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Social capital in the context of volunteer conservation initiatives

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Abstract

Conservation volunteering aims to benefit species and ecosystems, but whether positive collective social outcomes exist for conservation group participants is largely unknown. To examine the importance of the collective social benefits from conservation, we surveyed members of the Auckland, New Zealand public to investigate social capital: the connections among people and the collective positive benefits that are enabled. We found members of community groups, particularly conservation groups, had higher social capital than people who did not participate in community groups. Members of multiple types of community group also had increased social capital scores. Conservation group members had more positive perceptions of pest management compared with members of the public not undertaking conservation action. Our findings indicate that conservation groups and their members are associated with collective social benefits not previously identified. Linking social capital benefits with ecological benefits could increase conservation's appeal to people more strongly motivated by personal well-being and a sense of community, facilitating positive outcomes for them and the environment. To increase social capital at the community level, we recommend encouraging participation in community conservation.

KEYWORDS

community conservation, conservation group, conservation volunteering, urban conservation

1 | INTRODUCTION

Volunteer programs hold a critical place in society (Cumming, 2018). Conservation activities are supported by voluntary work globally and many programs depend on volunteers to operate (Bond et al., 2018; Department of Conservation, 2020). Activities such as tree planting, invasive species management, and environmental clean-up play a key role in ecological restoration and preservation (Asah et al., 2014; Ryan et al., 2001). Community group projects facilitate a broad approach to conservation and can be inclusive of differences in viewpoints on conservation management strategies, thereby allowing for more effective conservation outcomes and better landscape connectivity (Cumming, 2018; Luke et al., 2014; Peters et al., 2015). Understanding the contributions of volunteers and their groups can improve the longevity of programs to the benefit of people and the environment (Ryan et al., 2001; Takase et al., 2019).

The benefits for individuals are generally well documented, such as education and friendship (Lin, 2002;

Putnam, 1993; Wollebaek & Selle, 2002). Group participation correlates with well-being indicators, such as happiness, life satisfaction, and a reduction in the harmful effects of loneliness (Kawachi et al., 2004, 2013; Lay-Yee et al., 2021; Miller & Buys, 2008). For environmental volunteering specifically, participation can increase people's ecological knowledge and connection to nature (Peters et al., 2015; Shanahan et al., 2018). This can lead to better mental and physical health outcomes for participants (Fuller et al., 2007; Morrow-Howell et al., 2009; Shanahan et al., 2016).

The advantages of volunteering can extend to the broader community. Volunteering can increase social bonds, encourage participation in decision making, and offer benefits for organizations, such as an advantage over competitors in creating and sharing intellectual capital (Burt, 1992; Nahapiet & Ghoshal, 1998). In addition, neighborhoods may benefit from ecological enhancement, engagement in sustainability, and improved recovery after natural disasters, such as earthquakes (Aldrich, 2017; Ohmer et al., 2009). These social benefits are known as social capital.

The concept of social capital has become one of the most widely used terms in social science research. It has been explored across many disciplines and consequently has no unanimous definition (Adler & Kwon, 2002; Frieling, 2018). However, social capital can broadly be described as the connections among people and the collective positive outcomes this enables (Bourdieu, 1985; Coleman, 1990). Typically, social capital requires shared norms and a social network that facilitates the actions of individuals, such as interactions that increase trust, reciprocity, and participation in communities (Fukuyama, 1995; Portes, 1998; Putnam, 1993). This produces strong communities which are better prepared for natural disasters and know how to organize for change (Magis, 2010). Hence, social capital can be viewed as a collective resource, as increases in social capital can benefit all community members (Bourdieu, 1985; Portes, 1998). Alternatively, social capital may also be viewed as an individual's resource, because of the individual benefits that can be derived from participation in the group (Fukuyama, 1995; Putnam, 1995).

High social capital is already associated with a range of community groups, such as sports organizations, where it has been found to help club members develop bonds; religious groups, where youth participation has been shown to lead to greater political involvement in young adults; and the education sector, where building social capital in schools can lead to more equity and inclusivity (Darcy et al., 2014; Murray et al., 2020; Smith, 1999). Increased social capital may contribute to conservation groups' long-term success by encouraging participation (Maseyk et al., 2021) and facilitating the spread of ideas through social learning (Pretty & Smith, 2004). Moreover, connecting people through conservation can reduce the adverse effects of low social capital, such as loneliness (Lovell et al., 2015). However, whether any association exists between social capital and community conservation groups where pest management is a key activity remains underexplored (Asah et al., 2014; Maseyk et al., 2021; Russell & Stanley, 2018).

Globally, community-based conservation activities are growing in popularity (Berkes, 2021). In New Zealand, over half of residents engage in conservation annually, and pest management as a community environmental initiative is becoming increasingly common (Aley et al., 2020). New Zealand has lost a significant number of native animal species, especially birds, with the remaining species threatened primarily by mammalian predators (Innes et al., 2010; Robertson et al., 2017). This has increased residents' concern for conservation and has motivated the social shift toward community engagement (Ipsos & Department of Conservation, 2016). In 2016, the New Zealand government adopted the ambitious goal to be "Predator Free" by 2050 and eradicate key invasive vertebrate predators from the country by 2050 (Owens, 2017). The strategy focuses specifically on rats (kiore *Rattus exulans*; Norway rat *R. norvegicus*; ship rat *R. rattus*), mustelids (ferrets *Mustela furo*; stoats *M. erminea*; weasels *M. nivalis*), and the brushtail possum (*Trichosurus vulpecula*) (Department of Conservation, 2020). However, the strategy's implementation remains contested, for example, as some oppose lethal predator control (Beever et al., 2019; Courchamp et al., 2017; Crowley et al., 2017). This indicates a need to understand the social context and social outcomes of community-led pest management (Berkes, 2021; Peters et al., 2016; Russell & Stanley, 2018).

New Zealanders are restoring native species, with many implementing predator trapping in their local reserves and suburban backyards (Martinez-Almoyna & Tuinder, 2022). More than 87% of New Zealand's 4.8 million residents live in urban areas, with 1.5 million living in the largest city: Auckland (Stats, 2019). Hence, Auckland city has a large source of potential volunteers who can assist with managing urban pest populations and these people are the focus of our research. The number of community conservation groups in Auckland has increased to over 100, many formed in response to Auckland Council's "Pest Free Auckland" initiative (Predator Free New Zealand, 2020).

Social capital, in particular, can be measured by identifying the values that community members uphold (Lay-Yee et al., 2021; Onyx & Bullen, 2000). We explored the association between urban conservation community group participation (with pest management as a key activity, hereafter conservation groups) and the social capital of communities in Auckland city by measuring differences in self-identified social capital levels among

conservation group members, members of other types of community groups (e.g. sports clubs, educational groups) and people without any community group affiliations. We further aimed to identify demographic variables correlated with increased social capital.

2 | METHODS

2.1 | Participants

Potential participants were all residents of the Auckland region over 15 years old. We used a market research company to disseminate a questionnaire to the wider Auckland public (residents with an Auckland postcode). We aimed for 1000 responses to be representative of Auckland's 1.5 million residents. Maximum quotas for age and gender, based on census data of Auckland, were included to ensure the sample was demographically representative (Survey A). A random survey approach was unlikely to yield an adequate sample size of conservation participants as previous literature suggested that only 3% of the Auckland population are members of conservation groups (North-West Wildlink, 2019). Therefore, to investigate how participation in pest control affects social outcomes and ensure a sufficient sample size for conservation group participants, we also directly targeted members of conservation groups (Survey B).

2.2 | Questionnaire procedure

We developed a questionnaire that applied constructs from previous socio-environmental research (Ahn & Davis, 2020; Onyx & Bullen, 2000). These effectively measure community engagement and social capital (Ahn & Davis, 2020; Lovell et al., 2015; Onyx & Bullen, 2000). We conducted a literature search using Google Scholar and gray literature to find relevant constructs on pest management and community engagement. Key search terms were: conservation, community, community groups, environmental, invasive species, pests, social capital, survey, urban, and volunteer.

We asked participants about pest management on their property, specific involvement with any community groups (conservation, cultural, educational, hobby, sports, religious), how connected they felt to nature and their community, and demographic questions (Appendix S1). Demographic questions were taken from the New Zealand census (Stats, 2018) and helped identify any sample bias. Conservation group members were asked additional questions about their group involvement (Appendix S1), including further questions for a wider study addressing motivations and barriers to participating in pest control. A mix of open and closed questions captured both quantitative and qualitative data. The questionnaire was a single time point survey, meaning it was limited in determining the direction of the relationship between group involvement and social capital. We piloted the questionnaire on a small sample of the public ($n = 20$) to ensure the questions and terminology were clear.

The questionnaire was available for 4 weeks in August 2020, via the platform SurveyMonkey, and took an average of 22 minutes to complete. The study was approved by the University of Auckland Human Ethics Committee (May 18, 2020 for 3 years; reference number 024511).

2.3 | Questionnaire analysis

We screened the data and removed incomplete responses ($n = 39$) or non-Auckland postcodes ($n = 19$). We checked for duplicate entries and were confident that all completed responses were unique. Any spelling mistakes, abbreviations, and acronyms were converted (e.g., the common misspelling "enviroment" was corrected, and "NZ" was changed to New Zealand). We excluded responses where more than half the statements were unanswered ($n = 10$ for questions 21–23). Scores for Likert (Likert, 1932) scales (questions 21–23) and types ("factors") of social capital were taken from the original article (Onyx & Bullen, 2000, Stukas *et al.*, 2005) and could range from 1 to 4 for each statement. These factors were family and friend connections, feelings of trust and safety, neighborhood connections, participation in the local community, social agency, tolerance of diversity, and value of life. Factor analysis had already been conducted on these questions.

We classified participants by their pro-environmental behaviors; conservation group member, controls mammalian pests at home, both, or neither. A participant was coded as managing mammalian pests at home if they controlled at least one of the mammalian species being targeted by the Predator Free initiative (see Department of Conservation (2020)). We grouped mice and rats together as "rodents" due to difficulty participants may have differentiating them. Five broad ethnic types were used in the analysis based on the New Zealand census 2018 (Stats, 2018): European, Asian, Pacific Peoples, Māori, and Middle Eastern/Latin American/African (MELAA). This pooled small sample sizes of several ethnicities in the original questionnaire. Following Bassett et al. (2020), participants who self-identified as belonging to multiple ethnic groups were classified as belonging to the minority group. This avoided a mixed classification comprised dissimilar groups.

We used linear models to test whether different community group memberships (conservation, cultural,

educational, hobby, sports, and religious groups) affected social capital scores. All models included a constant intercept term. Box plots were first used to visualize the distribution of social capital scores. We tested whether engaging in pest management (managing mammalian pests at home, conservation group membership, or both) affected social capital scores by performing a two-way analysis of variance (ANOVA). We checked for all pairwise correlations among covariates (but none were removed). All data analysis was carried out in R v.4.0.3 (R Core Team, 2020) and tests of analysis assumptions, such as normality, collinearity, and variance, were made where appropriate.

Question 16 in the questionnaire was "Please write down up to 5 words that come to mind when you think about participating in pest control." We defined "social capital" words from keywords in Putnam's (1995) definition of social capital (TABLE 1 heading) and a list of synonyms (Collins, 2020). To code the social capital words each participant used in question 16, we ran a word query in NVivo v.20 (QSR International Pty Ltd, 2020). Incomplete responses were first removed ($n = 72$). We excluded words with multiple definitions where their use in the context of social capital was unclear (e.g., "good" is a synonym for "benefit" but could describe a participant's opinion on pest control). An indicative translation was found for words not in English and alternate spellings were standardized to NZ English. We then calculated the total number of social capital words used by each participant.

We used linear models with a Poisson distribution on the word query results to compare the use of social capital words (see TABLE 1) among members of community groups (conservation, cultural, educational, hobby, sports, and religious) and participants not in any group. We also used Portes' (1998, pg. 15) definition to identify any use of negative social capital words. However, the number of search returns for these words was too small to perform any statistical analysis ($n = 2$; Prejudice, Unfair).

We ran a multi-model assessment using generalized linear models to explore the association of socio-demographic variables with social capital scores of respondents (based on their responses to Survey questions 21–23). These variables were based on previous research modeling social capital (Miller & Buys, 2008; Sengupta et al., 2013) and included age, gender, ethnicity, postcode, education level, income level, and number of different types of community group memberships (i.e., 0 to 6 group types; conservation, cultural, educational, hobby, sports, religious, or none). The full model and all subsets were constructed in R and the best model was found by identifying the most parsimonious model with the lowest Akaike Information Criterion (AIC) (Burnham & Anderson, 2002).

3 | RESULTS

The questionnaire was completed by 1217 Aucklanders. Survey A (for the general public) by 1007 people (i.e., 1000 responses with a 1% error margin; 456 male, 545 female, and six gender diverse) and Survey B (for conservation group members) was completed by 210 people (113 male, 97 female). We found 415 (X ~ 40%) and 158 (Y ~ 75%) people in Surveys A and B, respectively, who managed mammalian pests at their property.

TABLE 1 Synonyms of words used to define social capital submitted by participants answering question 16: "[F]eatures of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit" (Putnam, 1995, pg. 67)[a]

Social capital word	Synonyms
Social	Civic, collective, communal, community, group, public, societal, team, pāpori (social/community)[b]
Network	Organization[c]
Trust	Assurance, belief, certainty, certitude, confidence, conviction, credence, custody, duty, expectation, faith, guard, guardianship, obligation, protection, reliance, responsibility, safekeeping, trusteeship, kaitiaki (guardian)[b], kaitiakitanga (guardianship)[b], manaakitanga (support)[b], whakawhirinaki (dependable)[b]
Coordination	Together, integrate, organize[c], synchronize[c], systemize[c]
Cooperation	Assistance, collaboration, combine, concurrence, engagement, helpfulness, participation, responsiveness, teamwork, unity, kotahitanga (unity)[b]
Mutual	Communal, joint, reciprocal, reciprocated, requited, returned, shared
Benefit	Advantage, assistance, avail, betterment, favor[c], help, merit, reward, painga (well-being/gain)[b], takuhe (benefit)[b], whaipainga (beneficial)[b]

[a]Underlined words and their synonyms were used in the analysis.
[b]te reo Māori words (and indicative translation, (*Māori Dictionary*, 2020))
[c]New Zealand English spelling.

The mean score for participants not in a community group was 2.6. Members of community groups had significantly higher scores (FIGURE 1); conservation (95% CI 0.45 to 0.68, $p < .001$), cultural (95% CI 0.31 to 0.59, $p < .001$), educational (95% CI 0.06 to 0.39, $p < .01$), hobby (95% CI 0.16 to 0.38, $p < .001$), religious (95% CI 0.19 to 0.41, $p < .001$), sport (95% CI 0.19 to 0.39, $p < .001$).

The ANOVA revealed mean social capital scores of participants with pro-environmental behaviors (conservation group membership and managing mammalian pests at home) were significantly higher than the mean score of participants with neither behavior (2.8); participants who managed mammalian pests at their property (but were not in a conservation group; 95% CI 0.07 to 0.19, $p < .001$), and conservation group members (95% CI 0.23 to 0.50, $p < .001$). Pro-environmental behaviors were positively correlated with mean scores for all social capital factors except tolerance of diversity (where mean scores were high for all groups; Figure 2). Members of a conservation group had increased mean scores for family and friends connections, neighborhood connections, participating in the local community, feelings of trust, and value of life.

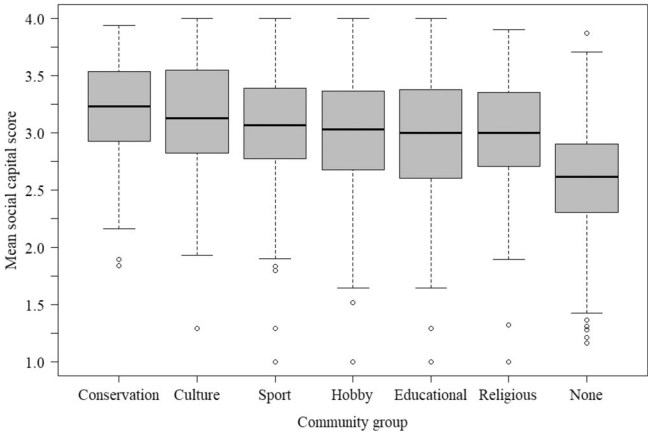

FIGURE 1 Participants' mean scores for social capital based on their self-identified community group membership from the questionnaire for Auckland residents. Scores range from 1 to 4, and a higher score indicates more social capital. Mean social capital scores (black line) for each type of community group (first six columns) were significantly higher for members than non-members. Boxplots display the median and interquartile ranges

The multi-model assessment returned 150 models and identified socio-demographic variables associated with increased social capital. One model emerged as the best (i.e., most parsimonious), as it was the only model with an AIC below the critical value (Appendix S2). Membership of multiple types of community group, age, ethnicity, income level, and education level were the variables included in the top model. There was a positive correlation between mean social capital score and age, education level, income level, and number of community group memberships, although these variables only explained 19% of the variation ($AdR^2 = 0.19$).

For the "participating in pest control" word analysis (question 16 in the questionnaire), 143 participants (11.8%) used social capital words, and the most common social capital words were "protection" ($n = 89$), "community" ($n = 64$), "helpful" ($n = 47$), and "responsibility" ($n = 29$). Conservation group members used social capital words significantly more (23.3% of participants, 95% CI 17.9 to 29.8, $p < .001$) than those not in a conservation group (9.3% of participants, 95% CI 7.6 to 11.3).

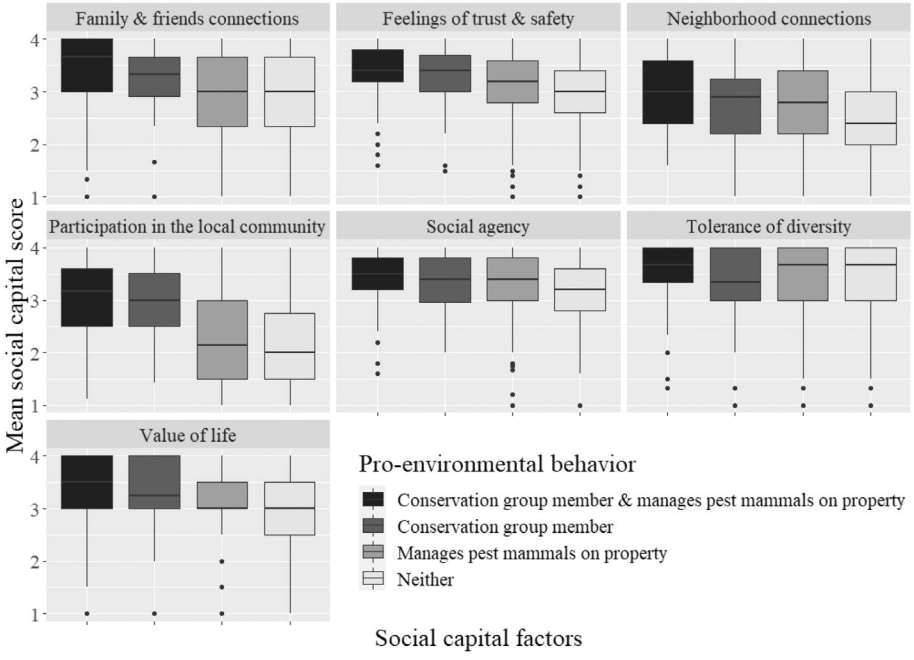

FIGURE 2 Participants' mean scores (black line) for social capital factors (from Onyx and Bullen (2000)) based on their self-identified community group membership from the questionnaire for Auckland residents. Scores range from 1 to 4, and a higher score indicates more social capital. Boxplots display the median and interquartile ranges

Conservation group members also used more positive words (e.g., "rewarding," "satisfying," "good") and more words about the outcomes of pest control (e.g., "birds," "native") compared with participants not in a conservation group (Appendix S3). Those not in a conservation group used more negative words (e.g., "annoying," "dirty") and more words to do with the process of pest control (e.g., "poison," "traps") than the outcome.

4 | DISCUSSION

Respondents who were part of any community group(s) had significantly higher mean social capital scores than non-members. This supports previous research findings that being part of a community group increases social capital (Onyx & Bullen, 2000;). However, our study is the first to investigate social capital scores of members of conservation groups, and we found these respondents to have the highest mean scores across multiple measures, compared with participants not in a conservation group. Furthermore, we found that membership of multiple types of community group was associated with significantly higher mean social capital scores, supporting the notion that social capital has no limit (Bourdieu, 1985; Evans & Syrett, 2007).

Our finding that some, but not all, social capital factors had scores that were significantly higher for conservation group members implies that social capital exists at different scales (Vemuri et al., 2011). The factors affected by group membership (family and friends connections, neighborhood connections, participating in the local community, feelings of trust, and value of life) are associated with community-level social capital (Portes, 2000). These are collective values, where a network is required to maximize the benefits (Putnam, 1993). Encouraging group participation could improve these social capital factors (Maass et al., 2016). Factor scores that were higher with pro-environmental behaviors, but were not affected by conservation group membership (social agency), are associated with individual-level social capital, and would unlikely improve by joining a group (Portes, 2000). This supports the perspective that social capital is both an individual and collective resource (Nahapiet & Ghoshal, 1998).

Although individuals who control pest mammals independently are not participating in a community group, if they believe their actions contribute to a broader shared goal, they may still get positive individual social capital benefits, such as mental well-being and feeling valued (Kawachi et al., 2004, 2013). Predator Free 2050 is a national objective, and nature is linked to New Zealand's national identity (Russell et al., 2015). People who do not actively participate in activities may still intend to be part of the Predator Free movement and feel they are contributing to the community, as individual efforts connected to community action contribute more to the growth of social capital than individual efforts independent of wider communities (Wollebaek & Selle, 2002). If people think they are "working toward the common goal," they may receive some of the social capital benefits (Coleman, 1990, pg.274). This could explain why participants who managed pests independently of a group had elevated mean social capital scores for some social capital factors compared with participants without pro-environmental behaviors.

In addition to having higher mean social capital scores, conservation group members used significantly more social capital words than either non-members or members of other types of community group. Highlighting that conservation group members used positive words (e.g., "rewarding," "good") at a higher rate could encourage people to participate in conservation groups as it shows participation is a positive experience. Furthermore, the more frequent use of negative words by participants not in a conservation group suggests that people not involved in community conservation have a more negative perception of pest control (Farnworth et al., 2014). Conservation group members have been found to view pest control more favorably than non-members (Heimann & Medvecky, 2022). Moreover, public support for controlling pest mammals has increased in recent years, but a large minority of the New Zealand public have concerns around implementation, such as the use of the poison sodium fluoroacetate (1080) (Hughey et al., 2019; Russell, 2014). Because public backing is necessary for effective pest management (Coleman, 2003; Cumming, 2018), understanding and trying to negate this perception should be part of pest management programs to improve programs' effectiveness.

The multi-model assessment was exploratory but supported previous research findings that community groups are associated with social capital (Sengupta et al., 2013; Wollebaek & Selle, 2002). Other typical predictors of social capital were excluded from our analysis, as it would be impossible for a questionnaire to include all necessary variables (Lovell et al., 2015). Individual variation, lived experience, and worldview can all influence social capital, meaning social capital as a concept is too broad to accurately predict (Hawe & Shiell, 2000; Uphoff, 2000). However, the model could be valuable in identifying demographics to target for community conservation, with the intent to increase their social capital and enhance people's general well-being (Sengupta et al., 2013; Zhu et al., 2013). This would avoid "preaching to the converted" about conservation (Scheufele, 2018).

The importance of community-led conservation for protecting biodiversity is well-known, as conservation initiatives rarely succeed without the support of local stakeholders (Martinez-Almoyna & Tuinder, 2022; Maxwell et al., 2020). More recently, it is becoming clear that the benefits also extend to people (Department of Conservation, 2021; Maseyk et al., 2021). Because of the social value that

community conservation may offer people, linking the benefits of social capital to the ecological benefits could increase participation in community conservation (MacDonald et al., 2018). This could increase conservation's appeal to people more strongly motivated by personal well-being and a sense of community, and in doing so, enhance their connection to nature (Woolley et al., 2021). As this study was a single time point survey, the data can offer information on associations, but not causality. It is plausible that the findings result from people with high social capital self-selecting into a group that shares their values, or mutual reinforcement in both directions. In future, it would be valuable to investigate the causation between community conservation and increased social capital by surveying people before and after they join conservation groups.

AUTHOR CONTRIBUTIONS

R. V. Gerolemou, J. C. Russell, and M. C. Stanley designed the study; R. V. Gerolemou collected the data; R. V. Gerolemou and J. C. Russell analyzed the data; R. V. Gerolemou wrote the manuscript; J. C. Russell and M. C. Stanley edited the manuscript. All authors reviewed the final manuscript.

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CONFLICT OF INTEREST

J. C. Russell is a scientific advisor to Zero Invasive Predators.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available at https://figshare.com/s/d400707d8bb73d0e5597.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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