections to local communities can help state agencies determine how to best conduct programming for urban wildlife viewers and act as a trusted liaison that may help overcome any negative public perceptions of the state agency. Investing time and energy into building these relationships, working to make them mutually-beneficial, and respecting the expertise of local groups will be key for creating lasting, impactful partnerships.

Build leadership support for urban wildlife viewers

Traditionally, the focus of state agencies has been on hunting and fishing. However, for state agencies to maintain their relevancy with the public, it is key to serve the growing population of urban wildlife viewers. This need not be in conflict with serving traditional constituencies. Past research has shown that there is overlap between wildlife viewers and hunters and anglers, hunters and anglers are interested in many of the same types of programs and support as wildlife viewers, and that managing for wildlife viewing will align with the needs of hunter-anglers (Grooms et al., 2023; Sinkular et al., 2022a). We hope that through sharing this study with state agency leadership, wildlife viewing professionals can communicate the importance of urban wildlife viewers as well as strategies to serve them more effectively.

Conclusions

This analysis of wildlife viewers across an urban-rural gradient fills multiple knowledge gaps about urban wildlife viewers and how they differ from rural wildlife viewers: who they are, where they view wildlife, what activities they participate in, their skill level, what barriers they face, and their relationships with their state agency. It also reveals that, beyond urbanicity, the income and ethnoracial identity of wildlife viewers have additional effects on how people engage in viewing. The information revealed here can enable state agencies to expand wildlife viewing programming and access to underserved urban, low income, and BIPOC wildlife viewers. These efforts will help state agencies become more relevant to a larger, more diverse constituency that is representative of the population of the U.S.

The following report details the methodology, complete findings, and conclusions from the analysis of the National and Regional Survey of Wildlife Viewers, administered to a national sample of wildlife viewers with additional oversamples in select states, with a focus on urban wildlife viewers. Accompanying Appendix A contains supplemental results tables, and Appendix B contains the results of a case study focused on the Great Florida Birding and Wildlife Trail.

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Introduction

Over the past three decades in the United States (U.S.), state fish and wildlife agencies (hereafter, state agencies), have made it a top priority to expand their reach to secure the financial and political support necessary to ensure the future of North America's conservation legacy (AFWA, 2017). The imperative to reach "broader constituencies," as defined by the Association of Fish and Wildlife Agencies (AFWA) Fish and Wildlife Relevancy Roadmap (hereafter, the Relevancy Roadmap), encompasses individuals and groups of people who are not currently engaged in conservation or with a conservation agency, including people from diverse ethnicities and backgrounds, youth, the elderly, people with disabilities, new immigrants, people of varied economic or educational backgrounds, and those who live in urbanized communities with limited or no access or personal connection to fish or wildlife (AFWA & WMI, 2019).

Since their inception, the work of many state agencies has been largely funded through the sale of hunting and fishing licenses, boating and shooting permits, and taxes on recreation equipment under a user-pay, user-benefit model (Organ et al., 2012). However, broader engagement is needed because of declines or stagnation in traditional outdoor recreational participation (namely hunting and angling). State agencies are faced with a shifting user base, along with a broader shifting demographic landscape marked by a more diverse and urbanized population (Organ et al., 2012; AFWA & WMI, 2019). Thus, the sustainability of state agencies and their contributions to wildlife conservation is contingent on expanding and diversifying the financial and political support provided by the public (AFWA & WMI, 2019).

In this report, we investigate the intersection of two segments of the Relevancy Roadmap's broader constituencies: wildlife viewers living in urban areas. This report builds on the work of the National and Regional Wildlife Viewer Survey, which explored the roles of the largest and fastest growing group of nontraditional recreationists, wildlife viewers (Sinkular et al., 2022a). Wildlife viewing is a broad category of wildlife-associated recreation that includes intentionally observing, photographing, or feeding wildlife, improving or maintaining wildlife habitat, and visiting parks and natural areas for the primary purpose of wildlife viewing (U.S. DOI & U.S. FWS et al., 2022). While hunter-anglers and wildlife viewers are often treated as separate groups, both the findings of the National and Regional Wildlife Viewer Survey (Sinkular et al. 2022a) and research published elsewhere (e.g., Cooper et al. 2015; Grooms et al. 2021) indicate that interest in wildlife viewing is a common ground for many wildlife recreationists. Managing for wildlife viewing serves the traditional constituencies of state agencies and fosters opportunities for broadening constituencies. Research has also shown that when wildlife viewers are supported by state agency programming, they are more aware of the state agency, more likely to provide funding to the agency, and potentially more

likely to perform conservation actions (Sinkular et al., 2022a). Taken together, this suggests that managing for wildlife viewing will grow the numbers of people engaging with state agencies, donating to agencies, and supporting conservation.

The National and Regional Wildlife Viewer Survey found that approximately 30% of wildlife viewers surveyed lived in a major city; another 20% reported living in a rural area and the remaining 50% reported living in a smaller city or suburban area (Sinkular et al., 2022a). These results were shared at the 2022 Wildlife Viewing and Nature Tourism Academy Recommendations Workshop, convened by AFWA for state agency wildlife viewing staff. Participants in the workshop were interested in further understanding urban wildlife viewers, as there was a perception that there is a weaker relationship with state agencies among this group and given the importance of around-the-home viewing revealed in the National Wildlife Viewer Survey, connection with this audience in urban locations is key (Sinkular et al., 2022a).

This goal of connecting with urban audiences in urban locations is not novel; indeed, in a 1999 report on “Broadening the Constituencies of State Fish and Wildlife Agencies: Some Successful Strategies,”, Kolus et al. (1999) recommends state agencies to “reach out to urban areas… regardless of the type of program you are developing” partly because votes and tax money are concentrated in these areas. The Relevancy Roadmap notes that state agency managed lands are often in rural areas, away from urban centers. Although this has benefits (e.g.,. providing safe places to use firearms, offering solitude, lower land acquisition costs), these areas are less accessible to many broader constituencies because of transportation or time constraints. The Relevancy Roadmap also recommends that state agencies should seek to match the proximity of outdoor recreation and nature-based opportunities to provide broader constituencies access to nature.

A 2023 Multistate Conservation Grant Program (MSCGP) grant, entitled “Implementing Recommendations from the Wildlife Viewer Survey: Enhancing Relevancy and Engaging Support from a Broader Constituency” was awarded to Virginia Tech and the AFWA Education, Outreach & Diversity (EOD) Committee - Wildlife Viewing and Nature Tourism (WVNT) Working Group and to ensure successful implementation of the findings from the National and Regional Wildlife Viewer Survey. This report presents new analyses of data from the National and Regional Wildlife Viewer Survey (Sinkular et al., 2022a), focusing on wildlife viewers across the urban-rural gradient. To better understand urban wildlife viewers and assist state agencies in connecting with wildlife viewers across the urban-rural gradient, we combined this survey data with publicly available data on population density and built-up area. With input from state agency partners, we focused on how the degree of urbanicity (a measure of how urban or rural a locality is) of the place where a wildlife viewer lives is related to:

1. Ethnoracial identity and income
2. Time spent wildlife viewing in different locations
3. Forms of wildlife viewing
4. Wildlife viewing skill
5. Perception of barriers to participation
6. Relationships with state agencies (i.e., familiarity and experience with state agency programs)
7. Communication preferences

For research questions 2-7, we also incorporated wildlife viewer ethnoracial identity and income to understand how relationships with urbanicity changed when demographics were taken into account. We focused on ethnoracial identity because our state agency partners were interested in reaching more BIPOC (Black, Indigenous, and people of color) wildlife viewers, and part of the motivation to better understand urban wildlife viewers was because there was a perception that urban areas would have more ethnoracially diverse wildlife viewers. We chose to look at income because we hypothesized that it would influence viewing behavior, and we also expected that there would be a relationship between wildlife viewer income and urbanicity of where viewers live. In addition, increasing inclusion in wildlife-associated recreation for underrepresented income and ethnoracial groups is a priority in the Relevancy Roadmap (AFWA & WMI, 2019).

The analysis presented in this report will enable state agencies to create efforts specifically relevant to diverse audiences in growing population centers. The report concludes with recommendations for improved engagement between state agencies and wildlife viewers living in urban areas were co-produced by the research team and staff from state agencies across the country.

Methods

Survey instrument

We developed a survey instrument consisting of 117 closed-ended questions about wildlife viewers' recreation and conservation behaviors and relationships with their state agencies (see Sinkular et al., 2022a for details of survey development and administration). The survey was administered in 2021 to a national sample of wildlife viewers (*n* = 4,030, Sinkular et al., 2022a), as well as additional pools in 14 individual states (*n* = 13,561, with approximately 500-1,000 respondents per state, Fig. 1, Pototsky et al., 2022a-f; Sinkular et al., 2022a-f; Sinkular et al., 2023a-c) for a total of 17,591 eligible respondents. The survey was a panel survey, with quotas set for age, gender, and education to match demographics of wildlife viewers reported in the 2016 National Survey for Hunting, Fishing, and Wildlife-Associated Recreation (U.S. DOI et al., 2018). A panel survey is a form of internet survey that consists of sampling respondents from an online group, or panel, and usually provides a small form of compensation.

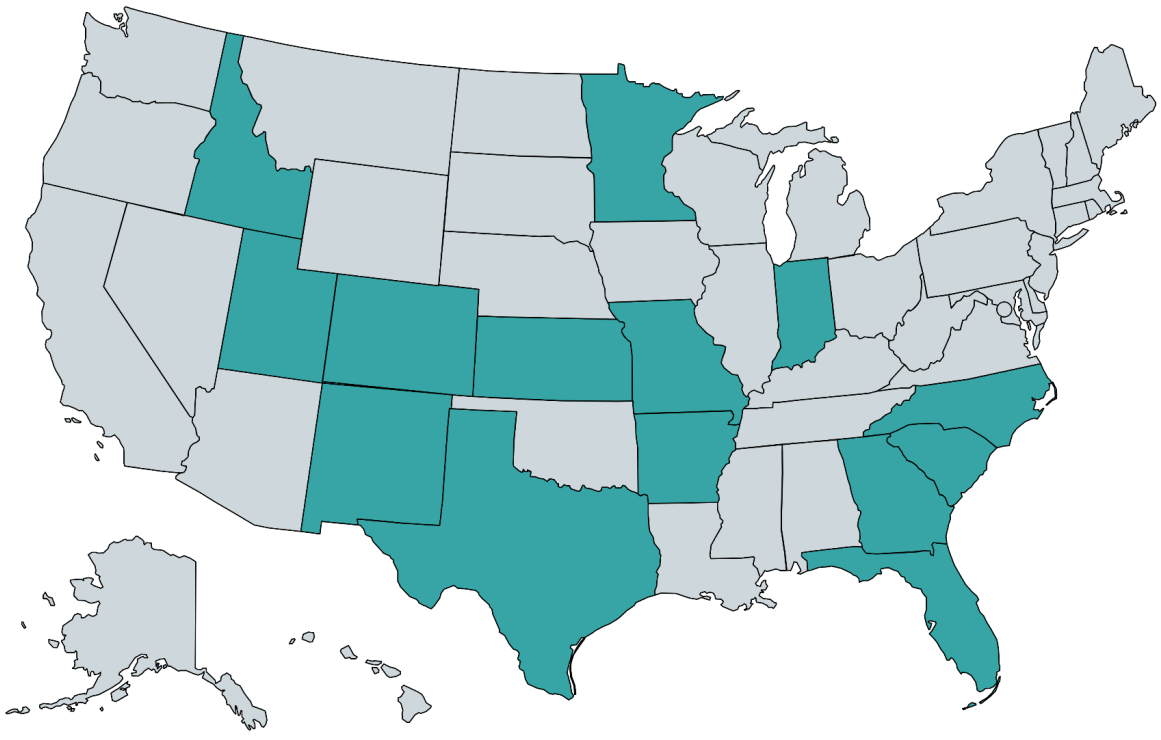

Figure 1. Map of state-level sampling
Map of the United States showing the 14 states that participated in state-level sampling for the Wildlife Viewer Survey.

Only individuals who had participated in at least one form of wildlife viewing in the past five years were able to complete the survey. This study did not examine traits of non-wildlife viewers. The survey provided a definition of both "wildlife" and "wildlife viewing" to ensure inclusion of a broad range of people who participate in various forms of wildlife viewing and exclusion of those who only observe wildlife incidentally during other outdoor activities. The following definitions were adapted from the National Survey of Wildlife Recreation (U.S. DOI et al., 2018):

For this survey, *wildlife* refers to all animals, such as birds, fish, insects, mammals, amphibians, and reptiles, that are living in natural environments, including in urban and semi-urban places. Wildlife does not include animals living in artificial or captive environments, such as aquariums, zoos, or museums, or domestic animals such as farm animals or pets.

Wildlife viewing refers to intentionally observing, photographing, or feeding wildlife; improving or maintaining wildlife habitat; or visiting parks and natural areas for the primary purpose of wildlife viewing. Wildlife viewing does not include simply noticing wildlife while doing something else, such as gardening, exercising, hunting, fishing, or intentionally scouting for game.

Survey questions assessed in this analysis covered wildlife viewers'

- Location of participation in wildlife viewing
- Types of wildlife viewing participated in
- Level of skill as a wildlife viewer
- Barriers to participating in wildlife viewing
- Familiarity with state agencies
- Experience with state agency programs, and
- Demographic characteristics.

Urbanicity metric

In order to understand how urban wildlife viewers differed from rural wildlife viewers, we needed to determine the level of urbanization where each respondent lived. To do this, we calculated a metric we called *urbanicity* for each ZIP code tabulation area (ZCTA) in the continental U.S. Alaska and Hawaii were excluded from the analysis because comparable land cover data was not available for those states, and we had a relatively low number of survey respondents. In brief, urbanicity was a metric of the degree of urbanization of each ZCTA, as measured by land cover and population density. This metric was based on the Global Human Settlement Layer, which also measures urban density using a combination of population density and built up area (Florcyzk et al.,

2019). However, we calculated our own metric so that it would be continuous, specific to the U.S., and match the spatial resolution of our survey data.

We calculated urbanicity in ZCTAs because ZIP codes are the finest spatial unit for which we had location data for survey respondents. ZCTAs are geographic approximations of ZIP codes. We obtained shapefiles of 2021 ZCTAs from TIGER/Line (U.S. Census Bureau, 2021).

We calculated urbanicity as an equally-weighted combination of percent impervious surface and log population density in a ZCTA. *Impervious surface* refers to developed areas, such as paved areas and buildings. We used impervious surface data from the 2021 National Land Cover Database (Dewitz & U.S. Geological Survey, 2021) which provided raster data on percent impervious surface in the continental U.S. from 2019 at a 30 meter resolution. We multiplied each raster pixel's percent impervious surface value by pixel area to determine the total impervious surface areas in each pixel, and then used zonal statistics to determine the impervious surface area in each ZCTA. Finally, we divided impervious surface area by total land area in each ZCTA to determine percent impervious surface area in each ZCTA. We used population density data for each ZIP code from the 2021 American Community Survey 5-year estimates (U.S. Census Bureau, 2022). ZIP codes with a missing estimate of population density or a population density of zero were dropped from the analysis. ZIP code population density was then matched with the corresponding ZCTA using the 2021 Uniform Data System Mapper ZIP to ZCTA crosswalk (UDS Mapper, 2021). We took the log of population density to address the right-skewed raw data, and to generate final urbanicity metrics that were less skewed and captured urban areas across the United States. We then normalized log population density to match the scale of the percent impervious surface data (0-1). To calculate urbanicity for each ZCTA, we added together the equally-weighted percent impervious surface (0-1) with normalized log population density (0-1) (Eq. 1). This gave us a final urbanicity metric that ranged from 0-1, where 0 was low urbanicity in the most rural ZCTAs, and 1 was high urbanicity in the most urban ZCTAs (Fig. 2). We performed a sensitivity analysis to determine how to weight impervious surface and population density, and determined that equal weighting was the most appropriate to produce a metric that was not strongly right-skewed and captured differences in urbanicity between cities with different development density.

$$\text{Urbanicity} = 0.5(\%\ \text{impervious surface}) + 0.5(\text{normalized log}(\text{population density}))$$

Equation 1. Urbanicity Metric

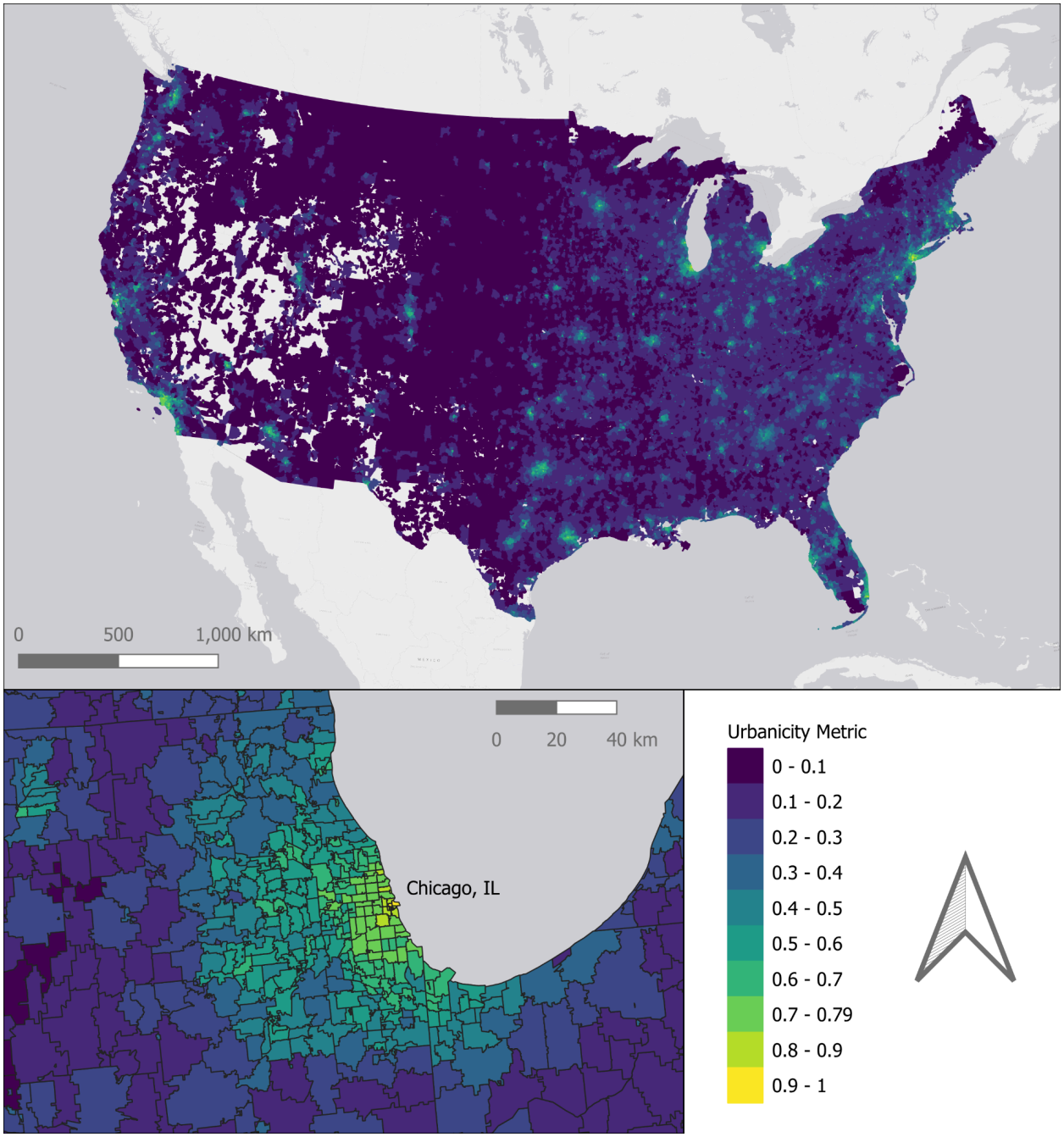

Figure 2. Map of urbanicity across the United States
Urbanicity shown for every ZIP code tabulation area in the continental United States, with darker purple representing the most rural and bright yellow representing the most urban areas. Areas with missing values either have no ZCTAs or are missing population estimates in the 2021 American Community Survey. The inset on the bottom left shows urbanicity for the city of Chicago, Illinois, with the highest values in the city center, mid-ranged values in the suburbs, and low values in the surrounding rural areas.

Survey data cleaning

We performed a final round of data cleaning to check whether respondents' ZIP codes matched the states they reported being from, and any respondents non-matching ZIP codes and states were excluded. Remaining survey respondent ZIP codes were matched to ZCTAs using the 2021 Uniform Data System Mapper ZIP to ZCTA crosswalk to match ZIP codes to ZCTAs (UDS Mapper, 2021), and any responses that could not be matched were removed from the analysis. Any survey respondents from ZCTAs for which we could not calculate urbanicity (i.e., outside the continental United States, missing population density estimates) were also excluded from the analysis. This generated a dataset consisting of 16,641 respondents across 6,411 ZCTAs.

Statistical analysis

Comparing urban and rural wildlife viewers

For all statistical tests, we used the continuous metric of urbanicity to examine how living in a more urban as opposed to less-urban ZCTA was related to wildlife viewer ethnoracial identity and survey responses. However, we used a different approach for descriptive statistics of urban wildlife viewers and rural wildlife viewers. To create our "urban wildlife viewers" category, we took the top quartile of wildlife viewer urbanicity; that is, the viewers who lived in ZCTAs with the top 25% highest urbanicity scores (.48 - .94). To create our "rural wildlife viewers" category, we took the bottom quartile of wildlife viewer urbanicity; that is, the viewers who lived in ZCTAs with the bottom 25% lowest urbanicity scores (.01 - .20).

It is important to note that these descriptive statistics are representative of our particular sample of wildlife viewers, and not the population of wildlife viewers in the United States in general. Because we used non-probabilistic sampling methods (i.e., setting quotas for certain demographics, oversampling in a subset of states), our descriptive results should not be generalized to all wildlife viewers in the U.S.

Incorporating ethnoracial identity and income

For all of our research questions that compared wildlife viewers' responses about wildlife viewing to urbanicity, we also ran a second set of analyses that included ethnoracial identity and income. We did this so that we could understand the effect of urbanicity on viewing above and beyond demographics, or the *marginal effects* of urbanicity, ethnoracial identity, and income. Marginal effects are the effect one of the predictor variables has on the outcome when other variables are accounted for. For example, for our model on likelihood of participating in viewing around the home, the model results showed us the effect of urbanicity on likelihood of participation while

accounting for ethnoracial identity and income, the effect of ethnoracial identity on participation while accounting for urbanicity and income, and the effect of income on participation while accounting for urbanicity and ethnoracial identity.

For our analyses, we categorized wildlife viewers' ethnoracial identities into white and BIPOC. We treated income as a continuous numeric variable using the median of each income bracket. To determine the median of the top bracket *mt*, "125,000 or more", we used a modified Pareto curve (see Equations 2 and 3, after Hout 2004), where *lt* was the lower limit of top bracket, *lt1* was the lower limit of the second highest bracket, *ft* was the frequency of the top bracket, and *ft1* was the frequency of second highest bracket. We then scaled income from 0-1 to match the scale of the other predictor variables.

$$v = (\log(ft1 + ft) - \log(ft)) / (\log(lt) - \log(lt1))$$

Equation 2. Determining *v* for use in calculation of median of top income bracket

$$mt = lt * (v / (v - 1))$$

Equation 3. Calculating median of top income bracket

Along with these analyses that incorporate ethnoracial identity and income, we present the results of analyses that only compare urbanicity to wildlife viewers' survey responses. Although these findings are not as informative in revealing the effect of urbanicity per se in predicting wildlife viewer responses, we share them because they could provide useful information for state agencies interested in comparing urban and rural wildlife viewers as a whole, regardless of their demographics. If readers are interested in understanding general patterns in wildlife viewing across the urban-rural gradient, they should reference these results. If, however, they are interested in understanding how much urbanicity as compared to ethnoracial identity and household income predicts wildlife viewers' responses, they should reference the results of the analysis that includes all three variables.

Ethnoracial identity and urbanicity

For our descriptive statistics, we looked at the percentage of all urban wildlife viewers and all rural wildlife viewers that fell into each ethnoracial group.

To determine whether there was a significant difference in the urbanicity of the ZCTAs where wildlife viewers in different ethnoracial groups lived, we used a Kruskall-Wallis rank sum test and a post-hoc Dunn's test with a Benjamini-Hochberg correction for multiple comparisons. To examine the relationship between urbanicity and white vs. Black, Indigenous, and people of color (BIPOC) wildlife viewers, we grouped together all

wildlife viewers who did not exclusively report “white” as their ethnoracial identity. We then performed a Kruskall-Wallis rank sum test.

Any missing or “prefer not to answer” responses were excluded from analysis.

Income and urbanicity

For our descriptive statistics, we looked at the percentage of all urban wildlife viewers and all rural wildlife viewers that fell into each income group.

To determine whether there was a significant difference in the urbanicity of the ZCTAs where wildlife viewers in different income groups lived, we used a Kruskall-Wallis rank sum test and a post-hoc Dunn’s test with a Benjamini-Hochberg correction for multiple comparisons.

Any missing or “prefer not to answer” responses were excluded from analysis.

Location of wildlife viewing and urbanicity

We examined three wildlife viewing locations: around the home, away from the home, and out of state or outside of the U.S. We followed the definition of *around the home* from the National Survey of Hunting, Fishing and Wildlife Associated Recreation, where around the home indicates wildlife viewing around or within 1 mile of the home (U.S. DOI et al, 2018).

For our descriptive statistics, we looked at the percentage of urban wildlife viewers who viewed wildlife for different numbers of days around the home, away from the home, and out of state or country in a typical year that was not impacted by unusual circumstances like the COVID-19 pandemic. The frequency categories were "0", "1-30", "31-60", "61-90", "91-120", "121-150", "151-180", "181-210", and ">210" days. We also looked at the percentage of urban wildlife viewers who both did and did not participate in viewing in each location. We did the same for rural wildlife viewers.

We examined the relationship between the urbanicity of a wildlife viewer’s ZCTA and the number of days they participated in viewing in each location using a Kendall’s rank correlation.

We also examined whether there was a significant relationship between the urbanicity of a wildlife viewer’s ZCTA and their likelihood of participating in viewing in different locations. For this analysis, we collapsed viewing frequency into two groups: those who had not participated in viewing at all, and those who had participated for at least 1 day, regardless of how many days they viewed. We used logistic regression models, with

urbanicity as a predictor variable, and participation in viewing as a response variable. We ran three models, one each for: viewing around the home, viewing away from the home, and viewing out of state or country.

We ran a second set of models to determine the relationship between urbanicity and likelihood of participation in viewing around the home, away from the home, and out of state or country while accounting for demographics. We ran three logistic regression models that included wildlife viewer urbanicity, ethnoracial identity, and income as predictors.

Any missing responses were excluded from analysis.

Type of wildlife viewing and urbanicity

We examined seven types of wildlife viewing adapted from the National Survey of Hunting, Fishing, and Wildlife Associated Recreation (U.S. DOI, 2018): 1) closely observing wildlife or trying to identify unfamiliar types of wildlife; 2) feeding wild birds; 3) feeding other wildlife; 4) photographing or taking pictures of wildlife; 5) maintaining plantings or natural areas for the benefit of wildlife; 6) visiting parks and natural areas to observe, photograph, or feed wildlife; and 7) taking trips or outings to any other location to observe, photograph, or feed wildlife. Wildlife viewers were provided a list of these seven behaviors and asked to select all of the behaviors they had participated in in the last five years.

For our descriptive statistics, we looked at the percentage of urban wildlife viewers who participated in each type of wildlife viewing. We did the same for rural wildlife viewers.

To determine whether there was a significant relationship between the urbanicity of a wildlife viewer's ZCTA and whether they were more or less likely to participate in a type of viewing, we used logistic regression models. We ran seven models, one for each type of viewing.

We ran a second set of models to determine the relationship between urbanicity and likelihood of participation in each of the seven types of viewing while controlling for demographics. We ran seven logistic regression models that included wildlife viewer urbanicity, ethnoracial identity, and income as predictors.

Any missing responses were excluded from analysis.

Recreational specialization and urbanicity

We examined cognitive recreational specialization (Harshaw et al., 2021; Needham et al., 2009) by looking at wildlife viewer self-reported skill level. In their survey responses, wildlife viewers ranked themselves from low to high wildlife viewing expertise using the following categories: *beginner, novice, intermediate, advanced*, and *expert.*

For our descriptive statistics, we looked at the percentage of urban wildlife viewers who ranked themselves in each category. We also looked at the percent of wildlife viewers who ranked themselves as either *beginner* or *novice;* or as *intermediate, advanced,* or *expert*. We did the same for rural wildlife viewers.

We examined the relationship between the urbanicity of a wildlife viewer's ZCTA and how highly they rated themselves using a Kendall's rank correlation.

We also examined whether there was a significant relationship between the urbanicity of a wildlife viewer's ZCTA whether they ranked themselves as having at least intermediate expertise. For this analysis, we combined expertise into two groups: those who ranked themselves as *beginner* or *novice*; and those who ranked themselves as *intermediate, advanced,* or *expert*. We used a logistic regression model, urbanicity as a predictor variable, and expertise as a response variable.

We ran a second set of models to determine the relationship between urbanicity and likelihood of a wildlife viewer ranking themselves *intermediate* expertise or above while controlling for demographics. We ran a logistic regression model that included wildlife viewer urbanicity, ethnoracial identity, and income as predictors.

Any missing responses were excluded from analysis.

Barriers to participation and urbanicity

We examined three types of perceived barriers to participation in wildlife viewing: lack of free time to participate in wildlife viewing, distance to high-quality locations for wildlife viewing, and not knowing where to go wildlife viewing. We chose to focus on these three barriers based on conversations with state agency partners about the importance of at home wildlife viewing, as revealed in the National Survey of Wildlife Viewers (Sinkular et al., 2022a), and understanding whether lack of access or awareness were limiting factors to wildlife viewing. Wildlife viewers responded with the extent to which each of the factors limited their participation in wildlife viewing in a typical year: *not at all*, *very little*, *somewhat*, *quite a bit*, and *a great deal*.

For our descriptive statistics, for each of our three barriers we looked at the percentage of urban wildlife viewers who ranked the barrier in each category of extent to which they limited participation. We also looked at the percentage of urban wildlife viewers who ranked each barrier as either *not at all/very little* or as *somewhat* and above. We did the same for rural wildlife viewers.

We examined the relationship between the urbanicity of a wildlife viewer's ZCTA and the extent to which each barrier limited participation in wildlife viewing using a Kendall's rank correlation.

We also examined whether there was a significant relationship between the urbanicity of a wildlife viewer's ZCTA and whether they indicated that each barrier was at least *somewhat* limiting their participation in wildlife viewing. For this analysis, we combined extent into two groups: *not at all/very little* and *somewhat/quite a bit/a great deal*. We used logistic regression models, urbanicity as a predictor variable, and barrier extent as a response variable. We ran three models, one for each barrier.

We ran a second set of models to determine the relationship between urbanicity and likelihood of ranking each barrier as at least *somewhat* of a limitation to their participation in wildlife viewing while controlling for demographics. We ran three logistic regression models that included wildlife viewer urbanicity, ethnoracial identity, and income as predictors.

Any missing responses were excluded from analysis.

Relationship with state agency and urbanicity

We examined wildlife viewers' relationships with state agencies in two ways. First, we looked at how familiar they were with their state agency, with response options *not at all familiar, slightly familiar, moderately familiar, very familiar,* and *extremely familiar*. We also looked at whether or not wildlife viewers had participated in any state agency programs in the past, regardless of the type of program.

For our descriptive statistics, we looked at the percentage of urban wildlife viewers who responded with each level of familiarity, the percentage of urban wildlife viewers said they were either *not at all familiar/slightly familiar* or as *moderately familiar* and above, and the percentage of urban wildlife viewers who had participated in programs. We did the same for rural wildlife viewers.

We examined the relationship between the urbanicity of a wildlife viewer's ZCTA and how familiar they were with their state agency using a Kendall's rank correlation.

We also examined whether there was a significant relationship between the urbanicity of a wildlife viewer's ZCTA and whether they were at least moderately familiar with their state agency. For this analysis, we collapsed familiarity into two groups: *not at all familiar/slightly familiar* and *moderately familiar/very familiar/extremely familiar*. We used a logistic regression model, urbanicity as a predictor variable, and familiarity as a response variable. To examine the relationship between urbanicity and participation in state agency programs, we ran another logistic regression model, urbanicity as a predictor variable, and participation as a response variable.

We ran a second set of models to determine the relationship between urbanicity and each of familiarity and participation while accounting for demographics. For each, we ran a logistic regression model that included wildlife viewer urbanicity, ethnoracial identity, and income as predictors.

Any missing responses were excluded from analysis.

Communication preferences and urbanicity

We looked at wildlife viewers' preferred modes of communication about wildlife viewing by asking wildlife viewers in which of the following ways they are interested receiving information from their state agency: blogs, email updates or e-newsletters, Facebook, Instagram, local news (such as television, online, or print newspapers), mailed newsletters or other subscriptions, online magazines, podcasts, printed materials (such as brochures or maps), one-on-one interactions with agency staff, text alerts, TikTok, Twitter, agency websites, and YouTube. Respondents were able to select as many options as they were interested in. Respondents were also given the option to select "I would prefer not to receive information from my state agency".

For our descriptive statistics, we looked at the percentage of urban wildlife viewers who were interested in receiving information via each type of communication. We did the same for rural wildlife viewers.

We also examined whether there was a significant relationship between the urbanicity of a wildlife viewer's ZCTA and whether they were interested in receiving information via each mode of communication. We ran 16 logistic regression models, with urbanicity as the predictor variable and preference for each type of communication as the response variables.

We ran a second set of models to determine the relationship between urbanicity and communication preference while accounting for demographics. For each, we ran a

logistic regression model that included wildlife viewer urbanicity, ethnoracial identity, and income as predictors.

Any missing responses were excluded from analysis.

Results

Ethnoracial identity and urbanicity

The ethnoracial identities of urban wildlife viewers differed from rural wildlife viewers (Figure 3, Tables SA1-2). A higher percentage of urban wildlife viewers were BIPOC than rural wildlife viewers (31% vs 16%, Figure 4, Table SA3).

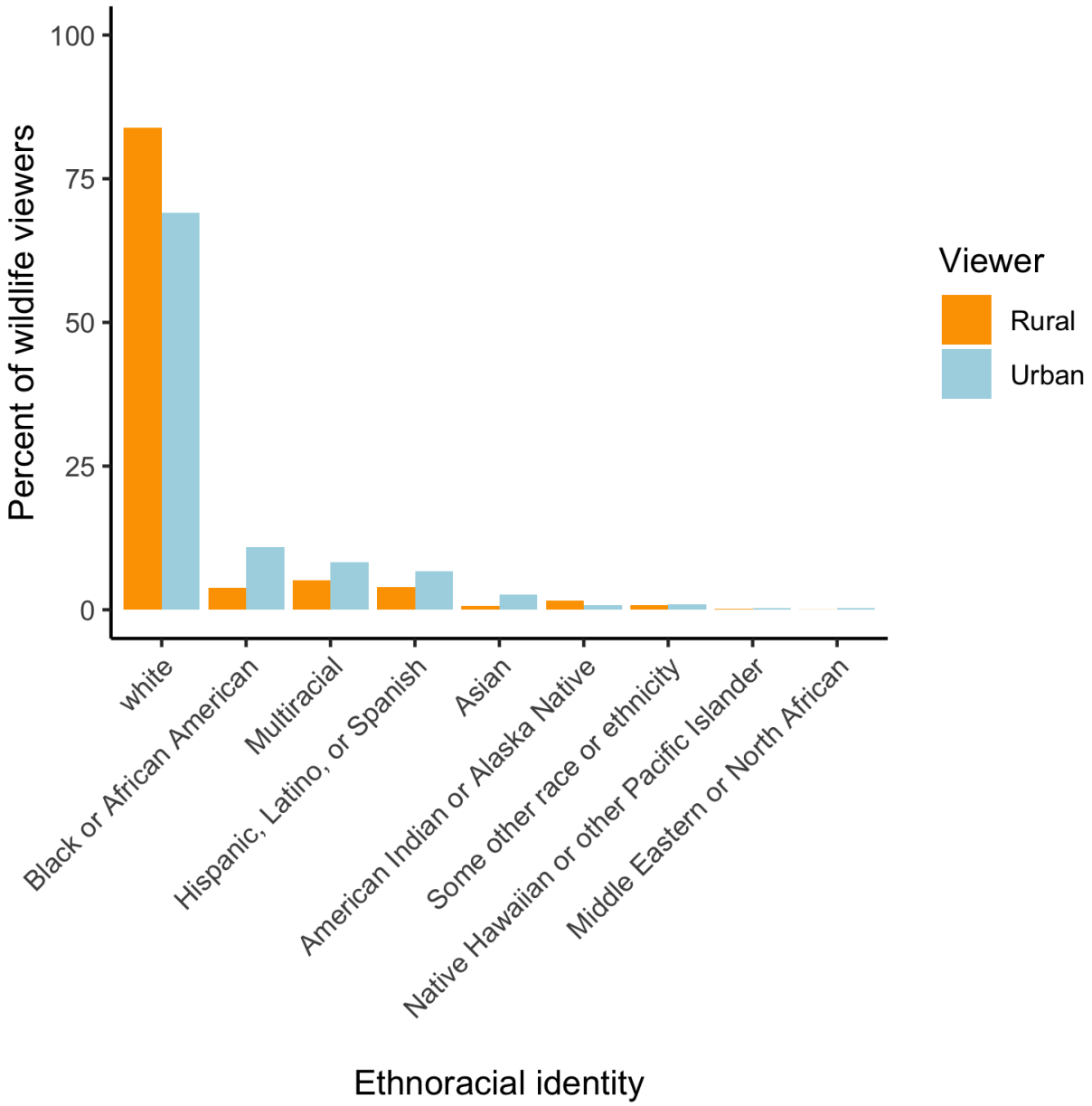

Figure 3. Ethnoracial identity in urban and rural wildlife viewers
Percentage of rural and urban wildlife viewers in each ethnoracial category. Categories arranged from those with the highest to lowest percentage for urban wildlife viewers.

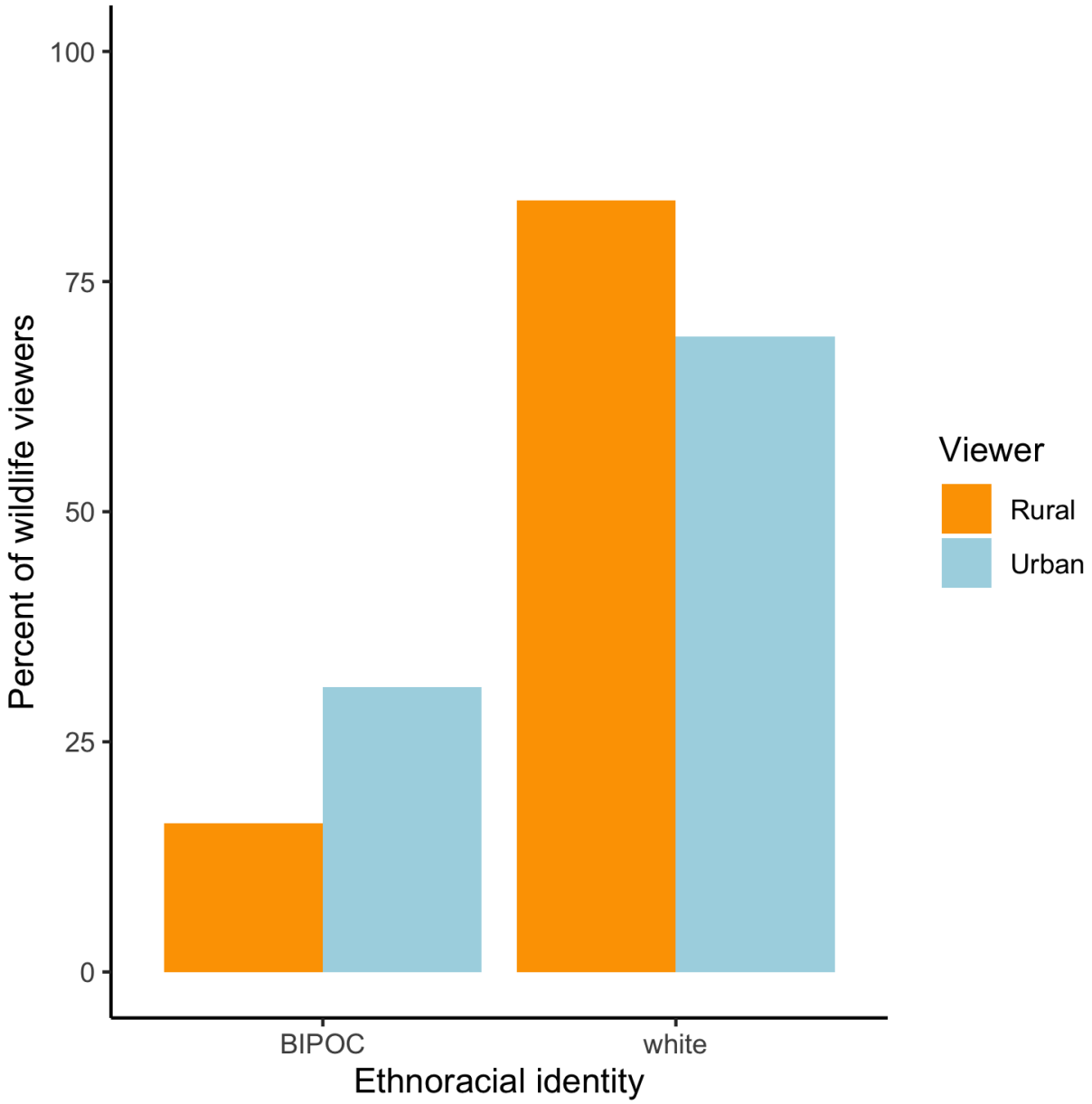

Figure 4. BIPOC and white urban and rural wildlife viewers
Percentages of rural and urban wildlife viewers that identified as Black, Indigenous, and people of color (BIPOC) and white.

The Kruskal-Wallis test comparing urbanicity across ethnoracial groups was significant (H = 387.81, df = 8, p < .001), meaning that there was a significant difference in urbanicity of ZCTAs where different ethnoracial groups lived. The Dunn's post-hoc test revealed significant differences between individual pairs of ethnoracial groups (Figure 5, Table SA4). American Indian or Alaska Native (hereafter, Native American) wildlife viewers lived in ZCTAs with lower urbanicity than all other groups. White wildlife viewers lived in ZCTAs with higher urbanicity than Native American wildlife viewers, but lower

urbanicity than all other groups of wildlife viewers except Native Hawaiian or other Pacific Islander wildlife viewers and wildlife viewers who chose “some other race or ethnicity”. Wildlife viewers who chose “some other race or ethnicity” lived in ZCTAs with higher urbanicity than Native American wildlife viewers, but lower than all other groups except white, multiracial, and Native Hawaiian or other Pacific Islander wildlife viewers. Multiracial wildlife viewers lived in ZCTAs with higher urbanicity than Native American and white wildlife viewers, but lower urbanicity than Black or African American and Asian wildlife viewers. Native Hawaiian or other Pacific Islander wildlife viewers lived in ZCTAs with higher urbanicity than Native American wildlife viewers. Hispanic, Latino, or Spanish wildlife viewers lived in ZCTAs with higher urbanicity than Native American and white wildlife viewers, but lower urbanicity than Black or African American and Asian wildlife viewers. Black or African American wildlife viewers lived in ZCTAs with higher urbanicity than all but Native Hawaiian or other Pacific Islander, Middle Eastern or North African, and Asian wildlife viewers. Middle Eastern or North African wildlife viewers lived in ZCTAs with higher urbanicity than white, Native American, and “some other race or ethnicity” viewers. Asian wildlife viewers lived in ZCTAs with higher urbanicity than all but Native Hawaiian or other Pacific Islander, Middle Eastern or North African, and Black or African American wildlife viewers.

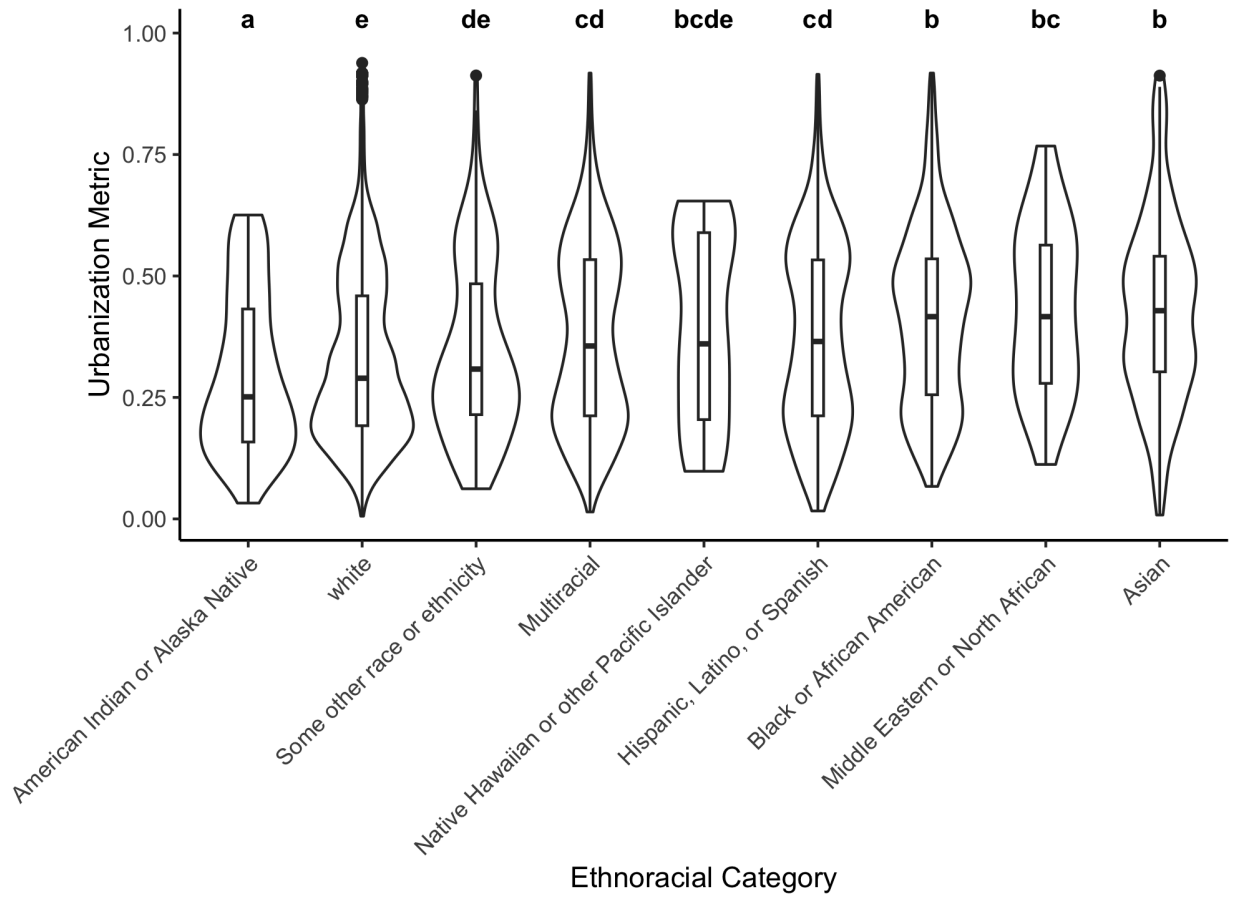

Figure 5. Ethnoracial groups by urbanicity
Violin plots showing the urbanicity of ZCTAs where wildlife viewers in different ethnoracial groups live. The bottom of the box represents the 25th percentile, the line in the middle the median, the top of the box the 75th percentile, and dots show outliers. Groups are arranged in order of increasing median urbanicity. The shape of the violin shows the shape of the frequency distribution of urbanicity scores for wildlife viewers in each ethnoracial group. Letters above each box are the results of pairwise comparisons from the Dunn's pos-thoc test. Groups that share the same letter do not have significantly different urbanicity from each other.

The Kruskal-Wallis test comparing urbanicity between white and BIPOC wildlife viewers was significant ($H = 284.22$, $df = 1$, $p < .001$), meaning that there was a significant difference in the urbanicity of ZCTAs where white as compared to BIPOC wildlife viewers lived (Figure 6). BIPOC wildlife viewers lived in ZCTAs with significantly higher urbanicity than white wildlife viewers.

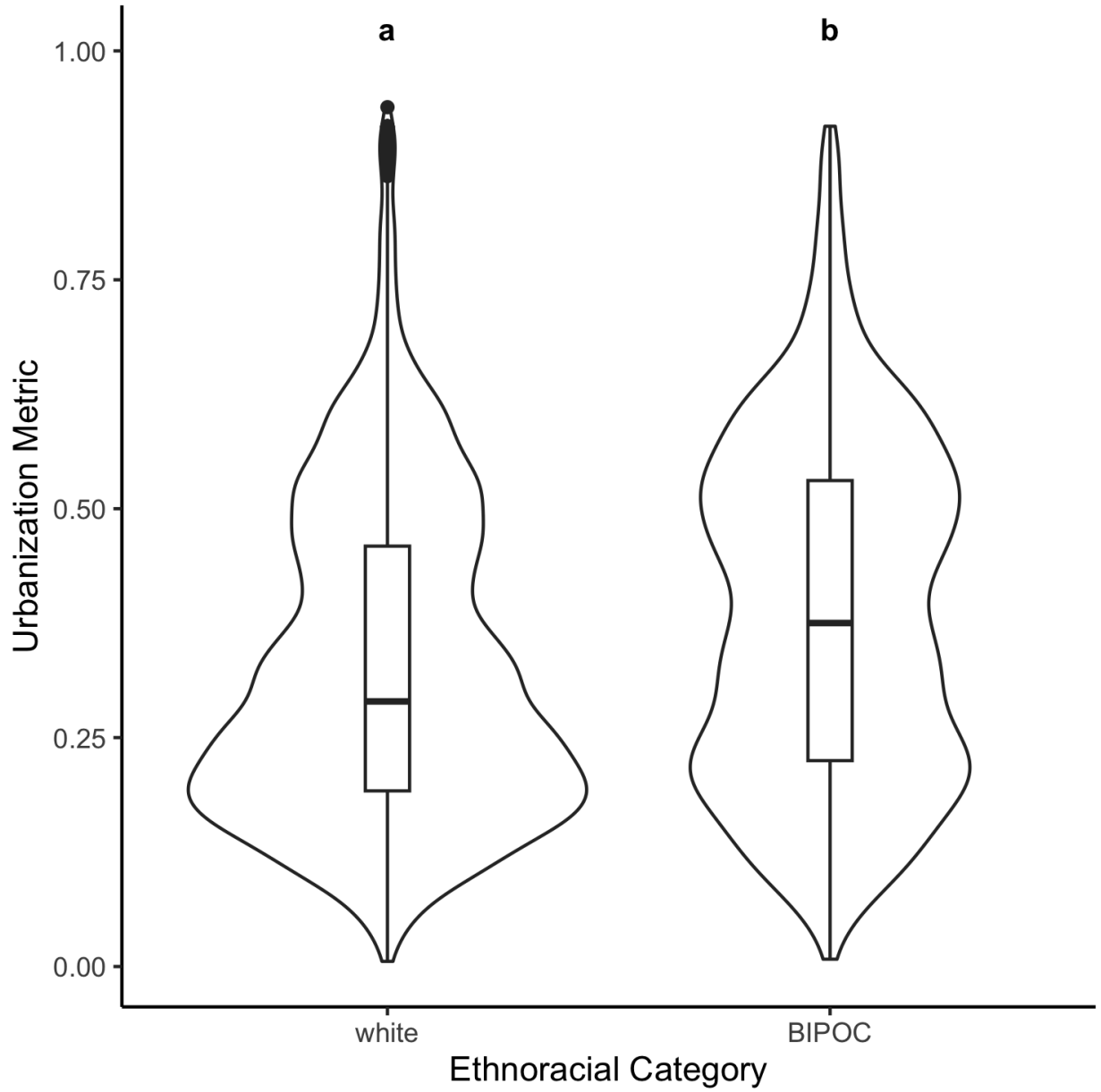

Figure 6. BIPOC and white by urbanicity
Violin plots showing the urbanicity of ZCTAs where white and BIPOC wildlife viewers live. The bottom of the box represents the 25th percentile, the line in the middle the median, the top of the box the 75th percentile, and dots show outliers. Groups are arranged in order of increasing median urbanicity. The shape of the violin shows the shape of the frequency distribution of urbanicity scores for wildlife viewers in each ethnoracial group. Letters above each box show results of Kruskal-Wallis test, that urbanicity scores between each group are significantly different.

Income and urbanicity

The income of urban wildlife viewers differed from rural wildlife viewers (Figure 7, Table SA5), with urban wildlife viewers being in general higher income.

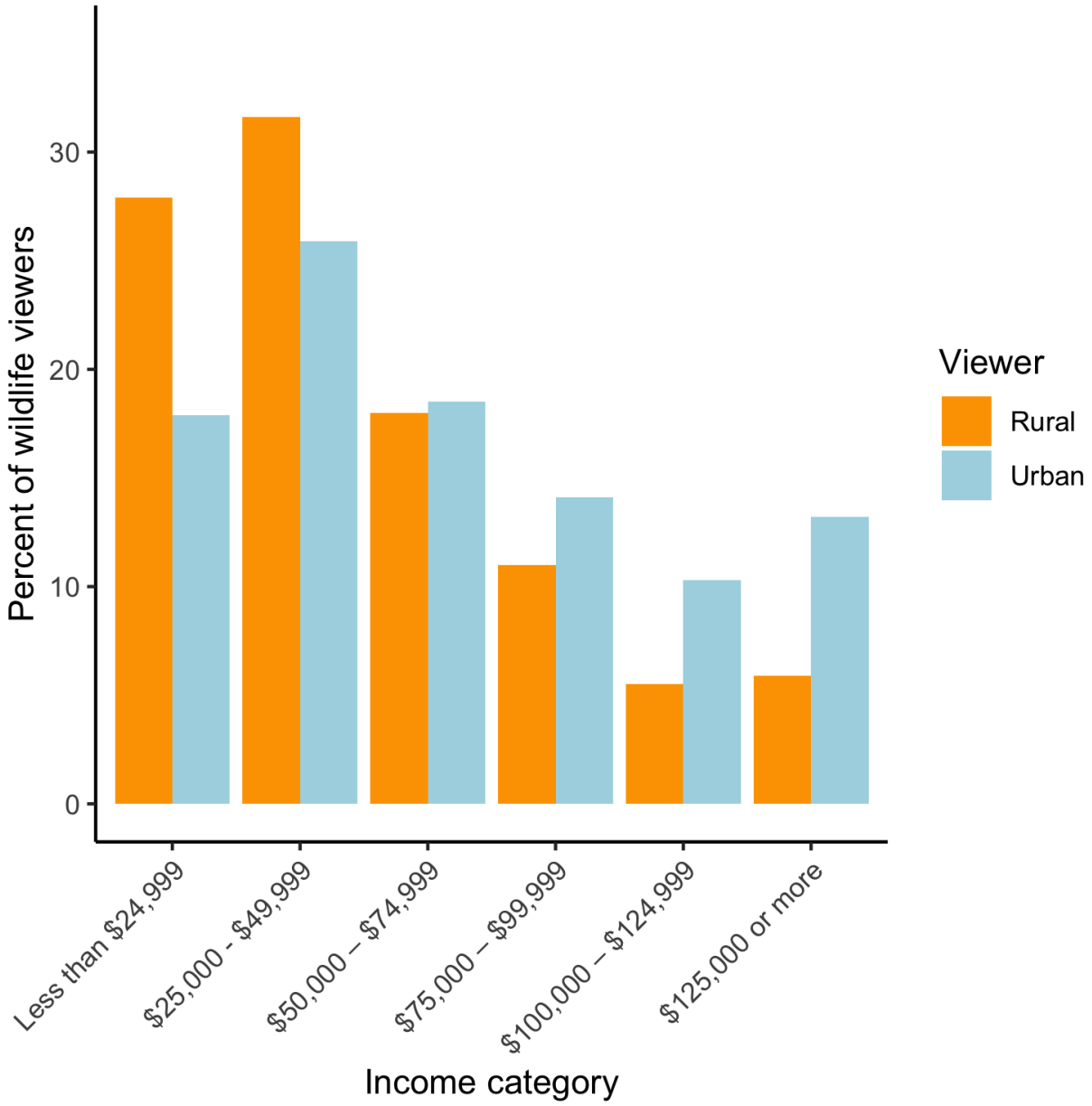

Figure 7. Income in urban and rural wildlife viewers
Percentage of rural and urban wildlife viewers in each income category.

The Kruskal-Wallis test comparing urbanicity across income groups was significant (H = 411.71, df = 5, p < .001), meaning that there was a significant difference in urbanicity of ZCTAs where different income groups lived. The Dunn's post-hoc test revealed significant differences between individual pairs of income groups (Figure 8, Table SA6). The urbanicity of where wildlife viewers lived increased with income category, except for the top two categories, which did not have significantly different urbanicity.

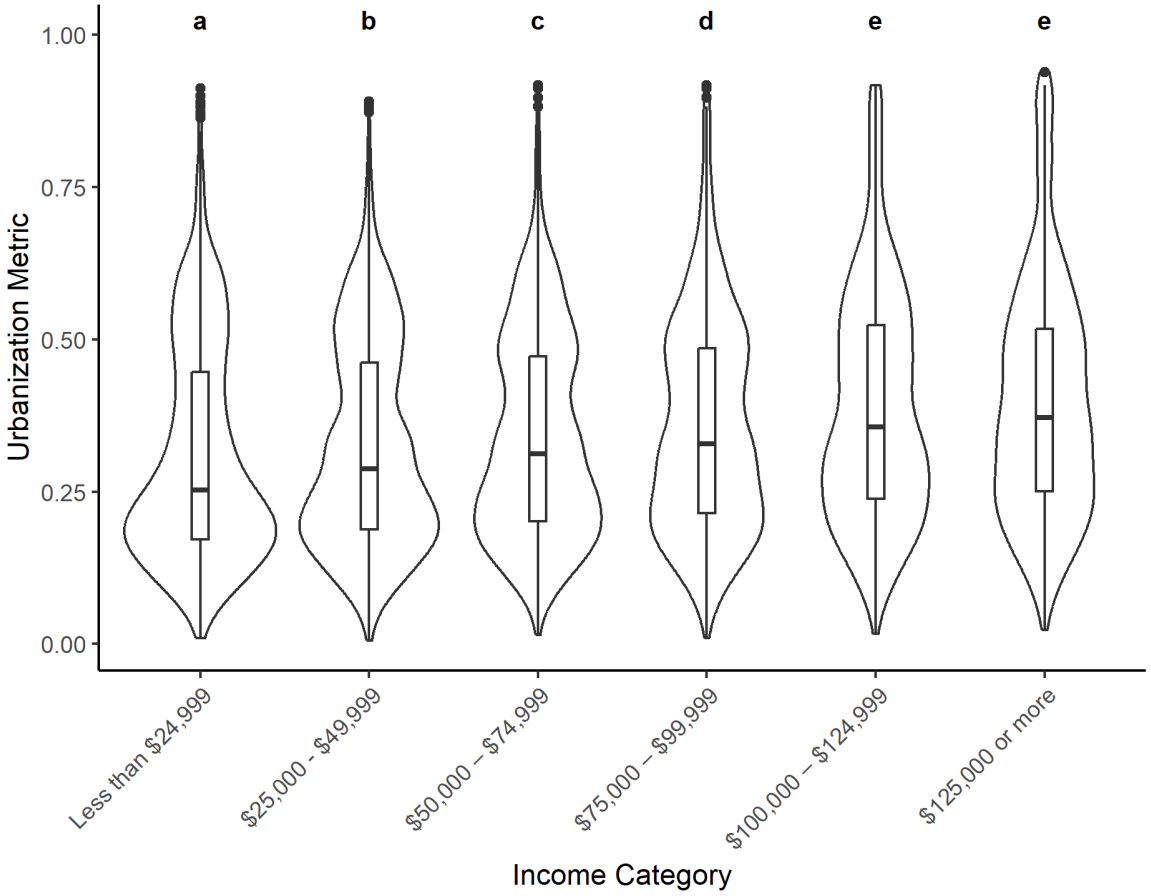

Figure 8. Income groups by urbanicity
Violin plots showing the urbanicity of ZCTAs where wildlife viewers in different income groups live. The bottom of the box represents the 25th percentile, the line in the middle the median, the top of the box the 75th percentile, and dots show outliers. The shape of the violin shows the shape of the frequency distribution of urbanicity scores for wildlife viewers in each income group. Letters above each box are the results of pairwise comparisons from the Dunn's post-hoc test. Groups that share the same letter do not have significantly different urbanicity from each other.

Location of wildlife viewing and urbanicity

Urban as compared to rural wildlife viewers had different distributions of the amount of days they spent viewing wildlife around the home, away from home, and out of state or country (Figures 9-11, Tables SA7-12). For both urban and rural wildlife viewers, the most popular viewing location is around the home, with 93% of urban wildlife viewers and 96% of rural wildlife viewers participating (Figure 12, Table SA13). Viewing away from home is the second most common (91% of urban wildlife viewers, 89% of rural wildlife viewers, Figure 13, Table SA14), followed by viewing out of state or country (66% of urban wildlife viewers, 55% of rural wildlife viewers, Figure 14, Table SA15).

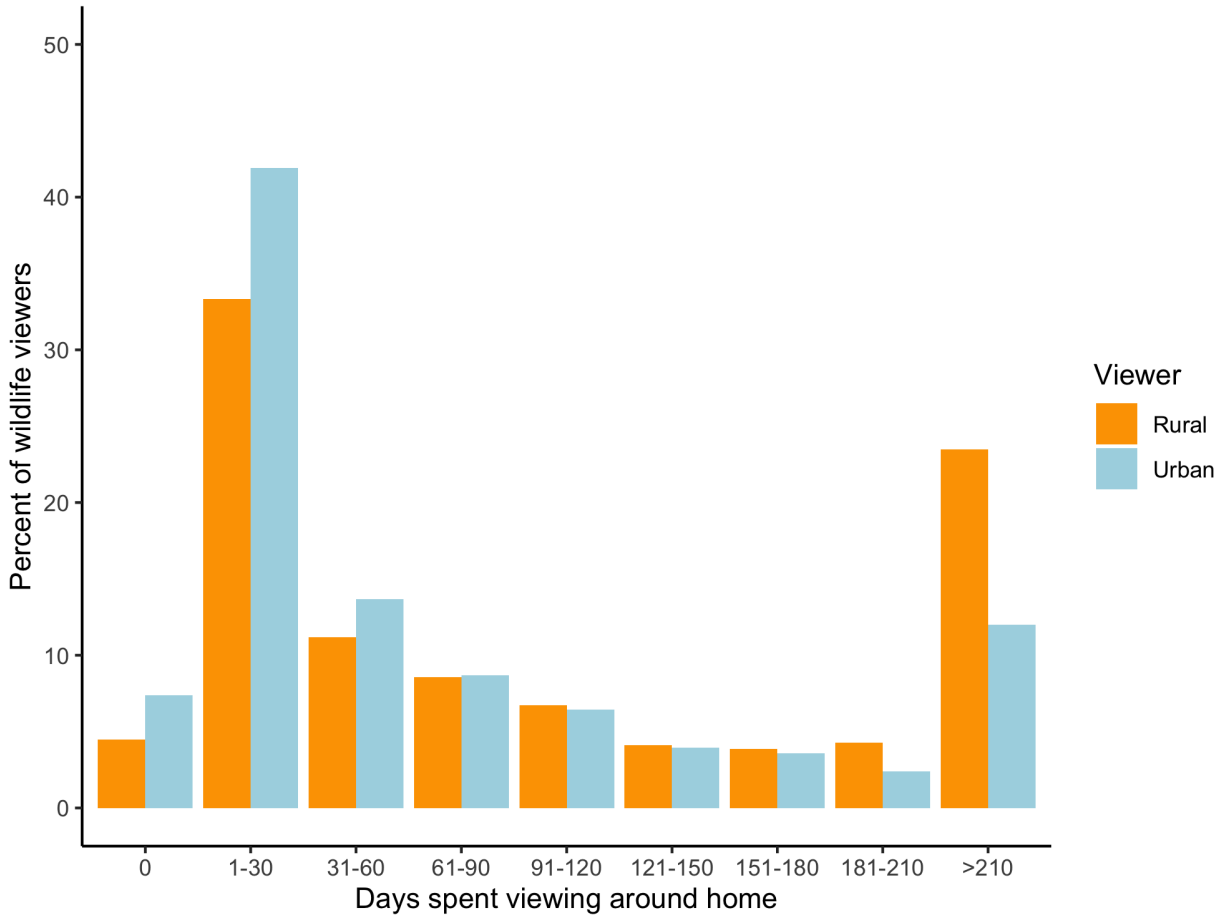

Figure 9. Days viewing around home for urban and rural wildlife viewers
Distribution of days spent viewing around home for urban and rural wildlife viewers.

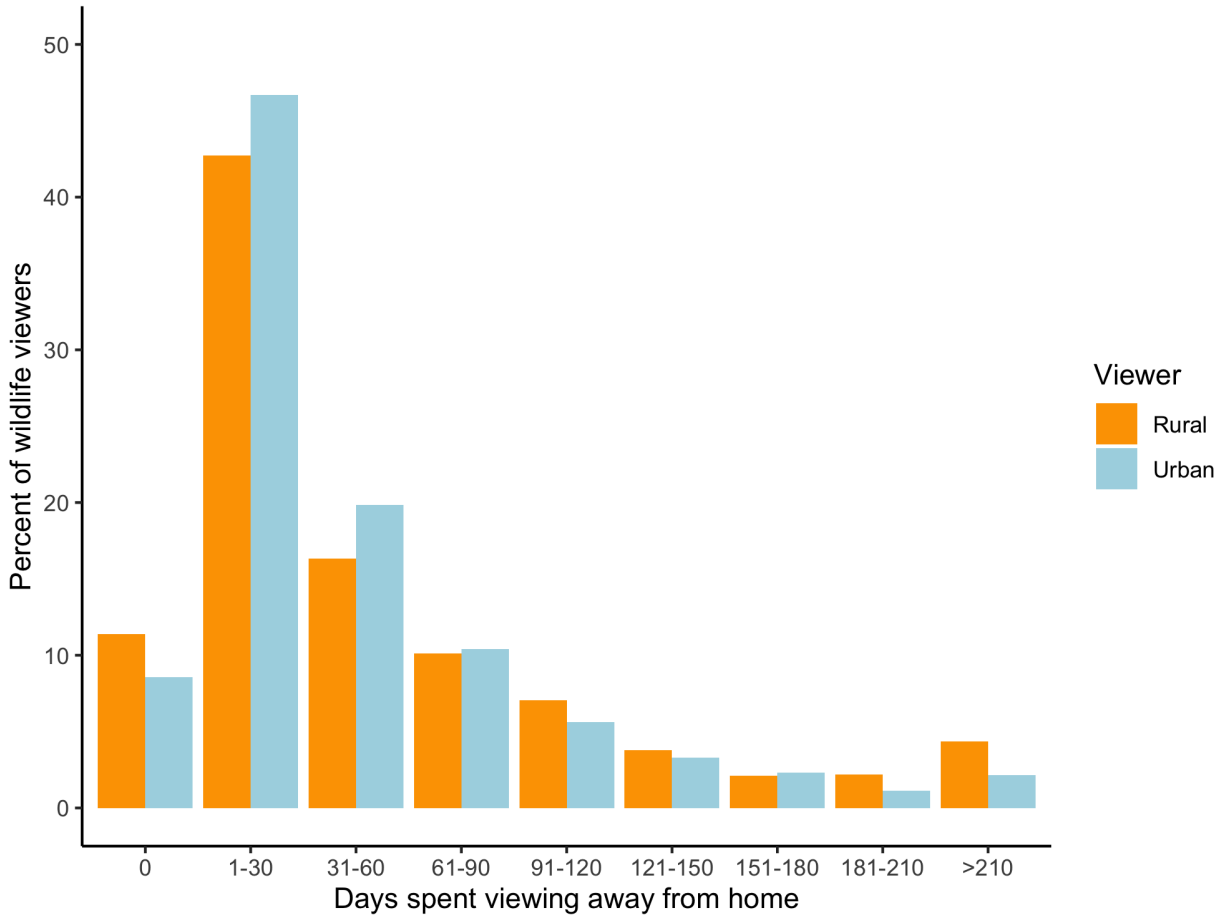

Figure 10. Days viewing away from home for urban and rural wildlife viewers
Distribution of days spent viewing away from home for urban and rural wildlife viewers.

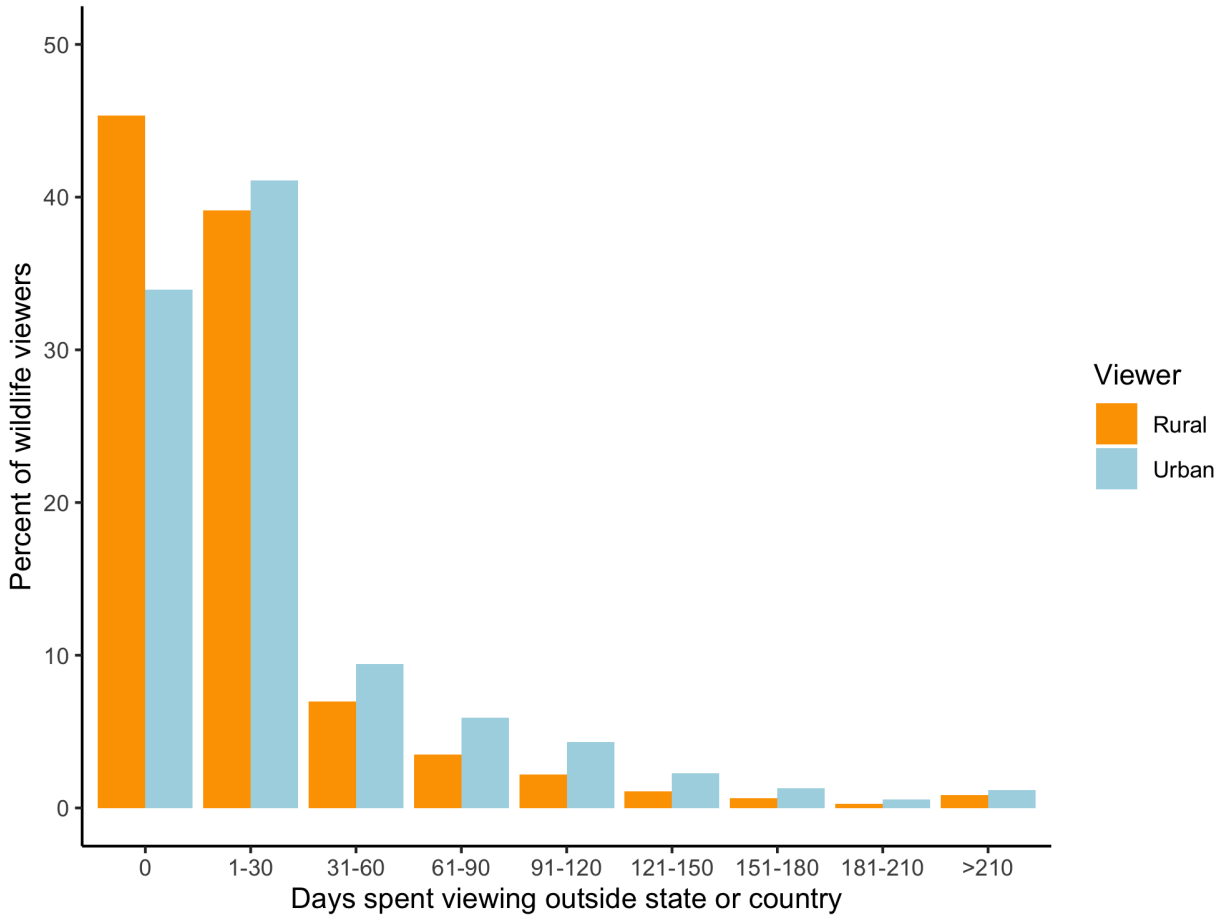

Figure 11. Days viewing out of state or country for urban and rural wildlife viewers
Distribution of days spent viewing out of state or country for urban and rural wildlife viewers.

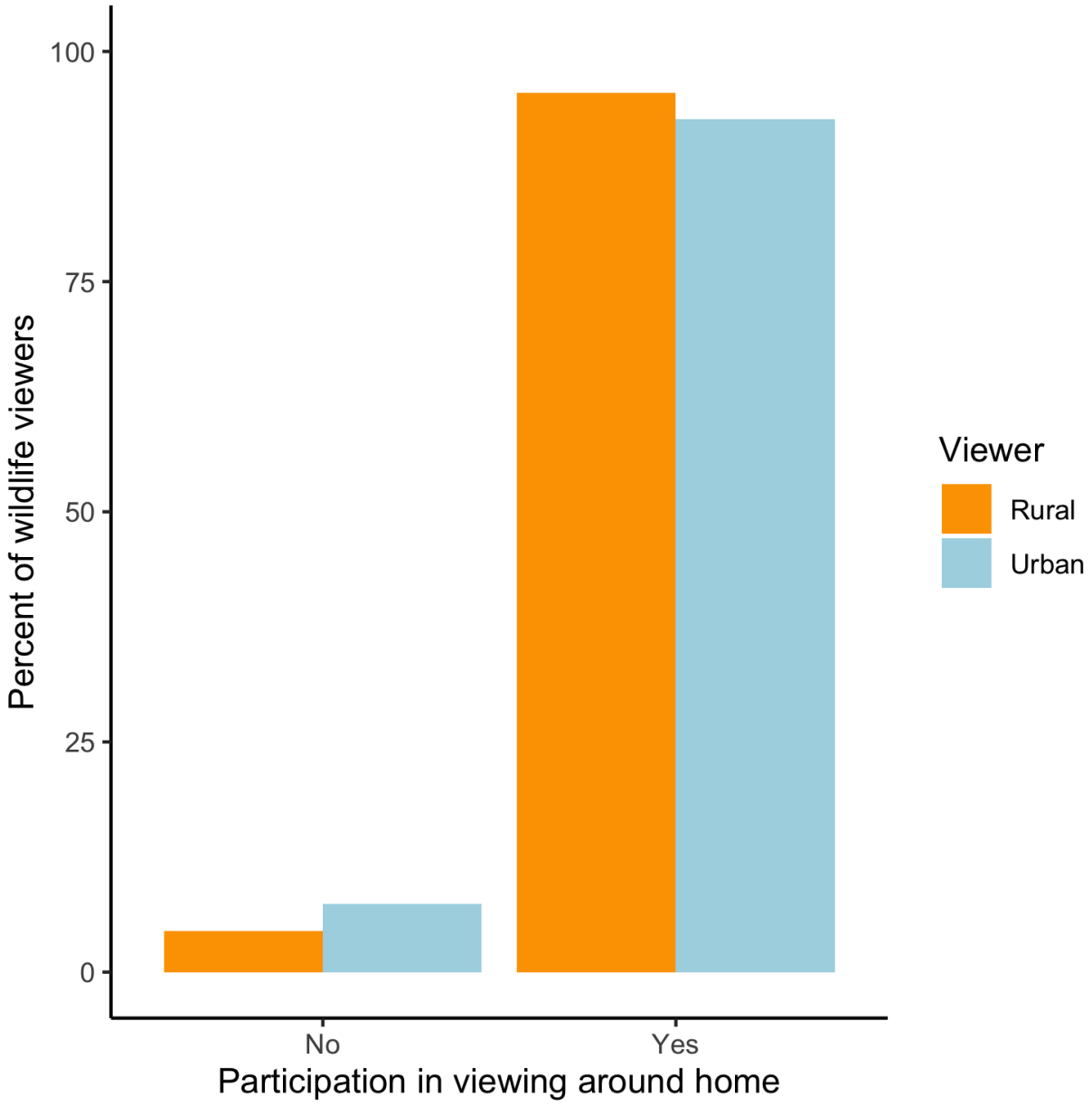

Figure 12. Participation in viewing around home for urban and rural wildlife viewers
Percentage of urban as compared to rural wildlife viewers that participate in viewing around the home.

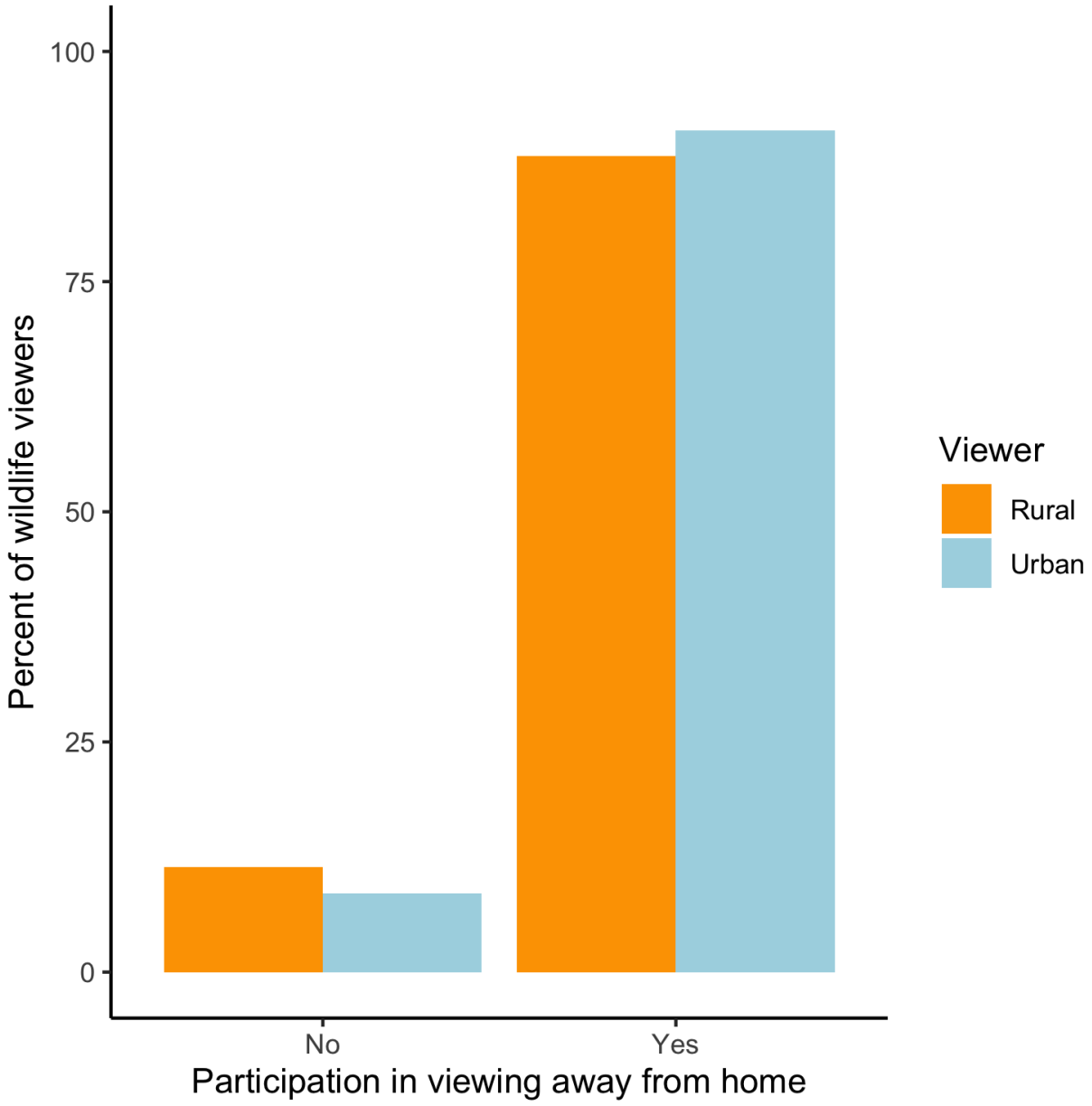

Figure 13. Participation in viewing away home for urban and rural wildlife viewers
Percentage of urban as compared to rural wildlife viewers that participate in viewing away from the home.

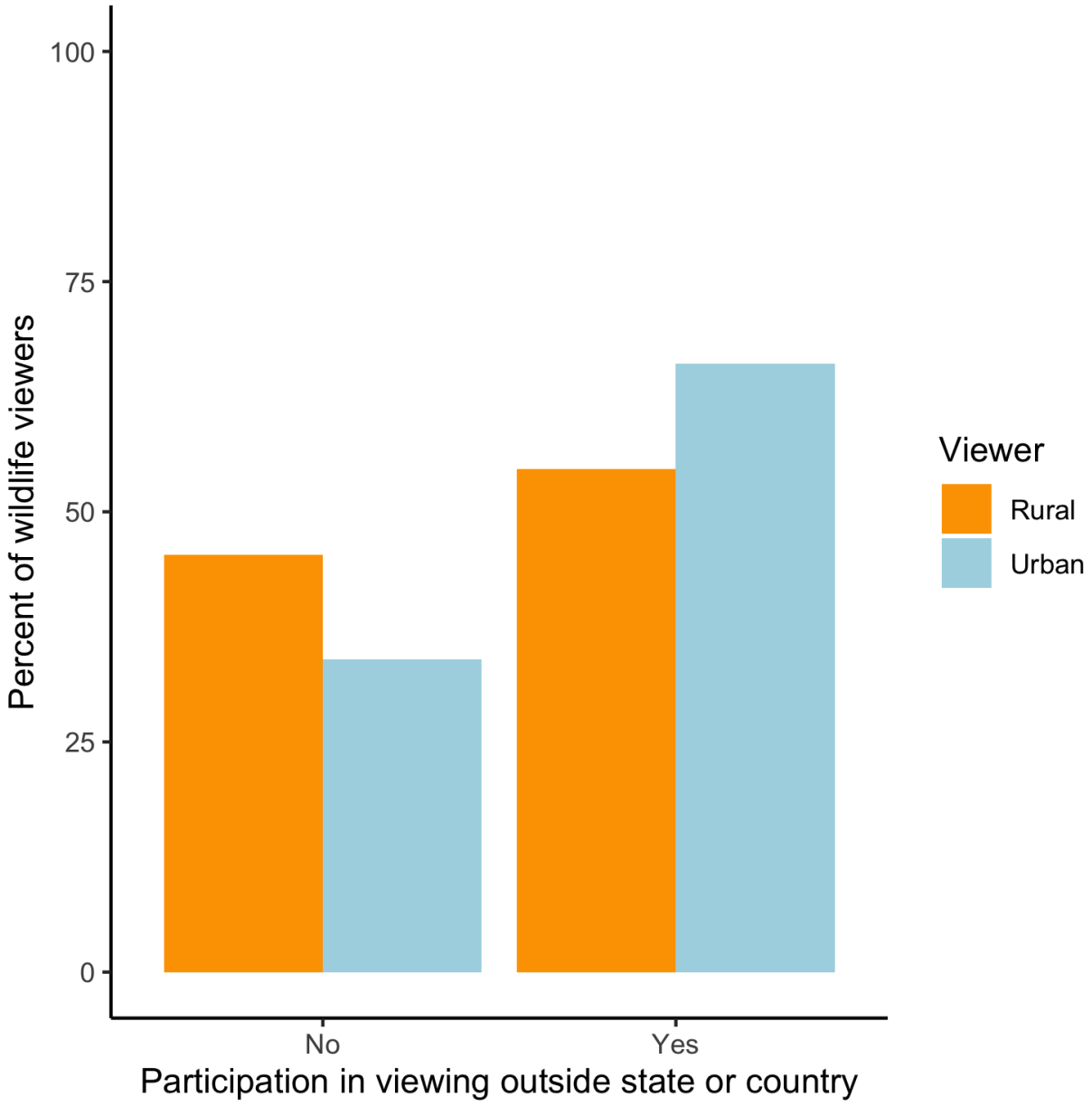

Figure 14. Participation in viewing out of state or country for urban and rural wildlife viewers
Percentage of urban as compared to rural wildlife viewers that participate in viewing out of state or country.

There was a significant negative correlation between the number of days spent viewing around the home and urbanicity (τ = -.09, *df* = 15,437, $p < .001$). There was also a significant negative correlation between the number of days spent viewing away from home and urbanicity (τ = -.01, *df* = 15,331, $p = .03$). However, there was a positive correlation between urbanicity and the number of days spent viewing out of state or country (τ = .09, *df* = 15,287, $p < .001$)

Viewers that lived in ZCTAs with a higher urbanicity were less likely to participate in viewing around the home than wildlife viewers in ZCTAs with a lower urbanicity (p < .001, Table 1, Tables SA16). However, wildlife viewers that lived in ZCTAs with a higher urbanicity were more likely to participate in viewing away from the home (p < .001, Table SA17) and out of state or country (p < .001, Table SA18) than wildlife viewers in ZCTAs with a lower urbanicity.

Table 1. Relationships between wildlife viewer urbanicity and likelihood of viewing in different locations.
Relationships between wildlife viewer urbanicity and likelihood of viewing around the home, away from the home, and out of state or country. Orange cells with a "-" indicate a significant negative relationship, green cells with a "+" indicate a significant positive relationship, and gray cells with an "x" indicate no significant relationship. For regression model outputs, see Tables SA16-18.

Variable	Relationship with urbanicity
Viewing around home	–
Viewing away from home	+
Viewing out of state or country	+

The relationships between urbanicity and viewing location did not change when accounting for ethnoracial identity and income. Wildlife viewers in higher urbanicity ZCTAs were still less likely to view around the home (p < .001) and more likely to view away from the home (p = .01) and out of state or country (p < .001) than wildlife viewers in lower urbanicity ZCTAs (Table 2, Tables SA19-21). After accounting for urbanicity and income, BIPOC wildlife viewers were less likely to view around the home (p = .01) but more likely to view away from the home (p < .001) and out of state or country (p < .001) than white wildlife viewers. After accounting for urbanicity and ethnoracial identity, higher income wildlife viewers were more likely to view around the home (p = .048), away from the home (p < .001), and out of state or country (p < .001) than lower income wildlife viewers.

Table 2. Relationships between wildlife viewer urbanicity, ethnoracial identity, and income and likelihood of viewing in different locations
Relationships between wildlife viewer urbanicity, ethnoracial identity, and income and likelihood of viewing around the home, away from the home, and out of state or country.Orange cells with a "-" indicate a significant negative relationship, green cells with a "+" indicate a significant positive relationship, and gray cells with an "x" indicate no significant relationship. To analyze ethnoracial identity, wildlife viewers have been separated into white and BIPOC categories. White wildlife viewers are treated as the baseline, such that a "+" indicates a positive relationship between BIPOC wildlife viewers and the outcome variable. For regression model outputs, see Tables SA19-21.

Variable	Relationship with urbanicity	Relationship with ethnoracial identity	Relationship with income
Viewing around home	–	–	+
Viewing away from home	+	+	+
Viewing out of state or country	+	+	+

Type of wildlife viewing and urbanicity

The forms of wildlife viewing differed in popularity in terms of percent participation for urban wildlife viewers. In order, they were visiting parks and natural areas to observe, photograph, or feed wildlife (64% participation); photographing or taking pictures of wildlife (57%); feeding wild birds (49%); taking trips or outings to any other location to observe, photograph, or feed wildlife (46%); closely observing wildlife or trying to identify unfamiliar types of wildlife (41%); feeding other wildlife (32%); and maintaining plantings or natural areas for the benefit of wildlife (32%) (Figure 15, Table SA22). For rural wildlife viewers, the order was feeding wild birds (57% participation); photographing or taking pictures of wildlife (54%); visiting parks and natural areas to observe, photograph, or feed wildlife (54%); closely observing wildlife or trying to identify unfamiliar types of wildlife (41%); taking trips or outings to any other location to observe, photograph, or feed wildlife (41%); feeding other wildlife (35%); and maintaining plantings or natural areas for the benefit of wildlife (30%).

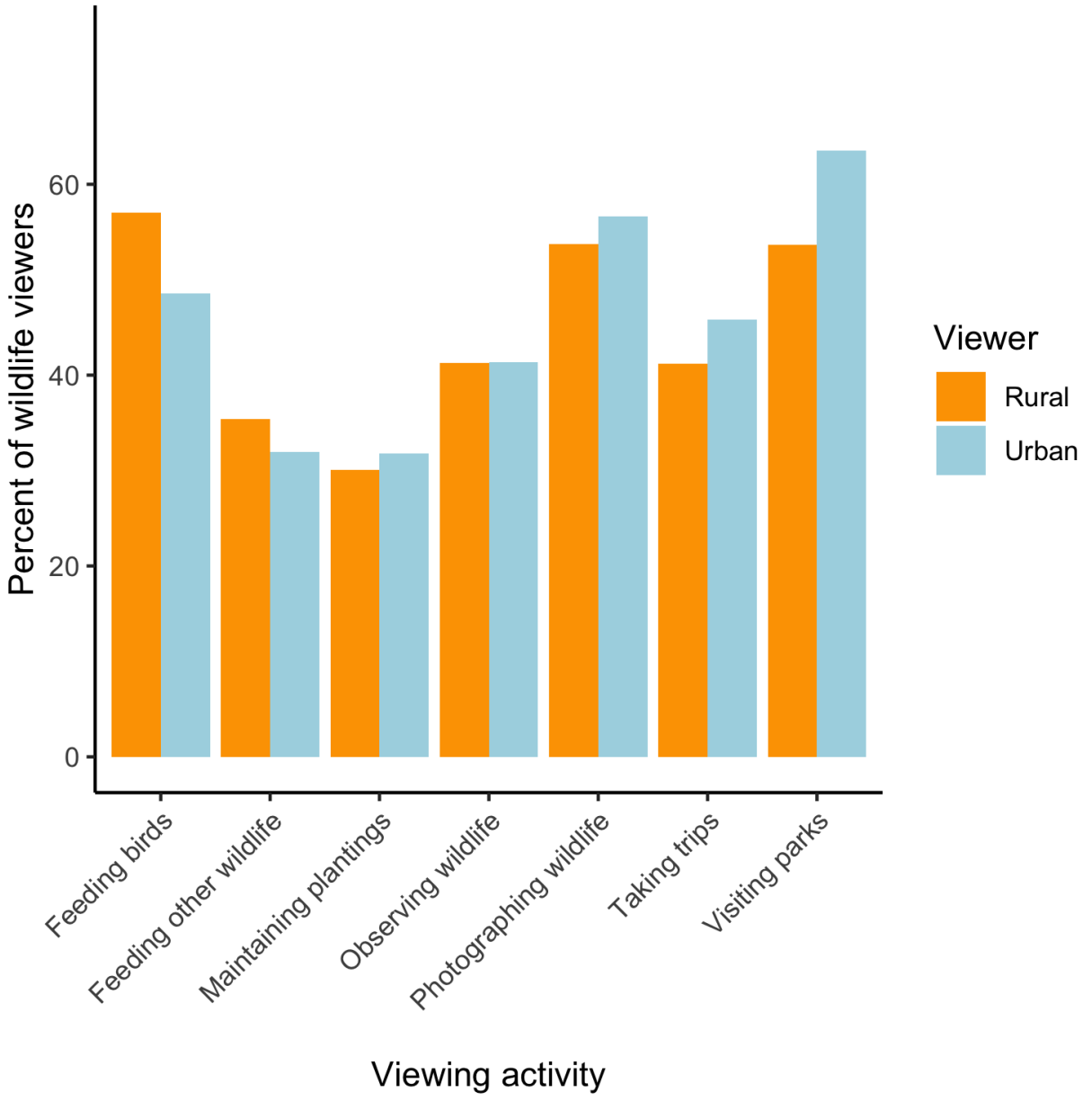

Figure 15. Participation in types of wildlife viewing by urban and rural wildlife viewers
Percentage of urban as compared to rural wildlife viewers that participate in each type of wildlife viewing. Type of wildlife viewing indicated in the graph correspond with the survey text as follows: feeding birds = feeding wild birds; feeding other wildlife = feeding other wildlife; maintaining plantings = maintaining plantings or natural areas for the benefit of wildlife; observing wildlife = closely observing wildlife or trying to identify unfamiliar types of wildlife; photographing wildlife = photographing or taking pictures of wildlife; taking trips = taking trips or outings to any other location to observe, photograph, or feed wildlife; visiting parks = visiting parks and natural areas to observe, photograph, or feed wildlife.

Viewers that lived in ZCTAs with a higher urbanicity were less likely to feed wild birds ($p < .001$) and feed other animals ($p = .002$) than wildlife viewers in ZCTAs with a lower urbanicity (Table 3, Tables SA23-24). However, wildlife viewers that lived in ZCTAs with

a higher urbanicity were more likely to photograph or take pictures of wildlife (p = .002); maintain plantings or natural areas for the benefit of wildlife (p = .02); take trips or outings to any other location to observe, photograph, or feed wildlife (p < .001); and visit parks and natural areas to observe, photograph, or feed wildlife (p < .001) than wildlife viewers in ZCTAs with a lower urbanicity (Tables SA25-28). There was no relationship between the urbanicity of a wildlife viewer's ZCTA and closely observing wildlife or trying to identify unfamiliar types of wildlife (p = .11, Table SA29).

Table 3. Relationships between wildlife viewer urbanicity and likelihood of participating seven forms of wildlife viewing
Orange cells with a "-" indicate a significant negative relationship, green cells with a "+" indicate a significant positive relationship, and gray cells with an "x" indicate no significant relationship. For regression model outputs, see Tables SA23-29.

Type of wildlife viewing	Relationship with urbanicity
Closely observing wildlife or trying to identify unfamiliar types of wildlife	x
Feeding wild birds	–
Feeding other animals	–
Photographing or taking pictures of wildlife	+
Maintaining plantings or natural areas for the benefit of wildlife	+
Taking trips or outings to any other location to observe, photograph, or feed wildlife	+
Visiting parks and natural areas to observe, photograph, or feed wildlife	+

Some of relationships between urbanicity and likelihood of participation in the seven forms of wildlife viewing did not change when accounting for ethnoracial identity and income (Table 4, Tables SA30-36). As when not accounting for demographics, wildlife viewers in higher urbanicity ZCTAs were less likely to feed wild birds (p < .001) and feed other animals (p < .001) and more likely to take trips or outings to any other location to observe, photograph, or feed wildlife (p = .01) and visit parks and natural areas to observe, photograph, or feed wildlife (p < .001) than wildlife viewers in lower urbanicity

ZCTAs, and there was no significant relationship between closely observing wildlife or trying to identify unfamiliar types of wildlife and urbanicity (p = .85, Tables SA30-31 & 34-36). However, when accounting for ethnoracial identity and income, wildlife viewers in higher urbanicity ZCTAs were no longer more likely to photograph or take pictures of wildlife (p = .32) or maintain plantings or natural areas for the benefit of wildlife (p = .57) than wildlife viewers in lower urbanicity ZCTAs; instead, there was no significant relationship between urbanicity and these two forms of wildlife viewing (Tables SA32-33).

After accounting for urbanicity and income, BIPOC wildlife viewers were less likely to feed wild birds (p < .001) but more likely to to feed other animals (p = .001); photograph or take pictures of wildlife (p < .001); maintain plantings or natural areas for the benefit of wildlife (p < .001); take trips or outings to any other location to observe, photograph, or feed wildlife (p = .01); and visit parks and natural areas to observe, photograph, or feed wildlife (p = .002) than white wildlife viewers (Tables SA30-35). There was no relationship between ethnoracial identity and likelihood of closely observing wildlife or trying to identify unfamiliar types of wildlife when controlling for income and urbanicity (p = .22, Table SA36).

After accounting for urbanicity and ethnoracial identity, higher income wildlife viewers were more likely to participate in all forms of viewing than lower income wildlife viewers (closely observing wildlife or trying to identify unfamiliar types of wildlife p < .001; feeding wild birds p = .0497; photographing or taking pictures of wildlife p < .001; maintaining plantings or natural areas for the benefit of wildlife p < .001; taking trips or outings to any other location to observe, photograph, or feed wildlife p < .001; visiting parks and natural areas to observe, photograph, or feed wildlife p < .001, Tables SA30 & 32-36), with the exception of feeding other animals. There was no significant relationship between feeding other animals and income when controlling for urbanicity and ethnoracial identity (p = .10, Table SA31).

Table 4. Relationships between wildlife viewer urbanicity, ethnoracial identity, and income and likelihood of participating in seven forms of wildlife viewing
Orange cells with a "-" indicate a significant negative relationship, green cells with a "+" indicate a significant positive relationship, and gray cells with an "x" indicate no significant relationship. To analyze ethnoracial identity, wildlife viewers have been separated into white and BIPOC categories. White wildlife viewers are treated as the baseline, such that a "+" indicates a positive relationship between BIPOC wildlife viewers and the outcome variable. For regression model outputs, see Tables SA30-36.

Type of wildlife viewing	Relationship with urbanicity	Relationship with ethnoracial identity	Relationship with income
Closely observing wildlife or trying to identify unfamiliar types of wildlife	x	x	+
Feeding wild birds	–	–	+
Feeding other animals	–	+	x
Photographing or taking pictures of wildlife	x	+	+
Maintaining plantings or natural areas for the benefit of wildlife	x	+	+
Taking trips or outings to any other location to observe, photograph, or feed wildlife	+	+	+
Visiting parks and natural areas to observe, photograph, or feed wildlife	+	+	+

Recreational specialization and urbanicity

The distributions of wildlife viewing skill levels between urban and rural wildlife viewers were similar (Figure 16, Tables SA37-38). Of urban wildlife viewers, 41% ranked themselves as *intermediate* wildlife viewing expertise or above, as compared to 38% of rural wildlife viewers (Figure 17, Table SA39).

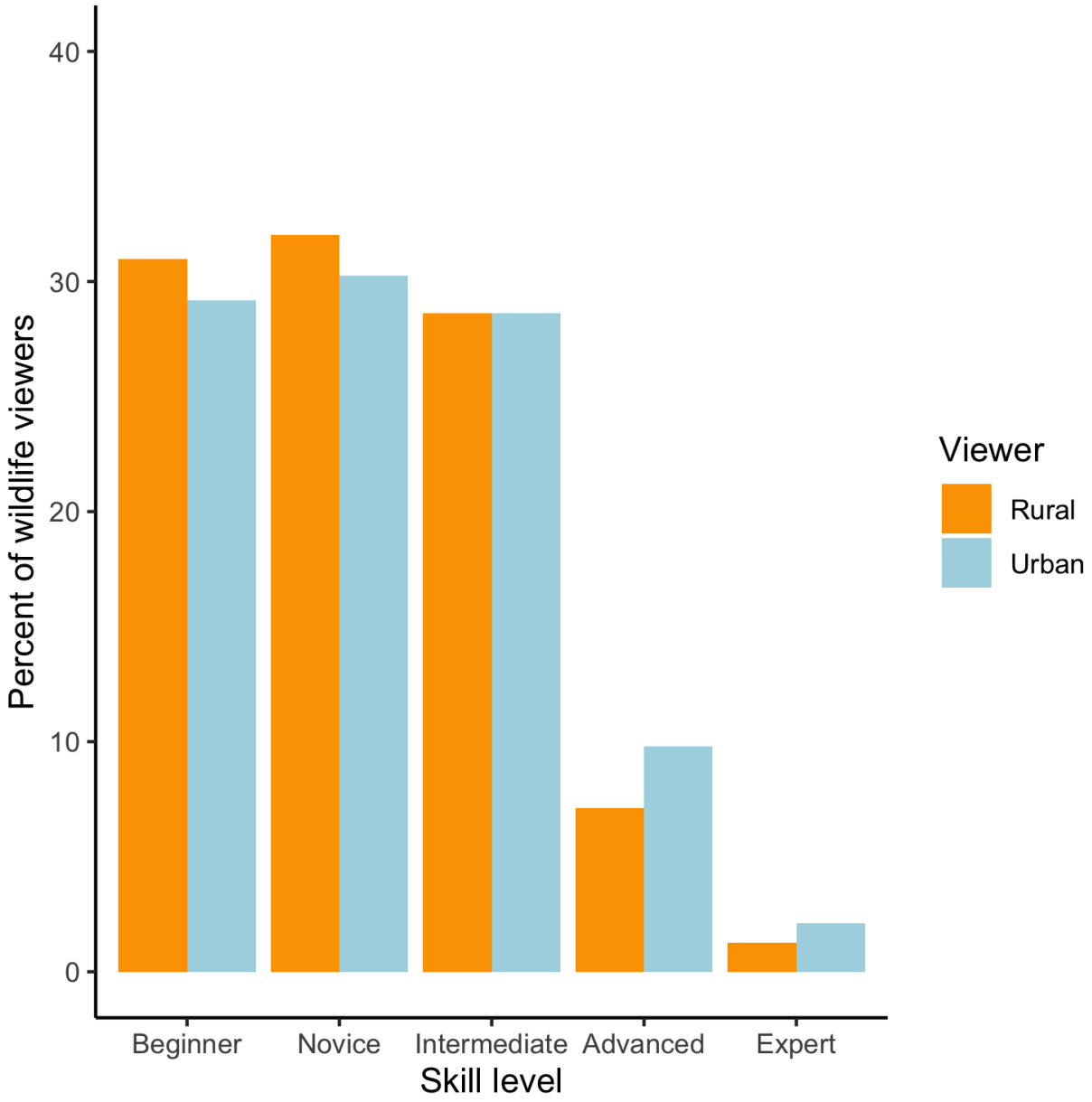

Figure 16. Skill level of urban and rural wildlife viewers
Percentage of urban and rural wildlife viewers who rank themselves in each category of wildlife viewing skill.

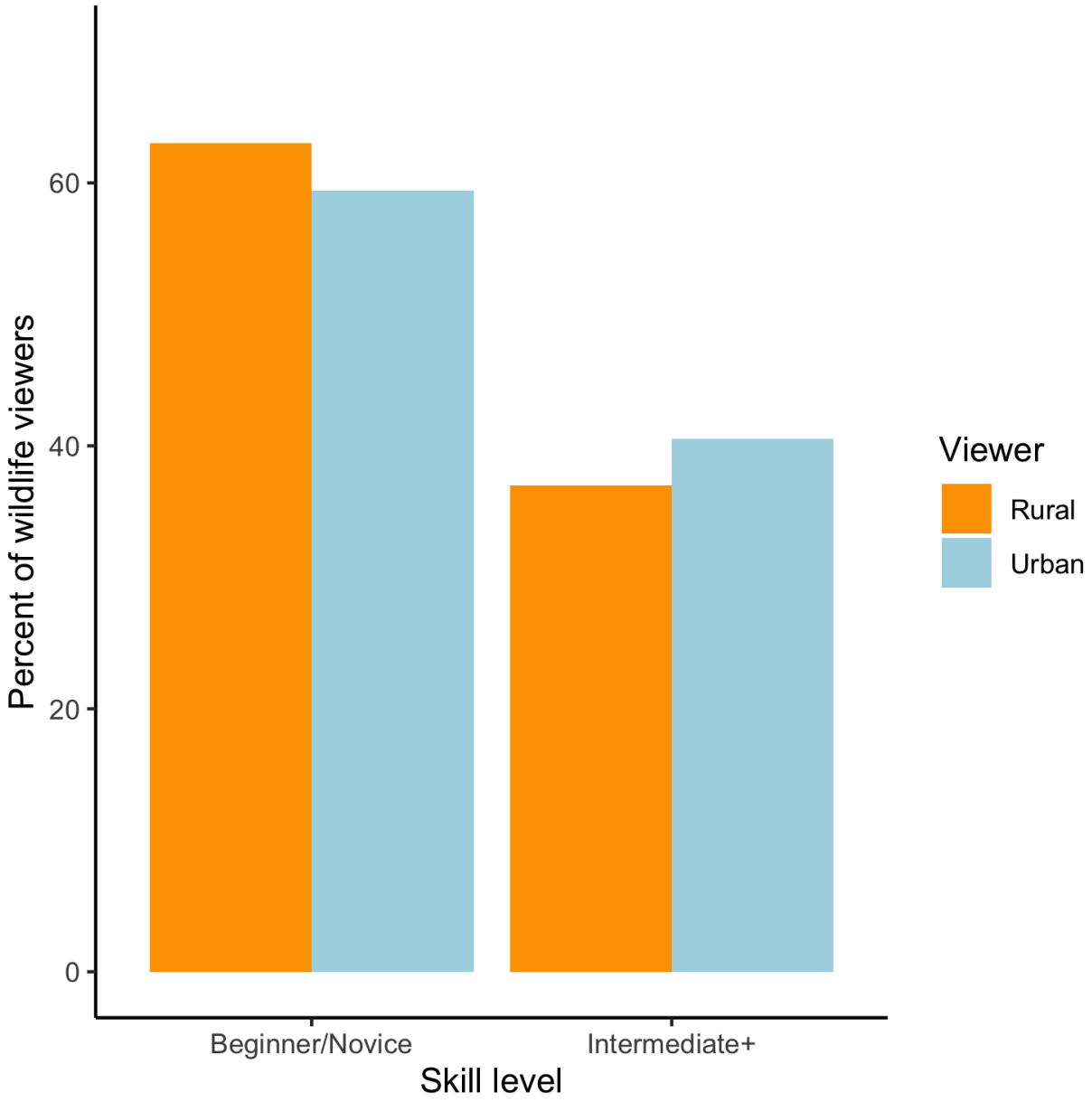

Figure 17. Intermediate skill by urban and rural wildlife viewers
Percentage of urban as compared to rural wildlife viewers who rank themselves as *beginner/novice* or *intermediate* and above in wildlife viewing skill.

There was a significant positive correlation between self-ranked wildlife viewer expertise and urbanicity ($\tau = .02$, $df = 15{,}756$, $p < .001$).

Viewers that lived in ZCTAs with a higher urbanicity were more likely to rank themselves as at least *intermediate* expertise than wildlife viewers in ZCTAs with a lower urbanicity ($p < .001$, Table 5, Table SA40).

Table 5. Relationships between wildlife viewer urbanicity and likelihood of a wildlife viewer ranking themselves as at least *intermediate* viewing expertise
Orange cells with a "-" indicate a significant negative relationship, green cells with a "+" indicate a significant positive relationship, and gray cells with an "x" indicate no significant relationship. For regression model outputs, see Table SA40.

Variable	Relationship with urbanicity
Self-ranked expertise	+

The relationship between urbanicity and self-ranked expertise did not change when accounting for ethnoracial identity and income. Wildlife viewers in higher urbanicity ZCTAs were still more likely to rank themselves as *intermediate* expertise or above than wildlife viewers in lower urbanicity ZCTAs (p = .02, Table 6, Table SA41). After accounting for urbanicity and income, BIPOC wildlife viewers were more likely to rank themselves as *intermediate* expertise or above than white wildlife viewers (p < .001). After accounting for urbanicity and ethnoracial identity, higher income wildlife viewers were more likely to rank themselves as *intermediate* expertise or above than lower income wildlife viewers (p < .001).

Table 6. Relationship between wildlife viewer urbanicity, ethnoracial identity, and income and likelihood of a wildlife viewer ranking themselves as at least *intermediate* viewing expertise.
Orange cells with a "-" indicate a significant negative relationship, green cells with a "+" indicate a significant positive relationship, and gray cells with an "x" indicate no significant relationship.To analyze ethnoracial identity, wildlife viewers have been separated into white and BIPOC categories. White wildlife viewers are treated as the baseline, such that a "+" indicates a positive relationship between BIPOC wildlife viewers and the outcome variable. For regression model outputs, see Table SA41.

Variable	Relationship with urbanicity	Relationship with ethnoracial identity	Relationship with income
Self-ranked expertise	+	+	+

Barriers to participation and urbanicity

The extent to which each barrier limited participation in wildlife viewing differed between barriers and between urban and rural wildlife viewers (Figures 18-20, Tables SA42-47). For urban wildlife viewers, distance to high-quality locations for wildlife viewing was the greatest barrier, with 60% of wildlife viewers indicating that it limited their participation in wildlife viewing at least *somewhat*, followed by lack of free time to participate in wildlife viewing (56%) and not knowing where to go wildlife viewing (48%) (Figure 21, Table SA48). For rural wildlife viewers, distance to high-quality locations for wildlife viewing

was also the greatest barrier, with 53% of wildlife viewers indicating that it limited their participation in wildlife viewing at least *somewhat*, followed by lack of free time to participate in wildlife viewing (51%) and not knowing where to go wildlife viewing (40%).

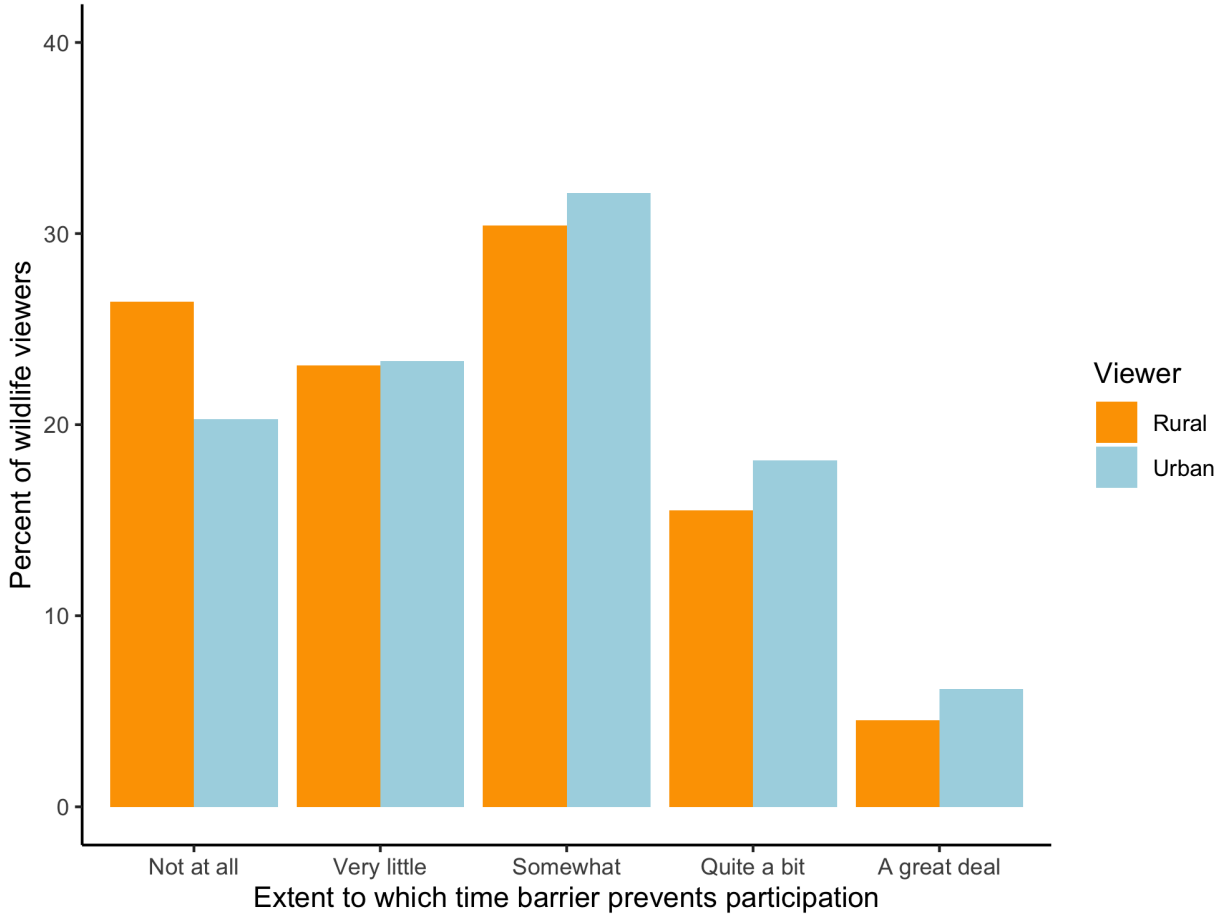

Figure 18. Time barrier for urban and rural wildlife viewers
The percentage of urban and rural wildlife viewers who indicated that lack of free time to participate in wildlife viewing limited their participation in wildlife viewing each amount.

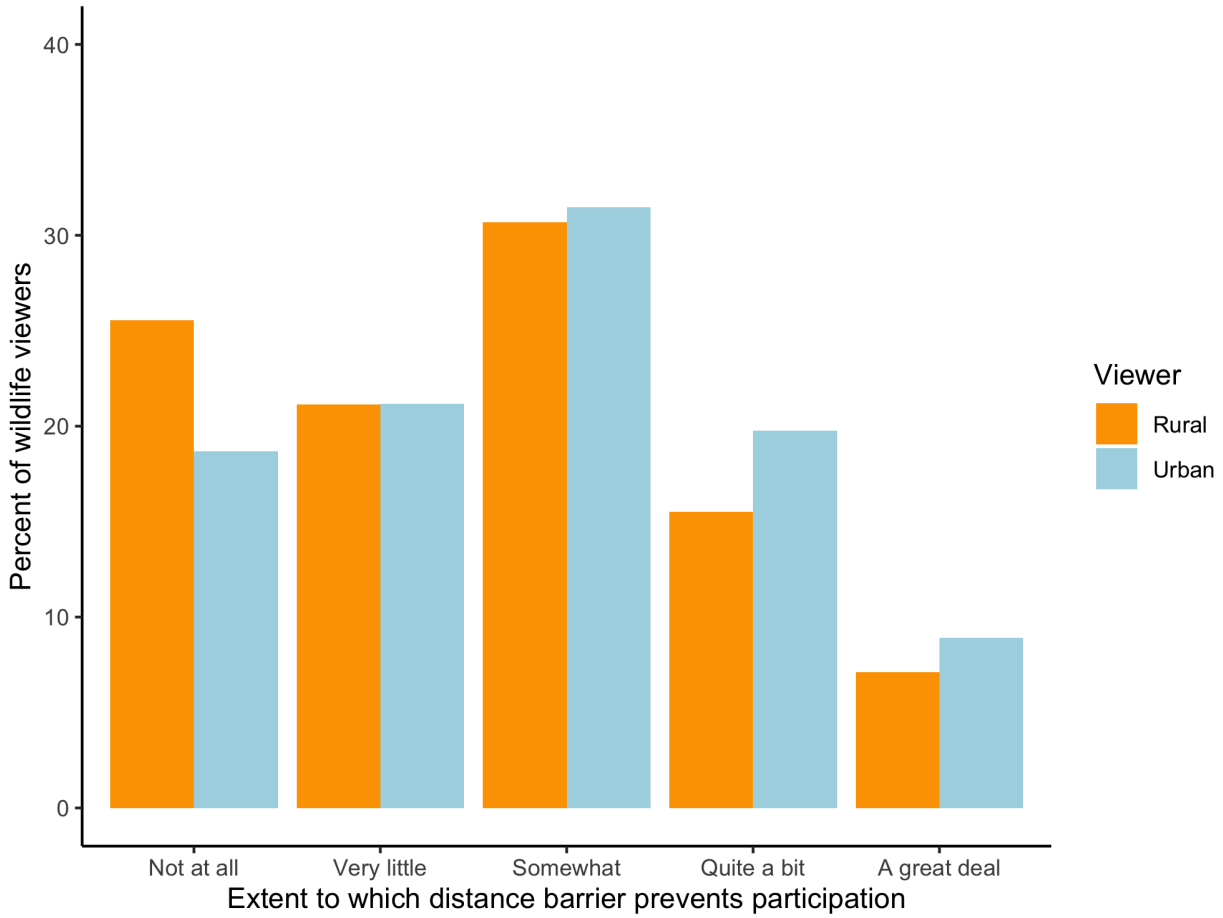

Figure 19. Distance barrier for urban and rural wildlife viewers
The percentage of urban and rural wildlife viewers who indicated that distance to high-quality locations for wildlife viewing limited their participation in wildlife viewing each amount.

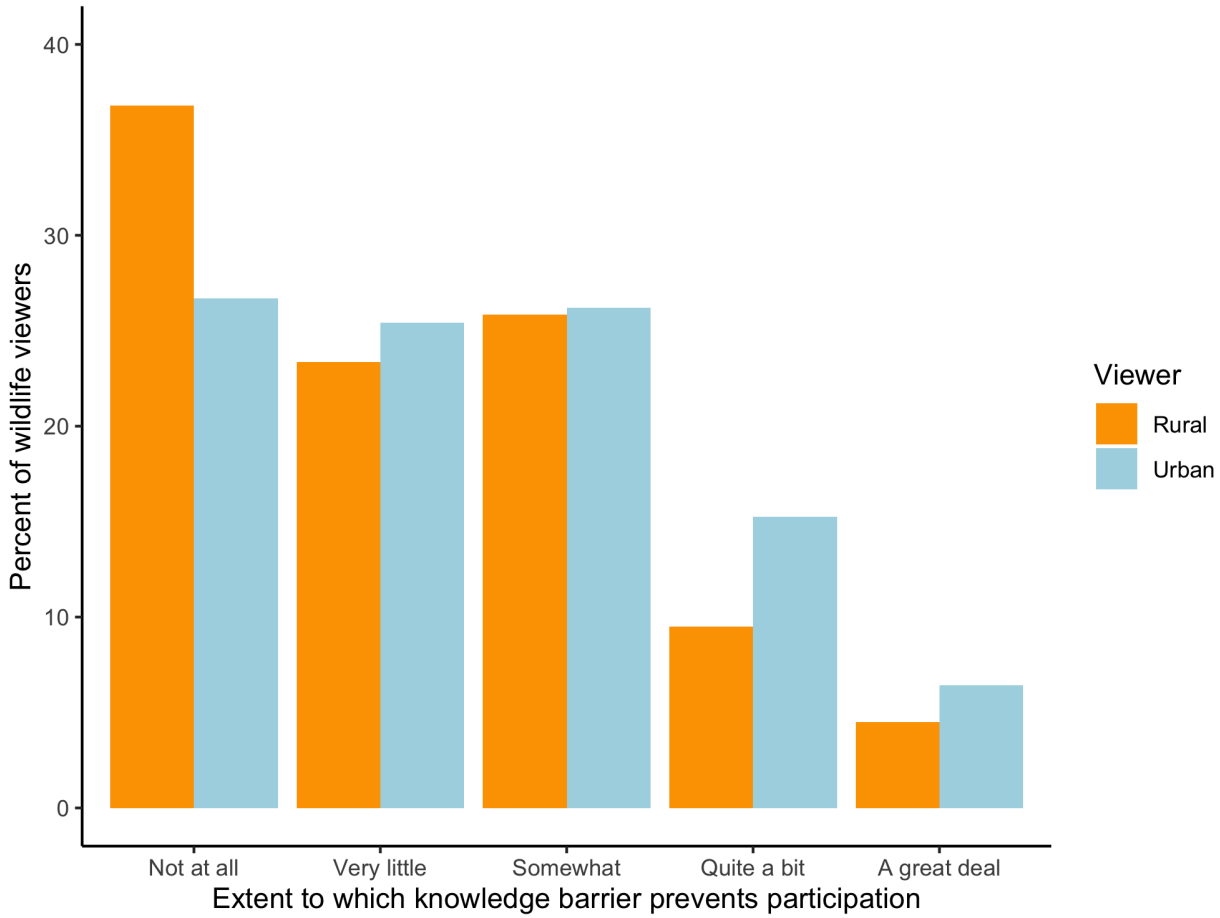

Figure 20. Knowledge barrier for urban and rural wildlife viewers
The percentage of urban and rural wildlife viewers who indicated that not knowing where to go wildlife viewing limited their participation in wildlife viewing each amount.

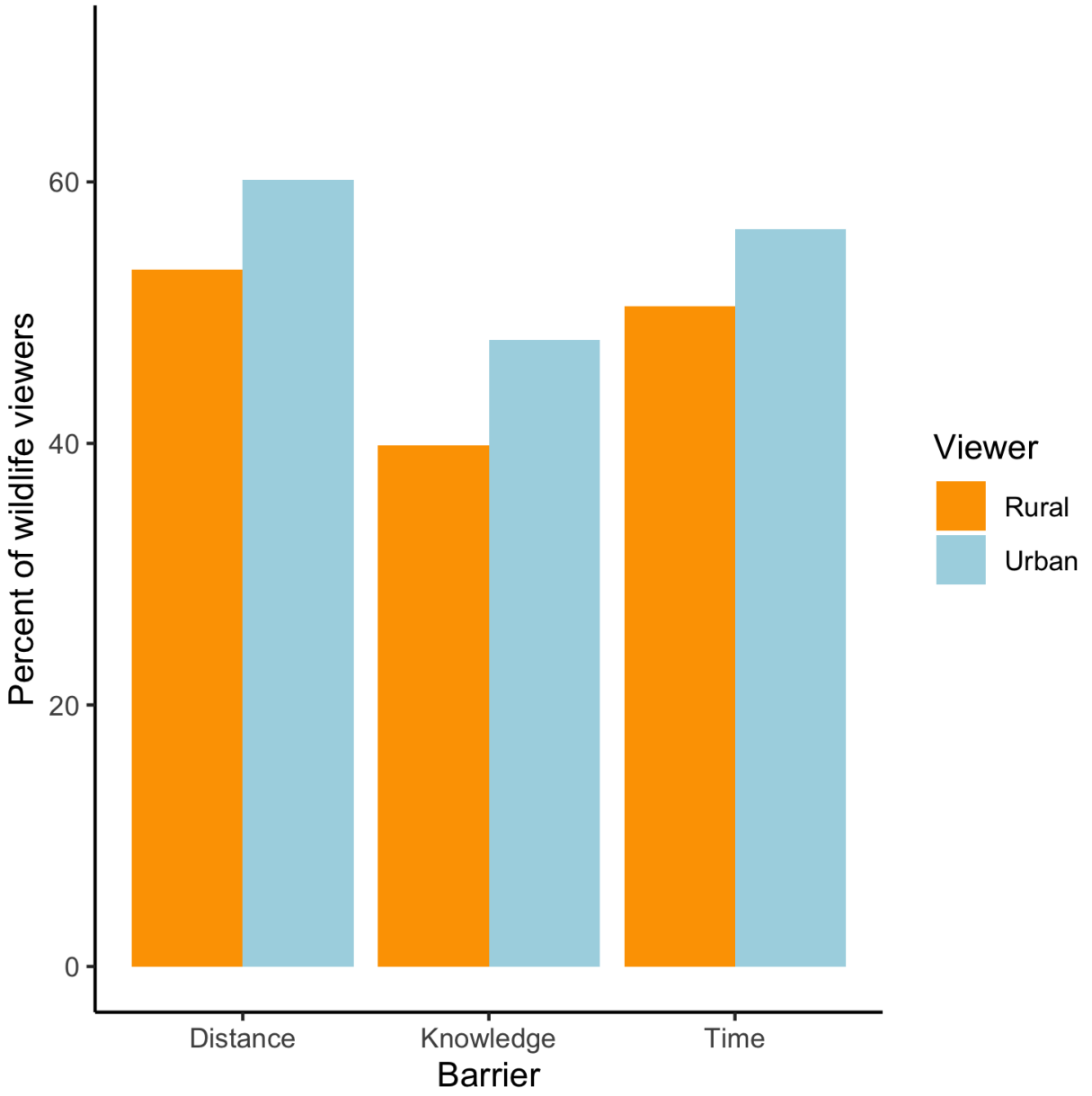

Figure 21. Somewhat limiting barriers by urban and rural wildlife viewers
The percentage of urban as compared to rural wildlife viewers who indicated that each barrier limited their participation in wildlife viewing at least *somewhat*. Distance = distance to high-quality locations for wildlife viewing, knowledge = not knowing where to go wildlife viewing, time = lack of free time to participate in wildlife viewing.

There were significant positive correlations between the extent to which each barrier limited participation and urbanicity (lack of free time to participate in wildlife viewing: τ = .04, *df* = 16,585, $p < .001$; distance to high-quality locations for wildlife viewing: τ = .05, *df* = 16,498, $p < .001$; not knowing where to go wildlife viewing: τ = .07, *df* = 16,476, $p <$ .001).

Viewers that lived in ZCTAs with a higher urbanicity were more likely to indicate lack of free time to participate in wildlife viewing ($p < .001$), distance to high-quality locations for wildlife viewing ($p < .001$), and not knowing where to go wildlife viewing ($p < .001$) were at least *somewhat* of a barrier to participation in wildlife viewing than wildlife viewers in ZCTAs with a lower urbanicity (Table 7, Table SA49-51).

Table 7. Relationships between wildlife viewer urbanicity and likelihood of time, distance, and knowledge being at least *somewhat* of a barrier to participating in wildlife viewing
Relationships between wildlife viewer urbanicity and likelihood of a wildlife viewer indicating that lack of free time to participate in wildlife viewing, distance to high-quality locations for wildlife viewing, and not knowing where to go wildlife viewing were at least *somewhat* of a barrier to participating in wildlife viewing. Orange cells with a "-" indicate a significant negative relationship, green cells with a "+" indicate a significant positive relationship, and gray cells with an "x" indicate no significant relationship. For regression model outputs, see Tables SA49-51.

Barrier	Relationship with urbanicity
Lack of free time to participate in wildlife viewing	+
Distance to high-quality locations for wildlife viewing	+
Not knowing where to go wildlife viewing	+

The relationship between urbanicity and barrier extent did not change when accounting for ethnoracial identity and income. Wildlife viewers in higher urbanicity ZCTAs were still more likely to indicate that lack of free time to participate in wildlife viewing ($p < .001$), distance to high-quality locations for wildlife viewing ($p < .001$), and not knowing where to go wildlife viewing ($p < .001$) were at least *somewhat* of a barrier than wildlife viewers in lower urbanicity ZCTAs (Table 8, Table SA52-54). After accounting for urbanicity and income, BIPOC wildlife viewers were more likely to indicate that lack of free time to participate in wildlife viewing ($p < .001$), distance to high-quality locations for wildlife viewing ($p < .001$), and not knowing where to go wildlife viewing ($p < .001$) were at least somewhat of a barrier than white wildlife viewers. Controlling for urbanicity and ethnoracial identity, higher income wildlife viewers were more likely to indicate that lack of free time to participate in wildlife viewing ($p < .001$) but less likely to indicate that distance to high-quality locations for wildlife viewing ($p < .001$) was at least *somewhat* of a barrier than lower income wildlife viewers. There was no relationship between the

perceived extent of not knowing where to go wildlife viewing as a barrier to participation in wildlife viewing and urbanicity (p = .52).

Table 8. Relationships between wildlife viewer urbanicity, ethnoracial identity, and income, and likelihood of time, distance, and knowledge being at least *somewhat* of a barrier to participating in wildlife viewing

Relationship between wildlife viewer urbanicity, ethnoracial identity, and income and likelihood of a wildlife viewer indicating that lack of free time to participate in wildlife viewing, distance to high-quality locations for wildlife viewing, and not knowing where to go wildlife viewing were at least *somewhat* of a barrier to participating in wildlife viewing. Orange cells with a "-" indicate a significant negative relationship, green cells with a "+" indicate a significant positive relationship, and gray cells with an "x" indicate no significant relationship.To analyze ethnoracial identity, wildlife viewers have been separated into white and BIPOC categories. White wildlife viewers are treated as the baseline, such that a "+" indicates a positive relationship between BIPOC wildlife viewers and the outcome variable. For regression model outputs, see Tables SA52-54.

Barrier	Relationship with urbanicity	Relationship with ethnoracial identity	Relationship with income
Lack of free time to participate in wildlife viewing	+	+	+
Distance to high-quality locations for wildlife viewing	+	+	–
Not knowing where to go wildlife viewing	+	+	x

Relationship with state agency and urbanicity

The distribution of familiarity with state agencies also differed between urban and rural wildlife viewers (Figure 22, Tables SA55-56). Of urban wildlife viewers, 61% were at least *moderately familiar* with their state agency, compared to 63% of rural wildlife viewers (Figure 23, Table SA57). More than half of both urban and rural wildlife viewers had participated in a state agency program in the past (67% and 58% of wildlife viewers, respectively, Figure 24, Table SA58).

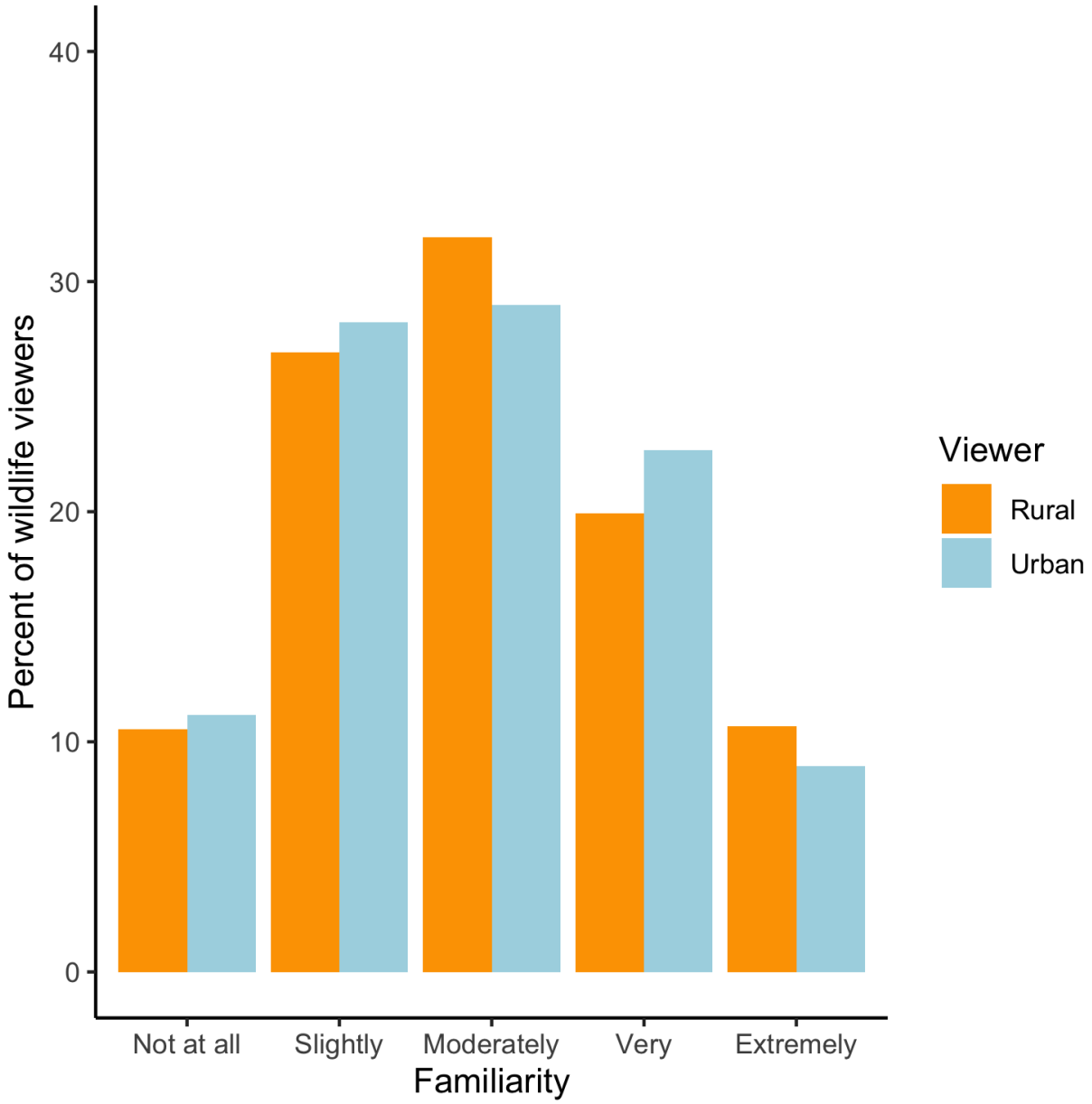

Figure 22. Familiarity with state agencies by urban and rural wildlife viewers
Percent of urban and rural wildlife viewers with different levels of familiarity with state agencies.

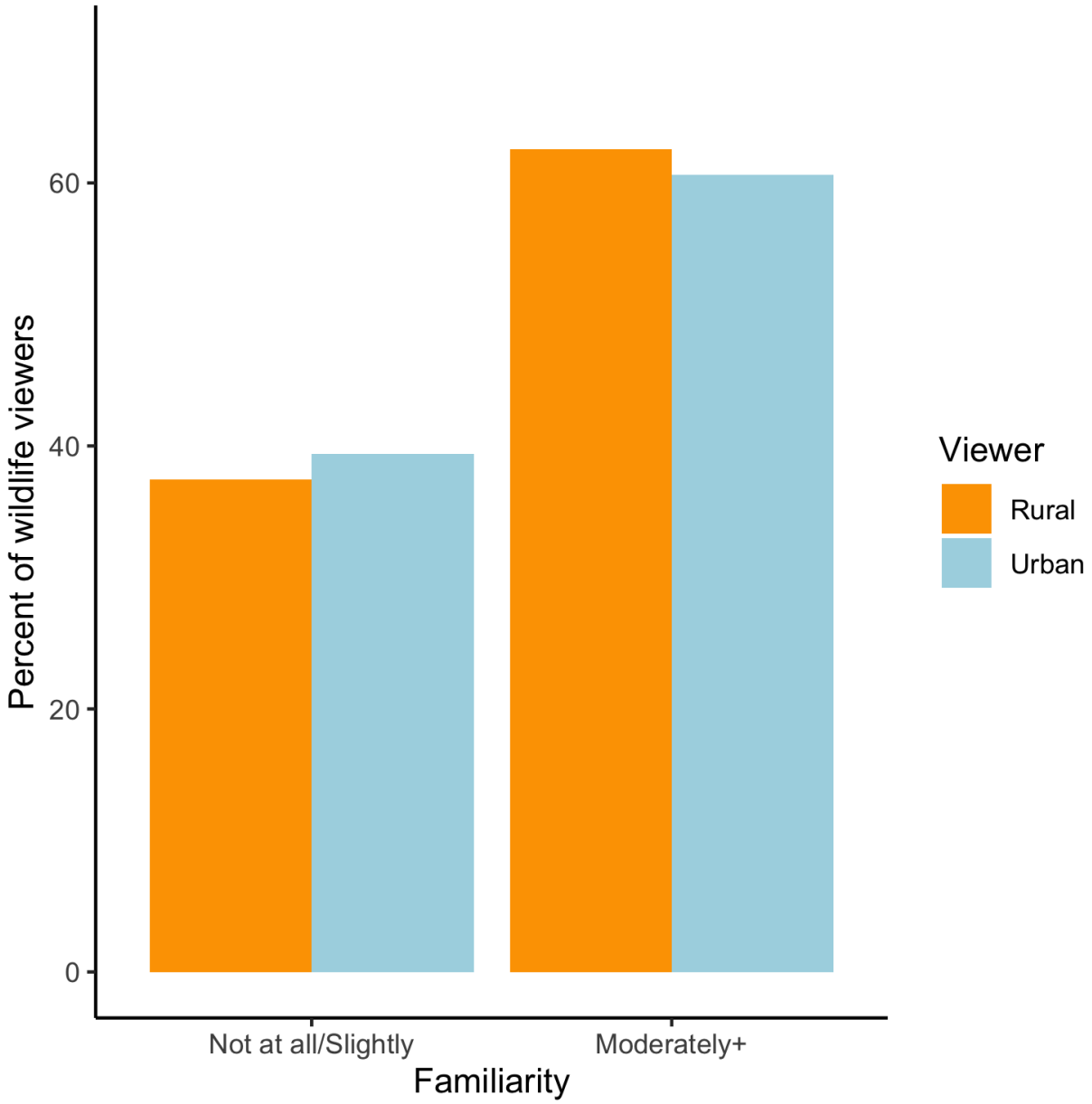

Figure 23. Moderate familiarity with state agencies by urban and rural wildlife viewers
Percent of urban as compared to rural wildlife viewers who are at least *moderately familiar* with their state agency.

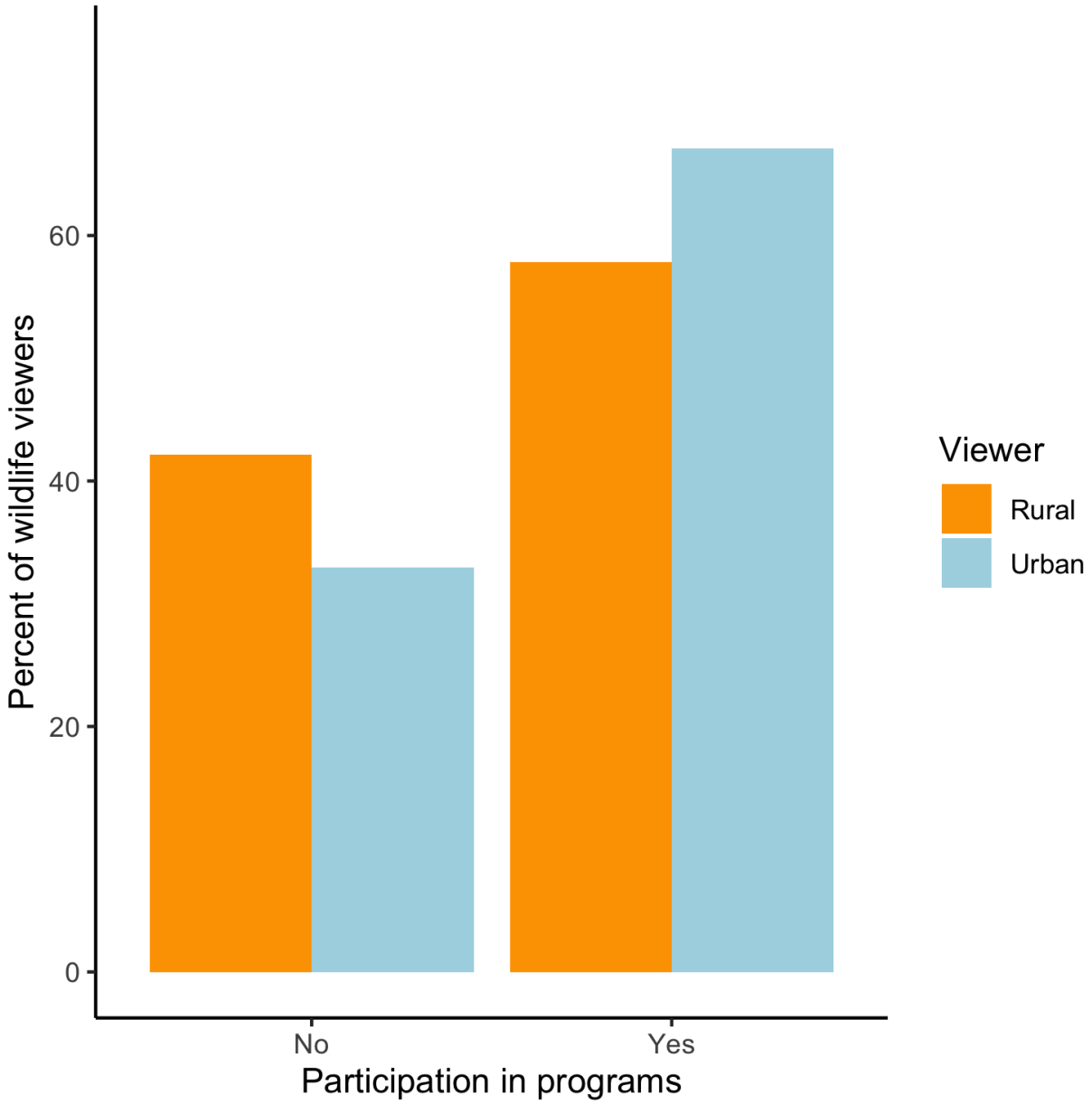

Figure 24. Program participation by urban and rural wildlife viewers
Percent of urban as compared to rural wildlife viewers who have participated in state agency programs.

There was no significant correlation between wildlife viewer familiarity with state agencies and urbanicity (τ = -.01, *df* = 16,591, *p* = .06).

Viewers that lived in ZCTAs with a higher urbanicity were more not more likely to be at least *moderately familiar* with state agencies than wildlife viewers in ZCTAs with a lower urbanicity (*p* = .995, Table 9, Table SA59). Wildlife viewers that lived in ZCTAs with a higher urbanicity were more likely to have participated in agency programs than wildlife viewers in ZCTAs with a lower urbanicity (*p* < .001, Table 9, Table SA60).

Table 9. Relationships between wildlife viewer urbanicity and likelihood of familiarity with state agency and participation in state agency programs
Relationships between wildlife viewer urbanicity and likelihood of wildlife viewers being at least *moderately familiar* with their state agency as well as having participated in state agency programs. Orange cells with a "-" indicate a significant negative relationship, green cells with a "+" indicate a significant positive relationship, and gray cells with an "x" indicate no significant relationship. For regression model outputs, see Tables SA59-60.

Relationship variable	Relationship with urbanicity
Familiarity with agency	x
Experience with programs	+

The relationship between urbanicity and familiarity changed when accounting for ethnoracial identity and income. When accounting for ethnoracial identity and income, wildlife viewers in higher urbanicity ZCTAs were less likely to be at least *moderately familiar* with state agencies than wildlife viewers in lower urbanicity ZCTAs ($p = .004$, Table 10, Table SA61). When accounting for urbanicity and income, BIPOC wildlife viewers were more likely to be at least *moderately familiar* than white wildlife viewers ($p < .001$). When accounting for urbanicity and ethnoracial identity, higher income wildlife viewers were more likely to be at least *moderately familiar* than lower income wildlife viewers ($p < .001$).

The relationship between urbanicity and participation in agency programs did not change when controlling for ethnoracial identity and income. Wildlife viewers in higher urbanicity ZCTAs were still more likely to have participated in state agency programs than wildlife viewers in lower urbanicity ZCTAs ($p < .001$, Table 10, Table SA62). Controlling for urbanicity and income, BIPOC wildlife viewers were more likely to have participated in state agency programs than white wildlife viewers ($p < .001$). Controlling for urbanicity and ethnoracial identity, higher income wildlife viewers were more likely to have participated in state agency programs than lower income wildlife viewers ($p < .001$).

Table 10. Relationships between wildlife viewer urbanicity, ethnoracial identity, income, and likelihood of familiarity with state agency and participation in state agency programs
Relationship between wildlife viewer urbanicity, ethnoracial identity, and income and likelihood of wildlife viewers being at least *moderately familiar* with their state agency as well as having participated in state agency programs. Orange cells with a "-" indicate a significant negative relationship, green cells with a "+" indicate a significant positive relationship, and gray cells with an "x" indicate no significant relationship.To analyze ethnoracial identity, wildlife viewers have been separated into white and BIPOC categories. White wildlife viewers are treated as the baseline, such that a "+" indicates a positive relationship between BIPOC wildlife viewers and the outcome variable. For regression model outputs, see Tables SA61-62.

Relationship variable	Relationship with urbanicity	Relationship with ethnoracial identity	Relationship with income
Familiarity with agency	–	+	+
Experience with programs	+	+	+

Communication preferences and urbanicity

A higher percentage of urban wildlife viewers were interested in receiving information about wildlife viewing via some modes of communication compared to others. In order of popularity, the modes of communication were agency websites (55% interested); email updates or e-newsletters (50%); printed materials (such as brochures or maps) (47%); Facebook (40%); online magazines (35%); local news (such as television, online, or print newspapers) (34%); mailed newsletters or other subscriptions (32%); YouTube (32%); Instagram (24%); Twitter (18%); TikTok (15%); blogs (13%), podcasts (11%); one-on-one interactions with agency staff (10%); and text alerts (10%). Only 7.3% of urban respondents said they were not interested in receiving information at all (Figure 25, Table SA63). For rural wildlife viewers, the order was printed materials (such as brochures or maps) (57% interested); agency websites (55%); email updates or e-newsletters (46%); Facebook (42%); mailed newsletters or other subscriptions (35%); local news (such as television, online, or print newspapers) (33%); online magazines (30%); YouTube (27%); Instagram (14%); one-on-one interactions with agency staff (13%); TikTok (11%); text alerts (10%); Twitter (9.8%); blogs (8.5%); and podcasts (6.9%). Only 9.6% of rural respondents said they were not interested in receiving information at all.

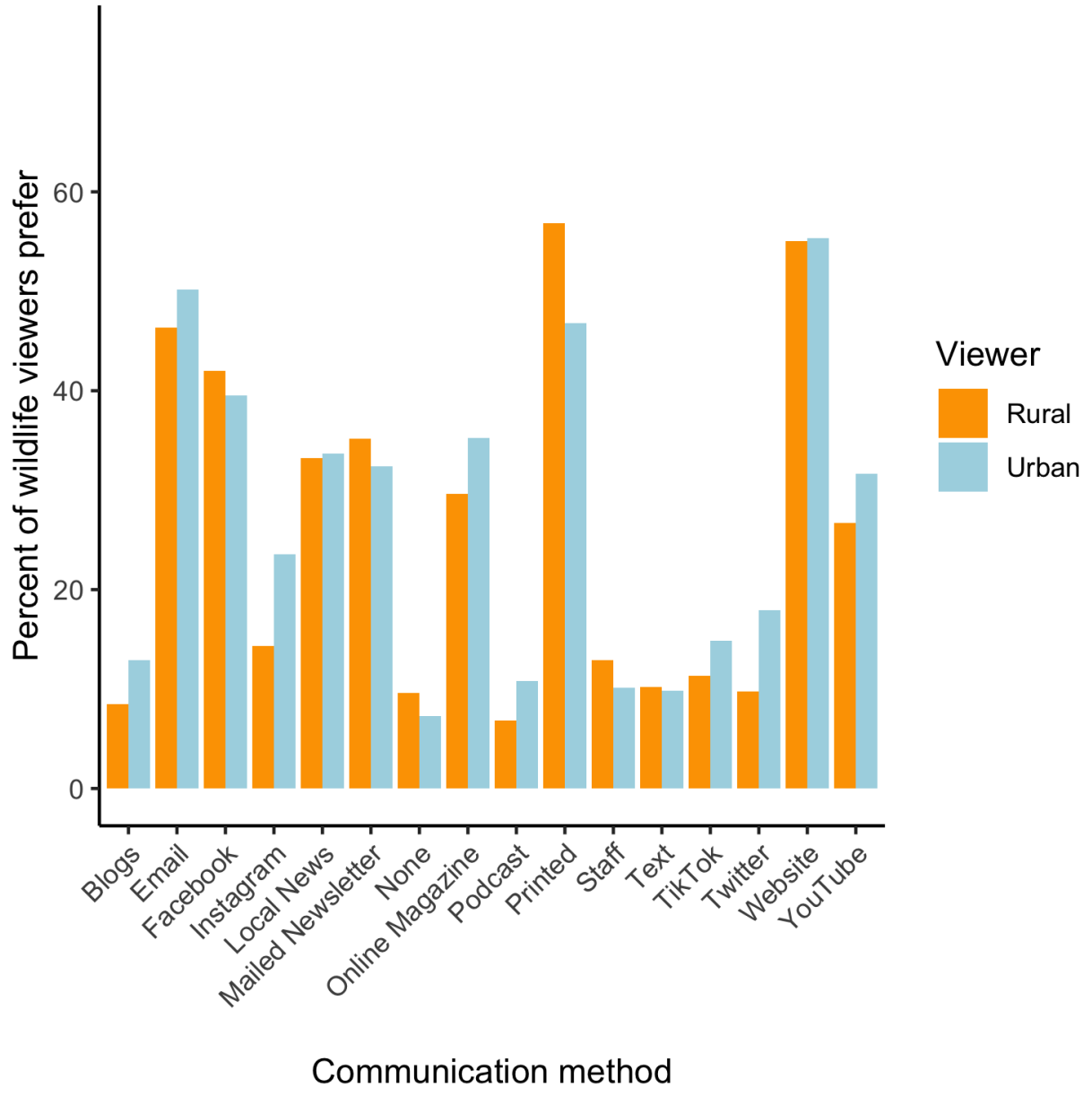

Figure 25. Preferred communication methods of urban and rural wildlife viewers
Percent of urban as compared to rural wildlife viewers who are interested in receiving information from their state agency via different modes of communication. Communication methods indicated in the graph, where different from survey text, correspond with the survey text as follows: email = email updates or e-newsletters; local news = local news (such as television, online, or print newspapers); mailed newsletter = mailed newsletters or other subscriptions; none = I would prefer not to receive information from my state agency; printed = printed materials (such as brochures or maps); staff = one-on-one interactions with agency staff; text = text alerts; website = agency website.

Viewers that lived in ZCTAs with a higher urbanicity were less likely to be interested in receiving information via mailed newsletters or other subscriptions (p = .03), printed materials (such as brochures or maps) (p < .001), or one-on-one interactions with

agency staff ($p < .001$) than wildlife viewers in ZCTAs with a lower urbanicity (Table 11, Tables SA64-6). However, wildlife viewers that lived in ZCTAs with a higher urbanicity were more likely to be interested in receiving information via blogs ($p < .001$), email updates or e-newsletters ($p = .001$), Instagram ($p < .001$), online magazines ($p < .001$), podcasts ($p < .001$), TikTok ($p < .001$), Twitter ($p < .001$), and YouTube ($p < .001$) than wildlife viewers in ZCTAs with a lower urbanicity (Tables SA67-74). There was no relationship between the urbanicity of a wildlife viewer's ZCTA and the likelihood of being interested in receiving information via Facebook ($p = .41$), local news (such as television, online, or print newspapers) ($p = .37$), text alerts ($p = .39$), or agency websites ($p = .31$) (Tables SA75-78). Viewers that lived in ZCTAs with a higher urbanicity were less likely to not want to receive information from their state agency than wildlife viewers in ZCTAs with a lower urbanicity ($p < .001$, Table SA79).

Table 11. Relationships between wildlife viewer urbanicity and the likelihood of being interested in receiving information via different methods of communication.
Orange cells with a "-" indicate a significant negative relationship, green cells with a "+" indicate a significant positive relationship, and gray cells with an "x" indicate no significant relationship. For regression model outputs, see Tables SA64-79.

Mode of communication	Relationship with urbanicity
Blogs	+
Email updates or e-newsletters	+
Facebook	x
Instagram	+
Local news (such as television, online, or print newspapers)	x
Mailed newsletters or other subscriptions	–
Online magazines	+
Podcasts	+
Printed materials (such as brochures or maps)	–
One-on-one interactions with agency staff	–
Text alerts	x
TikTok	+
Twitter	+
Agency website	x
YouTube	+
I would prefer not to receive information from my state agency	–

All of relationships between urbanicity and likelihood of being interested in receiving information via different modes of communication did not change when accounting for ethnoracial identity and income (Table 12). As in the models run with urbanicity alone, wildlife viewers in higher urbanicity ZCTAs were less likely to be interested in receiving information via mailed newsletters or other subscriptions (p = .03), printed materials (such as brochures or maps) (p < . 001), and one-on-one interactions with agency staff (p < .001) than wildlife viewers in lower urbanicity ZCTAs (Tables SA80-82). Wildlife viewers in higher urbanicity ZCTAs were more likely to be interested in receiving information via blogs (p < .001), email updates or e-newsletters (p = .03), Instagram (p < .001), online magazines (p < .001), podcasts (p < .001), TikTok (p < .001), Twitter (p < .001), and YouTube (p < .001) than wildlife viewers in lower urbanicity ZCTAs (Tables SA83-90). There was no significant relationship between being interested in receiving information via Facebook (p = .15), local news (such as television, online, or print newspapers) (p = .18), text alerts (p = .33), and agency websites (p = .14) and urbanicity (Tables SA91-94). Viewers that lived in ZCTAs with a lower urbanicity were more likely to not want to receive information from their state agency than wildlife viewers in ZCTAs with a higher urbanicity (p = .03, Table SA95).

After accounting for urbanicity and income, BIPOC wildlife viewers were less likely to be interested in receiving information via local news (such as television, online, or print newspapers) (p < .001), printed materials (such as brochures or maps) (p < .001), one-on-one interactions with agency staff (p = .007), and agency websites (p < .001) than white wildlife viewers (Tables SA81-82, 92, & 94). BIPOC wildlife viewers were more likely to be interested in receiving information via blogs (p < .001), Facebook (p < .001), Instagram (p < .001), online magazines (p < .001), podcasts (p < .001), text alerts (p < .001), TikTok (p < .001), Twitter (p < .001), and YouTube (p < .001) than white wildlife viewers (Tables SA83, 85-91, & 93). There was no relationship between ethnoracial identity and the likelihood of being interested in receiving information via email updates or e-newsletters (p = .59) or mailed newsletters or other subscriptions (p = .84) when controlling for income and urbanicity (Tables SA80 & 84). White wildlife viewers were more likely to prefer not to receive information from their state agency than BIPOC wildlife viewers (p < .001, Table SA95).

After accounting for urbanicity and ethnoracial identity, higher income wildlife viewers were to more likely to be interested in receiving information via blogs (p < .001), email updates or e-newsletters (p < .001), Instagram (p < .001), online magazines (p < . 001), podcasts (p < .001), TikTok (p = .006), Twitter (p < .001), and agency websites (p < .001) than lower income wildlife viewers (Tables SA83-89 & 94). There was no significant relationship between feeding income and interest in receiving information via Facebook (p =.25), local news (such as television, online, or print newspapers) (p =

.32), mailed newsletters or other subscriptions (p = .75), printed materials (such as brochures or maps) (p = .08), one-on-one interactions with agency staff (p = .81), text alerts (p = .07), and YouTube (p = .76) when controlling for urbanicity and ethnoracial identity (Tables SA80-82 & 90-93). Lower income wildlife viewers were more likely to not to receive information from their state agency than higher income wildlife viewers (p < .001, Table SA95).

Table 12. Relationships between wildlife viewer urbanicity, ethnoracial identity, and income and the likelihood of being interested in receiving information via different methods of communication.
Orange cells with a "-" indicate a significant negative relationship, green cells with a "+" indicate a significant positive relationship, and gray cells with an "x" indicate no significant relationship. To analyze ethnoracial identity, wildlife viewers have been separated into white and BIPOC categories. White wildlife viewers are treated as the baseline, such that a "+" indicates a positive relationship between BIPOC wildlife viewers and the outcome variable. For regression model outputs, see Tables SA80-95.

Mode of communication	Relationship with urbanicity	Relationship with ethnoracial identity	Relationship with income
Blogs	+	+	+
Email updates or e-newsletters	+	x	+
Facebook	x	+	x
Instagram	+	+	+
Local news (such as television, online, or print newspapers)	x	–	x
Mailed newsletters or other subscriptions	–	x	x
Online magazines	+	+	+
Podcasts	+	+	+
Printed materials (such as brochures or maps)	–	–	x
One-on-one interactions with agency staff	–	–	x
Text alerts	x	+	x
TikTok	+	+	+
Twitter	+	+	+
Agency website	x	–	+
YouTube	+	+	x
I would prefer not to receive information from my state agency	–	–	–

Great Florida Birding and Wildlife Trail Case Study

Introduction

Florida has one of the largest urban populations in the United States. In the Florida Results of the Wildlife Viewer Survey (Pototsky et al. 2022b), 40% of wildlife viewers reported living in a major city, 30% in a smaller city, and the remaining one-third in a small town or rural area. Overall, this survey also found that wildlife viewers in Florida were particularly interested in more information on when, where, and how to view wildlife, as well as increased access to wildlife viewing locations. To meet these needs, the Florida Fish and Wildlife Conservation Commission (FWC) desires to continue to play a key role as an information resource on wildlife viewing in Florida, as they do through the Great Florida Birding and Wildlife Trail (GFBWT; Figure 1), a network of more than 500 premier wildlife viewing sites across the state. Created in 1998, the GFBWT connects the FWC to birders, wildlife viewers, and local communities. However, it is not understood whether wildlife viewers' desire for more access to wildlife viewing locations is connected to a potential lack of awareness of the GFBWT or gaps in access on the GFBWT, particularly for urban wildlife viewers.

Figure 1. GFBWT sites can be public or private lands. Sites are designated via a nomination process and selected based on unique wildlife viewing opportunities, ecological significance, educational opportunities, access for the public, and resilience to recreational use. FWC photo by Andy Wraithmell.

Research questions:

We collaborated with FWC to explore three research questions:

1) What is the relationship between the degree of urbanicity and a) quantity of GFBWT sites and b) area of GFBWT sites for ZIP codes in Florida?

2) Is Floridian wildlife viewers' perception of a) distance to [self-defined] high-quality sites, b) lack of transportation, and c) financial cost as barriers to their participation correlated with the area of GFBWT sites in their ZIP codes?

3) Is Floridian wildlife viewers' desire for access to more places to view wildlife correlated with area of GFBWT sites in their ZIP codes?

Methods

We combined data from 1,246 Floridian respondents in the national and state-level Wildlife Viewer Surveys with spatial data on GFBWT site locations provided by FWC (Figure 2). We generated a metric called urbanicity for each ZIP Code Tabulation Area (ZCTA) in Florida based on land cover of impervious surfaces and population density (Figure 3). To account for the high proportion of ZCTAs with no GFBWT area, two-part models and hurdle models were used to explore relationships between quantity/area of GFBWT sites and urbanicity. Hurdle models and two-part models are applied to situations in which data have many zero values, to go along with the other observed values. They have two parts: a model for whether an observation is zero or not, and an appropriate regression model for all other values. Spearman's correlation tests were used to assess relationships between wildlife viewers' reported barriers to participation. Finally, a generalized linear model with a binomial distribution was used to assess the relationship between urbanicity and whether or not wildlife viewers were interested in FWC providing access to more places to go wildlife viewing. All analyses were performed in R 2023.3.0.

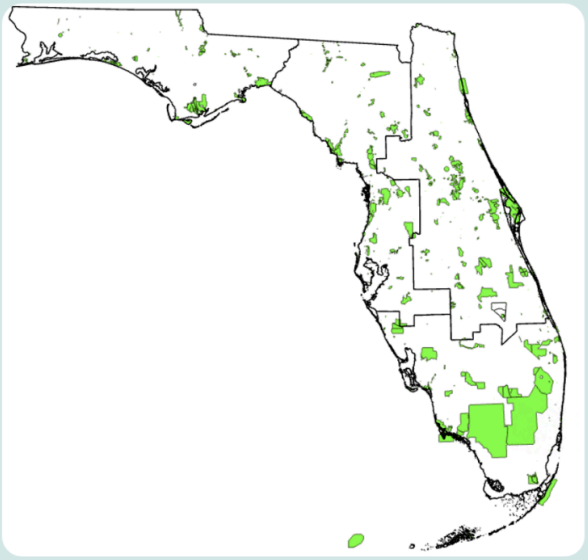

Figure 2. Map of GFBWT sites across Florida (in green). The most urban GFBWT site is Sand Key Park in downtown Clearwater in the Tampa Bay area.

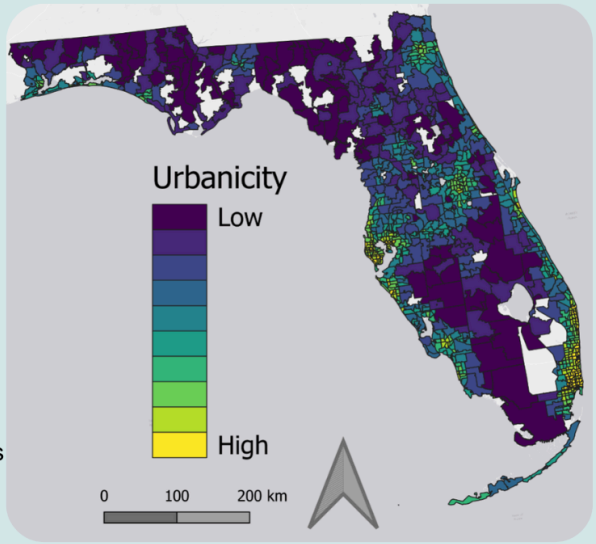

Figure 3. Map of an urbanicity metric combining impervious surface and population density for ZCTAs across Florida. The top twenty most urban ZCTAs in Florida have no GFBWT area, and fifteen of these ZCTAs are in Miami-Dade County. Miami-Dade County is on the southeastern coast, home to Miami, and is the most populous county in the state.

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Results

Using a hurdle model, we found no significant relationship between the degree of urbanicity and the number of GFBWT sites in ZCTAs in Florida ($p > .05$; Appendix B). However, a two part model indicated that urbanicity is significantly related to the area of GFBWT sites in a ZCTA, with more urban ZCTAs having less GFBWT area ($p < .001$; Appendix B). Considering this significant relationship, subsequent Spearman's correlation tests indicated no strong or practically significant correlations between distance to high-quality locations for wildlife viewing, lack of transportation, or financial cost as barriers to participation for wildlife viewers and the area of GFBWT sites in wildlife viewers' ZCTAs (Appendix B). Finally, there was no significant relationship between GFBWT area in wildlife viewers' ZCTAs and wildlife viewers' desire for more access to wildlife viewing locations from FWC ($p > .05$; Appendix B). Overall, there are many ZCTAs in Florida with little to no GFBWT site area, especially in urban areas. However, there are no significant relationships between GFBWT site area, a simple proxy for access, and wildlife viewers' barriers to access or desire for more places to view wildlife

Discussion

While additional access to wildlife viewing locations is needed, wildlife viewers with more or less GFBWT area near them do not report any difference in perceived barriers or needs. This suggests that there may be a mismatch between 'real' access and wildlife viewers' perceived access to wildlife viewing opportunities near their homes. Promoting awareness of GFBWT sites in Florida may be an appropriate approach for supporting wildlife viewers, rather than only expanding sites. In addition, wildlife viewers may be able to access GFBWT sites, but may be unaware of their existence, or how to access them. For future research, GFBWT area is a more relevant factor than number of sites when considering access and urbanicity. In addition, future research should also consider more complex measures of access, including proximity to public transportation.

Notes

See Appendix B for statistical results.

For more information on GFBWT, visit floridabirdingtrail.com

This case study was contributed to by Lauren Ali (Great Florida Birding and Wildlife Trail Coordinator), Adam Neuse, Anne Glick, and Jerrie Lindsey of the Florida Fish and Wildlife Conservation Commission.

Recommendations

Our analyses revealed that wildlife viewers across an urbanicity gradient are not the same. Instead, who is viewing wildlife, how they are viewing, where they are viewing, the challenges they face, and their relationships with state agencies change from rural areas to towns to cities. While there are many commonalities between wildlife viewers regardless of where they live, new strategies may be useful for engaging the large population of wildlife viewers in urban areas across the U.S. Based on the results of our analysis and the input of state agency wildlife viewing staff, we suggest the following recommendations to those state agencies interested in engaging a broader constituency of wildlife viewers in urban areas:

Focus on urban areas to reach more wildlife viewers from ethnoracial minorities

Overall, we found that areas with higher urbanicity had a significantly higher percentage of BIPOC wildlife viewers than areas with lower urbanicity. In particular, there were more Black or African American, Asian, Native Hawaiian or other Pacific Islander, and Middle Eastern or North African wildlife viewers in more urban areas. Focusing on wildlife viewing offerings in cities will be especially key for serving Black or African American wildlife viewers: 10% of urban wildlife viewers in our study were Black or African American, as opposed to only 3.8% of rural wildlife viewers. As state agencies strive to reach a constituency that is more representative of the U.S. and include historically underserved groups, cities represent an opportunity to engage with minority audiences who are already engaged in wildlife viewing.

Create programming around activities that urban wildlife viewers prefer

The most popular wildlife viewing activities among urban wildlife viewers were visiting parks to view wildlife (almost two-thirds of urban wildlife viewers participated), photographing wildlife (over half of wildlife viewers), and feeding birds (just under half of wildlife viewers). While the same three activities were also most popular among rural wildlife viewers, we observed some differences between wildlife viewers who lived in more urban as compared to more rural areas. Wildlife viewers who lived in more urban areas engaged in visiting parks more and feeding birds less than those in more rural areas. Focusing wildlife viewing programming for urban wildlife viewers on these three activities could align well with existing wildlife viewer interests.

Tailor programming in public spaces to urban wildlife viewers

Our analysis revealed that wildlife viewers in public spaces, such as larger green spaces, parks, and lands further from people's homes, are more likely to be from urban than rural areas. There are both more urban than rural wildlife viewers overall (Sinkular

et al., 2022a), and urban wildlife viewers are more likely to view in public spaces than rural wildlife viewers. While viewing wildlife around the home was very popular with both urban and rural wildlife viewers (93% and 96% of wildlife viewers participated, respectively), wildlife viewers who lived in more urban areas were more likely than those in more rural areas to participate both away from home and out of state or country. Considering the needs and interests of urban wildlife viewers, as outlined in this report, when designing programming such as signage, events, or interpretation for public spaces could help state agencies better connect with wildlife viewers.

Offer diverse programming for urban wildlife viewers of all expertise levels

Some may believe that urban wildlife viewers have less expertise in wildlife viewing than rural wildlife viewers. However, in our study, urban wildlife viewers were actually more likely to rank themselves as intermediate or higher expertise than rural wildlife viewers. State agencies can offer wildlife viewing opportunities for all different levels of expertise, while still providing important entry-level programming to serve the almost two-thirds of urban wildlife viewers who reported themselves as beginner and novice and attract new people to wildlife viewing.

Reach urban wildlife viewers by creating programming in urban areas, especially parks

Our research showed that around the home viewing is popular among urban wildlife viewers and that urban wildlife viewers enjoy visiting parks to view wildlife. Although wildlife viewers living in more urban areas are more likely to travel to view wildlife than those in more rural areas, almost ⅔ of urban wildlife viewers reported that distance to high quality viewing locations limited their participation at least somewhat. These findings all suggest that state agencies can reach more urban wildlife viewers by focusing on viewing in urban areas like city parks and urban wildlife trails, especially those that are accessible by public transit. Programming specifically focused on these urban green spaces, such as events and festivals held in cities, city-specific wildlife viewing guides, resources on common urban viewable wildlife, and participatory science events like the City Nature Challenge might help state agencies better serve urban wildlife viewers. Reaching people in places where they already are in cities, like schools, community centers, markets, and non-wildlife-focused events, may help overcome both distance and time barriers. Although state agencies might often prioritize wildlife viewing opportunities where charismatic and/or more uncommon wildlife are found, our analyses show that in order to engage urban wildlife viewers, it is also important to go where wildlife viewers are. In addition, wildlife viewers in more urban areas were more likely to report lack of information about places to view wildlife as a barrier to viewing, with almost half of urban wildlife viewers experiencing it as at least

somewhat of a barrier. This suggests that wildlife viewers may also not be aware of opportunities to view wildlife that do exist around them. As in the case study of the Great Florida Birding and Wildlife Trail, increasing both access and awareness about wildlife viewing in cities is important.

Utilize more virtual and social media communication methods to share information with urban wildlife viewers

Our study showed that lack of information about places to view wildlife was more likely to be a barrier for wildlife viewers in more urban areas than more rural areas. We also uncovered differences in the ways in which urban and rural wildlife viewers prefer to receive information from state agencies. The same three modes of communication were most popular among both urban and rural wildlife viewers: email, agency websites, and printed materials. However, compared to those in more rural areas, wildlife viewers in more urban areas preferred virtual and social media communication methods, such as blogs, emails, online magazines, podcasts, YouTube, Instagram, TikTok, and Twitter. They also were less likely to prefer physical materials (such as print materials and mailed newsletters) and in person communication with agency staff. Taken together, this suggests that to help overcome the information barrier facing urban wildlife viewers, state agencies could make use of more virtual and social media communication tools. Collaborating with local organizations that frequently offer outreach programs for or communicate with wildlife viewers in urban areas will be key to learning effective strategies.

Use the ParkServe Tool to identify priority locations for expanding access to nature in cities

Our research has shown that developing opportunities for wildlife viewing in cities near where urban wildlife viewers live is key. State agencies may be interested in understanding current patterns of access to nature in cities, and pinpointing priority areas where people have particularly limited access to focus their efforts. To do this, we recommend using a tool developed by the Trust for Public Land called ParkServe® (available at: https://parkserve.tpl.org/mapping/). The ParkServe® database contains information on every urban park in every urban area (over 15,000 cities and towns) in the U.S. Through their free, interactive mapping tool, users can search a city and instantly generate a map of that city, where parks are currently located, and priority areas for new parks (as measured by people being >10 minute walk from a park, Figure 23). Each search also generates summary statistics, such as the percentages of different ethnoracial groups, age groups, and income groups, as well as the overall percentage of residents that live within a 10 minute walking distance from a park. An interactive scenario module allows users to change the map of priority areas for

developing parks by adjusting prioritization criteria, and users can test out how adding new parks and trails would impact nature access (Figure 24). State agencies could use this tool to identify areas within a city where there is a higher priority for developing wildlife viewing opportunities based on their own criteria, as well as test the impact of new parks and trails. Wildlife viewing opportunities could be developed by creating programming in existing natural spaces, performing habitat restoration to improve natural space quality, or creating new natural spaces. State agencies could also use this tool to draw comparisons between cities in their state to determine which have more or less access to nature overall.

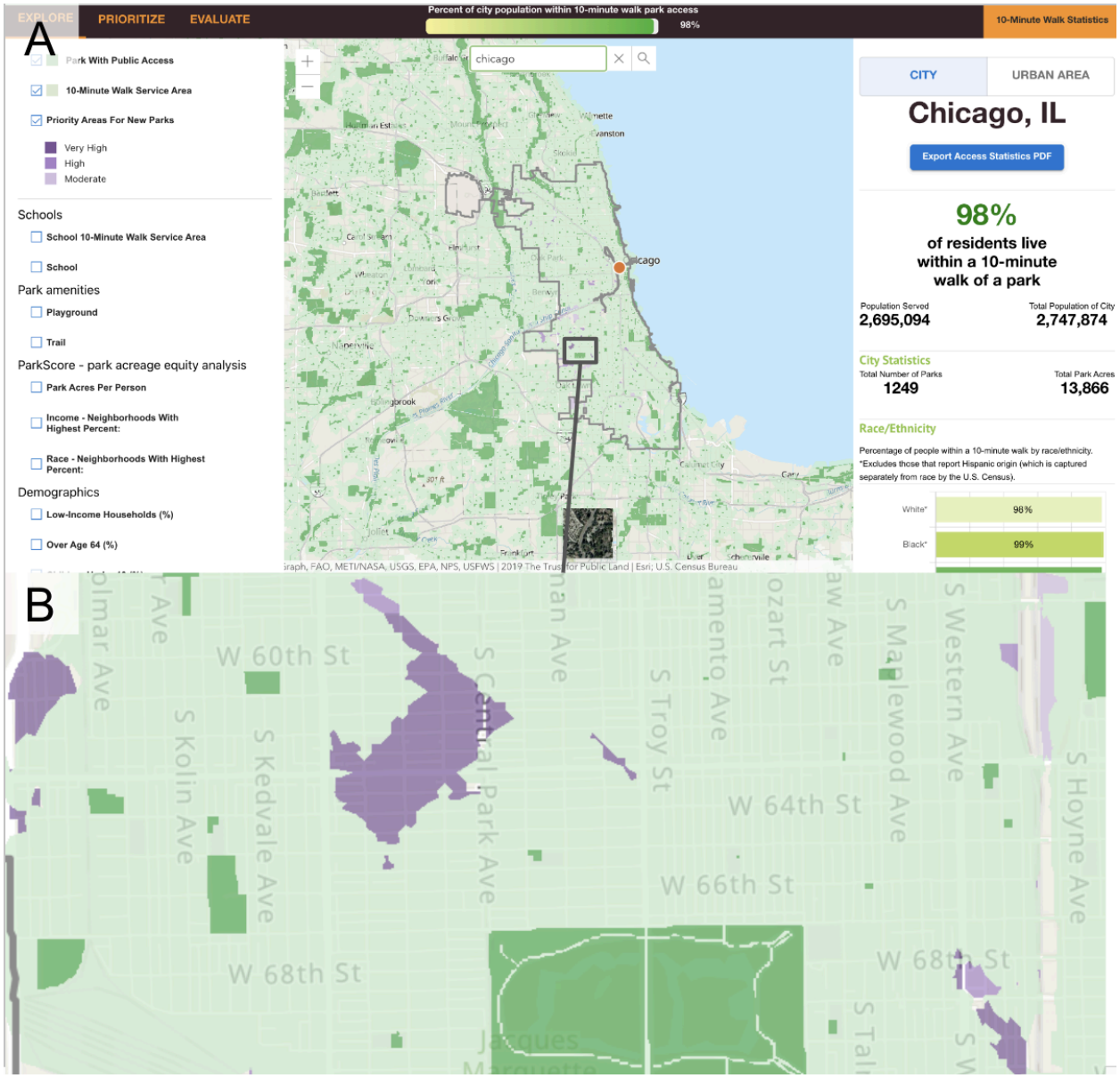

Figure 23. User interface of the ParkServe ® tool

A) A map of Chicago from the Trust for Public Land's ParkServe® tool, showing patterns of access to nature in the city. Dark green areas represent parks with public access, light green areas places within a 10 minute walk of a park, and purple areas high priority places for new parks. The left hand menu allows users to toggle on different map layers, and view things such as schools, park amenities, park equity, and demographics. It also allows users to prioritize parks by different criteria and experiment with drawing new parks (next figure). The right hand bar presents summary statistics, showing how many people overall and within different demographic groups live within a 10 minute walk of a park. B) The interactive map allows users to zoom in on particular neighborhoods to identify areas with a high priority for new parks.

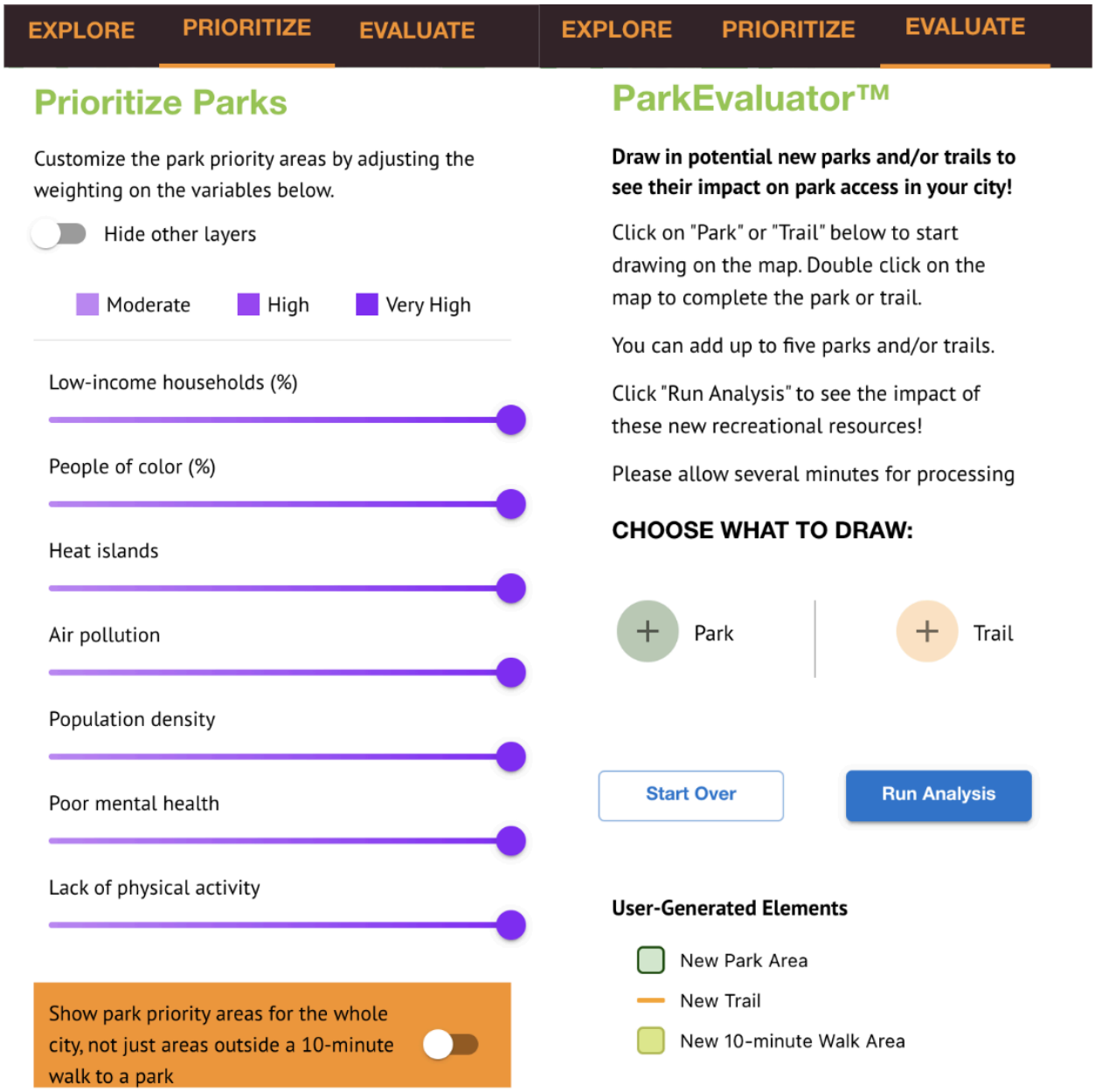

Figure 24. Interactive scenarios in the ParkServe® tool
"Prioritize" and "Evaluate" options on the left hand sidebar of the Trust for Public Land's ParkServe® tool. By clicking on the "prioritize" tab, users can weigh what factors they wish to use to prioritize new park areas. By clicking on the "evaluate" tab, users can evaluate the impact of new parks and trails on increasing access.

Expand access and outreach for low income and BIPOC wildlife viewers

Although our study did not focus explicitly on income and ethnoracial identity, by incorporating these demographics into our analysis of urban wildlife viewers, we were able to learn more about underserved low income and BIPOC wildlife viewers. We found that, after accounting for urbanicity, lower income wildlife viewers were less likely

to participate in viewing than higher income wildlife viewers, regardless of where the viewing took place (around home, away from home, out of state or country) or type of activity. The only exception to this was that lower income wildlife viewers were more likely than higher income wildlife viewers to feed animals other than wild birds. Distance to high quality wildlife viewing locations was a barrier to their participation, and they were less likely to be familiar with state agencies or participate in programs than higher income wildlife viewers. In addition, we found that there were fewer low income wildlife viewers in urban than rural areas, suggesting that we may be missing an opportunity to engage low income urbanites. We found that BIPOC wildlife viewers were more likely to experience lack of free time, distance, and knowledge as at least somewhat of a barrier to viewing than white wildlife viewers. State agencies wishing to better serve low income and BIPOC wildlife viewers could both expand outreach to these wildlife viewers and opportunities to view around where wildlife viewers live. These efforts may also help retain BIPOC participation in wildlife viewing, an important consideration given that BIPOC are underrepresented in wildlife viewing as compared to the U.S. population (Jones et al., 2021; Sinkular et al., 2022a). Our research shows that BIPOC wildlife viewers have a high level of participation in wildlife viewing, so emphasizing engaging with existing strengths and interests may be key to successful outreach.

Expand capacity in urban areas through partnerships

State agencies that wish to expand their reach in urban areas may be hindered by lack of capacity, including a lack of staff based in urban areas, a lack of experts in urban outreach, and a lack of urban lands. Partnering with urban-based organizations, including city parks and recreation agencies, zoos and aquariums, and local community groups, represents a key opportunity to expand that capacity and bring programming to where people are. These groups may be stewards of the urban greenspaces where urban wildlife viewers are already going to recreate, including parks, trails, and community gardens, and could partner with state agencies to deliver programming there. In addition, groups with connections to local communities can help state agencies determine how to best conduct programming for urban wildlife viewers and act as a trusted liaison that may help overcome any negative public perceptions of the state agency. Investing time and energy into building these relationships, working to make them mutually-beneficial, and respecting the expertise of local groups will be key for creating lasting, impactful partnerships.

Build leadership support for wildlife viewing

Many wildlife viewing professionals noted that additional challenges they faced in serving urban wildlife viewers were internal state agency priorities. They pointed to the traditional focus of state agencies on hunting and fishing, and the perception that urban areas are not important wildlife habitat, and therefore should not be the focus of state

agencies. However, research has shown that nationally, numbers of wildlife viewers far outnumber hunters and anglers (U.S. DOI & U.S. FWS, 2022), and that the majority of these wildlife viewers live in urban areas (Sinkular et al., 2022a). For state agencies to maintain their relevancy with the public, it is key to serve this growing population of urban wildlife viewers. This need not be in conflict with serving traditional constituencies. Past research has shown that there is overlap between wildlife viewers and hunters and anglers, hunters and anglers are interested in many of the same types of programs and support as wildlife viewers, and that managing for wildlife viewing will align with the needs of hunter-anglers (Grooms et al., 2023; Sinkular et al., 2022a). We hope that through sharing this study with state agency leadership, wildlife viewing professionals can communicate the importance of urban wildlife viewers as well as strategies to serve them more effectively.

Moving Forward

This analysis of wildlife viewers across an urban-rural gradient fills multiple knowledge gaps about urban wildlife viewers and how they differ from rural wildlife viewers: who they are, where they view wildlife, what activities they participate in, their level of expertise, what barriers they face, and their relationships with their state agency. It also reveals how the income and ethnoracial identity of wildlife viewers interact with urbanicity to affect how people engage in viewing. The information revealed here can enable state agencies to expand outreach and access to wildlife viewing opportunities to underserved urban, low income, and BIPOC wildlife viewers. These efforts will help state agencies become more relevant to a larger, more diverse constituency that is representative of the population of the United States.

Interestingly, our study highlights the popularity of supplementary feeding among wildlife viewers across the urban-rural gradient. Feeding wild birds was among the top three most popular activities for both urban and rural wildlife viewers, and over a third of each participated in feeding other animals. Many state agencies discourage feeding animals, especially non-birds, because of concerns about wildlife health and human/wildlife conflict. Although agencies may instead recommend creating habitat to attract wildlife, our study showed that this was the least popular wildlife viewing activity among both urban and rural viewers. New strategies for promoting habitat creation may need to be explored, along with evaluation of their effectiveness. Feeding birds in particular presents people across the urban-rural gradient with opportunities to connect with nature and may have a positive impact on human well-being that is not currently being taken into consideration (Dayer et al., 2024). Given this evidence, it may be worth designing management plans that, instead of calling for the complete cessation of feeding during disease outbreaks, manage feeding for the greatest benefits for humans and wildlife.

In addition, although our study reveals that viewing around the home is popular among wildlife viewers across the urban-rural gradient, we are unable to shed light on where this viewing is taking place. Our definition of *around the home* was any location within a mile of a wildlife viewer's home, and could include both people's yards and as well other neighborhood green spaces. Interesting questions remain about how access to wildlife viewing changes depending on housing type (i.e., high density apartments, low rise apartments, homes), and how this may differ between urban and rural areas.

While much progress can be made implementing the results of this research to better serve urban wildlife viewers, many additional opportunities exist to build upon this study. In particular, this study raised two key questions: 1) what about people who are not participating in wildlife viewing currently and 2) how can we most effectively reach urban

wildlife viewers? For the first question, the surveys upon which this analysis was based only focused on people who were already participating in wildlife viewing, and not on those who did not engage. Additional research into who is not participating in wildlife viewing, and how wildlife viewing might be made relevant and accessible for them, could present exciting new opportunities to connect more people with nature and the benefits that it provides. For the second question, while our study revealed differences between urban and rural wildlife viewers and highlighted the importance of urban wildlife viewers as an underserved population, much remains to be learned about how state agencies may need to adjust the approaches they developed for rural wildlife viewers to reach urban wildlife viewers. State agencies may develop these strategies iteratively and through the help of local partners as they expand their work with urban wildlife viewers. Further research evaluating the effectiveness of these strategies will be key to increasing the success of efforts to serve urban wildlife viewers.

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Appendix A. Supplementary Tables

Table SA1. Percentage of urban wildlife viewers in each ethnoracial category.

Ethnoracial Identity	**Percent**
Asian	2.7
Black or African American	11
Native Hawaiian or other Pacific Islander	0.3
Hispanic, Latino, or Spanish	6.8
Middle Eastern or North African	0.2
Multiracial	8.2
American Indian or Alaska Native	0.9
Some other race or ethnicity	1.0
white	69

Table SA2. Percentage of rural wildlife viewers in each ethnoracial category.

Ethnoracial Identity	**Percent**
Asian	0.7
Black or African American	3.8
Native Hawaiian or other Pacific Islander	0.1
Hispanic, Latino, or Spanish	4.0
Middle Eastern or North African	0.02
Multiracial	5.1
American Indian or Alaska Native	1.8
Some other race or ethnicity	0.8
white	84

Table SA3. Percentages of urban and rural wildlife viewers that identified as white and Black, Indigenous, and people of color (BIPOC).

Viewer	Ethnoracial ID	Percent
Urban	white	69
Urban	BIPOC	31
Rural	white	84
Rural	BIPOC	16

Table SA4. Dunn's post-hoc test for ethnoracial identity and urbanicity. Pairwise comparisons are shown between each ethnoracial group with the test statistics and significance. Significance based on p-values adjusted for multiple comparisons is indicated after each test statistic, where * p = .02 - .05, ** p = .001 - .01, *** p <.001. Sample sizes for each ethnoracial group are American Indian or Alaska Native n = 195; Asian n = 276; Black or African American n = 1,177; Native Hawaiian or other Pacific Islander n = 26; Hispanic, Latino, or Spanish n = 796; Middle Eastern or North African n = 25; Multiracial n = 1,003; some other race or ethnicity n = 159; white n = 12,913.

Group 1	Group 2	Test statistic z
American Indian or Alaska Native	Asian	7.69***
American Indian or Alaska Native	Black or African American	8.10***
American Indian or Alaska Native	Native Hawaiian or other Pacific Islander	2.56*
American Indian or Alaska Native	Hispanic, Latino, or Spanish	5.14***
American Indian or Alaska Native	Middle Eastern or North African	3.63***
American Indian or Alaska Native	Multiracial	5.38***
American Indian or Alaska Native	some other race or ethnicity	2.38*
American Indian or Alaska Native	white	2.29*
Asian	Black or African American	-1.40
Asian	Native Hawaiian or other Pacific Islander	-0.90
Asian	Hispanic, Latino, or Spanish	-4.43***
Asian	Middle Eastern or North African	0.25
Asian	Multiracial	-4.40***
Asian	some other race or ethnicity	-4.68***
Asian	white	-9.12***
Black or African American	Native Hawaiian or other Pacific Islander	-0.46

Black or African American	Hispanic	-4.70***
Black or African American	Middle Eastern or North African	0.72
Black or African American	Multiracial	-4.78***
Black or African American	some other race or ethnicity	-4.40***
Black or African American	white	-15.15***
Native Hawaiian or other Pacific Islander	Hispanic, Latino, or Spanish	-0.62
Native Hawaiian or other Pacific Islander	Middle Eastern or North African	0.84
Native Hawaiian or other Pacific Islander	Multiracial	-0.57
Native Hawaiian or other Pacific Islander	some other race or ethnicity	-1.33
Native Hawaiian or other Pacific Islander	white	-1.89
Hispanic, Latino, or Spanish	Middle Eastern or North African	1.78
Hispanic, Latino, or Spanish	Multiracial	0.22
Hispanic, Latino, or Spanish	some other race or ethnicity	-1.80
Hispanic, Latino, or Spanish	white	-6.73***
Middle Eastern or North African	Multiracial	-1.73
Middle Eastern or North African	some other race or ethnicity	-2.40*
Middle Eastern or North African	white	-3.03**
Multiracial	some other race or ethnicity	-1.95
Multiracial	white	-7.81***
some other race or ethnicity	white	-1.12

Table SA5. Percentage of urban and rural wildlife viewers in each income category.

Viewer	Income category	Percent
Urban	Less than $24,999	17.9
Urban	$25,000 - $49,999	25.9
Urban	$50,000 - $74,999	18.5
Urban	$75,000 - $99,999	14.1
Urban	$100,000 - $124,999	10.3
Urban	$125,000 or more	13.2
Rural	Less than $24,999	27.9
Rural	$25,000 - $49,999	31.6
Rural	$50,000 - $74,999	18
Rural	$75,000 - $99,999	11
Rural	$100,000 - $124,999	5.5
Rural	$125,000 or more	5.9

Table SA6. Dunn's post-hoc test for income group and urbanicity. Pairwise comparisons are shown between each income group with the test statistics and significance. Significance based on p-values adjusted for multiple comparisons is indicated after each test statistic, where * p = .02 - .05, ** p = .001 - .01, *** p <.001. Sample sizes for each ethnoracial group are less than $24,999 n = 3,287; $25,000 - $49,999 n = 4,516; $50,000 - $74,999 n = 3,014; $75,000 - $99,999 n = 2,119; $100,000 - $124,999 n = 1,325; $125,000 or more n = 1,623.

Group 1	**Group 2**	**Test statistic z**
Less than $24,999	$25,000 - $49,999	5.04***
Less than $24,999	$50,000 - $74,999	8.39***
Less than $24,999	$75,000 - $99,999	10.78***
Less than $24,999	$100,000 - $124,999	13.66***
Less than $24,999	$125,000 or more	16.52***
$25,000 - $49,999	$50,000 - $74,999	4.08***
$25,000 - $49,999	$75,000 - $99,999	7.02***
$25,000 - $49,999	$100,000 - $124,999	10.53***
$25,000 - $49,999	$125,000 or more	13.32***
$50,000 - $74,999	$75,000 - $99,999	3.14**
$50,000 - $74,999	$100,000 - $124,999	7.07***
$50,000 - $74,999	$125,000 or more	9.41***
$75,000 - $99,999	$100,000 - $124,999	4.11***
$75,000 - $99,999	$125,000 or more	6.08***
$100,000 - $124,999	$125,000 or more	1.53

Table SA7. Percentages of urban wildlife viewers who spent different amounts of days viewing around the home.

Days	Percent
0	7.4
1-30	42
31-60	14
61-90	8.7
91-120	6.5
121-150	3.9
151-180	3.6
181-210	2.4
>210	12

Table SA8. Percentages of rural wildlife viewers who spent different amounts of days viewing around the home.

Days	Percent
0	4.5
1-30	33
31-60	11
61-90	8.6
91-120	6.7
121-150	4.1
151-180	3.9
181-210	4.3
>210	23

Table SA9. Percentages of urban wildlife viewers who spent different amounts of days viewing away from the home.

Days	Percent
0	8.6
1-30	47
31-60	20
61-90	10
91-120	5.6
121-150	3.3
151-180	2.3
181-210	1.1
>210	2.2

Table SA10. Percentages of rural wildlife viewers who spent different amounts of days viewing away from the home.

Days	Percent
0	11
1-30	43
31-60	16
61-90	10
91-120	7.1
121-150	3.8
151-180	2.1
181-210	2.2
>210	4.4

Table SA11. Percentages of urban wildlife viewers who spent different amounts of days viewing out of state or country.

Days	Percent
0	34
1-30	41
31-60	9.4
61-90	5.9
91-120	4.3
121-150	2.3
151-180	1.3
181-210	0.6
>210	1.2

Table SA12. Percentages of rural wildlife viewers who spent different amounts of days viewing out of state or country.

Days	Percent
0	45
1-30	39
31-60	7.0
61-90	3.5
91-120	2.2
121-150	1.1
151-180	0.6
181-210	0.3
>210	0.9

Table SA13. Percentages of urban and rural wildlife viewers who participate in viewing around home.

Viewer	Participation	Percent
Urban	No	7.4
Urban	Yes	93
Rural	No	4.5
Rural	Yes	96

Table SA14. Percentages of urban and rural wildlife viewers who participate in viewing away from the home.

Viewer	Participation	Percent
Urban	No	8.6
Urban	Yes	91
Rural	No	11
Rural	Yes	89

Table SA15. Percentages of urban and rural wildlife viewers who participate in viewing out of state or country.

Viewer	Participation	Percent
Urban	No	34
Urban	Yes	66
Rural	No	45
Rural	Yes	55

Table SA16. Model output of logistic regression model predicting likelihood of participation in wildlife viewing around home based on wildlife viewer urbanicity.

	Viewing Around Home		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	21.77	18.81 – 25.26	**<0.001**
Urbanicity	0.39	0.28 – 0.57	**<0.001**
Observations	15439		
R^2 Tjur	0.002		

Table SA17. Model output of logistic regression model predicting likelihood of participation in wildlife viewing away from home based on wildlife viewer urbanicity.

	Viewing Away From Home		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	6.57	5.89 – 7.33	**<0.001**
Urbanicity	2.23	1.65 – 3.02	**<0.001**
Observations	15333		
R^2 Tjur	0.002		

Table SA18. Model output of logistic regression model predicting likelihood of participation in wildlife viewing out of state or country based on wildlife viewer urbanicity.

	Viewing Outside State/Country		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	1.03	0.96 – 1.10	0.439
Urbanicity	3.19	2.65 – 3.85	**<0.001**
Observations	15289		
R^2 Tjur	0.010		

Table SA19. Model output of logistic regression model predicting likelihood of participation in wildlife viewing around home based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that “BIPOC” is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Viewing Around Home		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	21.61	18.42 – 25.42	**<0.001**
Urbanicity	0.40	0.27 – 0.58	**<0.001**
Income	1.29	1.01 – 1.66	**0.048**
BIPOC	0.81	0.69 – 0.95	**0.008**
Observations	14751		
R^2 Tjur	0.002		

Table SA20. Model output of logistic regression model predicting likelihood of participation in wildlife viewing away from home based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that “BIPOC” is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Viewing Away From Home		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	5.20	4.61 – 5.87	**<0.001**
Urbanicity	1.53	1.11 – 2.10	**0.009**
Income	3.11	2.48 – 3.92	**<0.001**
BIPOC	1.66	1.43 – 1.93	**<0.001**
Observations	14653		
R^2 Tjur	0.011		

Table SA21. Model output of logistic regression model predicting likelihood of participation in wildlife viewing out of state or country based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that “BIPOC” is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Viewing Outside State/Country		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.66	0.61 – 0.72	**<0.001**
Urbanicity	1.98	1.62 – 2.42	**<0.001**
Income	7.31	6.33 – 8.47	**<0.001**
BIPOC	1.49	1.37 – 1.63	**<0.001**
Observations	14610		
R^2 Tjur	0.070		

Table SA22. Percentage of urban as compared to rural wildlife viewers that participate in each type of wildlife viewing.

Viewer	Activity	Percent Participation
Urban	Closely observing wildlife or trying to identify unfamiliar types of wildlife	42
Urban	Photographing or taking pictures of wildlife	57
Urban	Feeding wild birds	49
Urban	Feeding other wildlife	32
Urban	Maintaining plantings or natural areas for the benefit of wildlife	32
Urban	Visiting parks and natural areas to observe, photograph, or feed wildlife	64
Urban	Taking trips or outings to any other location to observe, photograph, or feed wildlife	46
Rural	Closely observing wildlife or trying to identify unfamiliar types of wildlife	41
Rural	Photographing or taking pictures of wildlife	54
Rural	Feeding wild birds	57
Rural	Feeding other wildlife	35
Rural	Maintaining plantings or natural areas for the benefit of wildlife	30
Rural	Visiting parks and natural areas to observe, photograph, or feed wildlife	54
Rural	Taking trips or outings to any other location to observe, photograph, or feed wildlife	41

Table SA23. Model output of logistic regression model predicting likelihood of participation in feeding wild birds based on wildlife viewer urbanicity.

	Feeding birds		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	1.45	1.35 – 1.54	**<0.001**
Urbanicity	0.48	0.41 – 0.57	**<0.001**
Observations	16614		
R^2 Tjur	0.004		

Table SA24. Model output of logistic regression model predicting likelihood of participation in feeding other animals based on wildlife viewer urbanicity.

	Feeding Other Animals		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.54	0.51 – 0.58	**<0.001**
Urbanicity	0.75	0.62 – 0.90	**0.002**
Observations	16614		
R^2 Tjur	0.001		

Table SA25. Model output of logistic regression model predicting likelihood of participation in photographing or taking pictures of wildlife based on wildlife viewer urbanicity.

	Photographing wildlife		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	1.09	1.02 – 1.17	**0.008**
Urbanicity	1.32	1.11 – 1.56	**0.002**
Observations	16614		
R^2 Tjur	0.001		

Table SA26. Model output of logistic regression model predicting likelihood of participation in maintaining plantings or natural areas for the benefit of wildlife based on wildlife viewer urbanicity.

	Maintaining plantings		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.41	0.38 – 0.44	**<0.001**
Urbanicity	1.24	1.03 – 1.49	**0.021**
Observations	16614		
R^2 Tjur	0.000		

Table SA27. Model output of logistic regression model predicting likelihood of participation in taking trips or outings to any other location to observe, photograph, or feed wildlife based on wildlife viewer urbanicity.

	Taking trips		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.65	0.61 – 0.69	**<0.001**
Urbanicity	1.53	1.29 – 1.82	**<0.001**
Observations	16614		
R^2 Tjur	0.001		

Table SA28. Model output of logistic regression model predicting likelihood of participation in visiting parks and natural areas to observe, photograph, or feed wildlife based on wildlife viewer urbanicity.

	Visiting parks		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	1.10	1.03 – 1.18	**0.004**
Urbanicity	2.26	1.90 – 2.70	**<0.001**
Observations	16614		
R^2 Tjur	0.005		

Table SA29. Model output of logistic regression model predicting likelihood of participation in closely observing wildlife or trying to identify unfamiliar types of wildlife based on wildlife viewer urbanicity.

	Observing wildlife		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.65	0.60 – 0.69	**<0.001**
Urbanicity	1.15	0.97 – 1.37	0.109
Observations	16614		
R^2 Tjur	0.000		

Table SA30. Model output of logistic regression model predicting likelihood of participation in feeding wild birds based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that “BIPOC” is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Feeding birds		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	1.49	1.39 – 1.61	**<0.001**
Urbanicity	0.53	0.45 – 0.64	**<0.001**
Income	1.12	1.00 – 1.25	**0.050**
BIPOC	0.66	0.61 – 0.71	**<0.001**
Observations	15864		
R^2 Tjur	0.012		

Table SA31. Model output of logistic regression model predicting likelihood of participation in feeding other animals based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that “BIPOC” is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Feeding Other Animals		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.54	0.50 – 0.58	**<0.001**
Urbanicity	0.69	0.57 – 0.83	**<0.001**
Income	1.10	0.98 – 1.24	0.101
BIPOC	1.14	1.06 – 1.24	**0.001**
Observations	15864		
R^2 Tjur	0.001		

Table SA32. Model output of logistic regression model predicting likelihood of participation in photographing or taking pictures of wildlife based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that “BIPOC” is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Photographing wildlife		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.96	0.89 – 1.03	0.271
Urbanicity	1.10	0.92 – 1.31	0.319
Income	1.78	1.59 – 1.99	**<0.001**
BIPOC	1.17	1.09 – 1.27	**<0.001**
Observations	15864		
R^2 Tjur	0.008		

Table SA33. Model output of logistic regression model predicting likelihood of participation in maintaining plantings or natural areas for the benefit of wildlife based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that “BIPOC” is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Maintaining plantings		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.34	0.31 – 0.36	**<0.001**
Urbanicity	0.95	0.78 – 1.15	0.567
Income	2.48	2.21 – 2.78	**<0.001**
BIPOC	1.16	1.07 – 1.26	**<0.001**
Observations	15864		
R^2 Tjur	0.016		

Table SA34. Model output of logistic regression model predicting likelihood of participation in taking trips or outings to any other location to observe, photograph, or feed wildlife based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that “BIPOC” is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Taking trips		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.58	0.53 – 0.62	**<0.001**
Urbanicity	1.28	1.07 – 1.53	**0.007**
Income	1.78	1.60 – 1.99	**<0.001**
BIPOC	1.10	1.02 – 1.19	**0.014**
Observations	15864		
R^2 Tjur	0.008		

Table SA35. Model output of logistic regression model predicting likelihood of participation in visiting parks and natural areas to observe, photograph, or feed wildlife based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that “BIPOC” is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Visiting Parks		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.96	0.89 – 1.03	0.250
Urbanicity	1.85	1.54 – 2.23	**<0.001**
Income	2.00	1.78 – 2.25	**<0.001**
BIPOC	1.13	1.04 – 1.22	**0.002**
Observations	15864		
R^2 Tjur	0.014		

Table SA36. Model output of logistic regression model predicting likelihood of participation in closely observing wildlife or trying to identify unfamiliar types of wildlife based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that “BIPOC” is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer’s ethnoracial identity being BIPOC and the response variable.

	Observing wildlife		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.58	0.54 – 0.62	**<0.001**
Urbanicity	1.02	0.85 – 1.22	0.853
Income	1.85	1.66 – 2.07	**<0.001**
BIPOC	0.95	0.88 – 1.03	0.216
Observations	15864		
R^2 Tjur	0.008		

Table SA37. Percentage of urban wildlife viewers who rank themselves in each category of wildlife viewing skill.

Skill level	**Percent**
Beginner	29
Novice	30
Intermediate	29
Advanced	9.8
Expert	2.1

Table SA38. Percentage of rural wildlife viewers who rank themselves in each category of wildlife viewing skill.

Skill level	**Percent**
Beginner	31
Novice	32
Intermediate	29
Advanced	7.1
Expert	1.3

Table SA39. Percentage of urban as compared to rural wildlife viewers who rank themselves as *beginner/novice* or *intermediate* and above in wildlife viewing skill.

Viewer	**Skill**	**Percent**
Urban	Beginner/Novice	59
Urban	Intermediate+	41
Rural	Beginner/Novice	63
Rural	Intermediate+	37

Table SA40. Model output of logistic regression model predicting likelihood of self-ranking at least *intermediate* expertise based on wildlife viewer urbanicity.

	Skill Level		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.48	0.45 – 0.51	**<0.001**
Urbanicity	1.72	1.44 – 2.05	**<0.001**
Observations	16506		
R^2 Tjur	0.002		

Table SA41. Model output of logistic regression model predicting likelihood of self-ranking at least *intermediate* expertise based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Skill Level		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.36	0.34 – 0.39	**<0.001**
Urbanicity	1.26	1.04 – 1.51	**0.017**
Income	3.44	3.07 – 3.85	**<0.001**
BIPOC	1.21	1.12 – 1.31	**<0.001**
Observations	15758		
R^2 Tjur	0.033		

Table SA42. The percentage of urban wildlife viewers indicating lack of free time to participate in wildlife viewing limited their participation in wildlife viewing to different extents.

Barrier extent	**Percent**
Not at all	20
Very little	23
Somewhat	32
Quite a bit	18
A great deal	6.2

Table SA43. The percentage of rural wildlife viewers indicating lack of free time to participate in wildlife viewing limited their participation in wildlife viewing to different extents.

Barrier extent	Percent
Not at all	26
Very little	23
Somewhat	30
Quite a bit	16
A great deal	4.5

Table SA44. The percentage of urban wildlife viewers indicating distance to high-quality locations for wildlife viewing limited their participation in wildlife viewing to different extents.

Barrier extent	Percent
Not at all	19
Very little	21
Somewhat	31
Quite a bit	20
A great deal	8.9

Table SA45. The percentage of rural wildlife viewers indicating distance to high-quality locations for wildlife viewing limited their participation in wildlife viewing to different extents.

Barrier extent	Percent
Not at all	26
Very little	21
Somewhat	31
Quite a bit	16
A great deal	7.1

Table SA46. The percentage of urban wildlife viewers indicating not knowing where to go wildlife viewing limited their participation in wildlife viewing to different extents.

Barrier extent	**Percent**
Not at all	27
Very little	25
Somewhat	26
Quite a bit	15
A great deal	6.4

Table SA47. The percentage of rural wildlife viewers indicating not knowing where to go wildlife viewing limited their participation in wildlife viewing to different extents.

Barrier extent	**Percent**
Not at all	37
Very little	23
Somewhat	26
Quite a bit	9.5
A great deal	4.5

Table SA48. The percentage of urban as compared to rural wildlife viewers who indicated that each barrier limited their participation in wildlife viewing at least *somewhat*.

Viewer	Barrier	Barrier extent	Percent
Urban	Lack of free time to participate in wildlife viewing	Not at all/Very little	44
Urban	Lack of free time to participate in wildlife viewing	Somewhat+	56
Rural	Lack of free time to participate in wildlife viewing	Not at all/Very little	50
Rural	Lack of free time to participate in wildlife viewing	Somewhat+	50
Urban	Distance to high-quality locations for wildlife viewing	Not at all/Very little	50
Urban	Distance to high-quality locations for wildlife viewing	Somewhat+	60
Rural	Distance to high-quality locations for wildlife viewing	Not at all/Very little	47
Rural	Distance to high-quality locations for wildlife viewing	Somewhat+	53
Urban	Not knowing where to go wildlife viewing	Not at all/Very little	52
Urban	Not knowing where to go wildlife viewing	Somewhat+	48
Rural	Not knowing where to go wildlife viewing	Not at all/Very little	60
Rural	Not knowing where to go wildlife viewing	Somewhat+	40

Table SA49. Model output of logistic regression model predicting likelihood of wildlife viewers perceiving lack of free time to participate in wildlife viewing as at least *somewhat* of a barrier to their participation in wildlife viewing based on wildlife viewer urbanicity.

	Time Barrier		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.92	0.86 – 0.98	**0.012**
Urbanicity	1.80	1.52 – 2.14	**<0.001**
Observations	16587		
R^2 Tjur	0.003		

Table SA50. Model output of logistic regression model predicting likelihood of wildlife viewers perceiving distance to high-quality locations for wildlife viewing as at least *somewhat* of a barrier to their participation in wildlife viewing based on wildlife viewer urbanicity.

	Barrier Distance		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	1.02	0.96 – 1.10	0.467
Urbanicity	1.95	1.64 – 2.33	**<0.001**
Observations	16500		
R^2 Tjur	0.003		

Table SA51. Model output of logistic regression model predicting likelihood of wildlife viewers perceiving not knowing where to go wildlife viewing as at least *somewhat* of a barrier to their participation in wildlife viewing based on wildlife viewer urbanicity.

	Barrier Knowledge		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.62	0.58 – 0.67	**<0.001**
Urbanicity	2.07	1.75 – 2.47	**<0.001**
Observations	16478		
R^2 Tjur	0.004		

Table SA52. Model output of logistic regression model predicting likelihood of wildlife viewers perceiving lack of free time to participate in wildlife viewing as at least *somewhat* of a barrier to their participation in wildlife viewing based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Time Barrier		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.83	0.77 – 0.89	**<0.001**
Urbanicity	1.46	1.22 – 1.75	**<0.001**
Income	1.53	1.36 – 1.71	**<0.001**
BIPOC	1.33	1.23 – 1.44	**<0.001**
Observations	15841		
R^2 Tjur	0.009		

Table SA53. Model output of logistic regression model predicting likelihood of wildlife viewers perceiving distance to high-quality locations for wildlife viewing as at least *somewhat* of a barrier to their participation in wildlife viewing based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Barrier Distance		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	1.07	0.99 – 1.15	0.083
Urbanicity	1.89	1.57 – 2.27	**<0.001**
Income	0.78	0.70 – 0.88	**<0.001**
BIPOC	1.29	1.20 – 1.40	**<0.001**
Observations	15761		
R^2 Tjur	0.007		

Table SA54. Model output of logistic regression model predicting likelihood of wildlife viewers perceiving not knowing where to go wildlife viewing as at least *somewhat* of a barrier to their participation in wildlife viewing based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Barrier Knowledge		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.60	0.56 – 0.65	**<0.001**
Urbanicity	1.81	1.51 – 2.16	**<0.001**
Income	0.96	0.86 – 1.08	0.516
BIPOC	1.50	1.39 – 1.62	**<0.001**
Observations	15745		
R^2 Tjur	0.011		

Table SA55. Percent of urban wildlife viewers with different levels of familiarity with state agencies.

Familiarity	**Percent**
Not at all familiar	11
Slightly familiar	28
Moderately familiar	29
Very familiar	23
Extremely familiar	8.9

Table SA56. Percent of rural wildlife viewers with different levels of familiarity with state agencies.

Familiarity	**Percent**
Not at all familiar	11
Slightly familiar	27
Moderately familiar	32
Very familiar	20
Extremely familiar	11

Table SA57. Percent of urban as compared to rural wildlife viewers who are at least *moderately familiar* with their state agency.

Viewer	**Familiarity**	**Percent**
Urban	Not at all familiar/Slightly familiar	39
Urban	Moderately familiar	61
Rural	Not at all familiar/Slightly familiar	37
Rural	Moderately familiar	63

Table SA58. Percent of urban as compared to rural wildlife viewers who have participated in state agency programs.

Viewer	Participation	Percent
Urban	Yes	67
Urban	No	33
Rural	Yes	58
Rural	No	42

Table SA59. Model output of logistic regression model predicting likelihood of wildlife viewers being at least *moderately familiar* with their state agency based on wildlife viewer urbanicity.

	Familiarity		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	1.41	1.31 – 1.50	**<0.001**
Urbanicity	1.00	0.84 – 1.19	0.995
Observations	16593		
R^2 Tjur	0.000		

Table SA60. Model output of logistic regression model predicting likelihood of wildlife viewers having participated in state agency programs based on wildlife viewer urbanicity.

	Program Participation		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	1.11	1.03 – 1.18	**0.004**
Urbanicity	2.59	2.17 – 3.10	**<0.001**
Observations	16568		
R^2 Tjur	0.007		

Table SA61. Model output of logistic regression model predicting likelihood of wildlife viewers being at least *moderately familiar* with their state agency based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Familiarity		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	1.12	1.04 – 1.21	**0.002**
Urbanicity	0.76	0.63 – 0.92	**0.004**
Income	2.76	2.45 – 3.11	**<0.001**
BIPOC	1.32	1.22 – 1.43	**<0.001**
Observations	15843		
R^2 Tjur	0.020		

Table SA62. Model output of logistic regression model predicting likelihood of wildlife viewers having participated in state agency programs based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Program Participation		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.84	0.78 – 0.91	**<0.001**
Urbanicity	1.79	1.48 – 2.16	**<0.001**
Income	3.04	2.68 – 3.44	**<0.001**
BIPOC	1.81	1.67 – 1.97	**<0.001**
Observations	15820		
R^2 Tjur	0.037		

Table SA63. Percent of urban as compared to rural wildlife viewers who are interested in receiving information from their state agency via each mode of communication.

Viewer	Communication Method	Percent Prefer
Urban	Printed materials (such as brochures or maps)	47
Urban	Mailed newsletters or other subscriptions	32
Urban	Email updates or e-newsletters	50
Urban	Online magazine	35
Urban	Agency website	55
Urban	Local news (such as television, online, or print newspapers)	34
Urban	Blogs	13
Urban	Facebook	40
Urban	Twitter	18
Urban	Tik-Tok	15
Urban	Instagram	24
Urban	YouTube	32
Urban	Podcast	11
Urban	Text alerts	10
Urban	One-on-one interactions with agency staff	10
Urban	I would prefer not to receive information from my state agency	7.3
Rural	Printed materials (such as brochures or maps)	57
Rural	Mailed newsletters or other subscriptions	35
Rural	Email updates or e-newsletters	46
Rural	Online magazine	30
Rural	Agency website	55
Rural	Local news (such as television, online, or print newspapers)	33
Rural	Blogs	8.5
Rural	Facebook	42

Rural	Twitter	9.8
Rural	Tik-Tok	11
Rural	Instagram	14
Rural	YouTube	27
Rural	Podcast	6.9
Rural	Text alerts	10
Rural	One-on-one interactions with agency staff	13
Rural	I would prefer not to receive information from my state agency	9.6

Table SA64. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via mailed newsletters or other subscriptions based on wildlife viewer urbanicity.

	Prefer Newsletter Mailed		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.54	0.51 – 0.58	**<0.001**
Urbanicity	0.82	0.68 – 0.98	**0.029**
Observations	16595		
R^2 Tjur	0.000		

Table SA65. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via printed materials (such as brochures or maps) based on wildlife viewer urbanicity.

	Prefer Printed		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	1.42	1.33 – 1.52	**<0.001**
Urbanicity	0.42	0.36 – 0.50	**<0.001**
Observations	16595		
R^2 Tjur	0.006		

Table SA66. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via one-on-one interactions with agency staff based on wildlife viewer urbanicity.

	Prefer Staff		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.15	0.13 – 0.17	**<0.001**
Urbanicity	0.47	0.35 – 0.63	**<0.001**
Observations	16595		
R^2 Tjur	0.002		

Table SA67. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via blogs based on wildlife viewer urbanicity.

	Prefer Blogs		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.07	0.07 – 0.08	**<0.001**
Urbanicity	3.12	2.37 – 4.10	**<0.001**
Observations	16595		
R^2 Tjur	0.004		

Table SA68. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via email updates or e-newsletters based on wildlife viewer urbanicity.

	Prefer Emails		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.87	0.81 – 0.93	**<0.001**
Urbanicity	1.33	1.12 – 1.57	**0.001**
Observations	16595		
R^2 Tjur	0.001		

Table SA69. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via Instagram based on wildlife viewer urbanicity.

	Prefer Instagram		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.14	0.12 – 0.15	**<0.001**
Urbanicity	4.12	3.32 – 5.10	**<0.001**
Observations	16595		
R^2 Tjur	0.011		

Table SA70. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via online magazines based on wildlife viewer urbanicity.

	Prefer Online Magazine		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.38	0.35 – 0.41	**<0.001**
Urbanicity	1.83	1.53 – 2.19	**<0.001**
Observations	16595		
R^2 Tjur	0.003		

Table SA71. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via podcasts based on wildlife viewer urbanicity.

	Prefer Podcast		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.06	0.05 – 0.07	**<0.001**
Urbanicity	3.19	2.38 – 4.28	**<0.001**
Observations	16595		
R^2 Tjur	0.004		

Table SA72. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via TikTok based on wildlife viewer urbanicity.

	Prefer TikTok		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.11	0.09 – 0.12	**<0.001**
Urbanicity	2.33	1.81 – 2.99	**<0.001**
Observations	16595		
R^2 Tjur	0.003		

Table SA73. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via Twitter based on wildlife viewer urbanicity.

	Prefer Twitter		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.08	0.07 – 0.09	**<0.001**
Urbanicity	5.91	4.64 – 7.52	**<0.001**
Observations	16595		
R^2 Tjur	0.014		

Table SA74. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via YouTube based on wildlife viewer urbanicity.

	Prefer Youtube		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.30	0.28 – 0.32	**<0.001**
Urbanicity	2.03	1.68 – 2.46	**<0.001**
Observations	16595		
R^2 Tjur	0.003		

Table SA75. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via Facebook based on wildlife viewer urbanicity.

	Prefer Facebook		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.66	0.62 – 0.71	**<0.001**
Urbanicity	0.93	0.78 – 1.11	0.410
Observations	16595		
R^2 Tjur	0.000		

Table SA76. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via local news (such as television, online, or print newspapers) based on wildlife viewer urbanicity.

	Prefer Local News		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.47	0.44 – 0.50	**<0.001**
Urbanicity	1.09	0.91 – 1.30	0.372
Observations	16595		
R^2 Tjur	0.000		

Table SA77. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via text alerts based on wildlife viewer urbanicity.

	Prefer Text		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.11	0.10 – 0.12	**<0.001**
Urbanicity	0.88	0.66 – 1.18	0.388
Observations	16595		
R^2 Tjur	0.000		

Table SA78. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via agency websites based on wildlife viewer urbanicity.

	Prefer Website		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	1.22	1.15 – 1.31	**<0.001**
Urbanicity	0.92	0.77 – 1.09	0.311
Observations	16595		
R^2 Tjur	0.000		

Table SA79. Model output of logistic regression model predicting likelihood of wildlife viewers being uninterested in receiving information from their state agency at all based on wildlife viewer urbanicity.

	Prefer None		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.12	0.11 – 0.14	**<0.001**
Urbanicity	0.49	0.36 – 0.67	**<0.001**
Observations	16595		
R^2 Tjur	0.001		

Table SA80. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via mailed newsletters or other subscriptions based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Prefer Newsletter Mailed		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.55	0.51 – 0.60	**<0.001**
Urbanicity	0.81	0.67 – 0.98	**0.030**
Income	0.98	0.87 – 1.10	0.754
BIPOC	0.99	0.91 – 1.08	0.844
Observations	15846		
R^2 Tjur	0.000		

Table SA81. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via printed materials (such as brochures or maps) based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Prefer Printed		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	1.53	1.42 – 1.64	**<0.001**
Urbanicity	0.50	0.42 – 0.60	**<0.001**
Income	0.91	0.81 – 1.01	0.081
BIPOC	0.67	0.62 – 0.72	**<0.001**
Observations	15846		
R^2 Tjur	0.012		

Table SA82. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via one-on-one interactions with agency staff based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Prefer Staff		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.15	0.14 – 0.17	**<0.001**
Urbanicity	0.49	0.36 – 0.66	**<0.001**
Income	1.02	0.85 – 1.22	0.808
BIPOC	0.84	0.73 – 0.95	**0.007**
Observations	15846		
R^2 Tjur	0.002		

Table SA83. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via blogs based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Prefer Blogs		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.06	0.05 – 0.07	**<0.001**
Urbanicity	2.13	1.60 – 2.84	**<0.001**
Income	1.97	1.66 – 2.32	**<0.001**
BIPOC	1.78	1.59 – 2.00	**<0.001**
Observations	15846		
R^2 Tjur	0.014		

Table SA84. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via email updates or e-newsletters based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Prefer Emails		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.82	0.77 – 0.88	**<0.001**
Urbanicity	1.22	1.02 – 1.45	**0.032**
Income	1.40	1.26 – 1.57	**<0.001**
BIPOC	1.02	0.95 – 1.10	0.586
Observations	15846		
R^2 Tjur	0.003		

Table SA85. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via Instagram based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Prefer Instagram		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.11	0.10 – 0.12	**<0.001**
Urbanicity	2.90	2.32 – 3.64	**<0.001**
Income	1.75	1.53 – 2.01	**<0.001**
BIPOC	2.05	1.87 – 2.24	**<0.001**
Observations	15846		
R^2 Tjur	0.029		

Table SA86. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via online magazines based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that “BIPOC” is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer’s ethnoracial identity being BIPOC and the response variable.

	Prefer Online Magazine		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.33	0.30 – 0.35	**<0.001**
Urbanicity	1.51	1.25 – 1.82	**<0.001**
Income	1.89	1.69 – 2.12	**<0.001**
BIPOC	1.22	1.13 – 1.33	**<0.001**
Observations	15846		
R^2 Tjur	0.011		

Table SA87. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via podcasts based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that “BIPOC” is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer’s ethnoracial identity being BIPOC and the response variable.

	Prefer Podcast		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.05	0.04 – 0.06	**<0.001**
Urbanicity	2.23	1.64 – 3.02	**<0.001**
Income	2.04	1.71 – 2.44	**<0.001**
BIPOC	1.64	1.45 – 1.85	**<0.001**
Observations	15846		
R^2 Tjur	0.011		

Table SA88. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via TikTok based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Prefer TikTok		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.09	0.08 – 0.10	**<0.001**
Urbanicity	1.71	1.31 – 2.22	**<0.001**
Income	1.26	1.07 – 1.48	**0.006**
BIPOC	2.08	1.87 – 2.30	**<0.001**
Observations	15846		
R^2 Tjur	0.016		

Table SA89. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via Twitter based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Prefer Twitter		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.06	0.05 – 0.07	**<0.001**
Urbanicity	3.85	2.99 – 4.96	**<0.001**
Income	2.80	2.42 – 3.24	**<0.001**
BIPOC	1.81	1.63 – 2.00	**<0.001**
Observations	15846		
R^2 Tjur	0.034		

Table SA90. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via YouTube websites based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Prefer Youtube		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.28	0.26 – 0.31	**<0.001**
Urbanicity	1.70	1.40 – 2.08	**<0.001**
Income	0.98	0.87 – 1.11	0.757
BIPOC	1.69	1.55 – 1.83	**<0.001**
Observations	15846		
R^2 Tjur	0.014		

Table SA91. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via Facebook based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Prefer Facebook		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.66	0.61 – 0.71	**<0.001**
Urbanicity	0.87	0.73 – 1.05	0.146
Income	1.07	0.95 – 1.20	0.247
BIPOC	1.15	1.06 – 1.24	**<0.001**
Observations	15846		
R^2 Tjur	0.001		

Table SA92. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via local news (such as television, online, or print newspapers) based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that “BIPOC” is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer’s ethnoracial identity being BIPOC and the response variable.

	Prefer Local News		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.47	0.44 – 0.51	**<0.001**
Urbanicity	1.14	0.94 – 1.38	0.175
Income	1.06	0.94 – 1.19	0.320
BIPOC	0.81	0.74 – 0.88	**<0.001**
Observations	15846		
R^2 Tjur	0.002		

Table SA93. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via text alerts based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that “BIPOC” is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer’s ethnoracial identity being BIPOC and the response variable.

	Prefer Text		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.11	0.10 – 0.13	**<0.001**
Urbanicity	0.86	0.63 – 1.16	0.331
Income	0.84	0.69 – 1.01	0.067
BIPOC	1.27	1.12 – 1.44	**<0.001**
Observations	15846		
R^2 Tjur	0.001		

Table SA94. Model output of logistic regression model predicting likelihood of wildlife viewers being interested in receiving information from their state agency via agency websites based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Prefer Website		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	1.16	1.08 – 1.25	**<0.001**
Urbanicity	0.87	0.73 – 1.05	0.140
Income	1.56	1.40 – 1.75	**<0.001**
BIPOC	0.81	0.75 – 0.87	**<0.001**
Observations	15846		
R^2 Tjur	0.006		

Table SA95. Model output of logistic regression model predicting likelihood of wildlife viewers not being interested in receiving information from their state agency based on wildlife viewer urbanicity, income, and ethnoracial identity. Note that "BIPOC" is a binary variable, where 0=white and 1=BIPOC, such that an odds ratio<1 indicates a negative relationship between a viewer's ethnoracial identity being BIPOC and the response variable.

	Prefer None		
Predictors	*Odds Ratios*	*CI*	*p*
Intercept	0.15	0.13 – 0.17	**<0.001**
Urbanicity	0.69	0.49 – 0.96	**0.031**
Income	0.31	0.24 – 0.39	**<0.001**
BIPOC	0.62	0.53 – 0.72	**<0.001**
Observations	15846		
R^2 Tjur	0.009		

Appendix B. Great Florida Birding and Wildlife Trail Case Study Statistical Results

Table SB1. Hurdle model for number of Great Florida Birding and Wildlife Trail (GFBWT) sites and urbanicity, with ZCTA area. *P* values less than .05 are in bold.

Explanatory Variable	Estimate ± SE	*Z*	*p*
Zero hurdle model coefficients (binomial with logit link)			
(Intercept)	-3.32 ± 0.61	-5.45	**< .001**
Urbanicity	0.10 ± 0.67	0.15	0.88
Log-transformed ZCTA area	0.79 ± 0.10	8.19	**< .001**
Zero hurdle model coefficients (binomial with logit link)			
(Intercept)	-1.65 ± 0.49	-3.39	**< .001**
Urbanicity	0.11 ± 0.59	0.18	0.85
Log-transformed ZCTA area	0.39 ± 0.07	5.80	**< .001**

Table SB2. Two-part model for number of Great Florida Birding and Wildlife Trail (GFBWT) sites and urbanicity, with ZCTA area. *P* values less than .05 are in bold.

Explanatory Variable	Estimate ± SE	*z/t*	*P*
First part model (binomial with logit link)			
(Intercept)	-3.32 ± 0.61	-5.45	**< 0.001**
Urbanicity	0.10 ± 0.67	0.15	0.88
Log-transformed ZCTA area	0.79 ± 0.97	8.19	**< 0.001**
Second part model (Gamma with log link)			
(Intercept)	0.60 ± 0.16	3.82	**< 0.001**
Urbanicity	1.45 ± 0.22	6.51	**< 0.001**
Log-transformed ZCTA area	-0.07 ± 0.02	-3.52	**< 0.001**

Table SB3. Spearman's rank correlations to assess relationships between area of Great Florida Birding and Wildlife Trail (GFBWT) sites and wildlife viewers' reported extent of barriers to participation: distance to high-quality locations for wildlife viewing, financial cost, and lack of transportation. *P* values less than .05 are in bold.

Variables	ρ	p

GFBWT area and financial cost	-0.02	0.56
GFBWT area and distance to high-quality locations for wildlife viewing	-0.08	**0.007**
GFBWT area and lack of transportation	-0.02	0.40

Table SB4. Logistic regression model for area of Great Florida Birding and Wildlife Trail (GFBWT) sites and whether or not wildlife viewers were interested in Florida Fish and Wildlife Conservation Commission providing access to more places to go wildlife viewing. *P* values less than 0.05 are in bold.

Explanatory Variable	**Estimate ± SE**	***z***	***p***
(Intercept)	-0.48 ± 0.07	-7.01	**< 0.001**
Log-transformed GFBWT area	0.38 ± 0.44	0.86	**0.39**