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# Scale and sense of place among urban dwellers

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**Abstract.** Place connections are core to being human: Every person lives in, and thus has direct experience of, at least one place and likely of numerous places throughout a lifetime. Sense of place—or the meanings, knowledge, and bonds that arise from the biophysical, social, and political–economic aspects of places—in turn influences people's interactions with those places. Of particular interest to researchers, practitioners, and policy-makers, such interactions can impact place-protective, stewardship, or conservation behaviors. However, how sense of place develops and what it represents is shifting in today's rapidly urbanizing, globalizing world. Especially when considering the integrated social–ecological context, questions related to how sense of place forms and is enacted in urban settings and at a range of geographic scales are challenging to study. Our study addresses this dynamic space: We examined how people's place connections intersect with their notions of geographic scale and levels of urbanity. Specifically, we conducted a 1201-person randomized telephone survey in the San Francisco Bay Area ecoregion of California, USA, to explore how sense of place varies by (1) the scale of what people consider to be their place, and (2) the urbanity of where people live. In comparison with respondents who perceived their place as the larger-scale ecoregion, we found that respondents who perceived their place as primarily focused on the urban area rated their connection to the biophysical aspects of place (the plants, animals, and landscape-related elements) lower. Similarly, overall, respondents who lived in urban areas rated their connections to the biophysical aspects of place lower than did respondents who lived in non-urban areas. Our findings suggest the importance of encouraging conceptualizations of place at broader geographic scales and, particularly, of supporting notions of urban spaces that stretch beyond urban boundaries. We also call for supporting increased engagement with urban nature, especially among residents of urban areas.

**Key words:** ecoregion; place attachment; public perceptions; scale; sense of place, urban areas; urban nature.

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## INTRODUCTION

The world is rapidly urbanizing: In 2007, half of the world's human population lived in cities; by 2050, demographers predict that proportion will rise to two-thirds (UN DESA 2018). This large-scale shift is changing—in psychological, political, cultural, and even spiritual ways—how the majority of humans interact with species, ecosystems, and natural processes, with massive consequences for the potential benefits that humanity derives from a range of ecosystem services as well as people's individual and collective connections with places (Turner et al. 2004,

Chapin et al. 2012, Masterson et al. 2019). The relationship of sense of place, which has affective (emotional) and cognitive (knowledge-based) aspects, with pro-environmental or place-protective behaviors is complex, yet often complementary (Lewicka 2011, Kudryavtsev et al. 2012*a, b*, Ardoin 2014); therefore, understanding how sense of place forms, and motivates related actions, is of great importance to environmental conservation, natural resource management, and sustainability-related initiatives, now and in the future. Considering people's place connections is essential to developing geographically and culturally relevant environmental conservation endeavors, as well as pursuing meaningful, compelling conservation planning at a range of scales (Chapin and Knapp 2015), especially in light of today's shifting urban demographic.

Sense of place describes the complex, multidimensional connections that people have with places (Ardoin 2006, 2014). Scholars conceptualize sense of place as encompassing two primary constructs: place meanings and place attachments wherein meanings are cognitive, derived from symbolic associations with places (Tuan 1977, Stedman 2002), while attachments are affective, reflecting a person/place bond (Kudryavtsev et al. 2012*a, b*, Masterson et al. 2017, 2019). Many researchers imagine the overarching sense-of-place concept as incorporating, at the broadest level, sociocultural as well as biophysical elements of place: The fields of anthropology and sociology emphasize the former (Low and Altman 1992, Trentelman 2009), while tourism, natural resources, and planning tend to emphasize the latter, often in non-urban areas and recreational contexts (Kil et al. 2012, Ramkissoon et al. 2012).

Debate over the role that the physical (e.g., ecological, biological, human-built) aspects of surroundings play with regard to sense of place has been intense. Indeed, in the early 2000s, discussions and debate became heated and notable enough to inspire rural sociologist and established place scholar Stedman to title a paper with the question, "Is it really just a social construction?" (Stedman 2003), where "it" refers to the (bio)physical environment. Stedman's philosophically and literature review-based response and rhetorical discussion were essentially, no, the physical environment is not just a social construction; rather, the physical environment manifests extant aspects, which are indeed essential to how people construct place meanings. Indeed, scholars find evidence of multiple dimensions of people's place connections (e.g., biophysical, sociocultural, and so on) as well as how ideas for how to measure and construct those connections. Although, to date, researchers have failed to agree on the number of dimensions, as well as how to operationalize each (Halpenny 2010, Scannell and Gifford 2010, Ardoin et al. 2012*b*), most agree with Stedman's (2003) assertion that the biophysical and sociocultural aspects have different influences on and implications for how people feel connected to and become engaged in their places.

Despite this general agreement in the place literature more broadly, much of the research that considers urban contexts focuses primarily on social aspects, such as interpersonal relationships, community ties, and cultural roots (Hummon 1990, Stolle et al. 2008, Armstrong and Stedman 2018; see discussions in Lewicka 2011, Adams et al. 2017, Enqvist et al. 2019). Other studies compare the development and occurrence of sense of place in urban versus rural contexts, but do not parse dimensions or aspects of those place connections (Anton and Lawrence 2014). Of studies that apply a multidimensional lens, the emphasis is often on non-urban areas or recreational uses, places, and relationships (Lewicka 2011). In this study, we enrich and add to the ongoing discussion in existing work by considering both social and biophysical dimensions of sense of place, but in an urban context.

In addition to the novelty of studying place's biophysical dimension in urban areas, we investigate a little-studied, but central, characteristic of place: geographic scale. The place literature is surprisingly quiet on issues of scale (Lewicka 2011, Ardoin 2014, Chapin and Knapp 2015), although for years researchers have suggested that the scale (or size) of place that a person considers meaningful may impact attachment to that place (Altman et al. 1992). Our literature review uncovered few empirical studies exploring the intersection of scale and sense of place, and those studies indicated that places of different geographic scales hold different meanings for individuals (Gustafson 2001, Vorkinn and Riese 2001, Ardoin 2014), suggesting that further

empirical study in this area is warranted. Although this finding makes intuitive sense, the scant empirical attention to this factor represents a surprising omission in the place literature. In an increasingly mobile, cosmopolitan world, the scale(s) of what people consider their place(s) may be a crucial variable in our understanding of place connections (Massey 1991, Stedman and Ardoin 2013, Chapin and Knapp 2015, Armstrong and Stedman 2018). We thus set out to explore this important and understudied aspect of people/place relationships.

In this article, we examine interactions between urban context, geographic scale, and sense of place using data from a 1201-person survey conducted in the San Francisco Bay Area of California, USA. The data set is particularly appropriate for simultaneously addressing the two gaps in sense-of-place research identified above. First, urban populations are less commonly a focus of place research that addresses biophysical elements. Our study area is geographically and biophysically diverse, contains multiple urban centers, and is home to millions of urban residents; this heterogeneity facilitates comparison between urban and non-urban residents. Second, nearly all sense-of-place research seeks perspectives on a researcher-defined, rather than participant-defined, area and thus treats issues of geographic scale cursorily (Lewicka 2011). By contrast, we use an approach that allowed respondents to define "their place" and the scale of that place (see Methods for details). We expected that the distinction between residence in urban and non-urban areas might be important; similarly, we anticipated that perceived scale might be a meaningful mediator of sense of place. Because of a paucity of previous research on those topics, however, we did not know what these interactions might look like. Our data set facilitated exploratory analyses to examine interactions among scale, urbanity, and sense of place.

## Methods

Between July and September 2014, we conducted a random-sample telephone survey with 1201 adults (age 18+) in California's San Francisco Bay Area (hereafter, the Bay Area). The survey was part of a larger study exploring place connections and how people learn about the environment in the 12-county geographically and demographically diverse Bay Area. The area encompasses dense urban centers, suburban developments, and rural lands; it is home to people from a range of ethnic backgrounds and socioeconomic levels.

The survey addressed issues related to sense of place, environmental behavior, and environmental learning; in this paper, we focus on the sense-of-place-related items. (See Table 1 for item language.) The study's guiding research questions were as follows: (1) What do people consider to be "their place" in this large, heterogeneous

Table 1. Survey items, scored on a 0 (strongly disagree) to 10 (strongly agree) Likert-type scale.

| Sense of place construct | Item language |
|---|---|
| Biophysical dimension | I like [my place]'s mix of plants, animals, and landscapes. |
| | I think the wildlife in [my place] is fascinating. |
| | There are a lot of open, natural spaces for me to go to in [my place]. |
| | I think the natural parts of [my place] are beautiful. |
| Political/Economic dimension | I am willing to make financial sacrifices for the sake of [my place]. |
| | I am willing to invest my time and effort into making [respondent's place] a better place. |
| | The elected officials in [my place] do a good job of representing me. |
| | [My place] is a good place for the kind of work I do. |
| | I think the economy is strong in [my place]. |
| Sociocultural dimension | I feel connected to the other people who live in [my place]. |
| | I like the cultural activities available in [my place]. |
| | The pace of life in [my place] is about the right speed for me. |
| | There are a lot of people like me in [my place]. |
| | I feel a strong sense of community in [my place]. |
| Psychological dimension | [My place] is the best place for what I like to do. |
| | I get more satisfaction out of living in [my place] than living anywhere else. |
| | I am emotionally attached to [my place]. |
| | Living in [my place] says a lot about who I am. |

area? And (2) what degree and type of connection to "their place" do people report?

Respondents' average age was 51.5 yr (SD = 17.1, $n$ = 1142). The majority (60%) self-identified as female. With regard to race/ethnicity, the majority (62%) self-identified as White (non-Hispanic), followed by White (Hispanic) and Asian (19% and 7%, respectively; $n$ = 1126). Other groups represented in the survey sample included Black/African American (3.7%), American Indian/Alaskan Native (1.2%), and Pacific Islander (0.9%). The survey, which was conducted orally through a telephone bank, required an average of 19.6 min to complete. The majority of the surveys (93%) were conducted in English; 7% were conducted in Spanish, upon the respondent's request. Using a split-sample approach to account for survey length and reduce participant burden, we asked certain questions, including the sense-of-place items reported in this paper, of roughly half the sample. The resulting sample size for the study described in this paper was 615.

### *Independent variables*

Our primary independent variable was scale of place, or the geographic size of the area that respondents identified as their place (see Table 1). A key design aspect of our study was that we allowed respondents to self-identify the scale of their place in our survey. We did so for two reasons: First, based on prior studies (Altman et al. 1992, Gustafson 2001, Vorkinn and Riese 2001, Ardoin 2014), we theorized that scale might be an important factor in understanding the development of sense of place. Second, the most frequently studied scale—the community level—is reported to be the least common scale to which place attachment develops (Cuba and Hummon 1993, Hidalgo and Hernandez 2001).

The scale-of-place variable results from an open-ended item asked with the objective of capturing respondents' perceived scale of place. The item was worded as follows: "Now, think about your place, by which I mean the whole area in California where you work, play, and otherwise live your life. So, think about the area that includes all the places you typically go to do all kinds of things like work, go to school, relax, do outdoor activities, run errands, and visit friends and family." We coded the perceived scale-of-place responses into three geographic categorizations: (1) non-major city (towns with populations under 200,000); (2) urban (cities with populations over 400,000, i.e., San Francisco, San Jose, and Oakland); and (3) regional (larger than a single town or city, e.g., the Bay Area or a subset of the Bay Area).

In addition to our primary independent variable of respondents' perceived scale of place, we used ZIP (mail) codes to create two variables denoting the urbanity of place of residence: (1) population density (per square kilometer) of area of residence, based on 2010 U.S. Census ZIP code tabulation areas (USCB 2010); and (2) whether respondents' city of residence is classified as urban or non-urban, with urban defined as living in a city with a population of over 400,000. We selected this amount as our cutoff after listing the cities within the study area in decreasing order of population size. We found a clear division between the city of Berkeley, which is the fourth-largest city in the area and has a population of approximately 120,000, and Oakland, which is the third-largest city and has a population of about 406,000. Using those criteria, we classified ZIP codes in the areas of San Francisco, San Jose, and Oakland as urban; we classified all other ZIP codes as non-urban.

### *Dependent variables*

Our survey included 19 sense-of-place items representing four dimensions of place (Ardoin 2006, Ardoin et al. 2012*a, b*): biophysical (four items), psychological (four items), sociocultural (five items), and political–economic (six items; see Table 1). We asked survey participants to respond to the items using an 11-point scale, from strongly disagree (0) to strongly agree (10). Each item referenced the respondent's previously identified place (which s/he provided in response to the prompt as described above).

### *Analysis*

We conducted statistical analyses to address the following questions: Does sense of place differ based on (1) perceived scale of place (i.e., the scale of what people consider to be their place, including whether it is regional, a non-major city, or a major city), and (2) the urbanity of where people's residences are located?

To address those questions, we first explored whether the dimensions of place were statistically

distinguishable concepts. Internal consistency of the four place dimensions was well above the minimum threshold ($\alpha = 0.60$, Vaske 2008). Cronbach's alphas for each of the place dimensions were as follows: 0.79 (biophysical); 0.79 (sociocultural); 0.85 (psychological); and 0.73 (political–economic). This allowed for our second step of analysis: creating a latent index for each dimension of place using the means of response to items within each construct. Third, we used those indices as dependent variables in sequential ANOVAs with each independent categorical variable: perceived scale of place alone, urban versus non-urban place of residence alone, and perceived scale of place by urban versus non-urban place of residence. For our analysis examining population density and dimensions of place, we used regression as all variables were continuous and had sufficiently normal distributions.

## Results

### *Perceived scale of place and sense of place*

Respondents who perceived their place as urban (a major city) reported significantly lower levels of biophysical sense of place (mean = 7.44) than respondents who perceived their place as regional, or encompassing an area larger than the urban core (mean = 8.25; $F = 7.66$ df = 2, $n = 588$ $P = 0.001$; Tamhane's post hoc analysis). There was no significant difference in biophysical sense of place in other pairwise comparisons between scales of place; that is, the biophysical ratings of respondents whose scale of place was a non-major city (mean = 7.93) did not differ from those whose scale of place was regional ($P = 0.18$) or urban ($P = 0.20$). The other three sense-of-place dimensions—psychological, sociocultural, and political–economic—showed no statistical difference between perceived scales of place ($P > 0.17$, Fig. 1, Table 1).

### *Urban residence and sense of place*

To investigate the distinction between respondents' perceived scale of place and their location of residence, we explored the relationship between the urbanity of residence and the four dimensions of place in multiple ways. We used our two ZIP code-based variables for place of residence: population density and residence in an area classified as urban or non-urban. First, we analyzed population density in the area of respondents' ZIP codes, and we used a regression analysis to compare those with the dimensions of place. We found a weak relationship between the biophysical dimension of place and population density ($r^2 = 0.00015$, $P = 0.01$); we found no relationship between population density and the other dimensions of sense of place (sociocultural, psychological, political–economic).

Second, we compared all four sense-of-place dimensions between urban residents (those living in a city with more than 400,000 people; $n = 84$) and non-urban residents (those living in a city with fewer than 400,000 people; $n = 472$). The mean for the biophysical dimension of place was higher for non-urban residents (mean = 8.15) than for urban residents (mean = 7.42; $F = 12.39$, df = 1; $P$-value < 0.001; Eta = 0.145; Bonferroni post hoc; Fig. 2, superscripts 1 and 2). We found no significant differences between urban dwellers and non-urban dwellers for other place dimensions ($P > 0.134$).

### *Interaction between perceived scale of place and place of residence*

Third, we explored how perceived scale of place (our first independent variable) interacted with place of residence as urban vs. non-urban (our third independent variable). Due to small sample size ($n = 4$), we omitted urban residents who perceived their scale of place to occur at the level of a non-major city, although we did retain this sample in the visualization (Fig. 2a). Among urban residents, we found no significant differences in sense of place for those with different perceived scales of place ($F = 0.694$, df = 2; $P$-value 0.503; Eta = 0.130; Figure 2a**)**. Among non-urban residents, connection to the biophysical dimension of place was higher for those who perceived their place as regional (i.e., larger than a single town or city; mean = 8.34) than for those who defined their place as a major city (mean = 7.69; $F = 5.14$, df = 2; $P$-value < 0.006; Eta = 0.146; Tamhane's post hoc analysis; Fig. 2b).

### *Scale of place and respondent background*

In an additional analysis, we considered potential relationships between respondents'

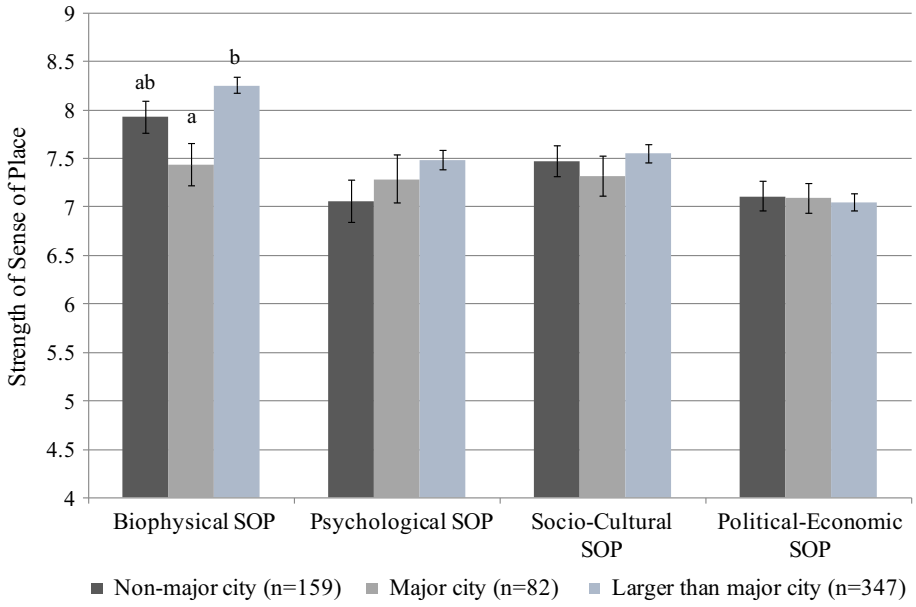


Fig. 1. Dimensions of sense of place by scale of place (standard error bars shown). Bar color represents respondents' perceived scale of place. The biophysical dimension ranks higher for those who perceive their place as non-urban than for those who perceive their place as urban. Superscript letters indicate significant differences in sense of place between different scales of place at $P$-value < 0.05.

scale of place, race/ethnicity, and income. We found no significant relationship between respondents' race/ethnicity and their perceived scale of place (Pearson $\chi^2 = 1.76$, df = 1, $P = 0.185$; Eta = 0.04). We found a weak relationship between income and scale of place, such that higher-income respondents were slightly more likely to identify a regional scale of place than were lower-income respondents (Pearson $\chi^2 = 5.12$, df = 1, $P = 0.024$; Eta = 0.076).

## Discussion

Among our sample, we found that people who considered their place to be confined to an urban area were more likely to indicate a lower level of connection to the biophysical dimension of sense of place than those who considered their place to be either a smaller town or a larger geographical region (Fig. 1). Our results also indicate that simply living in an urban area does not fully explain those lower ratings for the connections to biophysical dimension of place; rather, perception of scale of place matters as well. One indication of this phenomenon is the very low 0.015% percent variance in the connection to the biophysical dimension that is explained by population density.

Another indication of this phenomenon derives from our results related to urban versus non-urban residents (based on residence in one of the Bay Area region's three major cities). First, the results suggest that, regardless of scale, non-urban residents, in comparison with urban residents, tend to have stronger connections to biophysical aspects of their place. When perceived scale of place is considered, however, the importance of a non-urban perceived scale of place emerges. Non-urban residents who perceived their place to be at the major-city scale, for example, rated the biophysical dimension of place lower compared with non-urban residents who perceived their place to be at a regional scale. We also saw a trend (although a non-significant one) of urban dwellers with a regional scale of place as rating their connection to biophysical aspects of place more highly than their urban-dwelling counterparts with a major city perceived scale of place (Fig. 2a). This mirrors the pattern found for all respondents (Fig. 1) as well as for non-urban residents, in particular (Fig. 2b).

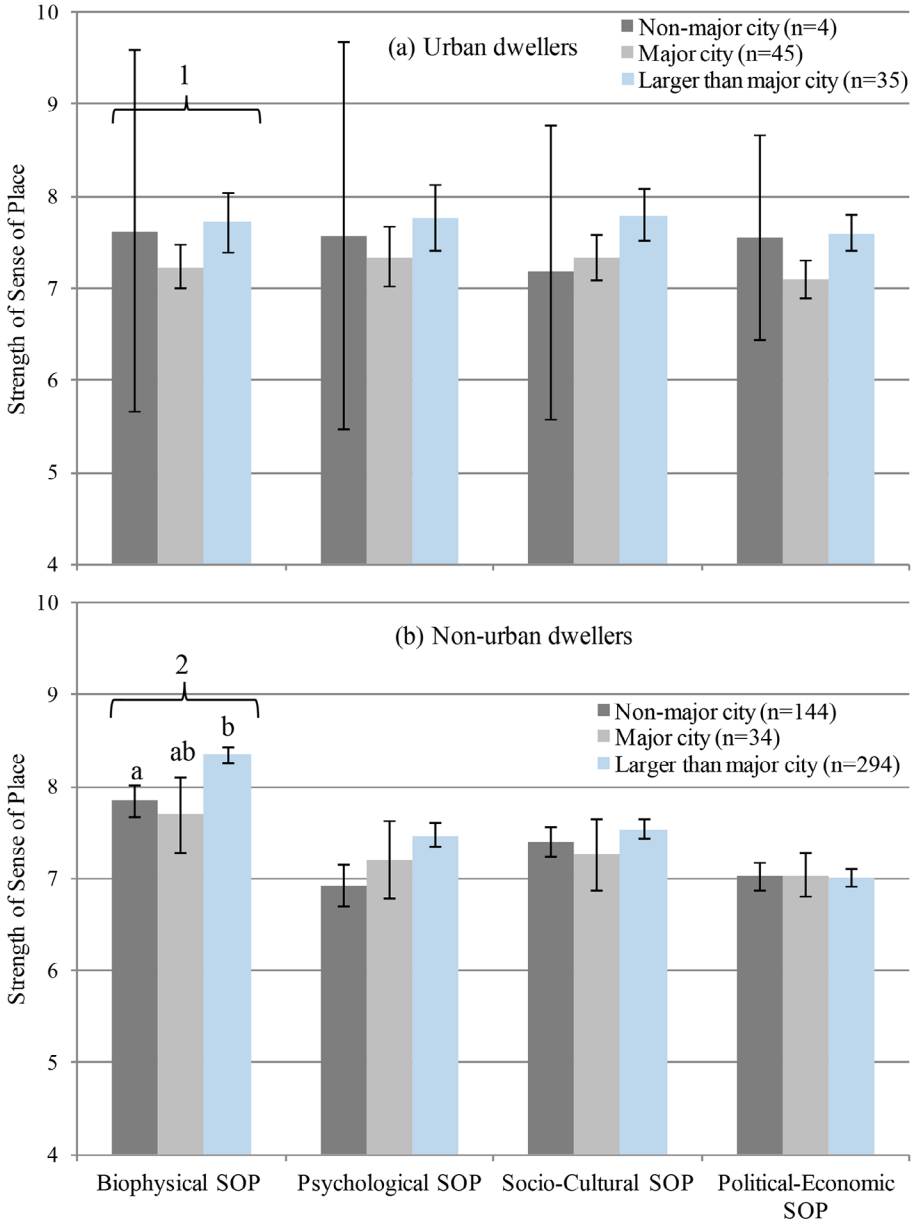


Fig. 2. Dimensions of sense of place at different scales of place among (a) urban residents (i.e., respondents who live in the cities of San Francisco, Oakland, or San Jose) and (b) non-urban residents (i.e., respondents who do not live in the three Bay Area major cities, as determined by ZIP code). Bar color represents respondents' perceived scale of place. Non-urban residents (collectively) rate the biophysical dimension higher than urban dwellers (superscripts 1 and 2) do. Among non-urban residents, those with a regional scale of place rate the biophysical dimension more highly than those with a major-city scale of place (superscripts a, b, and c). Standard error bars shown. Superscript numbers indicate significant differences in sense-of-place dimensions between urban and non-urban dwellers at $P$-value < 0.05. Superscript letters indicate significant differences (among non-urban dwellers only) in sense of place between different scales of place at $P$-value < 0.05.

Our results make a methodological contribution to sense-of-place research as our design allowed respondents to identify their place, which included indicating the scale of that place. Our results demonstrate that people who defined their place at different scales reported different levels of connectedness to the biophysical aspects of that place. Understanding the size of the geographical area to which people feel connected may have important implications; these findings may provide insight into the processes that transform undifferentiated space into meaningful place (Tuan 1977, Lowery and Morse 2013, Cresswell 2014). As noted, in many place studies, researchers develop measures in such a way as to predetermine the boundaries of the place under discussion. They thus circumscribe the content and the scale of place, imposing those decisions and structures on respondents from the outset. Future work might combine these approaches—that is, they might explore both respondent— and researcher-defined place scales. One way this vein of research could manifest, for instance, would be through studies that encourage respondents to assess their connections to places at multiple predetermined scales, with preliminary work with respondents helping define multiple relevant scales; researchers could then compare within-respondent levels of attachment for different scales of place.

### *Implications*

One might wonder about the meaning of our findings in an increasingly urbanized world. Our findings suggest that, when people consider their place to be an urban area, they may be less connected to its ecologically related biophysical aspects. We found, however, no difference in connections to sociocultural, economic, or psychological dimensions of place by perceived scale of place. In other words, in our results, non-biophysical dimensions of place were equally strong for respondents who perceived their area to be urban as for those who perceived their area to be non-urban. The wealth of sociological and anthropological literature on sense of place in urban areas supports this finding, emphasizing that certain dimensions of place, such as the sociocultural, are often particularly vibrant in the context of cities (as reviewed in Lewicka 2011; also cf. Low 2017).

Our finding of divergence around the biophysical dimensions for urban versus non-urban-scaled places makes sense intuitively: People connect with the psychological, sociocultural, and political–economic contexts in which they live, perhaps regardless of the biophysical nature of those surroundings. It may be just as easy to connect psychologically, socially, and politically in a bustling city as in a smaller town or a less-dense rural space. Connections to biophysical aspects of place, however, may look and feel dramatically different depending on whether a place is dominated by concrete, steel, and glass, with the occasional street tree or urban park, or dominated by complex forested or grassland ecosystems, with the occasional single-family home. In efforts to connect people and places, therefore, we may need to consider, with more nuance, the ways and conditions under which, as our results suggest, connections to biophysical aspects of place intersect with socially and culturally focused connections.

Based on our findings, which indicate some potential challenges with connecting to the biophysical aspects of place in an urban environment, we suggest two avenues for enhancing connectedness within this dimension in light of the world's increasingly urban population. We discuss, first, opportunities for encouraging larger-scale perceptions of place, stretching beyond the urban boundary; second, we discuss and explore opportunities for supporting connections with urban nature.

We may wish, first, to encourage people to perceive their place as larger than the bounds of the urban area in (or near) which they live or inspire a sense of urban areas as nested within a broader region. Various permutations of regional scales are frequently discussed and operationalized in outreach and planning-related efforts of NGOs and government agencies focused on large-scale conservation (Ardoin 2014, Wyborn and Bixler 2013, Dinerstein et al. 2019). The Nature Conservancy, WWF, and collaborating conservation organizations, for example, have pursued (eco) regional-scale portfolios for nearly two decades (TNC 2001, TNC and WWF 2006). Similarly, the U.S. federal government's National Landscape Conservation System works to broaden connections to federal lands beyond the national park system: Over 132 million acres of these federal

lands lie within 50 miles of urban areas (US DOI 2015). Building urban/peri-urban/rural bridges and encouraging people to perceive nature and the environment as not only in remote wild and untouched landscapes, but also in parks and open spaces adjacent to urban areas, provides opportunities to connect to the natural world nearby (Miller and Hobbs 2002). This concept also interfaces with ongoing discussions in the conversation field about the role of traditional protected areas (of various types) versus "other effective area-based conservation measures" as mechanisms to conserve both biodiversity and human well-being in the long term (Dudley et al. 2018).

Relatedly, the second opportunity we suggest is to increase people's perception of, and attachment to, nature within urban areas. This relates to what some researchers (Dunn et al. 2006) have called the pigeon paradox: How biodiversity conservation efforts—even in remote, seldom-seen locales—may benefit from encouraging appreciation of species commonly experienced in urban areas, such as pigeons and squirrels (Pyle 2002, Dunn et al. 2006). Such common species have been, and continue to be, the focus of urban outreach efforts, drawing attention to wildlife and ecosystems in everyday settings (Dearborn and Kark 2010, Beatley 2011, Schwartz et al. 2012). This aligns with the notion that conservation and restoration efforts in urban areas may bring a plethora of benefits and values—including social, economic, educational, and health and wellness-related, among others—through enhancing opportunities for positive human/wildlife and biodiversity interactions (Miller and Hobbs 2002, Soulsbury and White 2015).

This focus on nature in urban contexts, while somewhat outside the norm in conservation initiatives and organizations, is of growing interest in a range of theoretical discussions and empirical studies (Schwartz et al. 2012, Wang Wei et al. 2016, Korpilo et al. 2018). In particular, when considering the historical trajectory of environmental education, efforts to reconnect an increasingly urbanized society to nature and the outdoors parallel initiatives over the past 150 years (McBride et al. 2013, Russ and Krasny 2015). Many historical accounts describe one of environmental education's key predecessors as nature study, a late-nineteenth-century response to the distancing from rural life inherent in industrialization (Biedenweg et al. 2013, Gough 2013). Relatedly, in the 1950s, outdoor education emerged in response to concerns that urban populations lacked exposure to the outdoors; this approach focused on bringing urban populations to non-urban overnight camps (Palmer 2002, McBride et al. 2013). In the 1960s, environmental education focused primarily on the social causes and consequences of humans' environmental impact (Palmer 2002, McBride et al. 2013). The field's primary guiding definition, laid out in the UNESCO/UNEP Tbilisi Declaration and written nearly four decades ago, describes a focus on the total environment, emphasizing the importance of engaging with audiences of all ages audiences and developing initiatives in cities and the urban content (Maddox et al. 2017, NAAEE 2017, Stevenson et al. 2017).

The current decade is witnessing a wave of environmental education that foregrounds urban contexts in both their social and biophysical aspects (Ardoin et al. 2012*a, b*, Russ and Krasny 2017, Stevenson et al. 2017). Efforts to connect people with (native and non-native) urban ecosystems abound through environmental and sustainability education programming (e.g., Kudryavtsev et al. 2012*a, b*), citizen science projects (Bonney et al. 2014), urban agriculture (Saldivar-Tanaka and Krasny 2004), arts-and-environment initiatives (Heimlich and Miss 2013), and other mechanisms. Such undertakings facilitate opportunities for connecting to nature in close-to-home, easily accessed spaces. Russ and Krasny (2017: 5) summarize the importance of this aspect of environmental education, which they note "includes an impressive array of approaches *in* cities, ranging from nature play to green infrastructure creation, to art and political action" (emphasis original). They also emphasize that, "cities are places where learners can readily observe how ecosystem and social processes are tightly intertwined" (Russ and Krasny 2017: 5).

Consistent with current directions in environmental education, we suggest these strategies for enhancing and supporting place connections, with a focus on the biophysical aspect, in today's urbanizing world: expanding the scale of place connections and facilitating people's nature connections in urban settings. Many groups—such as the Golden Gate Parks Conservancy, Outdoor

Afro, and the Student Conservation Association (the former operates in California; the latter two operate across the United States)—work to enhance people–place relationships through such avenues. Research indicates that these, and similar, efforts can help enhance place-based meanings, deepen intertwined social–ecological relationships, and support pro-environmental behaviors (Adams et al. 2017).

Many of these urban efforts focus on populations who are traditionally less involved in and, relatedly underserved by, environmental education, such as those from non-white racial/ethnic backgrounds or working-class populations (Taylor 2014, 2016, Gould et al. 2018). Although we found no correlation between scale of place and ethnicity, higher-income respondents were slightly more likely to report feeling connected to their place at a larger scale. Given our results that larger scales of place were correlated with stronger connections to biophysical dimensions of place, this is a concerning finding. It suggests perhaps that environmental education and nature-connection programs created with and in service to lower-income populations may fill a particularly important niche.

We emphasize, however, that we are not advocating a re-creation of the outdoor education movements of the mid-twentieth century, characterized by the primary aim of exposing urban residents to non-urban nature, nor are we advocating for using those same frameworks and approaches used decades ago. Such approaches, often aligned with upper-middle-class European American culture and aesthetic of the wild, can be problematic for many people of other backgrounds (Finney 2014, Taylor 2016, Gould et al. 2018). Environmental sensitivity likely arises from multiple aspects of peoples' backgrounds, and not everyone comes to caring about the environment through direct interaction with flora, fauna, or undeveloped spaces (Ardoin et al. 2014). Many other routes are possible. These include, but are not limited to community activism spurred by environmental degradation and harm (Bullard 1990, Enqvist et al. 2019), developing and maintaining community gardens (McIlvaine-Newsad and Porter 2013), connecting to public history (Hayden 1997), and involvement in community groups that beget interest in and collective action related to place (Enqvist et al. 2019). Although our findings lead us to suggest that it may be helpful to facilitate urbanites' connections with the biophysical aspects of places, we also suggest that this should, by no means, be an isolated focus. We suggest that the biophysical be treated as part of a holistic system (Masterson et al. 2019), as one of multiple dimensions of place. This increased effort toward connecting urbanites to the biophysical aspects of their places (both within and surrounding the city) may help move toward a situation different from those suggested in our findings. Just as (in our findings) peoples' social and political connections to place are similar whether that place is urban or non-urban, in the future, connections to cities' biophysical aspects might be as strong as they are for non-urban places.

Our results may also have implications for pro-environmental behavior and engagement in conservation issues. Connections between attachment to a place and taking action to protect that place (and, by extension, nature in general) may seem intuitive, yet research on the relationship between connection to place and pro-environmental behavior remains inconclusive (Scannell and Gifford 2010, Lewicka 2011, Masterson et al. 2017). Some researchers have found relationships between strong place connections and place-related behaviors; for example, Jorgensen and Stedman (2006) found that lakeside residents' place connections correlated with their efforts to discourage shoreline development, and Devine-Wright and Howes (2010) found a correlation between place attachment and wind power-related place-protective actions. Others, however, have found no such connections: Gosling and Williams (2010), for example, found no correlation between place attachment and efforts to protect native vegetation.

When researchers analyze sense-of-place dimensions separately, they have found a connection between the biophysical dimension of place and conservation-related behavior, but not between the social dimensions of place and conservation-related behavior (Scannell and Gifford 2010). This past finding emphasizes the potential importance of our result that biophysical dimensions of place tend to be lower in cities and for people who perceived their place to be focused on that urban setting. Moreover, little research has explored how scale of place might influence

the sense of place–behavior relationship. In one of the few studies that addresses scale of place, and with results highly relevant to ours, Vorkinn and Riese (2001) found that attachment to a larger area was associated with negative attitudes toward development. Their findings suggest—as do ours—that this scale–place relationship may have attitudinal implications that might manifest in behavioral implications.

### *Limitations*

We recognize the necessity of future research to refine the items that assess the biophysical dimensions of place in our instrument. In particular, attention must be paid to developing items equally applicable to biophysical aspects of urban and non-urban places. Further, we recognize limitations inherent in our quantitative data. Future work drawing on qualitative data, such as free responses, would facilitate more nuanced understanding of residents' perceptions of the scale of their place(s), depth of place connections, and interactions among those phenomena.

## Conclusion

Research on the connection between sense of place and pro-environmental behavior does not suggest a single, definitive relationship between the two, primarily because diverse paths to environmental behavior interact with different place dimensions. Enhancing attachment to the biophysical aspects of place may not directly result in increased support for conservation; however, supporting and nurturing people's connection to the species and landscapes around them may positively influence conservation efforts—at scales ranging from local to regional to global—perhaps through as-yet-undiscovered mechanisms. Our findings suggest that a dual strategy—encouraging connections to nature in the city and, at the same time, pushing the boundaries of what people consider to be "their place" beyond the immediate urban surroundings—may help move toward greater support for conservation and place, in its many manifestations.

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