In a recent paper, Binley, Proctor, Pither, Davis, and Bennett (2021) call for greater integration of community science (also often called citizen science) into research on the resilience of protected areas. We strongly agree with their focus on community science as a means to expand the spatial and temporal scale of data collection, facilitate consistency in long-term environmental monitoring, and promote conservation awareness and action (Binley et al., 2021). Expanded use of community science will undoubtedly contribute greatly to the resilience of protected areas. However, to achieve the goal of increased application of community science, it is vital that we acknowledge its current contribution. At the same time as we applaud the authors' clear spotlight on the opportunities offered by community science, we think their conclusions downplay its current importance. To the contrary, we believe that community science plays an active role in the planning, management, and monitoring of resilient protected areas. We assert that an improved understanding of the relationship between community science and protected areas research will be critical for achieving the goal of increased application.

Conservation community science is difficult to capture in literature reviews, in part because the practice of community science is often rooted in the stewardship of a specific place by a local community (Ganzvoort, van den Born, Halfman, & Turnhout, 2017; Halliwell, 2019; Haywood, Parrish, & Dolliver, 2016; Lawrence, 2009). The place-based nature of community science extends to the language used to describe it; specific place names and other place-based language have been shown to be integral to conservation community science initiatives (Newman et al., 2017). As a result, literature reviews based on broad search terms, such as the general terms used by Binley et al. (2021) to denote protected areas—“protected area,” “reserve,” “park,” and “preserve,”—may fail to capture many examples of place-based community science. Inclusion of a sufficient number of synonymous search terms to capture the variation in language commonly used to describe key review concepts is critical for obtaining a representative sample of the literature (Bramer, de Jonge, Rethlefsen, Mast, & Kleijnen, 2018; Haddaway et al., 2020), and this limitation is compounded in a search focused on documents’ abstracts, titles, and keywords, as with the Web of Science search employed by Binley et al. (2021) (Bramer, Rethlefsen, Kleijnen, & Franco, 2017).

As an example, we altered the search strategy used by Binley et al. (2021), using Google Scholar to iteratively target 10 terms for protected areas, including the four used by Binley et al. (2021) as well as six more context-dependent terms (“wildlife refuge”; “state park”; “national park”; “provincial park”; “beach”; “conservation area”), and adding terms indicating the application of community science (Box 1). Because Google Scholar indexes articles’ full text, we expected it to capture a broader set of relevant articles; this is because when a review topic is defined by several distinct search terms, it is likely that some terms will not appear in all relevant
BOX 1. The search string used to query Google Scholar

(“[protected area synonym*]”) AND (“citizen science” OR “community science” OR “citizen scientists”) AND (ecology OR ecological OR conservation OR stewardship) AND (planning OR optimization OR design OR prioritization) AND (resilience OR resilient)

*These ten synonymous search terms were used one a time to represent the concept of “protected areas” in ten iterative searches: “Protected area”; “Reserve”; “Park”; “Preserve”; “Wildlife refuge”; “State park”; “National park”; “Provincial park”; “Beach”; “Conservation area”.

articles’ titles or abstracts despite their presence in the article text (Bramer et al., 2017). We accessed the first 10 documents retrieved by each search iteration and scanned them for discussion of community science contribution to protected area resilience.

We found ample evidence that community science is deeply integrated into the planning, management, and monitoring of many protected areas, identifying 29 examples in peer-reviewed articles and 13 examples in grey literature and book chapters (Mandeville, 2021). The protected areas in these examples are diverse in terms of scale and geographic region, with management ranging from local to transnational. We expect that further examples could be retrieved by targeting specific place names or descriptors of protected areas and by substituting other broad search terms—for example, supplementing the general term “resilience” with more context-dependent threats to resilience, such as “wildfire” or “sea level rise.” Still, the community science initiatives identified by our search exhibit diverse strategies for addressing the five key research topics identified by Binley et al. (2021) (Table 1).

An accurate assessment of the role of community science in protected areas research is needed to direct future

| Research topic                  | Example 1                                                                 | Example 2                                                                 |
|---------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Biodiversity                    | Data collected during a community science bioblitz in London, UK, contributed to the designation of a park as a new nature reserve with a management regime designed to protect locally rare species (Ballard et al., 2017). | Community science data collected by the Island County Beach Watchers in Washington, USA, was used to assess progress towards eelgrass management goals at several beach sites, including State Park locations facing high human impact (Toft et al., 2017). |
| Climate change                  | The Valle de Oro National Wildlife Refuge in New Mexico, USA, used community science phenology data to plan the timing of ecological restoration activities and monitor their long-term impacts (Posthumus et al., 2018). | The Urban Tides program solicited community science photo contributions to ground truth models of projected flood risk due to sea level rise in California, USA, with an emphasis on State Beach locations (Grace-McCaskey, Iatarola, Manda, & Etheridge, 2019). |
| Connectivity                    | Community science was used to investigate how urban gardens support bird diversity and contribute to connectivity between natural areas in Cape Town, South Africa (Pauw & Louw, 2012). | Community science surveying of coral reefs was used to designate priority zones within the Tioman Island Marine Park in Malaysia, which contributes to improved understanding of the connectivity between Marine Protected Areas (Lau et al., 2019). |
| Resources and ecosystem services| Community science collaboration between commercial lobster fishers and researchers led to the establishment of a new Marine Protected Area in Newfoundland, Canada, improving sustainability of the fishery (Charles, Loucks, Berkes, & Armitage, 2020). | Community science volunteers collected data on beach dynamics and coastal erosion to assess the impact of management actions, such as beach nourishment, on beaches in southeastern Australia (Pucino, Kennedy, Carvalho, Allan, & Ierodiaconou, 2021). |
| Social governance               | Individuals living near the Tiwai Island Wildlife Sanctuary in Sierra Leone were surveyed to assess community interest in incorporating community science into a management scheme for the Sanctuary (Conway, 2013). | Qualitative social–ecological research methods were used to study the relationship between community science initiatives and Indigenous communities in and around the Danungdafu Forest Park in Taiwan, demonstrating the need to define resilience in terms of Indigenous communities’ priorities (Tai, 2020). |
developments in this area as well as to acknowledge the impact of the countless community science participants currently engaged in the stewardship of protected areas. In this respect, we believe the results of Binley et al. (2021) are a significant step forward, identifying important trends in the literature and demonstrating that community science is nearly absent from broad academic discussions of the resilience of protected areas. As stated by the authors, this is problematic because community science presents an opportunity to expand protected areas research and more tightly integrate research and management strategies. As the impacts of global change are increasingly felt, the academic research community must recognize and elevate the contribution of community science to protected areas. And to achieve this goal, it will be essential to recognize and learn from the many current examples of successful community science.

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CONFLICT OF INTEREST
The authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS
Caitlin P. Mandeville conducted the literature search and led the writing of the manuscript. Both authors participated in conceptual development and contributed to writing the manuscript.

ETHICS STATEMENT
The authors are not aware of any ethical issues regarding this work.

DATA AVAILABILITY STATEMENT
The results of the literature search reported in this manuscript are available here: https://osf.io/pxkj5/.

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