Revisiting the promise of conservation psychology

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Conservation psychology was first described as a field of research nearly 15 years ago (Saunders 2003) and such was the optimism for psychology to affect conservation that Saunders et al. (2006) published "Using Psychology to Save Biodiversity and Human Well-Being" in *Conservation Biology*. Conservation psychology developed as an offshoot from environmental psychology, a field that evolved from social psychology in the 1950s. Although environmental psychology is the study of people and their interactions with their environments, both built and natural, it initially did not address conservation matters. As conservation of biodiversity gained prominence, research into the psychological dimensions of conservation proliferated, and in 2003 the term *conservation psychology* was adopted to differentiate this field from environmental psychology. However, despite differences in scope, environmental psychology and conservation psychology are sometimes used interchangeably (Clayton & Saunders 2012).

Managing human behavior is essential for biodiversity conservation. It is therefore timely to consider the uptake and impact of conservation psychology by examining how the publishing record in this field has changed over time and how its content relates to biodiversity. We performed a literature search via Web of Science (www.webofknowledge.com) for articles containing *conservation psychology* in keywords, abstracts, or titles. We found 68 articles published in peer-reviewed journals from January 2003 (the year the field was described) and December 2016. Six of these (8.8%) related

to energy and water conservation—topics generally considered within the broader field of environmental psychology.

To capture further relevant papers that did not contain the term *conservation psychology*, we used the root terms: *biodivers** AND (*psycholog** OR "*behavi* change*"). This returned 155 relevant articles, of which 141 were unique to the additional search. Of the total relevant articles from the 2 searches (*n* = 203) (Fig. 1), 18.1% (37) were published in leading conservation journals, *Conservation Biology* (14), *Ecological Economics* (8), *Biological Conservation* (7), *Conservation Letters* (4), and *Society and Natural Resources* (4). Over the last 13 years these 5 journals have published 12,880 articles. Our results suggest that only 0.28% of those are related to psychology. Although there are likely additional terms that could be used to explore the conservation psychology literature, our results indicate that despite perceptions of growth in conservation psychology, behavioral research has not yet penetrated mainstream conservation science. Additionally, only 5 articles in our search came from environmental psychology journals, *Environment and Behavior* and *Journal of Environmental Psychology*, which equates to just 0.36% of their output during the same period.

Our results reveal that *conservation psychology* has not become an umbrella term for interdisciplinary research that integrates biodiversity conservation and psychology; although the number of related research articles is increasing, the impact of psychology on conservation science is still relatively small; and biodiversity issues have received limited attention in environmental psychology. As with social sciences generally, structural barriers, such as past and potentially current publishing and funding biases, have hindered the uptake of conservation psychology and use of psychology in conservation science (Bennett et al. 2017). Changes to any science, of course, take time (Kuhn 1962).

The rate of uptake of psychology within conservation science is comparable to transformations in economics. Recognition that cognitive and behavioral factors that influence human decision making are inconsistent with standard economic models emerged in the 1960s but took 40 years to be accepted by the economic community (arguably culminating in the 2002 award of the Nobel Prize in economics to Daniel Kahneman) and integrated into policy and practice (a subsequent Nobel economics prize to Richard Thaler in 2017).

Similarly, despite psychology's highly relevant, practical benefits there remains comparatively little psychology research addressing the conservation of biodiversity. Structural barriers have likely contributed to this. However, we believe there are other reasons for the lack of attention to biodiversity behaviors. To examine this claim, we explored the differences between biodiversity conservation and water and energy conservation behaviors.

Challenges of biodiversity behaviors

Biodiversity issues are often context specific (e.g., overharvesting, human-wildlife interactions) or diffuse (e.g., consumption related), and identifying threats and individuals or populations whose behavior is driving the threat is difficult but important (Reddy et al. 2016). Typically, the major drivers of threats to biodiversity — biological resource use and agriculture (Maxwell et al. 2016) — stem from multiple behaviors by multiple actors and are generally spatially and temporally diffuse, which makes examining the link between behavior and biodiversity impact difficult. Although biodiversity loss is global, few individual biodiversity-related problems (or solutions) are as universal as household water and electricity consumption. Owing to the globalized economy, the world's population in both developed and developing nations has a limited perception of how their

consumptive behaviors affect biodiversity. As a result, these behaviors are harder to decipher than behaviors that have direct effects or a higher degree of tangibility.

The majority of the world's people live in cities, where disconnection from nature is an increasing phenomenon (Soga et al. 2016). Urban residents struggle to link biodiversity conservation with actions undertaken at the household level. Feedback mechanisms, in which the user has a direct link between their action and the outcome, are essential for promoting proenvironmental behavior change (Schultz 2009; Faruqui et al. 2010). Water and electricity meters and bills provide feedback that allows individuals to see the efficacy of their actions. But there are no biodiversity meters or bills, and feedback mechanisms are further complicated by the indirect way in which biodiversity is affected by people's lives.

Where water and energy conservation generally lead to personal financial efficiencies, biodiversity actions are more likely to have negative financial impact on the user. For example, biodiversity-friendly products are often more expensive, and engaging in private land conservation by placing a permanent conservation contract on farmland may reduce its financial value or incur a significant opportunity cost (Farrier 1995). Furthermore, biodiversity-conservation behaviors are not typically easy for an individual to undertake due to societal structures. Information about the actions individuals can take to reduce impacts on biodiversity can be confusing, conflicting, and unreliable, which leaves it to the individual to invest time and effort to identify effective probiodiversity behaviors and to source biodiversity-friendly products.

Impediments to behavior change are likely tied to a number of social-psychological and cognitive factors and biases (Table 1) that potentially have a number of common underlying mechanisms. Behaviors that impact biodiversity derive from complex interactions between values, social and individual norms, attitudes, and a number of perceived and real behavioral controls that subvert behavioral intentions. Although numerous psychological measures of the relationship between individuals and nature exist (e.g., new ecological paradigm [Dunlap et al. 2000]; environmental concern [Schultz 2001]; connectedness to nature [Mayer & Frantz 2004]), it is not yet clear how and under what circumstances to apply existing psychological measures to biodiversity issues, how they relate to biodiversity behavioral change, whether they effectively predict biodiversity behaviors, and when or how to develop novel or case-specific measures (St John et al. 2010; Clayton et al. 2016).

Bringing conservation psychology into the mainstream

Biodiversity conservation researchers and practitioners are aware of the importance of psychology in solving biodiversity issues, and we acknowledge there are dedicated psychology and conservation scientists working in this space. Our analysis of the literature showed that these numbers are still low, which presents challenges but also highlights opportunities. Psychologists may be missing unique research opportunities for understanding human behavior. Conservation psychology is not simply another applied psychology domain; biodiversity issues are multilayered and generate novel psychological questions and concepts (e.g., biophilia, environmental amnesia, environmental hyperopia). The domain of conservation provides opportunities for psychologists to engage in long-term studies over which to observe significant institutional and cultural shifts.

A deeper integration of psychology into conservation science could capitalize on these opportunities. Some recommendations for integrating conservation and psychology and social sciences exist (e.g., Schultz 2011; Pearson 2013; Clayton et al. 2016; Stenseke 2016; Bennett et al. 2017). Specific ideas include encouraging conservation scientists and psychologists to attend each other's conferences, greater inclusion of psychologists in the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, a prioritization of behaviors that drive the greatest global biodiversity threats and are most amenable to change, and continued development of conservation psychology courses for students from both disciplines to help produce truly interdisciplinary researchers who understand both fields. Promising approaches also include the Society of Conservation Biology's Conservation Marketing Working Group's advancement of marketing and communication techniques underpinned by theory and impact evaluation (http://conbio.org/groups/working-groups/conservation-marketing-working-group), the Conservation Psychology Institute at Antioch University (https://www.antioch.edu/new-england/resources/centers-institutes/conservation-psychology-institute/), and courses in conservation psychology such as those offered by University of Adelaide (https://study.unisa.edu.au/courses/151240/2018).

As our literature search revealed, the term *conservation psychology* is not widely used in the context of biodiversity conservation, and when associated with issues relating to the conservation of water and energy, it may also be conflated with environmental psychology. However, behaviors affecting biodiversity are contextual and complex, and psychological theory or tools developed for other environmental issues may not be applicable. Given the urgent need to bring attention to biodiversity issues, as a starting point we encourage those who apply psychology to conservation research (e.g., conservation messaging, human dimensions of wildlife, conservation marketing, zoo engagement research, applied psychology in all conservation contexts) to use the term *conservation psychology* in

keyword selection to highlight their work, its breadth, and importance to understanding and affecting biodiversity issues and initiatives. Although there is great potential for conservation psychology to help address current and future biodiversity challenges, this must be jointly cultivated by conservationists and psychologists to fulfil this promise.

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Supporting Information

A fully referenced Table 1 (Appendix S1) is available online. The authors are solely responsible for the content and functionality of these materials. Queries (other than absence of the material) should be directed to the corresponding author.

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Table 1. Examples of psychological dimensions of biodiversity conservation drawn from an exploratory search of the literature*.

Psychological dimension	Description and potential impact on biodiversity
Environmental amnesia or shifting baselines	Ecological changes or disappearance of species can create an environmental amnesia in individuals who forget their past personal experiences of nature or generations who are unaware of what was lost previous to their understanding of their environment. This influences how people perceive the naturalness of current ecological conditions and may potentially accelerate under climate change.
Environmental cognitive dissonance	People seek consistency between their beliefs and actions. When people hold beliefs and behave in a way that does not align with these beliefs, a mental discomfort occurs that could lead to an adaptation of the belief or attitude or a rationalization of behavior. Cognitive dissonance may explain the values-action gap found in biodiversity behaviors.
Environmental hyperopia	The perception that environmental issues occurring at a distance (e.g., rainforest loss in remote areas) have greater impacts than local issues and can lead to a sense of hopelessness associated with a lack of self-efficacy in the ability to positively affect

biodiversity conservation.

Extinction of experience

The loss of interaction with nature may correspond with a decrease in proenvironmental attitudes and behaviors in a bidirectional relationship, potentially creating a negative feedback within an individual and a society. Just a few engagements with nature may protect against this decline of proenvironmental attitudes.

Governance trap

Citizens may assume the government is responsible for the conservation of the environment and threatened species. This can change if there is perceived neglect of the environment by a government.

Moral licensing

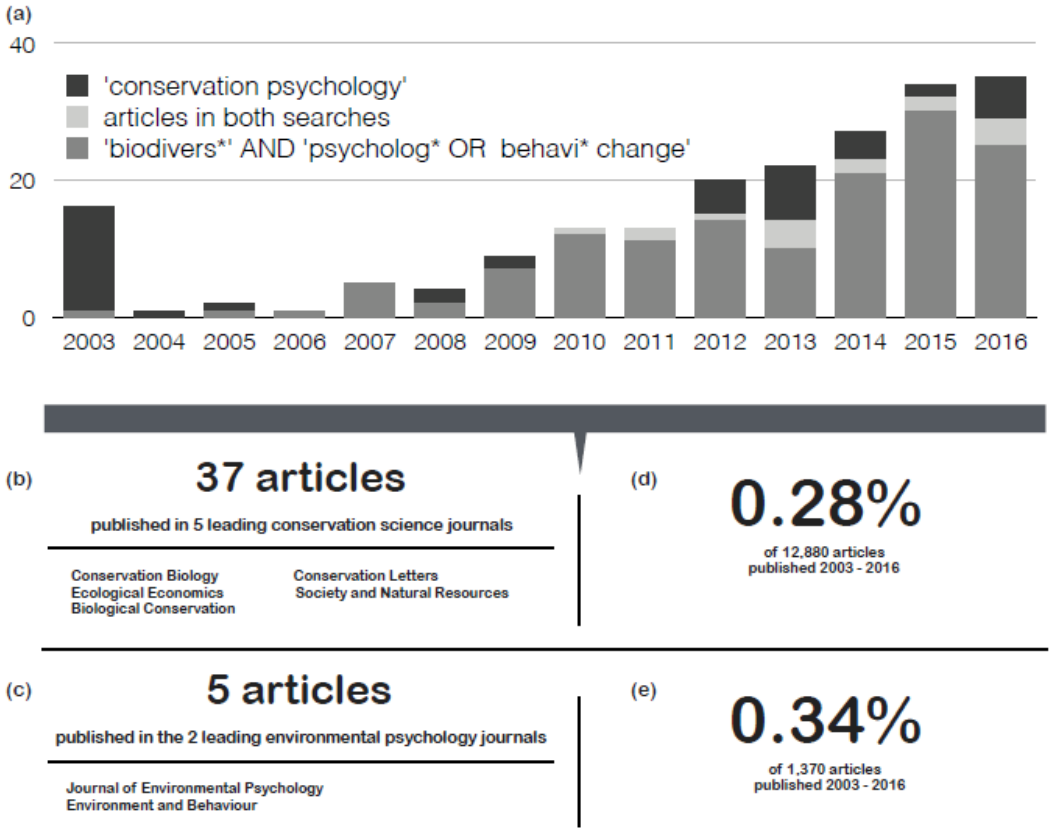
Moral licensing is a perverse behavioral outcome that may result from an individual's positive perception of their moral self. Engagement in a moral behavior, such as a planting a tree, may diminish future proenvironmental behaviors. Although the licensing effect has been demonstrated in water and energy consumption behaviors, there has been little consideration of licensing relative to biodiversity behaviors.

Psychological distance

Psychological distance impacts an individual's thinking about an object or action. Psychological distance can be temporal, spatial, or cultural and is affected by uncertainty; events or objects that are uncertain, occur far into the future, a long way away, or to people or species that we perceive as different from ourselves will tend to

	be viewed more abstractly. Psychological distance affects the perceived threat of climate change.
Psychic numbing or collapse of compassion	Typically associated with large-scale human suffering (e.g., war, famine), psychic numbing is a psychologically protective response to great loss of life, which may be deployed in the case of continued degradation of ecosystems, loss of species, and other threats to biodiversity. If so, one can expect it to increase with greater loss of species; people will be unable to process the news of continued species loss and as a result ignore the problem and its solutions. To our knowledge, there is currently no research examining the impacts of psychic numbing and biodiversity loss.
Self-efficacy	Self-efficacy is determined by the real or perceived barriers (cognitive, physical, financial or regulatory) controlling one's own behavior. An individual's perception of self-efficacy is a strong predictor of how she or he will approach biodiversity-related behaviors.
Status quo bias	A risk-averse strategy that prevents societal or individual adaptations to fundamentally different futures, such as large-scale sustainability measures. Status quo bias may influence resistance to policies needed for the conservation of biodiversity despite the long-term benefits that will be generated.

*A fully referenced version of this table is available in Supporting Information.



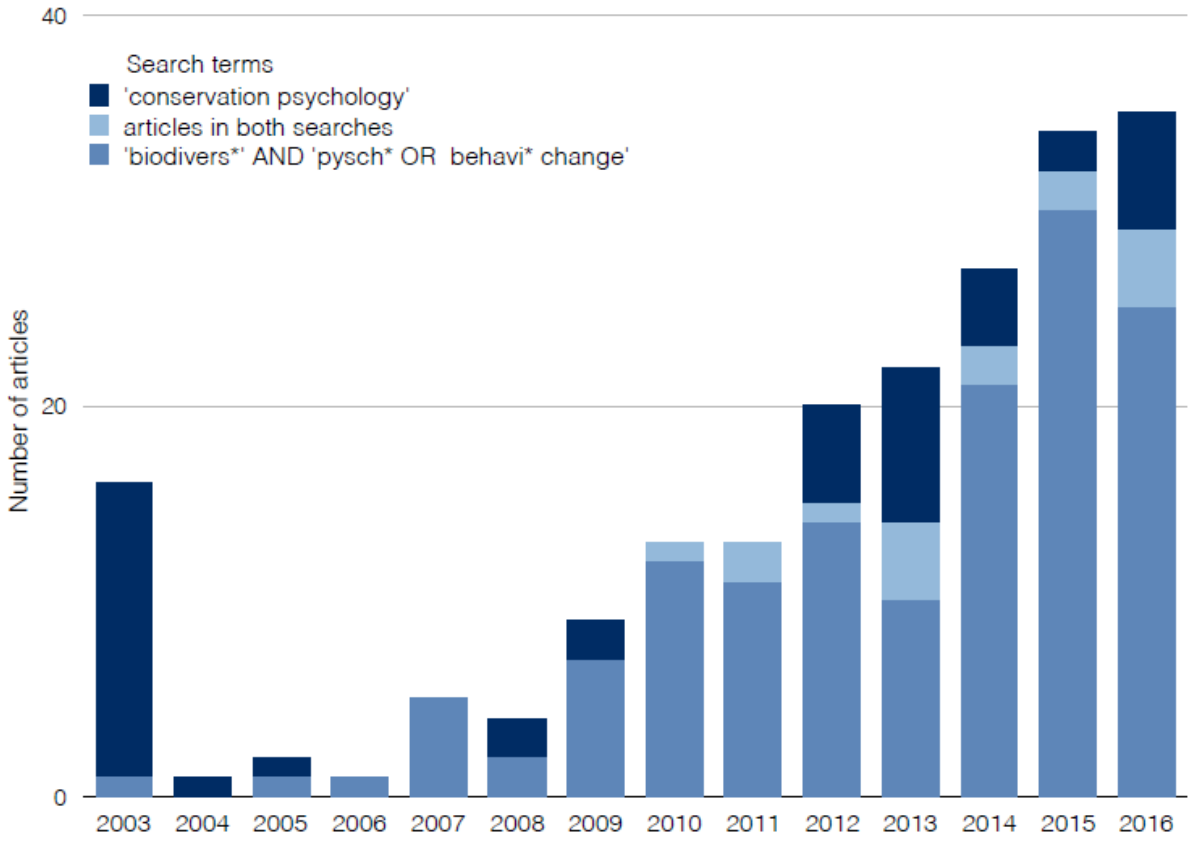


Figure 1. Number of psychology articles published per year with a biodiversity focus (n = 203).