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VICTORIANS VALUE NATURE

SURVEY RESULTS

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Victorians Value Nature – Survey Results

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EXECUTIVE SUMMARY

WHAT THIS REPORT DELIVERS

This report describes the results of the Victorians Value Nature (VVN) Foundation Survey of 3,090 Victorians and makes recommendations for behavioural interventions to enhance connection with nature and inspire Victorians' to act to protect their natural environment. The Survey and this report are part of an ongoing partnership between BehaviourWorks Australia (BWA) and the Victorian Department of Environment, Land, Water, and Planning (DELWP) to support the Victorians Value Nature initiative, a key goal of *Protecting Victoria's Environment – Biodiversity 2037 Plan*.

The report includes baseline measures of Victorians' environmental psychology including connection to nature; where they spend time in nature, pro-environmental behaviours, and drivers / barriers of those behaviours.

RECOMMENDATIONS

We focus the recommendations to meet the key aims of the VVN initiative as defined by DELWP: raising the public's awareness of biodiversity, facilitating opportunities for people to connect with nature and increasing opportunities for Victorians to act to protect and enhance nature.

Public awareness of biodiversity

- Fostering connection to nature, pro-environmental / pro-social values, and providing opportunities for Victorians to spend time in nature
- Targeting awareness campaigns and behaviour change interventions to younger Victorians and men

Opportunities for people to connect with nature

- Reinforce the relationship between spending time in nature and feeling connected to nature
- Address perceived barriers around lack of time or few activities for families and friends by encouraging spending time in more accessible natural environments (e.g., their own garden, neighbourhood parks)
- Encourage Victorians to spend time in natural environments with which they are less familiar

Opportunities for Victorians to act to enhance nature

- Teaching Victorians how they can volunteer, protect, or take other direct actions to enhance nature
- Informing Victorians of existing avenues for pro-environmental behaviour while they are in nature
- Persuading Victorians of the importance or effectiveness of some pro-environmental behaviours
- Leveraging the association between connection to nature and willingness to act to protect the natural environment as part of a campaign
- Leveraging existing pro-environmental behaviours such as reducing energy use and catching public transport to encourage Victorians to take up new pro-environmental behaviours, emphasising the consistency between the behaviours

Recommendations for policy campaign and interventions: a focus on gardens

Victorians' identified their own gardens as primary opportunities to spend time in nature. While there are differences in places that Victorians spend time in nature as opposed to places where they feel connected to nature, this overlaps in their own gardens. Policies and campaigns that focus on increasing connection to nature and spending time in nature could focus on gardens and strengthen Victorians identification with nature through their garden. Strengthened connection with nature may lead to later engagement in pro-environmental actions. Campaigns should be targeted separately for populations with strong and weak connection to nature.

KEY RESULTS

Environmental Psychology of Victorians

Connectedness to nature

A person's feeling of connectedness to nature (CN) is positively related to pro-environmental outcomes (Restall & Conrad, 2015). It is a multidimensional concept with five distinct dimensions: attachment, identity (self), materialism, experience, and spirituality.

Victorians have higher levels of connection when it is expressed as attachment, identity (self), experiential, and spirituality but not when nature is valued for its material benefits. Victorians have a very strong spiritual sense of connectedness to nature.

We segmented Victorians into three groups based on their connectedness to nature (CN: high, moderate, low).

- Victorians with a strong connection to nature (CN high) were more likely to be female, over the age of 60, retired, and work in the environmental sector
- Victorians with a weak connection to nature (CN low) were more likely to be male, unemployed, speak only English at home, and spent some of their childhood in Australia

Victorians' connection to nature is a central part of their environmental psychology, and is related to all other key variables including pro-environmental and pro-social values, environmental awareness, perceived health of the environment, spending time in nature, feeling connected to specific places in nature (e.g, beaches, national parks), and actions to protect nature.

Values, environmental health, and awareness

- Victorians hold strong pro-environmental and pro-social values (86%), suggesting that Victorians link natural and human flourishing as related to each other
- The majority of Victorians (56%) rate the health of the environment as good or very good
- Almost all Victorians (95%) understand the importance of a healthy environment and some of the key threats to it

Demographic patterns in Victorians' environmental psychology

Women, older Victorians, and those who spent more time in nature:

- Expressed more support for pro-environmental / pro-social values
- Felt more strongly connected to nature
- Rated the health of the Victorian natural environment as worse
- Were more aware of Victoria's environmental conditions

Time in Nature, Places in Nature and Their Meaning

60% of Victorians spend time in nature at least once a week (32% every day or every other day)

When spending time in nature, Victorians spend most time in their own garden (42%) and least time in a community garden, zoo, or wildlife park. Other places where Victorians spend time in were green spaces such as parks, courtyards, and green roofs.

Common barriers to spending time in nature were not having time to get out into nature (32%), having family, and friends who do not like to spend time in nature (32%), and having difficulties to access nature (19%). 6% of Victorians don't like spending time in nature. Parents thought it was important that their children spend time in nature

The top 3 places where Victorians felt connected to nature were national parks, beaches, and their own gardens.

Victorians engage most commonly in all forms of physical activity when spending time in nature, with 56% stating that they walked, hiked, cycled or did other physical activities in nature at least weekly.

Demographic patterns in Victorians' activities in nature

- Women, older Victorians, and those in rural residences spent more time in nature
- Men, older Victorians, Melbourne residents, and respondents who spent less time in nature were more likely to perceive barriers to spending time in nature

Pro-environmental Behaviours

Engagement in pro-environmental behaviours in the past 12 months

Across 11 pro-environmental behaviours, Victorians most frequently controlled the movement of their pets to keep them away from wildlife, reduced energy use and used public transport. Collecting information for science and volunteering time for the environment were the least frequently engaged behaviours.

The more strongly Victorians felt connected to nature, the more frequently they cleaned up litter, donated money to organisations that take care of the environment, and chose native plants for their garden. The stronger Victorians connection to nature, the more frequently they engaged in all forms of pro-environmental actions covered in the survey.

Likelihood to engage in pro-environmental behaviours over the next 12 months and barriers

Findings for the uptake of pro-environmental behaviours over the next 12 months were very similar to past behaviours, with pet owners reporting intentions to control the movement of their pets and all Victorians reporting it was likely they would reduce energy use and use public transport. Citizen science, advocating and donating money for environmental causes were the least likely pro-environmental behaviours over the next 12 months.

Key barriers to the uptake of specific pro-environmental actions included a negative attitude toward the action, lack of capability (skill, knowledge), and a lack of opportunity (resources, time, access).

From Connection to Action

To encourage Victorians to act to protect the Victorian environment beyond their current activities, it is suggested to increase connectedness and awareness, nurture pro-environmental and pro-social values, and strengthen feelings of connectedness to highly modified places (e.g., parks, gardens). A strong connection to nature is also a key determinant for volunteering time for the environment over the next 12 months.

THE VVN FOUNDATION SURVEY METHODOLOGY

The VVN Foundation Survey was developed following a targeted literature review and the insights of key stakeholders (i.e., academics and practitioners). The project team conducted workshops with a range of practitioners from allied organisations (e.g., DELWP, DHHS, Outdoors Victoria, Royal Botanical Gardens, Parks Victoria, Victorian National Parks Association, and City of Melbourne) to maximise the relevance and utility of the data.

The survey was distributed through a survey panel company. A representative sample of 3,090 Victorians completed the survey. The survey sought information on Victorian's connection with nature; their environmental values; key engagement behaviours; awareness about biodiversity; interactions with nature; and, behaviours to protect nature. Barriers to spending time in nature and barriers to pro-environmental behaviours were also identified.

INTRODUCTION

BACKGROUND

The *Protecting Victoria's Environment – Biodiversity 2037 Plan*, supported by the Victorian Government, aims to address the decline of our native plants and animals and improve our natural environment so it is healthy, valued and actively cared for. A key goal of Biodiversity 2037, which is being delivered by the Department of Environment, Land, Water and Planning, is the Victorians Value Nature (VVN) initiative. This goal includes multiple priorities including raising the public's awareness of biodiversity, facilitating opportunities for people to connect with nature and increasing opportunities for Victorians to act to protect and enhance nature.

To facilitate the development of robust policy and program interventions, the VVN team recently collaborated with BehaviourWorks Australia (BWA) on the development of a conceptual framework to describe the relationships between people connecting with nature and acting to protect biodiversity. This collaboration also sought to establish reliable baseline data on Victorians current connection with nature; understand how much time they spent in nature; identify the drivers and barriers to connecting and spending time in nature; and, measure behaviours to protect the natural environment. These goals were realised in the development of the Foundation Survey.

The conceptual framework and survey were presented to various internal and external stakeholders (e.g., Parks Victoria and the City of Melbourne) in July, along with leading academics in the field. Based on this feedback, the survey was revised (see Appendix A), and completed by 3,090 individuals from Victorian households.

An initial report was delivered to DELWP on 26 October 2018. Following comments and feedback from key stakeholders including DELWP, RMIT, Zoos Victoria, Royal Botanical Gardens Victoria, Parks Victoria, and Department of Health and Human Services, we have revised and expanded the report to provide more explicit behavioural recommendations, additional detail regarding population segmentation by connection to nature, and proportions of responses to each option for key variables (connectedness to nature, environmental values, rating of the Victorian natural environment, environmental awareness, time in nature, places in nature, barriers to spending time in nature, activities in nature, and pro-environmental behaviours). Furthermore, we investigated the relationship between key variables with connection to nature with a particular focus on act to protect and volunteering time for the environment.

The report provides baselines against which to track progress of the Biodiversity 2037 Plan, summarises key findings of the survey, and offers recommendations toward the development of behavioural interventions for enhancing connection with nature and the protection of Victoria's natural environment.

REPORT STRUCTURE

This report has the following chapter content:

Chapter 1: The Environmental Psychology of Victorians. This chapter describes Victorians psychological connection to nature, pro-environmental values, ratings of the health of the natural environment in Victoria, and measures of environmental awareness or knowledge. A population segmentation analysis on connection to nature is also presented.

Chapter 2: Time and Places in Nature. This chapter describes how frequently Victorians spent time in nature over the past 12 months, the barriers to spending time in nature, and the places in nature where Victorians spend time and feel connected.

Chapter 3: Activities in Nature. This chapter describes the activities Victorians engage in when they spend time in nature and how they are related to connectedness to nature.

Chapter 4: Acting to Protect Nature. This chapter describes Victorians pro-environmental behaviour over the past 12 months, and their intentions to engage in pro-environmental behaviour over the next 12 months. Further analysis is conducted to establish the relationships between these behavioural variables and Victorians connection to nature, environmental values, environmental awareness, and the frequency of time spent in nature.

Chapter 5: From Connection to Action. This chapter describes the relationships between Victorians intentions to engage in pro-environmental behaviours and the various measures explored in the previous chapters, such as connection to nature, environmental awareness, and time spent in nature.

All five chapters conclude with a summary of the main findings and policy recommendations. To support the reading flow, only the main findings are presented in each chapter. Supporting technical analyses concerning differences between regions or groups of interest are included in the appendices.

METHODOLOGY

QUESTIONNAIRE DEVELOPMENT

The Victorian's Valuing Nature Foundation Survey involved a two-staged approach to survey development and implementation: 1) Survey piloting / cognitive testing; and 2) Finalisation and implementation.

QUESTIONNAIRE DESIGN

The pilot questionnaire was designed in collaboration with DELWP and its stakeholders including representatives from allied organisations and academics with expertise in the field of human-environment interactions. A literature review targeting existing measures of connection to nature and environmental behaviour was conducted to inform the development of the questionnaire.

The questionnaire covered six broad topics:

1. Nature connection – a multi-dimensional scale to measure connection to nature across Identity, Attachment, Materialism, Experience, and Spirituality.
2. Environmental values – a three-dimensional scale to measure environmental concern across egoistic (concern for me), altruistic (concern for all people), and biospheric (concern for the environment).
3. Engagement behaviours – frequency of time spent in nature, frequency of visiting different types of places or engaging with nature indirectly, visitation reasons.
4. Biodiversity knowledge – rating of Victoria's biodiversity and understanding of the threats to biodiversity
5. Protection behaviours – frequency of participation in activities which protect biodiversity, likelihood and barriers of future uptake, and perceived impact of protection behaviours.

Piloting

A small pilot study was administered before the final version of the Foundations Survey was implemented. The sample for the pilot constituted a convenience sample of six Victorian male and female adult residents, with varying ages, and located in metropolitan and regional Victoria. These participants were asked to complete a 45-60 minute interview, which included completing a draft version of the questionnaire and providing targeted feedback regarding the questionnaire for comprehension, flow, and length and a range of design elements. This involved testing the introductory script, assessing participants understanding of key concepts, determining the adequacy of response formats, checking sequencing logic, and validating general question comprehension. After reviewing interview data from the pilot, the questionnaire instrument was finalised.

DATA COLLECTION

Data was collected through an online panel led by the Online Research Unit (theoru.com) during September and October, 2018. Panelists of the Online Research Unit received an email invitation. Invitations were sent to panelists who were at least 18 years of age. To ensure representation of the Victorian adult population, further sampling was required for males between 18 to 24 years of age. As the data was collected through an external provider, Monash University ethics provisions excluded the opportunity to recruit from an under-18 sample.112 respondents did not pass the quality assurance checks and were removed from the final sample.

DESCRIPTION OF PARTICIPANTS

An analysis of the demographic characteristics of the survey respondents (n = 3090) is presented in Table 1. The sample was representative of the broader Victorian population in terms of gender and age, and metro (Melbourne) versus regional (rest of Victoria) residents according to Australian Bureau of Statistics information. It was not a random sample, however, and may differ to the Victorian population on other characteristics such as education and household composition. Respondents were also located across the State of Victoria as shown by the 'heat map' in Figure 1.

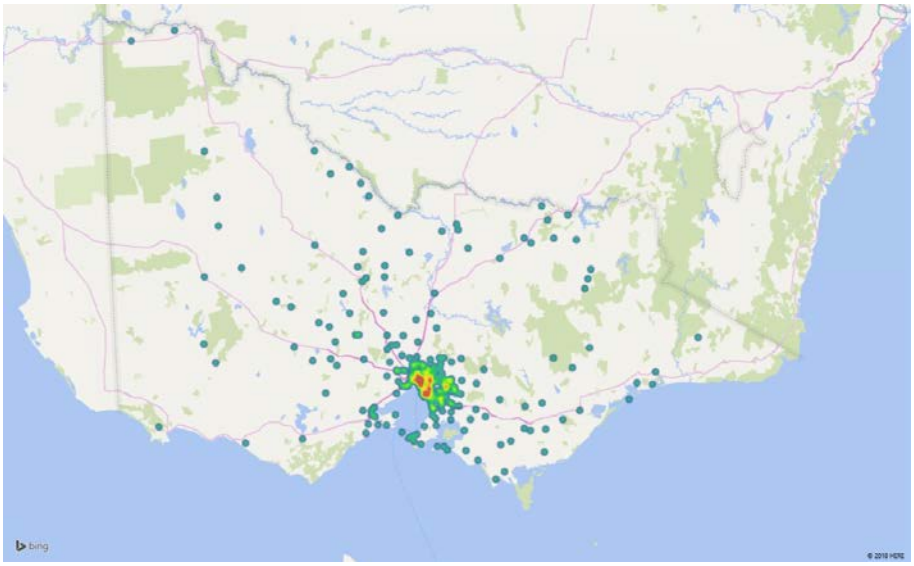


Figure 1. Heat Map of Participant Postcodes.

The majority of the respondents were employed full-time (45.4%). Most individuals resided in greater Melbourne (76.1%) and about a quarter of the respondents had children under the age of 18 years (23.4%). Most own the dwelling in which they resided in (68.3%). The majority of respondents were born in Australia (75.3%) and spent their childhoods here (79.2%). A complete description of the sample characteristics can be found in Appendix B.

Table 1. Demographic Characteristics of Household Sample (n=3090)

Variable	Response Category	% Respondents VVN	% ABS Data
Gender	Female	50.2	50.9
	Male	49.7	49.1
	Other	.1	
Age	18-29	19.3	18.4
	30-39	18.4	18.3
	40-49	17.3	17.2
	50-59	17.9	15.8
	Over 60	27.1	26.65
	Mean Age	46.97	
Region	Melbourne	76.1	75.5
	Rest of Victoria	23.9	24.5
SA4 regions	Ballarat	2.5	2.6
	Bendigo	2.1	2.5
	Geelong	5.0	4.6
	Hume	2.2	2.7
	Latrobe – Gippsland	3.5	4.4
	Melbourne – Inner	19.1	10.4
	Melbourne – Inner East	7.6	6.1
	Melbourne – Inner South	9.2	6.8
	Melbourne – North East	6.9	8.4
	Melbourne – North West	5.2	6.2
	Melbourne – Outer East	8.5	8.3
	Melbourne – South East	10.3	13.0
	Melbourne – West	9.9	12.6
	Mornington Peninsula	4.5	4.8
	North West	1.3	2.4
	Shepparton	1.0	2.1
	Warrnambool and South West	1.1	2.0
Employment status	Employed full time (30 or more hours)	45.4	
	Employed part time (less than 30 hours)	11.6	
	Employed casually	4.4	
	Self-employed	7.1	
	Student only	2.4	
	Student and working full time (30 or more hours)	0.3	
	Student and working part time (less than 30 hours per week)	2.3	
	Engaged in home duties or volunteer work	5.5	
	Retired	18.0	
	Unemployed	3.0	
Employed in environment sector	Yes	2.5	
	No	97.5	
Highest level of education	Year 10 or below	5.5	
	Year 11	4.8	
	Year 12	13.2	
	Certificate I/II	2.4	
	Certificate III/IV	8.2	
	Diploma/Advanced Diploma	13.1	
	Bachelor's degree	29.0	
	Graduate diploma/Graduate certificate	7.0	
	Postgraduate degree	16.9	
Household make-up	Household with child/children	23.4	
	Household without children	76.6	

Note. For statistical reasons (i.e., equal group sizes), only respondents identifying as male or female were included in the analysis. SA4: Statistical Area Level 4, ABS determined geographical regions with population of >100,000 persons per region.

CHAPTER 1: ENVIRONMENTAL PSYCHOLOGY OF VICTORIANS

CHAPTER INTRODUCTION

This chapter describes the current environmental psychology of Victorians. It starts with an exploration of the different terms that Victorians use to define nature and then presents results from the sections of the Foundational Survey that measure the following concepts and areas of interest:

- Connection to nature
- Support for pro-environmental and pro-social values
- Rating of the current health of the Victorian environment
- Awareness of the importance of a healthy Victorian environment and some of the key threats to it

The socio-demographic differences in these measures were assessed and a cluster analysis was performed based on levels of connection. A cluster analysis segments Victorians into different groups based on their current levels of connection to nature, with the intention of identifying key target audiences for future engagement.

This chapter concludes with a brief summary of the main findings and considers their implications.

NATURE DEFINITION

Respondents were asked to describe what came to mind when they thought of 'nature'. Verbatim responses were recorded and are presented in Figure 2 and Table 2 below, representing the most frequently mentioned words used by respondents. As seen below, respondents generally mentioned specific elements found in nature such as trees, animals, plants, and air, or they described qualities of the environment such as outdoors, green, and natural. Of interest is that words describing the experience of nature (e.g., relaxation, serenity, calm) while mentioned by participants, were not words used with greatest frequency in the sample to describe nature. Further, activities undertaken in nature (e.g., walking) were rarely used by participants in their definitions of nature.

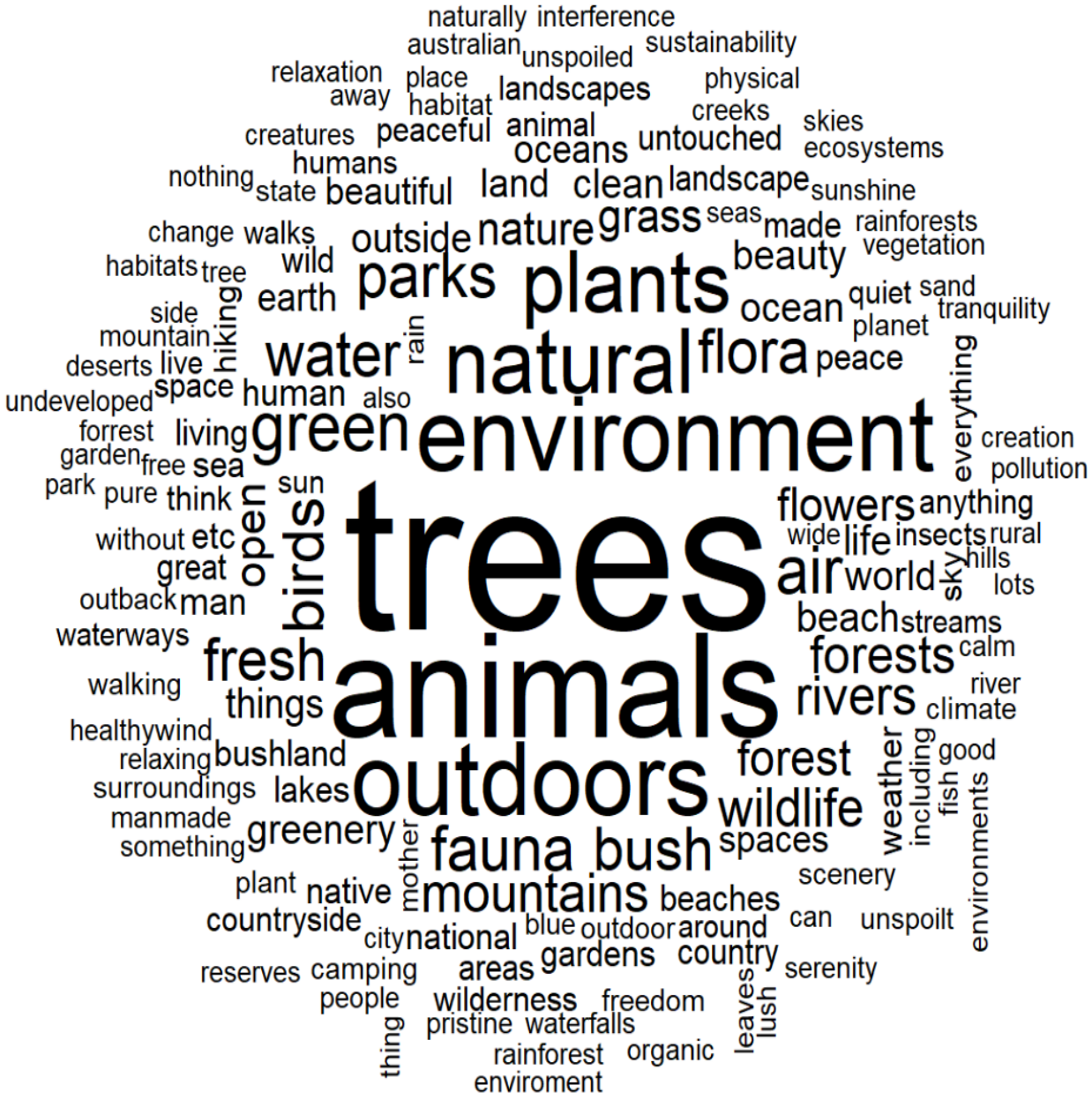


Figure 2. Nature Definition Word Cloud.

Table 2. Frequency of 30 Most Mentioned Words

#	Word	Frequency	#	Word	Frequency	#	Word	Frequency
1	trees	959	11	flora	186	21	flowers	107
2	animals	607	12	birds	186	22	grass	105
3	environment	397	13	water	180	23	open	103
4	outdoors	389	14	bush	177	24	nature	99
5	natural	331	15	fresh	175	25	things	84
6	plants	307	16	mountains	146	26	life	82
7	green	219	17	wildlife	143	27	beach	82
8	air	202	18	rivers	142	28	greenery	81
9	fauna	191	19	forests	138	29	outside	80
10	parks	188	20	forest	119	30	world	78

CONNECTEDNESS TO NATURE

Conceptualising and measuring connection with nature (CN)

Environmental psychology has focused much attention on connection with nature (CN) in recent years, with the effect of many separate yet overlapping measures and concepts (Tam, 2013). In their review of the literature, Restall and Conrad (2015) found that multi-dimensional measures showed generally better prediction of behavioural outcomes than simpler uni-dimensional tools. The two types of approaches differ in that the latter type are used to measure concepts that have only one defining characteristic (e.g., height and weight). Multi-dimensional measures, on the other hand, are used when the theoretical concept of interest has a number of characteristics that cannot be reduced to a single, overarching facet. For example, when purchasing a new car one might consider its features, performance, price and appearance among other possible dimensions. However, what makes a concept multi-dimensional is that its defining attributes are conceptually and empirically distinct from one another.

Closer inspection of the existing multi-item, survey-based measures highlights a few core differences. First, some measures are designed to measure a single concept – connection with nature (CN) – by having research participants rate their level of agreement to a number of items (or statements) that reflect the definition of the concept. The Connection-to-Nature Scale (Meyer & Frantz, 2004) is an example of this type of measure by which all of its 14 items are designed to measure the same concept.

The construct validity of multi-dimensional measures (i.e., the extent to which they measure the concept) is often demonstrated using factor analysis techniques (Jorgensen & Stedman, 2001). In a number of cases, factor analysis has indicated a lack of multi-dimensionality in CN measures despite the scales being constructed to measure different aspects of the CN concept. For example, participants' responses to Clayton's (2003) Environmental Identity Scale, designed to measure four dimensions of the concept (i.e., identity salience; self-identification; agreement with a pro-environmental ideology; and positive emotions for nature) were mostly explained by a single factor suggesting that all, or most, of the scale's 24 items measured the same concept with varying levels of success. This departure suggests that participants did not think about CN in the way hypothesised. But, as Clayton noted, the multi-dimensional factor structure may emerge in future research involving different populations to the one she sampled for her study.

The conceptualisation of the multi-dimensionality of CN has been the subject of a recent article by Ives et al. (2018). These authors provide a critique of the existing measurement literature pointing out that they discern five types of connections: material (i.e., consumption of goods and materials from nature), experiential (i.e., direct experience with nature), cognitive (i.e., environmental awareness, attitudes and values), emotional (i.e., attachment to nature and empathy for it), and philosophical (i.e., a more or less integrated set of beliefs about 'nature,' its significance and our ethical obligations toward it). These types of connections are very broad; representing many different types of consumption behaviours, experiences in nature, cognitions, emotions and philosophies. But, the environmental psychology literature offers a number of concepts that are important in understanding human-nature relationships and are consistent with the broad categories described by Ives et al. (2018). These concepts can be considered dimensions of CN and are briefly described in Table 3.

Table 3. Descriptions of Different Types of Nature Connection (based on Ives et al., 2018)

Connection	Category (Ives et al., 2018)	Description	Example References
Attachment	Emotional	Positive/ negative feelings toward nature	Perkins (2010)
Self	Cognitive	A sense of identity that is defined in relation to the natural environment	Clayton (2003); Schultz (2002)
Materialism	Material	Consumption of goods (e.g., recreational experiences, clothing, etc.) and materials (e.g., food, water, minerals, etc.) from nature	Kendal et al. (2015); Winter & Lockwood (2003)
Experiential	Experiential	Direct interaction with natural environments	Nisbet et al. (2009)
Spirituality	Philosophical	Being at one with nature through a belief that all things in nature are connected	Garfield et al. (2014)

In sum, the theoretical definition of the Connectedness to Nature (CN) concept employed by the project team followed from a literature review of current approaches and measurement protocols (Hatty, Borg, Meis & Jorgensen, 2018). A multi-dimensional conceptualisation was developed from work by Ives et al. (2018) proposing five general types of connection: Attachment, Self/Identity, Materialism, Experiential, and Spirituality.

CN Scale development

A conclusion that arises from looking at the original studies presenting the various CN scales published in the scientific literature is that most involve the administration of a reasonably large number of items to measure, in effect, a single factor (i.e., a uni-dimensional concept). The matrix algebra underpinning factor analysis models only requires information from four items to 'measure' (i.e., mathematically over-identify) a factor (Anderson & Gerbing, 1984). To this end, the measurement of CN via the Foundation Survey benefits from employing a smaller number of items that attempt to better target and communicate the multi-dimensional characteristics of the CN concept (see Appendix C for the survey questions used to measure CN).

The multi-dimensional conceptualisation was tested to understand whether it adequately reflected the way participants thought about their connections with nature. Confirmatory factor analysis was utilised for this task because it is a more powerful and comprehensive approach when validating theoretical models of the kind proposed here. The results of this analysis is presented in Appendix C.

Detail: Victorians' connection with nature by CN dimension

Figure 3 to Figure 7 displays the distribution of the five CN dimensions. The Attachment, Self/Identity, Experiential and Spirituality distributions are negatively skewed indicating a greater proportion of higher than lower scores. This is reflected in their mean scores which were 4.9 (Attachment), 4.8 (Self), 5.1 (Experiential) and 5.3 (Spirituality) on a scale ranging from 1 (strongly disagree) to 7 (strongly agree). These mean scores were significantly different between all the CN dimensions at the .001 significance level. Materialism had the lowest mean whereas Spirituality had the highest. Therefore, Victorians are more likely to express a level of connection with nature when it is expressed in spiritual terms rather than as attachment, self/identity, experience, or materialism.

This pattern of results was replicated in the medians of each distribution (i.e., the value at which 50% of CN scores lie above and below it): 5.0 (Attachment), 4.7 (Self), 5.2 (Experiential) and 5.2 (Spirituality). Based on the median scores, it can be concluded that, for these dimensions of CN, more than 50% of participants reported levels greater than the scale midpoint of 4.0.

The Materialism distribution, on the other hand, is more "bell-shaped" indicating similar proportions of scores above and below the mean of four. In fact, 11.6% of participants reported the median score of four while the remainder either endorsed a materialist connection to nature to some extent (46.4%) or were inclined to reject it (42.0%). Therefore, more Victorians are likely to have higher than lower levels of connection with nature when it is expressed as attachment, identity (self), experience, and spirituality, but not when nature is valued for its material benefits.

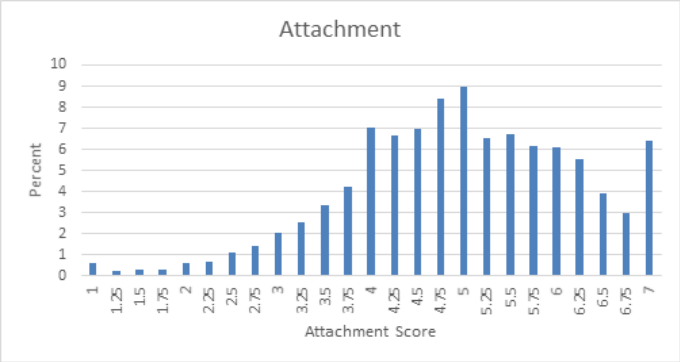


Figure 3. Distribution of Attachment Scores

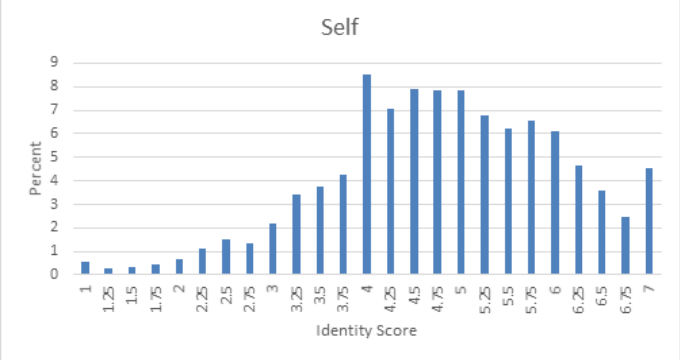


Figure 4. Distribution of Self/Identity Scores

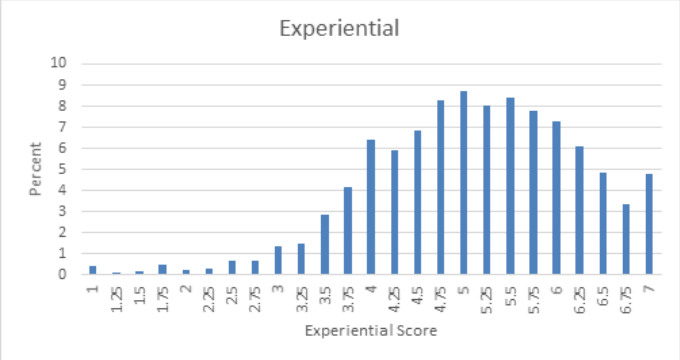


Figure 5. Distribution of Experiential Scores.

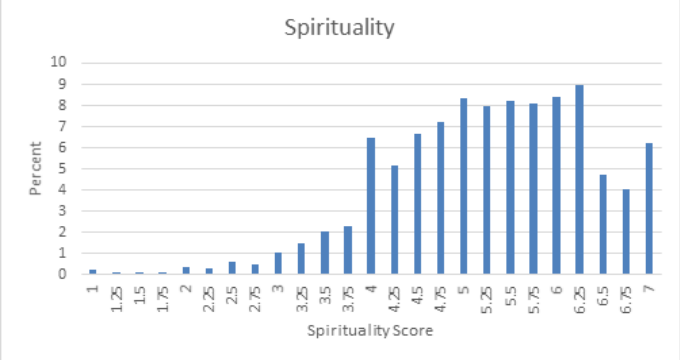


Figure 6. Distribution of Spirituality Scores.

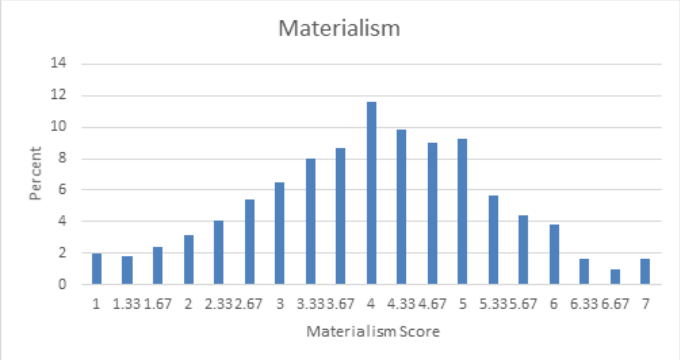


Figure 7. Distribution of Materialism Scores.

Associations between CN dimensions

Some of the CN dimensions showed strong inter-relationships (see Table 4). Specifically, the Attachment, Self, Experiential and Spirituality scales had correlations ranging from .70 (Spirituality and Experiential) to .90 (Self and Attachment) and .80 (Attachment and Experiential) which were all significantly different to one. The correlations between Materialism and the other dimensions were low, ranging between -.04 (Materialism and Experiential) and -.35 (Materialism and Self). These generally low levels of association suggest that this type of connection is very different to the others and contrary to these non-material types of connections given the negative correlations observed. The main conclusion following from this analysis is that the dimensions are neither identical nor interchangeable, even those that shared high correlations, but Attachment, Self, Experiential and Spirituality represent a cluster of connections that share a great deal in common.

Table 4. Correlation Table of CN dimensions (Based on Scale Scores)

	1	2	3	4	5	6
1. CN Total	—					
2. CN Attachment	.90**	—				
3. CN Identity	.88**	.79**	—			
4. CN Materialism	-.35**	-.07**	-.11**	—		
5. CN Experiential	.82**	.80**	.70**	-0.00	—	
6. CN Spiritual	.80**	.72**	.70**	-.04*	.60**	—

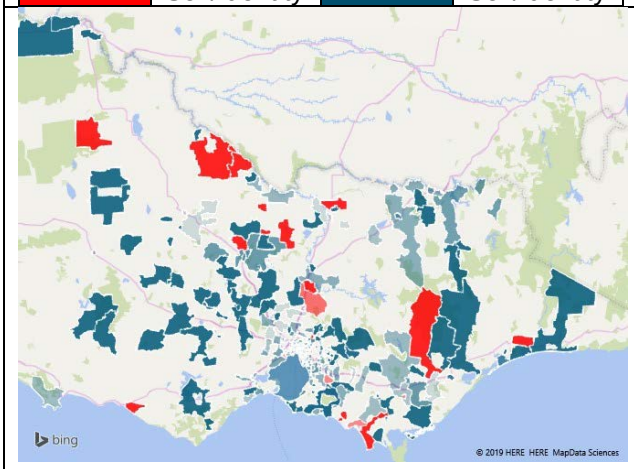
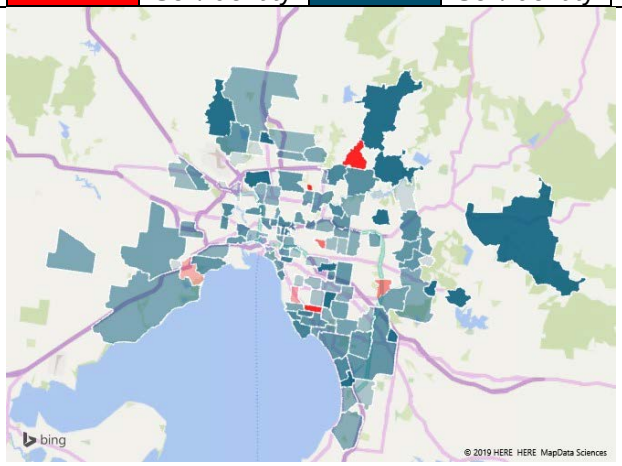
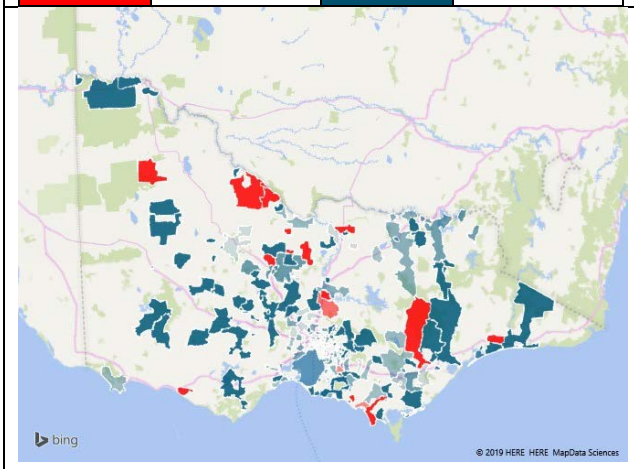
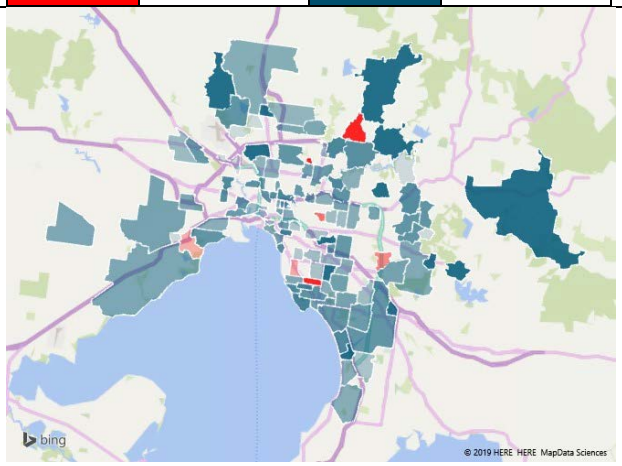
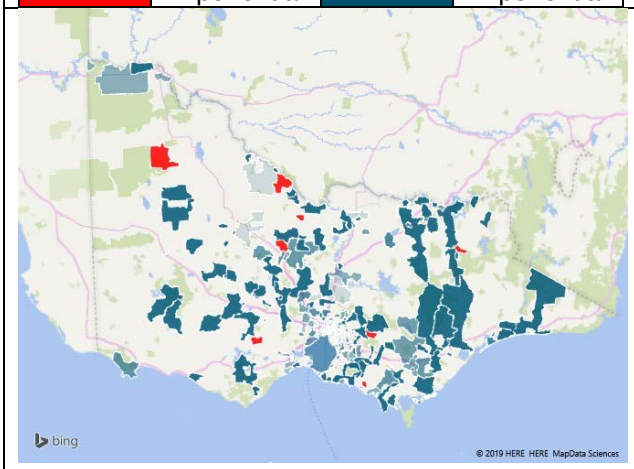
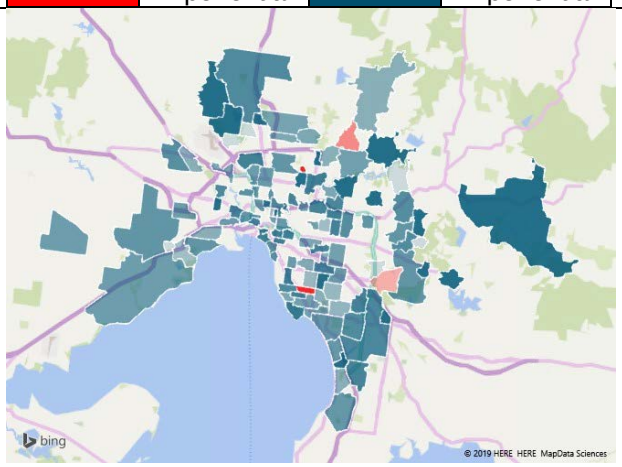
Note: ** $p < .01$

Spatial distribution of CN dimensions: regional Victoria and Melbourne

Figure 8 shows the spatial distribution of the CN dimensions for both Victoria as a whole and for the Melbourne metropolitan area. These maps were produced from data in which the postcode is the unit of analysis (rather than the individual). High scores on the dimensions (i.e., greater than the scale midpoint of 4) and low scores (i.e., lower than the scale midpoint) were expressed as a proportion of the total number of observations for each postcode. Darker (lighter) shaded blue corresponds with a higher (lower) percentage of high CN scores in the postcode area. The same darker/lighter interpretation applies to the red regions which refer to the percentage of low CN scores in each postcode. However, caution should be exercised when drawing conclusions based on differences in the shaded areas on the map as postcodes with small numbers of observations may not be representative of the postcode region they are drawn from.

Consideration of the statewide maps reveals that relatively few of the postcode regions could be classified as low CN when Self, Attachment, Experiential and Spirituality were mapped. Moreover, the maps for these dimensions of CN are quite similar, and virtually identical in the case of Self and Attachment. The map of Materialism shows that most postcodes can be regarded as having low levels of this dimension, which, as noted earlier, has a small, negative relationship to the other non-material dimensions. In this sense, low materialism corresponds to the rejection that nature's primary worth is as a source of natural resources. These results are consistent with the CN distributions examined earlier which also showed that greater than fewer proportions of Victorians reported higher levels of CN.

The spatial distributions of the CN dimensions rendered at the scale of the Melbourne metropolitan area support the conclusions drawn from the regional maps. That is, the greater proportion of Victorian postcodes areas can be characterised by residents with higher levels of CN when the non-material dimensions of CN (i.e., Self, Attachment, Experiential and Spirituality are concerned). The map of Materialism values shows a preponderance of low CN levels which, as noted earlier, is consistent with a pro-environmental outlook.

CN Distribution Victoria	CN Distribution Melbourne
% Low Self/Identity % High Self/Identity	% Low Self/Identity % High Self/Identity
	
% Low Attachment % High Attachment	% Low Attachment % High Attachment
	
% Low Experiential % High Experiential	% Low Experiential % High Experiential
	

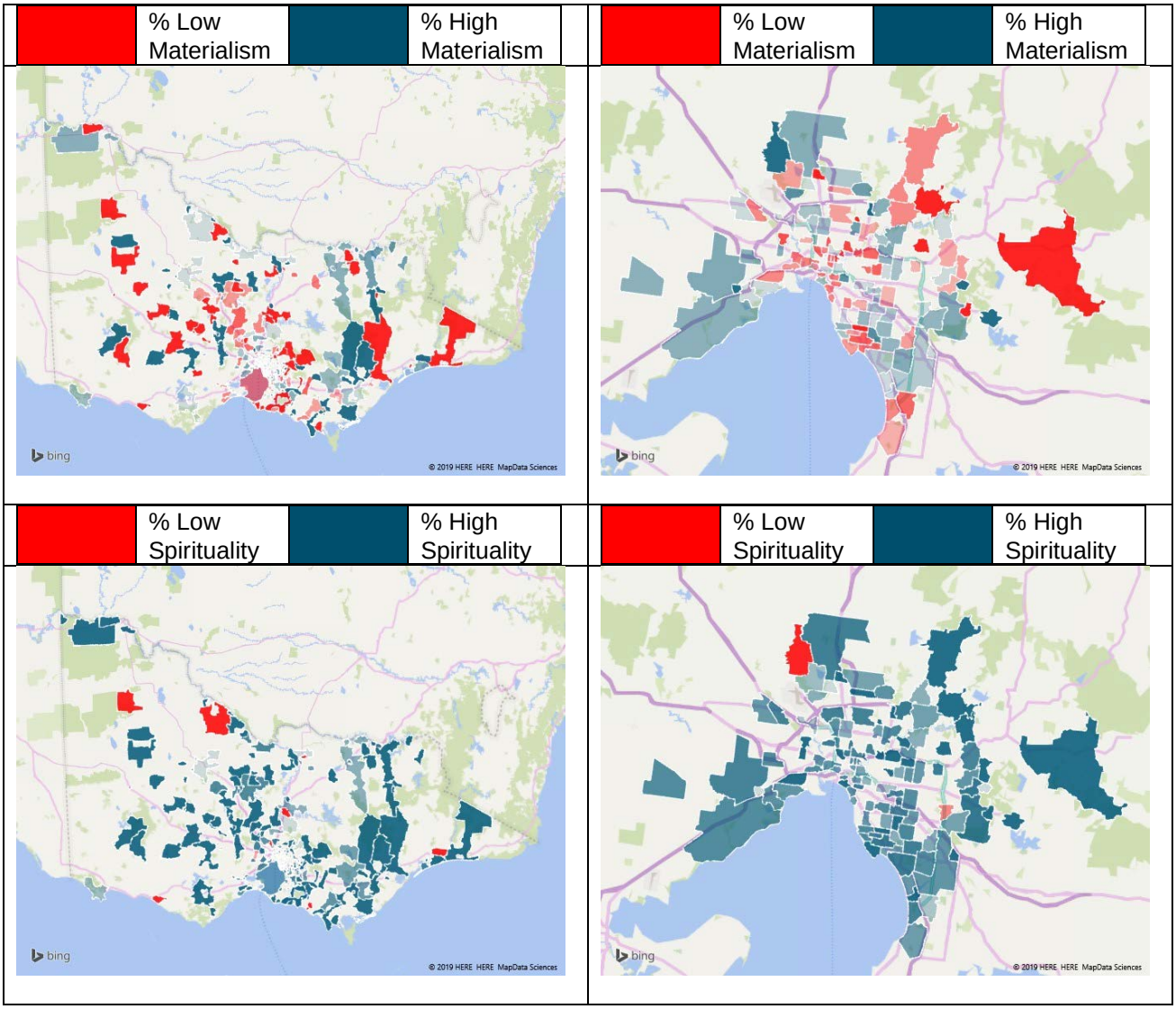


Figure 8. Spatial Distribution of the CN Dimensions for both Victoria as a Whole and for the Melbourne Metropolitan Area

Differences in CN dimensions between groups

All reported differences between groups are significant at p <.01.

Gender

Connectedness to nature differed between men and women with women having higher scores on the total nature connection scale compared to men. Specifically, women reported higher scores of connectedness to nature on four out of the five subscales. Men showed more support for material connection with nature.

Age

Nature connectedness differed between age groups with older Victorians feeling a stronger sense of connection with nature compared to younger Victorians (CN total). Differences between younger and older Victorians were also significant for Self, Attachment, and Spirituality with older Victorians having higher mean connection scores.

Region

Connectedness to nature did not differ on any scale (total or dimension subscales) between rural and urban residents. More detailed analysis of the SA4 regions also revealed total no difference between regions.

Frequency of time spent in nature

We found that the more frequently Victorians spent time in nature, the more likely they were to report a stronger sense of nature connectedness (all dimensions). However, these associations do not imply causality. It is possible that spending time in nature leads to stronger connectedness or vice versa.

Calculation of CN total

A total CN score was computed by adding those CN dimensions with strong inter-relationships (i.e., Attachment, Self, Experiential and Spirituality) and subtracting the scores for Materialism (i.e., CN Total = Attachment + Self + Experiential + Spirituality – Materialism).

To gather information about the strength of Victorians overall connectedness with nature, the CN total score was transformed to map on to the original scale of 1-7. Table 5 shows the general distribution of CN total scores and Figure 9 shows a graphic representation of those scores. Overall, 64,36% of Victorians felt connected or very connected to nature, having a CN total score equivalent to 5, 6, or 7 on a 7-point score. Figure 10 shows the CN total average scores for Victoria and Melbourne.

Table 5. Numeric Distribution of CN Total Score.

Row score labels equivalent to	Proportion	Frequency
Score 1 – *Strongly disagree*	0.06%	2
Score 2	0.83%	26
Score 3	6.39%	178
Score 4 – *Neither agree nor disagree*	28.37%	887
Score 5	40.77%	1271
Score 6	20.98%	644
Score 7 – *Strongly agree*	2.60%	82
Grand Total	100.00%	3090

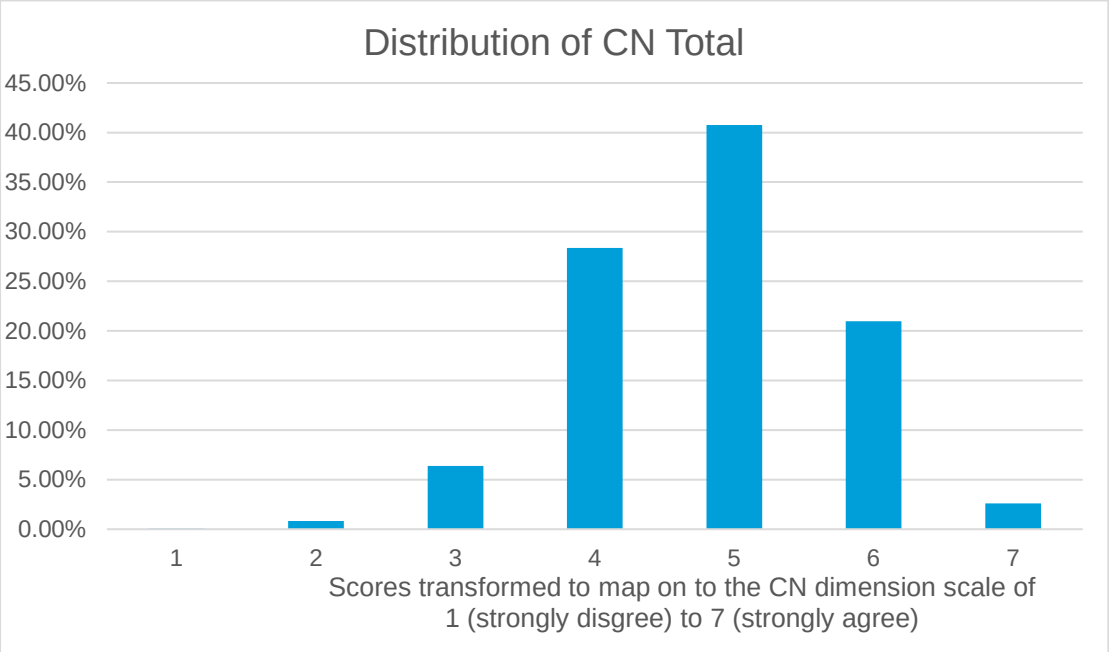


Figure 9. Distribution of CN Total Score.

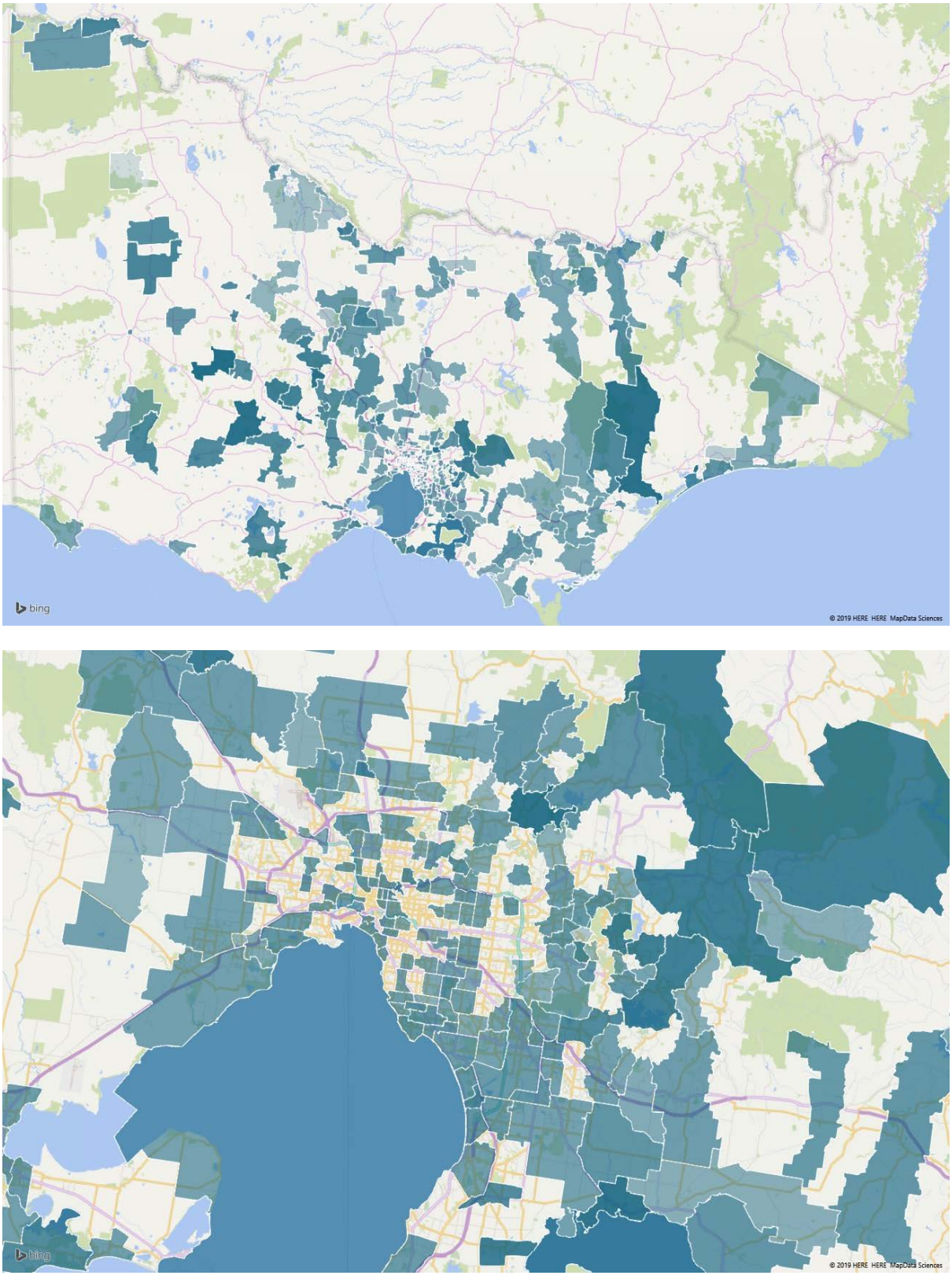


Figure 10. Mapping of CN total (average) for Victoria (upper map) and Melbourne (lower map). Darker shades of blue represent areas of stronger overall connection to nature. For more detailed information see next chapter.

POPULATION SEGMENTATION ON CONNECTION TO NATURE

Segmentation is a statistical procedure by which a population of individuals can be grouped on the basis of a number of variables. By understanding how clusters of individuals are the same or different on some characteristics of interest (e.g., the CN dimensions), behaviour change and communication strategies can be developed that reflect the diversity within the population. In this way, interventions can be developed and tailored with the intended target audience in mind (Forthofer & Bryant, 2000).

The five CN variables measured in the survey (i.e., Attachment, Self, Materialism, Experiential, and Spirituality) were combined to develop a typology of the Victorian population using the Two-step clustering approach of Chiu, Fang, Chen, Wang, and Jeris (2001). The analysis sought to create groups (or clusters) of participants that had similar profiles on connectedness-to-nature so that members of the same group were more similar to each other (in terms of the CN variables of interest) than to those in other groups. (See Appendix E for the details of the procedure.)

The analysis created three clusters comprising the following numbers of participants: Cluster 1: 1035 (33.5%); Cluster 2: 1170 (37.9%); and, Cluster 3: 885 (28.6%). The results of the analysis are summarised in Table 6 which shows the input variables that were most important in creating the groups appearing toward the top of the table. The most important variables have an importance score equal to 1.0 while the least important variables have a score of zero. The key variables in the analysis were Attachment, Experiential, Self, and Spirituality with importance scores of 1.0. The fifth dimension, Materialism, made a relatively moderate contribution to the formation of the groups with an importance coefficient equal to 0.6.

Also shown in Table 6 are the means of the distributions of each CN dimenstion for each cluster. Statistical testing (i.e., analysis-of-variance (ANOVA) with Bonferroni adjusted post-hoc tests) indicated that the means of all the CN variables were statistically different between clusters ($p < .001$). The means of Attachment, Experiential, Self, and Spirituality were highest in Cluster 1, lowest in Cluster 3 and intermediate in Cluster 2. Therefore, the groups were labeled “Higher CN,” “Lower CN” and “Moderate CN” respectively. The Materialism means showed a different pattern across the groups compared to the other CN variables. Materialism was higher in the Moderate CN cluster and lowest in the Higher CN group indicating that this type of instrumental connection operates somewhat independently of the other more symbolic, value-expressive dimensions of CN.

Table 6. Cluster Description

	Input (Predictor) Importance		
	1.0 — 0.8 — 0.6 — 0.4 — 0.2 — 0.0		
Cluster	1	2	3
Label	High CN	Moderate CN	Low CN
Descripttion	Higher Attachment, Experiential, Self, and Spirituality and lower Materialism	Moderate Attachment, Experiential, Self, and Spirituality and higher Materialism	Lower Attachment, Experiential, Self, and Spirituality and moderate Materialism.
Size (%)	1035 (33.5%)	1170 (37.9%)	885 (28,6%)
Inputs (mean)	Attachment (6.18)	Attachment (4.92)	Attachment (3.54)
	Experiential (6.10)	Experiential (5.11)	Experiential (3.88)
	Self (6.02)	Self (4.74)	Self (3.50)
	Spiritual (6.24)	Spiritual (5.25)	Spiritual (4.11)
	Materialism (3.74)	Materialism (4.25)	Materialism (4.03)

Describing the Different Connection-to-Nature Segments

Demographic Profile

Statistical tests (i.e., chi-square and analysis-of-variance) were conducted to examine the relationships between the three CN clusters and a number of demographic variables. The results showed that, compared with the low and moderate CN groups, participants in the High CN cluster were *more likely* to be female, aged over 60 years, retired, and employed in the environmental sector, but *less likely* to be aged under 30 years, employed full-time, or a student working part-time (see Table 7). Furthermore, compared with just the low CN cluster, high CN participants were more likely to be self-employed but less likely to be in the 30-39 age bracket, working part-time or have a bachelors degree.

Participants reporting low levels of CN were *more likley* to be male, unemployed, born in Australia, speak only English at home, and have spent some of their childhood years in Australia compared with participants in the high and moderate clusters.

The moderate CN cluster members were less likely to have a low level of education (i.e., Year 10 or less) compared with the other two clusters, and also less likely to either hold a diploma or have a disability relative to those participants in the high CN group.

In sum, the main demographic differences between Victorians reporting lower levels of CN and those reporting high levels is their gender (male), age (younger), employment status (full-time work), country of birth (Australia) and the language spoken at home (English).

Figure 11 maps the different clusters across Victoria and Melbourne.

Table 7. Demographic Profile of the CN Clusters (n=3090)

Variable (test statistic)	Response Category	High CN (*n* = 1035)	Moderate CN (*n* = 1170)	Low CN (*n* = 885)
Gender ($\chi^2(df)$ = 39.05(2) p <.001)	Female	56.7%[a]	50.5%[b]	42.4%[c]
	Male	43.3%	49.5%	57.6%
Age ($\chi^2(df)$ = 38.52(8) p <.001)	18-29	14.7%[a]	21.3%[b]	21.9%[b]
	30-39	16.8%[a]	17.8%[ab]	21.0%[b]
	40-49	18.0%[a]	16.5%[a]	17.7%[a]
	50-59	18.8%[a]	18.5%[a]	16.0%[a]
	Over 60	31.7%[a]	26.0%[b]	23.3%[b]
($F(df)$ = 17.93(2,3087) p <.001)	Mean Age	7.45 (45-54yrs)[a]	6.88 (40-49yrs)[b]	6.59 (40-49yrs)[b]
Region ($\chi^2(df)$ = 1.75(2) p >.05)	Melbourne	74.8%[a]	77.2%[a]	76.3% [a]
	Rest of Victoria	25.2%	22.8%	23.7%
Employment status ($\chi^2(df)$ = 48.20(18) p <.000)	Employed full time (30 or more hours)	39.2%[a]	48.3%[b]	48.9[b]
	Employed part time (less than 30 hours)	13.3%[a]	11.7%[ab]	9.4%[b]
	Employed casually	5.2%[a]	3.7%[a]	4.4%[a]
	Self-employed	8.6%[a]	6.4%[ab]	6.2%[b]
	Student only	2.3%[a]	2.3%[a]	2.5%[a]
	Student and working full time (30 or more hours)	0.5%[a]	0.2%[a]	0.3%[a]

	Student and working part time (less than 30 hours per week)	1.4%[a]	2.8%[b]	2.6%[b]
	Engaged in home duties or volunteer work	6.1%[a]	5.0%[a]	5.5%[a]
	Retired	20.8%[a]	17.1%[b]	16.0%[b]
	Unemployed	2.6%[a]	2.5%[a]	4.1%[b]
Employed in environment sector ($\chi^2(df) = 15.49(2)$ $p < .001$)	Yes	4.0%[a]	2.1%[b]	1.2%[b]
	No	96.0%	97.9%	98.8%
Highest level of education ($\chi^2(df) = 36.69(16)$ $p < .001$)	Year 10 or below	6.0%[a]	3.8%[b]	7.1%[a]
	Year 11	4.3%[a]	4.4%[a]	5.6%[a]
	Year 12	12.0%[a]	13.6%[a]	14.2%[a]
	Certificate I/II	2.9%[a]	2.3%[a]	1.9%[a]
	Certificate III/IV	7.6%[a]	9.2%[a]	7.3%[a]
	Diploma/Advanced Diploma	15.7%[a]	11.4%[b]	12.3%[ab]
	Bachelor's degree	26.1%[a]	30.1%[ab]	31.1%[b]
	Graduate diploma/Graduate certificate	7.6%[a]	7.4%[a]	5.8%[a]
	Postgraduate degree	17.8%[a]	17.9%[a]	14.6%[a]
Disability ($\chi^2(df) = 9.05(2)$ $p < .05$)	Yes	11.7%[a]	7.9%[b]	9.5%[ab]
	No	88.3%	92.1%	90.5%
Language spoken at home ($\chi^2(df) = 18.97(2)$ $p < .001$)	English only	86.8%[a]	87.0%[a]	92.5%[b]
	Other	13.2%	13.0%	7.5%
Country of birth ($\chi^2(df) = 18.86(2)$ $p < .001$)	Australia	73.5%[a]	75.5%[a]	81.7%[b]
	Other	26.5%	24.5%	18.3%
Childhood spent in Australia ($\chi^2(df) = 7.23(2)$ $p < .05$)	Yes	78.0%[a]	77.9%[a]	82.3%[b]
	No	22.0%	22.1%	17.7%
Household make-up ($\chi^2(df) = 0.08(2)$ $p > .05$)	Household with child/children	23.7%[a]	23.2%[a]	23.4%[a]
	Household without children	76.3%	76.8%	76.6%

Note: Percentages having the same superscript are not significantly different from each other at the .05 level.

Geographic profile

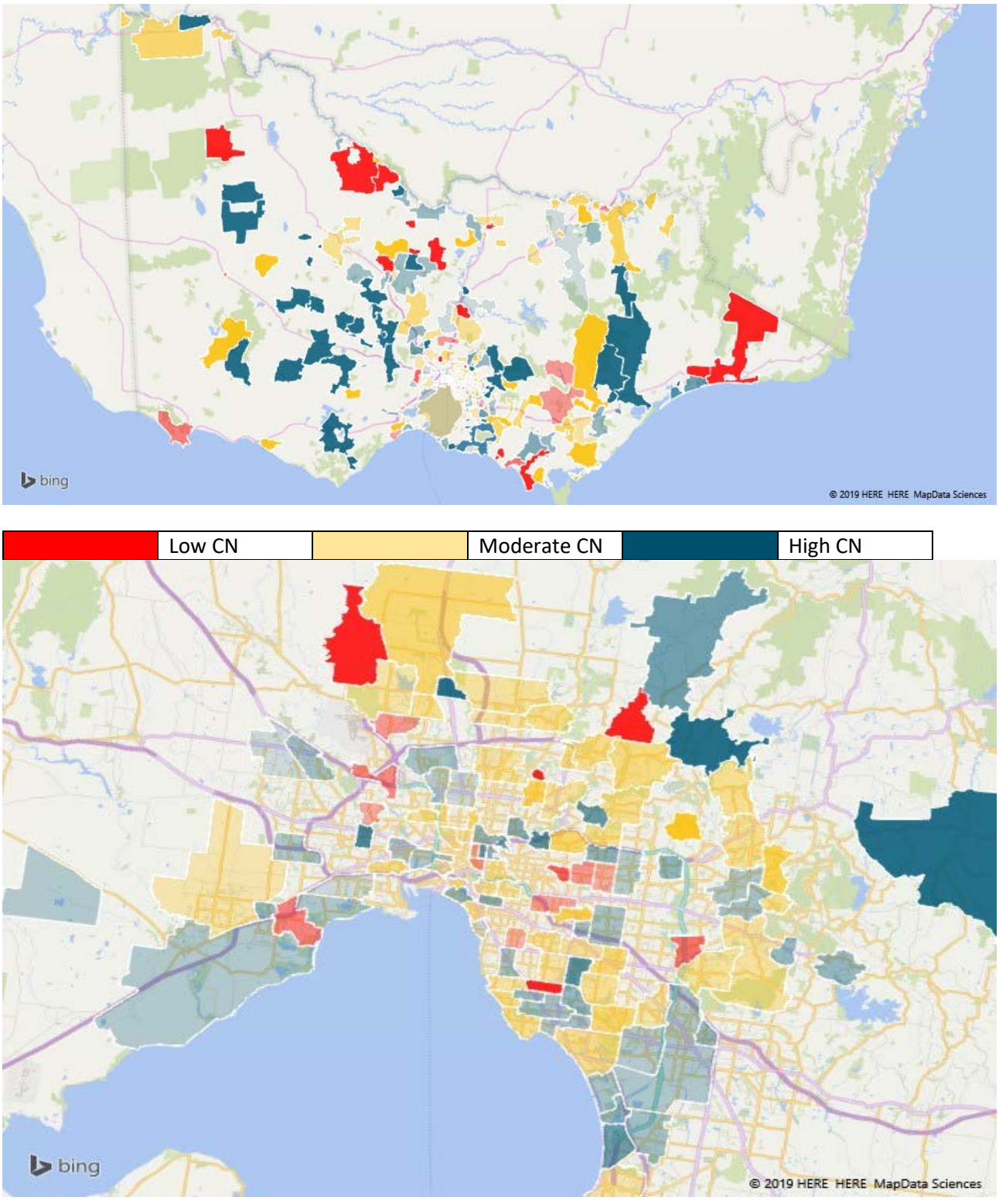


Figure 11. Mapping of the Different Groups of Connection to Nature for Victoria (upper map) and Melbourne (lower map).

Values Profile

Statistitical tests (ANOVA) were conducted to identify differences in the pattern of means of pro-environmental/pro-social (biospheric/altruistic) and self-interested (egoistic) values (please see page 34 for more detailed information on values). The results indicated that the mean of the pro-environmental/pro-social orientation was highest for the high CN group, moderate for the moderate group, and lowest for the low CN group, and that the means differed between all three groups (Welch(*df*) = 769.97(2,1886.97) $p < .001$). In other words, the means of the value orientation were aligned to the level of CN reflected in the definition of the cluster groups with stronger pro-environmental and pro-social values in the high CN group (see Figure 12).

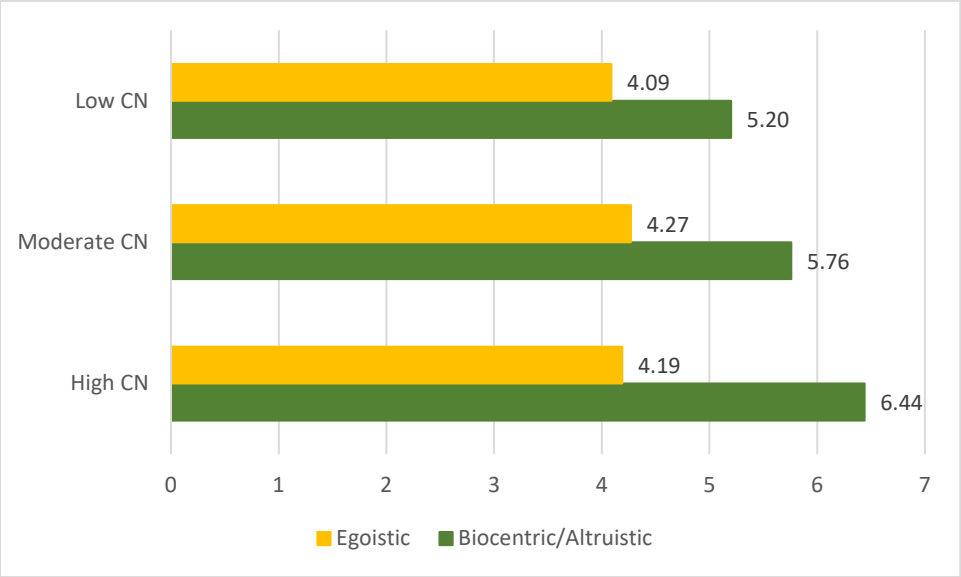


Figure 12. Means of the Value Orientations by CN Group.

For the self-interested (egoistic) value orientation, the pattern of mean differences was quite different to the pro-environmental/pro-social orientation. The only significant relationship was the statistically higher mean in the moderate CN group compared with the low CN group (Welch(*df*) = 10.31(2,1976.75) $p < .001$). That is, values such as authority, power and control were endorsed to a greater extent among the moderate CN group and to a lesser degree in the low CN group. (See Appendix E for further analyses.)

Engagment Profile: Spending time in nature

The relationship between cluster membership and time spent in nature was assessed by comparing the group means for participants' scores for their self-reported frequency of time spent in nature (EB1); places in nature where Victorians spent time (EB2); places of connection (EC1); and willingness and unwillingness to spending time in nature (TIN). Please refer to Chapter 2 for more detailed information about those variables.

Time spent in nature: Frequency, willingness and unwillingness

The pattern of means for the frequency of time spent in nature were consistent with high/moderate/low CN cluster membership (see Figure 13; see page 40 onwards for further information about this variable). That is, high CN participants spent time in nature with greater frequency than did moderate CN partipants who spent more time in nature than low CN participants (Welch(*df*) = 205.14(2,1958.09) $p < .001$). The pattern of means described above was again observed in the ANOVA analysis of the cluster means on participants' willingness (i.e., their positive evaluations of spending time in nature) with higher/moderate/lower average desires to spend time in nature aligned with high/moderate/low CN cluster membership (Welch(*df*) = 928.19(2,1933.08) $p < .001$). The pattern was reversed when participants' perceptions of the barriers to spending time in nature (i.e., their unwillingness) was concerned as higher/lower scores on this variable corresponded with a greater/lesser likelihood of reporting behavioural impediments (Welch(*df*) = 118.27(2,2006.66) $p < .001$). See page 40 onwards for further information about this variable.

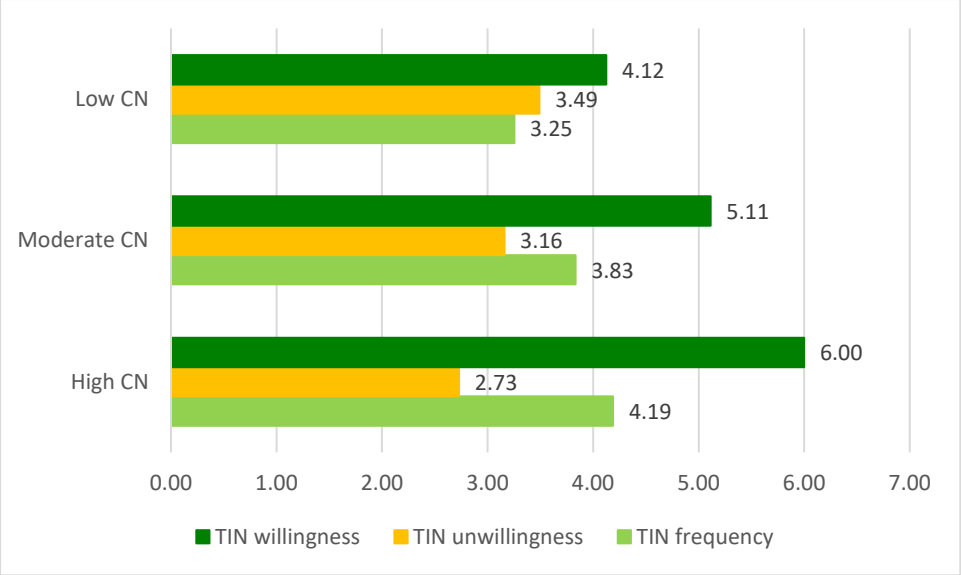


Figure 13. Spending Time in Nature by CN Group.

Environments where Victorians feel connected

The pattern of alignment between the levels of CN and engagement variables described above was replicated for participants' reported connection to highly modified (Welch(*df*) = 269.44(2,1941.48) $p < .001$) and weakly modified places (Welch(*df*) = 514.38(2,1841,89) $p < .001$) (see Figure 14). Of note is that the mean scores were higher for locations that might be described as 'unmodified' (e.g., national parks, native bushland reserve, beaches) compared with other environments that have had an obvious human influence (e.g., home gardens, green urban spaces, zoos). See page 45 onwards for further information about places of connection.

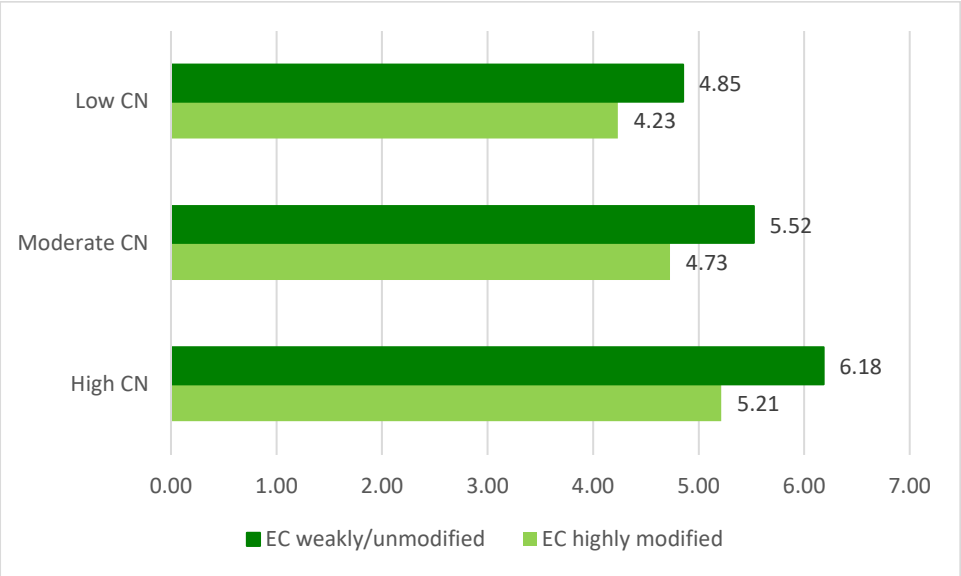


Figure 14. Places of Connection by CN Group.

In Appendix E, we provide the distribution for each of the ten places by CN group. This analysis reports the proportions of participants in the low, moderate and high CN groups reporting connection to the various places in nature.

Places where Victorians spend time in nature

Survey respondents were asked to identify the frequency with which they spent time in different environments when engaging with nature (i.e., Section EB2 of the questionnaire; see also page 43 onwards for further details). The pattern of means for the frequency of time spent in nature and the various locations were consistent with high/moderate/low CN cluster membership (see Figure 15). That is, high CN participants spent time in nature with greater frequency than did moderate CN partipants who spent more time in nature than low CN participants. Using Welch tests and (Bonferroni adjusted) post-hoc comparisons, this pattern of mean responses was observed for every location shown in Figure 15.

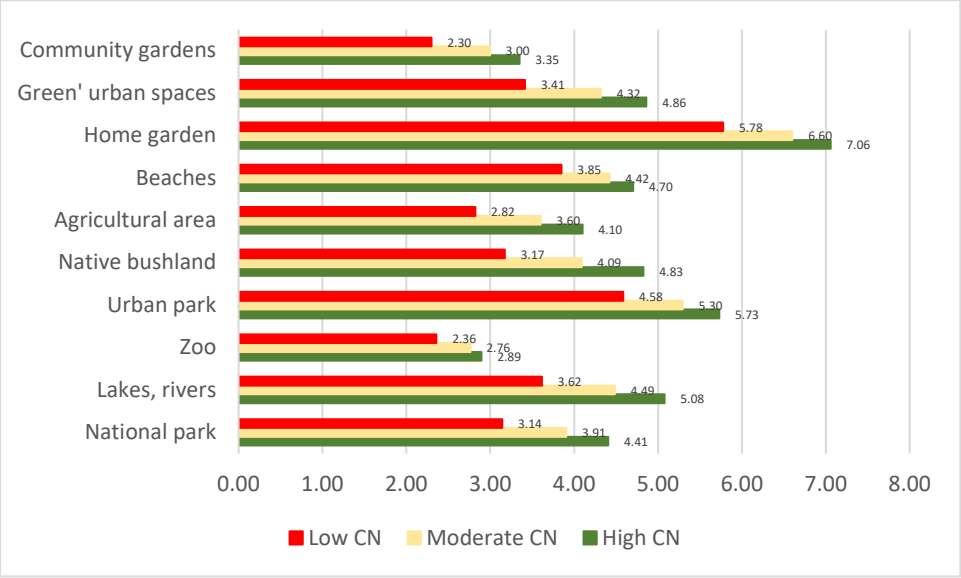


Figure 15. Means of the Places where Victorians Spend Time in Nature by CN Group.

In Appendix E, we provide the frequency (percentage) distributions for each of the ten places by CN group.

Activities Victorians undertake when spending time in nature

Survey participants were asked what they do when spending time in nature (Section EB3 in the Foundation Survey questionnaire; see also page 50 onwards for further details.). Activities included passive behaviours, restorative behaviours, social activities, and active, physical activities. Also included were non-leisure activities such as accompanying children and simply passing through nature places as a means of moving from one point to another. Frequency ratings of these activites were scored on a scale ranging from 'never' (1) to 'every day' (8).

An analysis of the mean frequency ratings participants provided in the survey (using Welch tests and Bonferroni adjusted post-hoc comparisons) that, in most instances, the behaviours were undertaken with greatest frequency by the high CN group, followed by the moderate CN group, and then the low CN group (see Figure 16). Departures from this general pattern of results was observed for accompanying children, engaging in motorised leisure, picnicing, and walking the dog. In each of these cases, the high and moderate CN group were not significantly different in their frequency of activity, but both of these groups reported higher levels of behaviour than the low CN group. These results are broadly consistent with earlier results indicating that low CN individuals are less likely to spend time in nature.

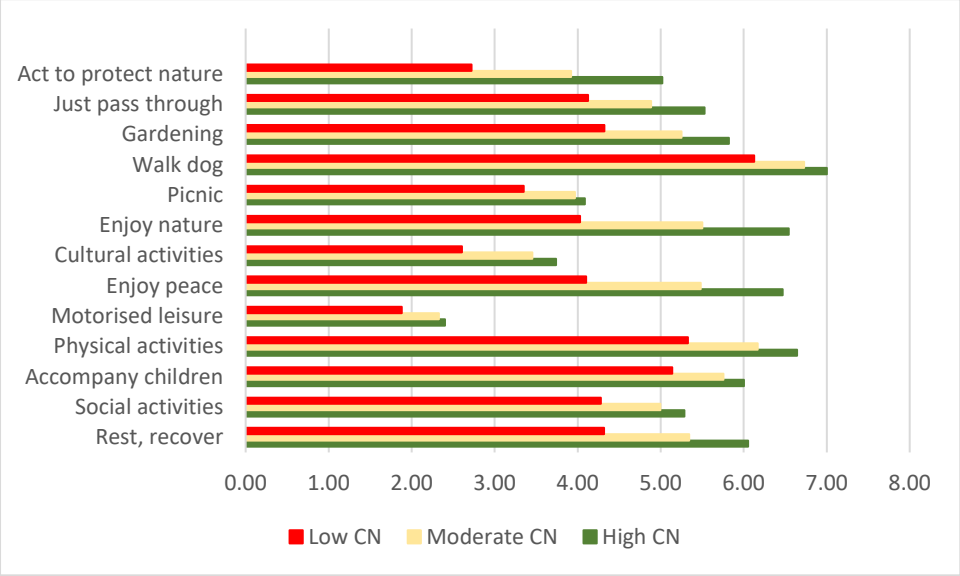


Figure 16. Frequency of the activities Victorians engage in when spend time in nature by CN Group.

In Appendix E, we provide the percentage distributions for each of the ten places by CN group.

Environmental Awareness Profile

The environmental awareness mean scores were compared across the three CN clusters using ANOVA (see page 37 for further details about this variable). The results revealed that high CN participants had the greatest awareness, followed by participants in the moderate CN group and those in the low CN group (Welch(*df*) = 397.36(2,1882.78) $p < .001$). The means for each CN group (measured on 7-point rating scales where higher scores corresponded with greater awareness) were: 6.35 (high CN), 5.82 (moderate CN), and 5.35 (low CN). These relatively high means corresponded with a high proportion of participants rating higher levels of awareness (i.e., greater than the midpoint 4) on average for the awareness questions. In fact 96% of participants endorsed the awareness items compared to just 4% having an average score of 4 or less.

Behavioural Profile

Past pro-environmental behaviours

Participants' reports of their existing pro-environmental behaviours involved those activities that were more frequently undertaken by individuals in the high CN group, least by low CN group members, and

with individuals classified as moderate CN falling in the middle of the other groups. The behaviours with this type of response pattern tended to be those that might be describec as “personal” or “private” in that they generally do not require coordinating or acting with others (see page 56 onwards for more details). Behaviours of this kind were planting native plants; reducing energy; and, choosing sustainable seafood. For these behaviours it was always the case that low CN participants were more likely than the other groups to never perform the behaviour. Simillarly, high CN participants reported that they were always performing the behaviours in higher numbers than individuals in the low and moderate groups. The ordered pattern of participation in these behaviours from high to low CN suggests that a key driver is likely to be differences in pro-environmental motivations between the three groups.

Other behaviours that involved working with others or acting in public had a response pattern that was reasonably similar across CN groups. The response patterns for behaviours of this kind tended to show higher proportions of individuals from all three CN groups tending to report that they never or rarely performed them. These behaviours include environmental volunteering, collecting scientific information (i.e., citizen science activities), and environmental advocacy. The relatively low participation rates for these behaviours in all CN groups suggests that the key driver is likley to be a lack of behavioural control or efficacy rather than differences in pro-environmental motivations.

The response patterns of the remaining behaviours – controlling the movement of pets, donating to environmental organisations, and taking public transport instead of driving – contain elements both of the patterns discussed above. In this respect there is likely to be a more complex array of drivers with pro-environmental motivations (e.g., environmental attitudes and norms) and behavioural control issues (e.g., financial costs, opportunity) potentially interacting.

In the Appendix E, figures for each behaviour and how the CN groups differ on the frequency with which they engaged in each behaviour in the past year can be found.

Intended pro-environmental behaviours

The frequency distributions describing intentions to undertake pro-environmental behaviours over the next 12 months revealed a pattern of responding to more public behaviours where low CN participants tended to report that they were very unlikely to perfom the behaviours (for further details see page 59 onwards). The high and moderate CN inidividuals, however, tended to show some support for these behaviours relative to the low CN group. Notwithstanding, all three CN groups tended to report relatively similar patterns of responding when selecting the midpoint of the response scale (i.e., “neither likely nor unlikely”) suggesting that these individuals may, with the right behavioural intervention, be supported in taking up these behaviours in the future. Examples of behaviours having this pattern of responses were environmental volunteering, environmental advocacy, collecting scientific information, and donating to an environmental organisation.

Pro-environmental behaviours that we have described as more private in other sections of this report showed distributions characterised by larger proportions of high and moderate CN participants reporting a strong intention to perform the behaviours over the next 12 months relative to the low CN group. The reverse pattern of low CN individuals being very unlikely to perform the behaviours was also observed in many cases, However, of interest is that reasonable and comparative percentages of low CN participants reported weaker but still positive intentions to perform behaviours suggesting that even those individuals with lower levels of connection to nature might be supported to act pro-environmentally in the future. Behaviours with distributions fitting this description include controlling the movement of pets, planting native plants, reducing energy, choosing sustainable seafood, and using public transport rather than driving.

Appendix E includes figures for each behaviour and how the CN groups differ on the frequency with which they intend to engage in each behaviour.

ENVIRONMENTAL VALUES

Key facts

Most (86%) of Victorians expressed support for pro-environmental / pro-social values[1]. This meant that they supported statements like "protecting the environment: preserving nature" and "equality: equal opportunity for all" as guiding principles in their lives.

Pro-environmental / pro-social values were more supported by:

- Older Victorians (compared to younger Victorians)
- Women (compared to men)
- Those who spent more time in nature (compared to those who spent less time in nature)

There were no regional differences.

What are environmental values?

According to psychology, values constitute desirable goals, varying in importance, that serve as guiding principles in people's life (Schwartz, 1992). As such, values are relatively stable influencers of beliefs, attitudes, norms, and behaviours (Schwartz 1992). Researchers such as Stern, Dietz, and Guagnano (1998) and Groot and Steg (2008) have sought to measure them and explore their relationships to key environmental concepts such as environmental beliefs, attitudes, norms, intentions and actions. A key characteristic of values is that some are considered to be more important than others.

There are three types of value orientations that have been identified as important for the human-nature relation as they reflect a broad range of motivations: These are strong pro-environmental (biospheric) values, strong pro-social (altruistic) values, and low self-interested (egoistic) values (de Groot and Steg, 2008). Often times pro-environmental actions involve a conflict between a person's short-term self-interest and his/her environmental and collective interests over the long run (e.g., (Steg & de Groot, 2012) Nordlund & Garvill, 2003; Samuelson, 1990;Steg, Dreijerink, & Abrahamse, 2005). In such situations, individuals who endorse biospheric and pro-social / altruistic values might be expected to substitute their immediate self-interest for pro-environmental and collective benefits.

What did we measure?

To measure Victorians environmental values, De Groot and Steg's (2008) 12-item scale was included in the survey. Factor analysis of the Victorian respondents revealed only two instead of three underlying factors (value orientations) that are important guiding principles in the lives of Victorians. These two value orientations relate to (1) "being good to nature and people" (pro-environmental and pro-social values) and (2) the endorsement of self-interest values (egoistic values). Although theoretically, a distinction between the three value concepts seems logical, there is only little empirical evidence for a distinction between biospheric (pro-environmental), and altruistic (pro-social) value orientations, which Groot and Steg (2008) attribute to the use of particular statistical techniques.

The combination of the pro-environmental and pro-social value orientation seem to indicate the interdependence of nature and humans in the minds of respondents. Victorians seem to support the view that nature and human depend on each other and thus they do not make a hard distinction between biospheric and pro-social / altruistic values.

All Victorians: responses to values items

Figure 17 provides details of the proportion of Victorians that expressed support or opposition for pro-environmental / pro-social (M = 5.83) and self-interested (M = 4.19) values in a stacked bar chart.

[1] Responded 5, 6, or 7 on a 1-7 scale

A stacked bar chart plots the proportions of each response on a scale (e.g., 1: strongly oppose, 7: strongly support) to allow for easy and accurate visual comparison between groups (e.g., age, gender, region). I a

A majority of Victorians endorsed pro-environmental / pro-social values, with more than 80% of respondents expressing support (5, 6, or 7) for the items that made up this factor. Results for self-interested values were split: 35% of Victorians expressed opposition (1, 2, or 3) for the items that made up this factor; 42% expressed ambivalence, and 23% expressed support. (See Appendix E for an analysis of responses to the values items by gender, age, region, and time in nature).

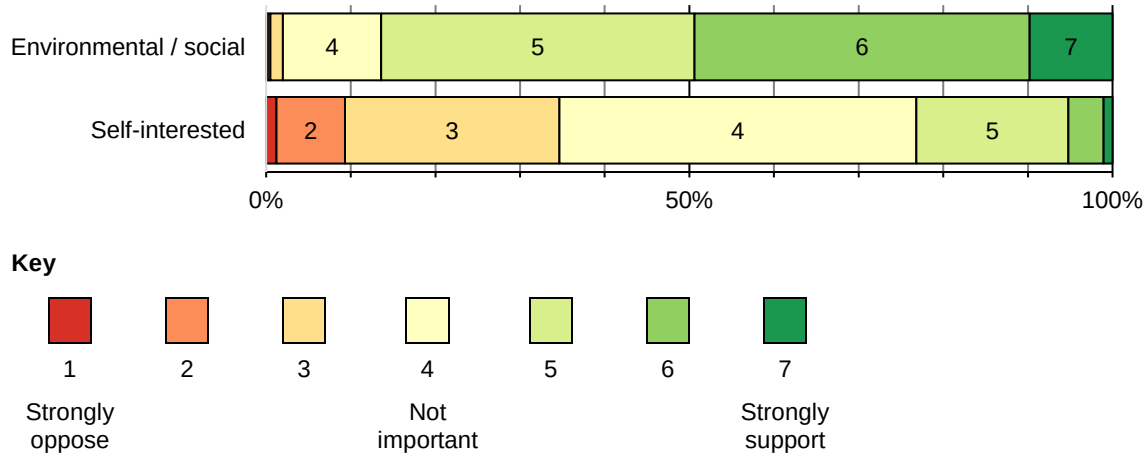


Figure 17. Victorians' Pro-environmental/Pro-Social and Self-Interested Values.

HEALTH OF VICTORIAN NATURAL ENVIRONMENT

Key facts

A majority of Victorians (56.2%) rated the health of the natural environment in Victoria as ‘good’ or ‘very good’. About 1 in 8 Victorians (12.2%) rated the health of the natural environment as ‘poor’ or ‘very poor’ (see Figure 18).

Women (compared to men) and Victorians living outside Melbourne (compared to Melbourne residents) rated the health of the natural environment as poorer. See Appendix E for health rating by different geographic regions.

Detail: health of the Victorian natural environment

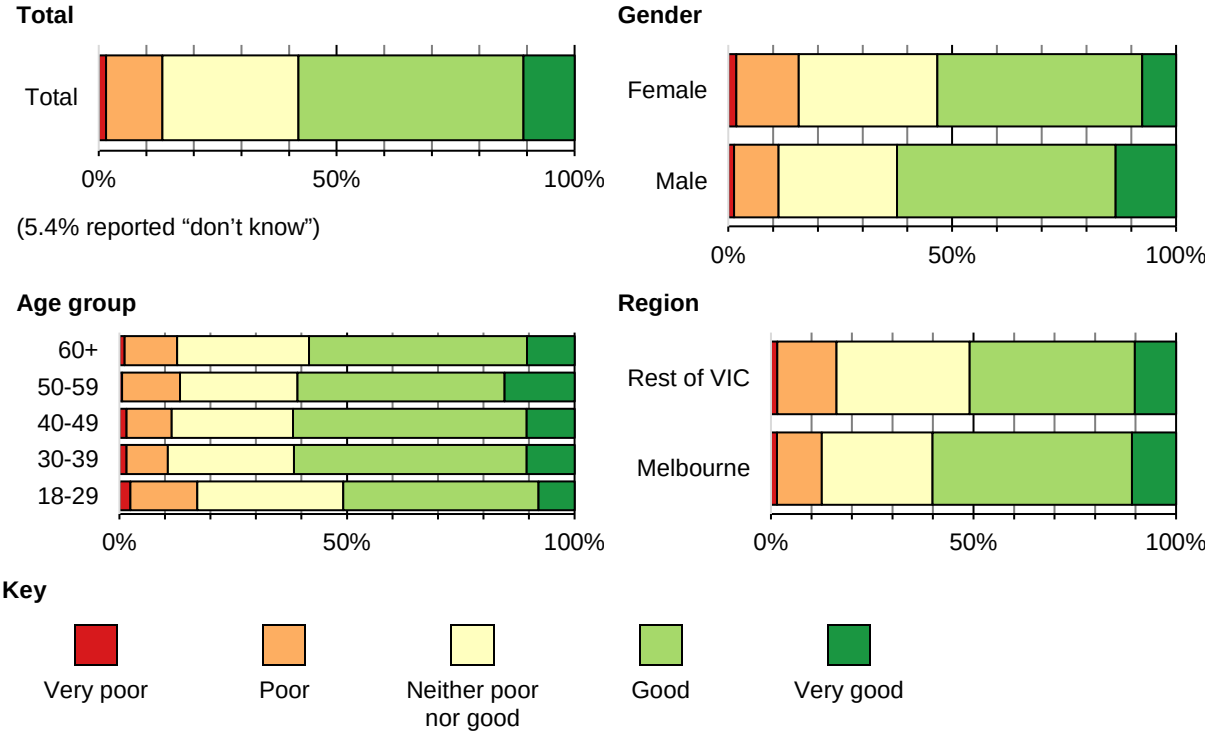


Figure 18. Ratings about the Health of the Natural Environment in Victoria.

ENVIRONMENTAL AWARENESS

Key facts

Almost all Victorians (95%) understand the importance of a healthy Victorian environment and some of the key threats to it[2], responding with agreement to statements like "There are native plants and animals in Victoria that are at risk of serious decline or becoming extinct". See Figure 19 for response patterns by groups.

Groups that were more aware of environmental conditions in Victoria included:

- Older Victorians (compared to younger Victorians)
- Women (compared to men)
- Those who spent more time in nature (compared to those who spent less time in nature)

What did we measure?

Respondents stated their agreement to 11 items reflecting on the importance of a healthy natural environment. Stronger agreement to items like "A healthy natural environment is essential to the production of food, clean air and water" were described as having a greater understanding of the importance of a healthy environment and some of the threats to it. (See Appendix E for further details.)

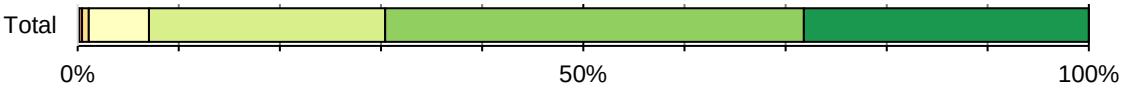
Relationship between environmental awareness and rating of the Victorian environment

Overall, environmental awareness was weakly and negatively related with ratings of the Victorian environment ($r = -.10$, $p < .001$). That means, the higher Victorians environmental awareness, the poorer they rated the health of the Victorian environment.

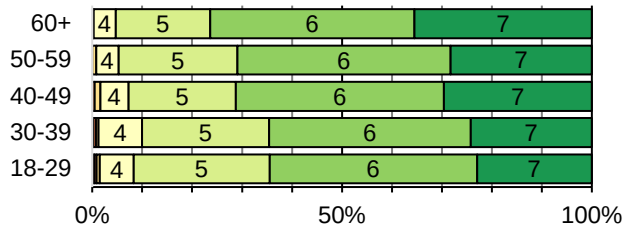
Detail: Environmental awareness

Please see Appendix E for detailed analyses per question item and group.

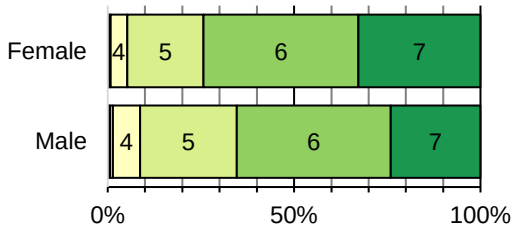
All Victorians



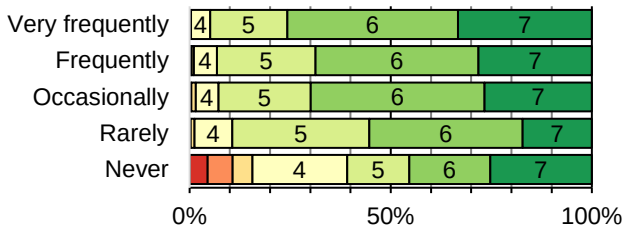
Age group



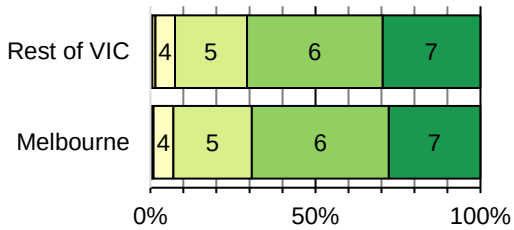
Gender



Frequency of time spent in nature



Region



[2] Responded 5, 6, or 7 on a 1-7 scale

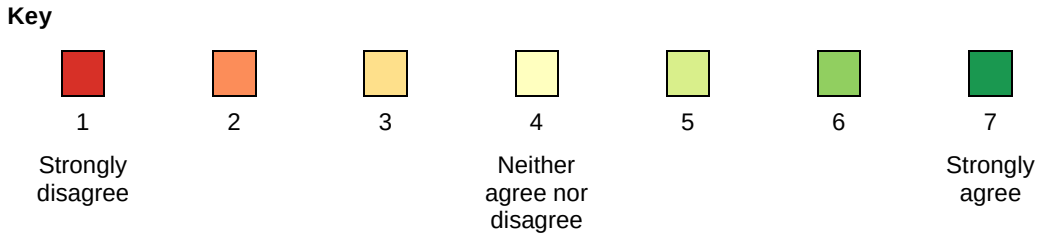


Figure 19. Victorians' Environmental Awareness.

CHAPTER SUMMARY

This chapter described the environmental psychology of Victorians in order to understand their values, awareness of, and experienced connection to the environment. We found that:

- 86% of Victorians expressed support for pro-environmental and pro-social values
- 56.2% of Victorians rated the health of the environment as 'good' or 'very good'
- 95% of Victorians expressed awareness of the importance of a healthy natural
- 64% of Victorians felt connected or very connected to nature

Socio-demographic differences in Victorians' environmental psychology emerged:

- Gender: **women** experienced more connectedness to nature, endorsed pro-environmental and pro-social values, were more aware of environmental conditions in Victoria, and rated the health of the environment lower compared to men
- Age: **older** Victorians experienced more connectedness to nature, endorsed pro-environmental and pro-social values, and were more aware of environmental conditions in Victoria than younger Victorians. There was no difference when rating the health of the environment.
- Region: Victorians **living outside Melbourne** rated the health of the environment as lower than those living in Melbourne. There were no other differences.
- Time spent in nature: those who spent **more time in nature** endorsed pro-environmental and pro-social values, and were more aware of environmental conditions in Victoria compared to those that spent less time in nature. There were no other differences.

When performing a cluster analysis based on Victorians levels of connection to nature, we found two distinct groups:

- Victorians with high levels of connection were more likely to be female, retired, over 60 years old and to work in the environment sector
- While Victorians with low levels of connection were more likely to be male, to be born in Australia, speak only English and to be unemployed

Those that clustered in the highly connected group were more aware of environmental conditions in Victoria, endorsed pro-environmental and pro-social values and spent time in nature more frequently compared to other groups.

So, what does this mean?

- These measures provide a baseline against which to track the progress of the Biodiversity 2037 plan, particularly for the major goal of increasing the numbers of Victorians that value nature.
- Victorians already report high levels of support for pro-environmental and pro-social values and high levels of connection to nature. There seems to also be a relationship between these two measures, as well as time spent in nature and environmental awareness; namely that Victorians who have high levels of one are more likely to have high levels in all others.
- Men and younger people represent key target groups for policies and campaigns that aim to increase awareness of the Victorian environment and levels of connections to nature.

CHAPTER 2: TIME IN NATURE, PLACES IN NATURE AND THEIR MEANING

CHAPTER INTRODUCTION

This chapter describes the places in nature that Victorians typically go to and the frequency at which they currently visit these places. Socio-demographic patterns in these measures are also explored, as well as the most commonly identified barriers that Victorians say prevent them from spending time in nature.

In addition to identifying the places where Victorians typically go, this chapter seeks to understand which places Victorians feel the most connected to. This is a subtle but powerful difference and may help to identify those places in Victoria to emphasise in campaigns that seek to increase connections to nature.

A brief summary of the main findings concludes the chapter, together with consideration of their implications.

FREQUENCY OF TIME SPENT IN NATURE

Key facts

Most Victorians spent time in nature regularly[3]:

- 32% every day or every other day
- 60% reporting at least once a week
- 86% at least once a month

People who spent time in nature more frequently included:

- Women (compared to men)
- Older Victorians (compared to younger Victorians)
- People outside Melbourne (compared to Melbourne residents).

Detail: time in nature

We asked participants how often they generally spent time in nature in the last year and grouped responses into five categories ranging from very frequently to never. Only 12% of Victorians rarely spent time in nature and 1% indicated they never spend time in nature. Figure 20 shows the frequency of time spent in nature for all Victorians and separately for male/female, the different age groups, and different regions. See Appendix F for differences in geographic areas and further details.

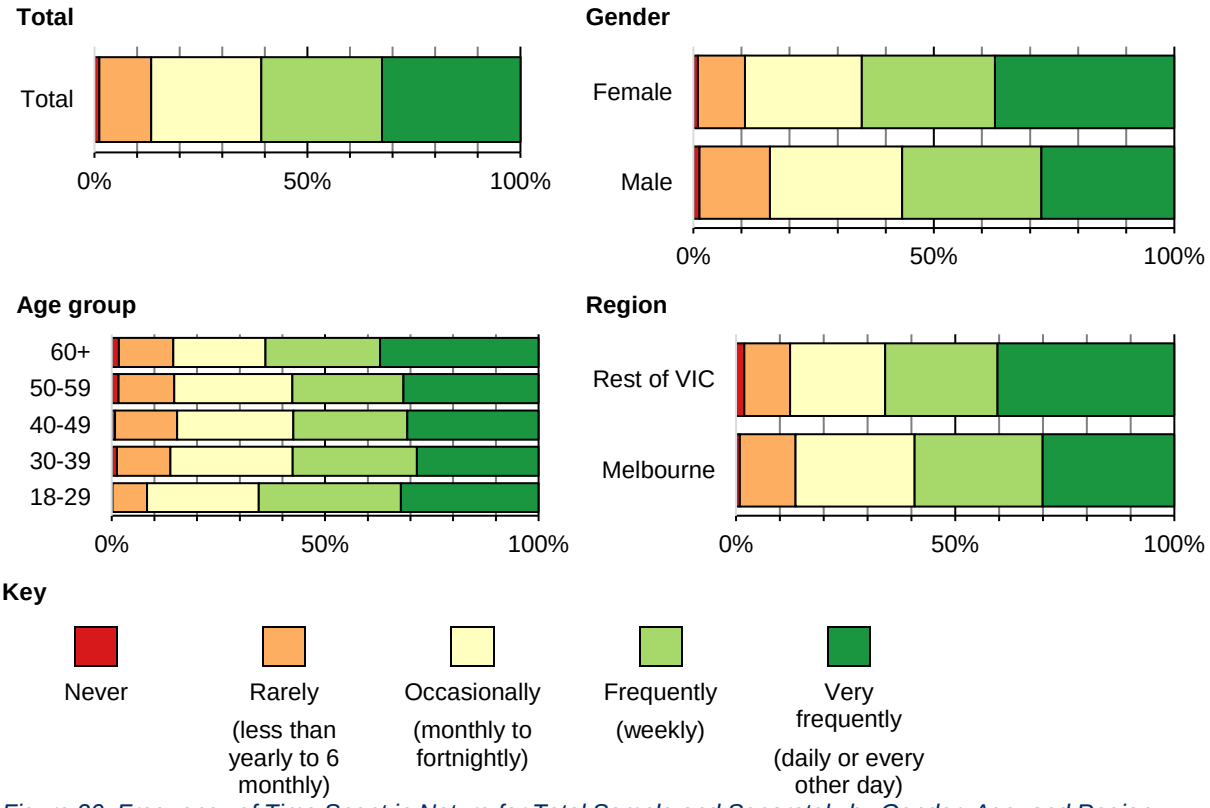


Figure 20. Frequency of Time Spent in Nature for Total Sample and Separately by Gender, Age, and Region.

[3] Original scale 1 (never) to 8 (every day). 32% responded 7 or 8; 60% responded 6, 7, or 8; 86% responded 5, 6, 7, or 8

BARRIERS TO SPENDING TIME IN NATURE

Key facts

A lack of time and few family or friends to spend time were the biggest barriers to Victorians spending more time in nature, with 32% of respondents agreeing that these were barriers[4]. 19% said it was difficult for them to access nature, and 6% said that they did not enjoy spending time in nature.

Some groups experienced greater overall barriers to spending time in nature:

- Men (compared with women)
- Older Victorians (compared with younger Victorians)
- Melbourne residents (compared with people who did not live in Melbourne)
- Respondents who spent less time in nature.

Further details about the analysis can be found in Appendix F.

Detail: barriers to spending time in nature

To understand potential barriers to spending time in nature and to get a feeling of how Victorians evaluate the amount of time they spent in nature, respondents indicated their agreement to six statements on a scale from 1 (strongly disagree) to 7 (strongly agree) .

We chose to exclude two statements from analysis as they were not barriers. Figure 21 shows the proportions of Victorians who agreed or disagreed with the barriers statements. For detailed descriptions of each barrier by major groups see Appendix F.

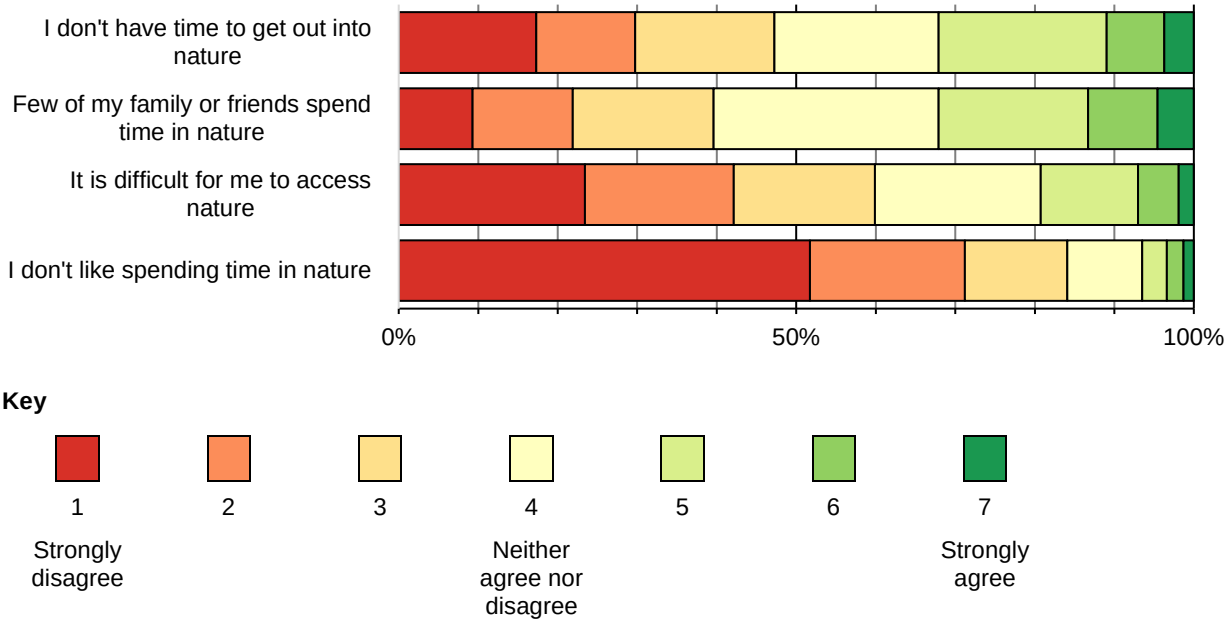


Figure 21. Barriers to Spending Time in Nature.

[4] Responded 5, 6, or 7 on a 1-7 scale

Separate analysis for Item 2: It is important to me that my child/children spend time in nature

Victorians with a child or children under the age of 18 years were asked how important it is that their child/children spend time in nature. In total, 723 respondents were parents. Overall, results indicated that it is important to them that their children spend time in nature (M = 5.93).

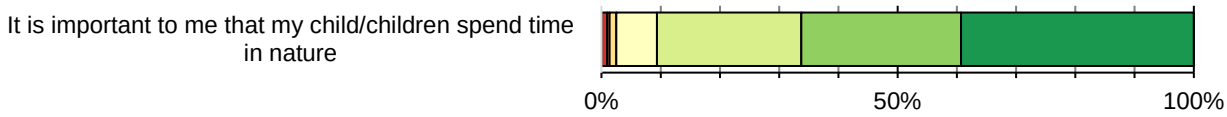


Figure 22. Importance to Parents that their Children Spend Time in Nature.

PLACES IN NATURE WHERE VICTORIANS SPENT TIME

Key facts

- Victorians own gardens were their primary opportunity for spending time in nature, with 42% spending time in their own garden every day or other day, and 87% spending time there at least monthly.[5]
- Other urban green spaces such as parks, courtyards, and green roofs were next most used by Victorians.
- Men more frequently spent time in agricultural areas compared to women; the reverse was true for personal and community gardens.
- Older Victorians spend more time in their own gardens and agricultural areas compared to younger Victorians; the reverse was true for national parks, zoos, and community gardens.

Detail: where do Victorians spend time in nature?

Figure 23 shows how frequently Victorians spend time in places in nature.

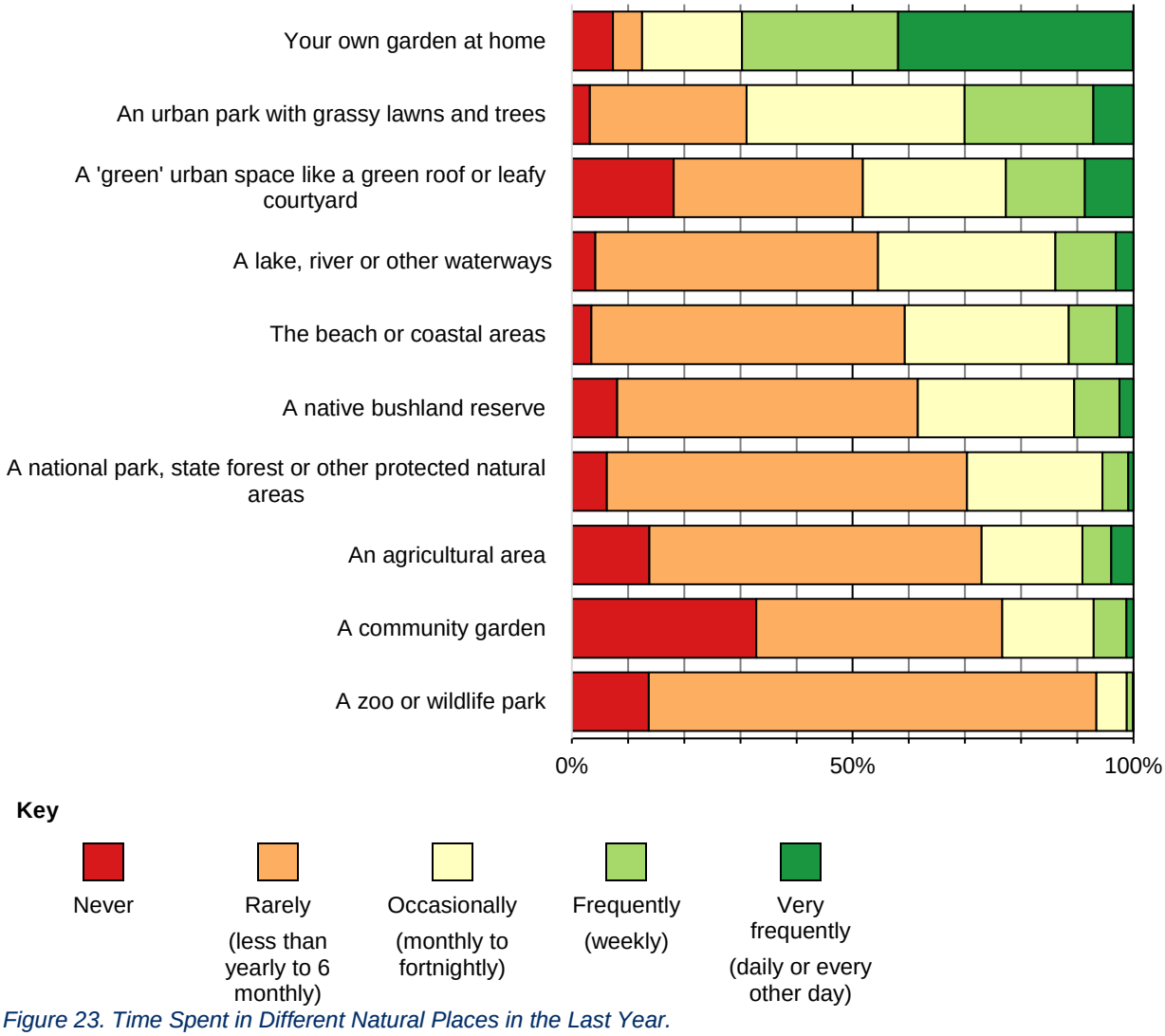


Figure 23. Time Spent in Different Natural Places in the Last Year.

[5] Original scale 1 (never) to 8 (daily). 42% responded 7 or 8; 87% responded 5, 6, 7 or 8

Relationship between CN and spending time in different places

Connectedness to nature was positively correlated with spending time in all ten places, indicating that the more respondents felt connected to nature, the more frequently they spent time in each place of nature. Correlations were highest for spending time in native bushland reserves and lowest for spending time in a zoo or wildlife park (see Table 8).

Table 8. Relation of CN and Spending Time in Different Places

	Connectedness to nature
A native bushland reserve	0.41
A lake, river or other waterways	0.37
A national park, state forest or other protected natural areas	0.36
An urban park with grassy lawns and trees	0.28
An agricultural area	0.27
Your own garden at home	0.26
A 'green' urban space like a green roof or leafy courtyard	0.24
The beach or coastal areas	0.22
A community garden	0.19
A zoo or wildlife park	0.15

Note: All correlations are significant at p <.01.

Other places to spend time in nature (EB2a)

When asked to describe other places in which Victorians spent time in nature, respondents often described places already listed such as parks and gardens, or beaches and rivers. Some of the new places included natural areas like mountains and the ocean, as well as managed spaces such as golf courses or farms (see Figure 24). A table of the 30 most frequently stated words can be found in the Appendix F.

Figure 24. Word Cloud Capturing Most Common Responses to "Other Places Where Victorians Spend Time in Nature".

PLACES OF CONNECTION

Key facts

Analyses revealed that Victorians feelings of connectedness to places in nature tended to cluster around highly modified natural places, like gardens and urban parks, and weakly / un-modified natural places, like lakes, beaches and reserves.

In general, Victorians felt more connected to nature when in weakly / un-modified natural places, compared to highly modified places.

The specific areas Victorians felt most connected to nature were, in order:

1. National parks
2. Beaches
3. Their own garden at home

Detail: places of connection clusters

Respondents stated their feeling of connectedness to ten different places in nature on a 7-point scale ranging from not connected at all to very strongly connected. Factor analysis revealed two underlying factors which can be described as highly modified natural places and weakly or un-modified natural places. Individuals who reported being connected to weakly or un-modified places (e.g., a national park) were likely to show low levels of connection to highly modified landscapes. Table 9 shows the relationship between the responses to the "places of connection" questions and the underlying factors. Further details about statistical differences can be found in Appendix F.

Table 9. Variable Names Belonging to the Identified Factors

Highly modified natural places	Weakly or un-modified natural places
A 'green' urban space like a green roof or leafy courtyard	A national park, state forest or other protected natural areas
A community garden	A lake, river or other waterways
An urban park with grassy lawns and trees	A native bushland reserve
A zoo or wildlife park	The beach or coastal areas
Your own garden at home	
An agricultural area	

Figure 25 shows the response distribution for Victorians overall and by groups. Mean feeling of connectedness to each of the ten different places by gender, age, region, and frequency of time spent in nature and can be found in Appendix F.

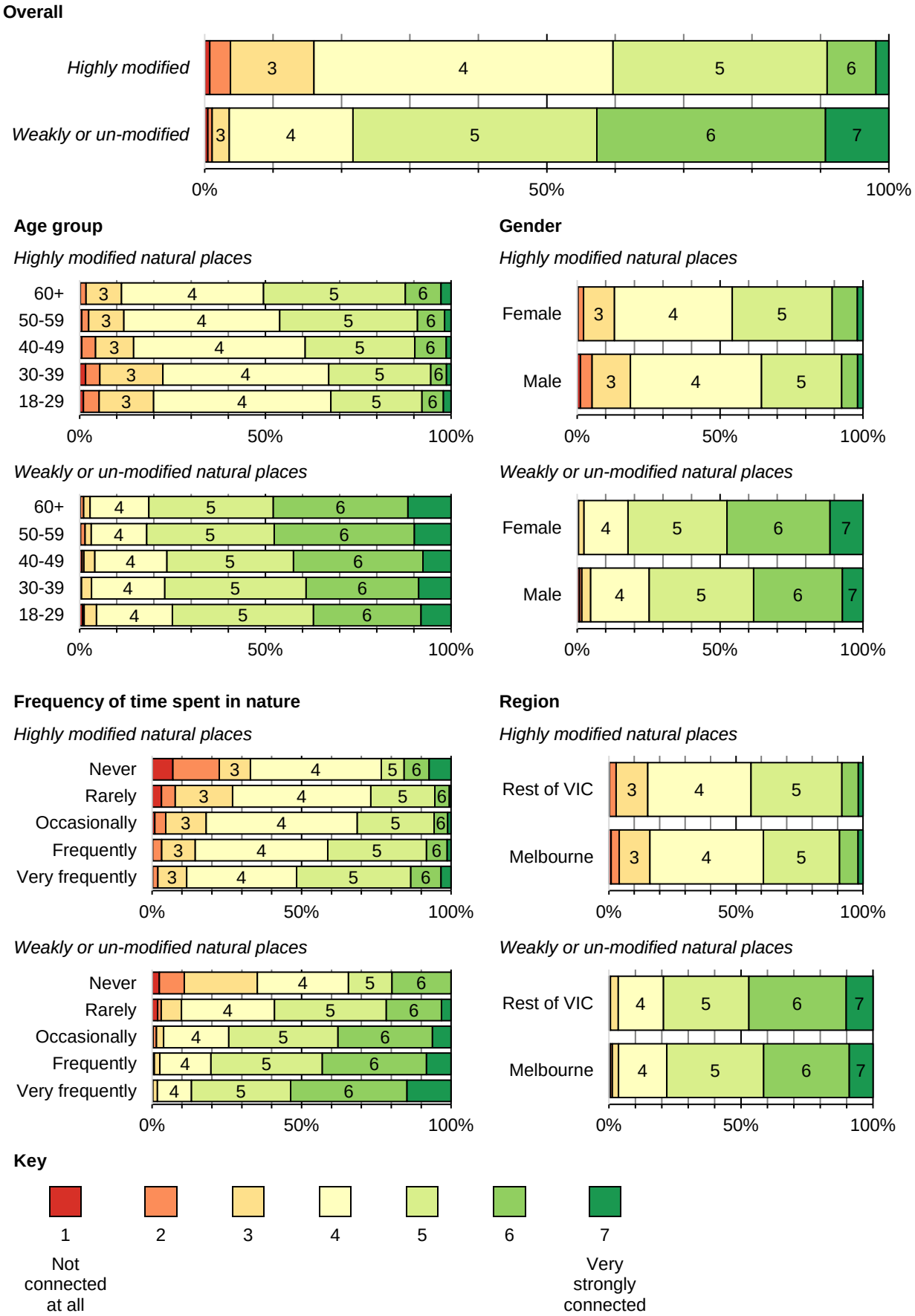


Figure 25. Feeling of Connectedness to Highly Modified and Weakly Un-modified Natural Places.

EC1a. Are there any other places where Victorians feel connected to nature?

Only 861 respondents described another place that they felt connected to nature, again tending to mention places already described, such as gardens. The most common other place mentioned was mountains, with a number of other specific places described – see Figure 26 below for examples. A table of the 30 most frequently stated words can be found in the Appendix F.

Figure 26. Word Cloud Summarising Most Common Responses to "Other Places where Victorians Feel Connected to Nature".

CHAPTER SUMMARY

This chapter sought to identify the places that Victorians spent time in nature, the frequency with which they spent time in those places and some of the barriers they identified. It found that:

- 32% Victorians spend every day, or every other day, in nature
- 6% of Victorians said that they don't like spending time in nature
- 19% of Victorians said it was difficult for them to access nature
- 32% of Victorians said that few of their family or friends spend time in nature so this was a barrier
- 32% of Victorians said that they don't have time to spend in nature

Victorians' identified their own gardens as primary opportunities to spend time in nature and 42% spent time in their own garden every day or other day. Other urban green spaces such as parks, courtyards, and green roofs were next most used by Victorians.

Women and older people generally spent more time in nature than men and younger people respectively. These groups also tended to agree less that there were particular barriers preventing them from spending time in nature. Victorians living outside of Melbourne spent more time in nature than those living in Melbourne. Those in Melbourne tended to agree more that there were particular barriers preventing them from spending time in nature.

The places in which Victorians felt most connected to nature were generally more unmodified places such as national parks or the beach. At the same time, they also felt connected to nature in their own gardens.

The stronger Victorians overall connectedness to nature and the stronger their support for pro-environmental and pro-social values, the more time they spent in nature and the fewer barriers they experienced to spending time in nature.

So, what does this mean?

- These measures provide a baseline against which to track the progress of the Biodiversity 2037 plan, particularly for the target of all Victorians connecting with nature by 2037.
- Men and younger people again present as target groups for policies and campaigns that try to get more Victorians to spend time in nature more frequently. Those living in Melbourne are also a potential target group.
- While there are differences in places that Victorians spend time in nature as opposed to places where they feel connected to nature, this overlaps in their own gardens. Policies and campaigns that focus on increasing connection to nature and spending time in nature could focus on gardens specifically, as opposed to national parks, which may suffer from greater accessibility barriers, particularly for those living in Melbourne.
- A focus on gardens might also overcome some of the commonly identified barriers to spending time in nature.

CHAPTER 3: ACTIVITIES IN NATURE

CHAPTER INTRODUCTION

This chapter describes the activities that Victorians typically engage in when spending time in nature. It also investigates the things Victorians do to indirectly experience nature. Socio-demographic patterns in these activities are also explored to provide further information about who likes to do what in nature and when.

The relationship between levels of connectedness to nature and the frequency with which the different activities were performed are reported and help to understand in which activities Victorians with a strong connection to nature engage in most frequently.

The chapter concludes with a brief summary of the main findings, together with consideration of their implications.

ACTIVITIES WHEN SPENDING TIME IN NATURE

Key facts

The majority of Victorians (56%) walked, hiked, cycled or did other physical activities in nature at least weekly[6], with 26% doing these activities daily.

Dog owners (n = 1027) and parents (n = 723) most frequently participated in activities related to their pet or child.

Detail: activities in nature

Figure 27 shows the proportion of Victorians engaging in different activities in nature.

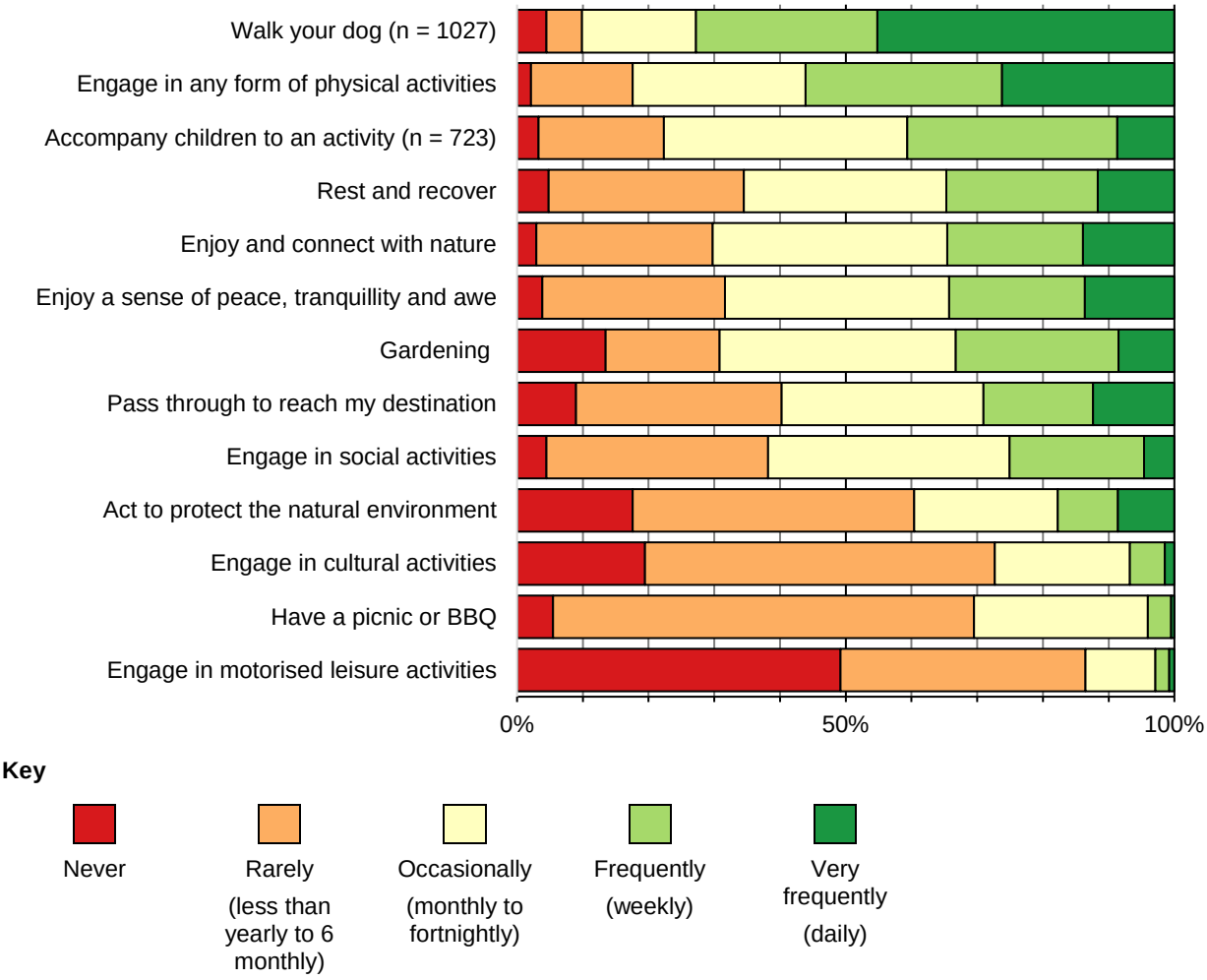


Figure 27. Proportions for Activities when Spending Time in Nature.

[6] Responded 4 (weekly) or 5 (daily)

Relationship between CN and activities when spending time in nature

Overall, connectedness to nature (CN total) was positively correlated to all forms of activities (see Table 10). The more Victorians felt connected to nature the more frequently they engaged in the various activities (strongest correlation $r = .57$, $p < .01$ with "Enjoy and connect with nature", weakest correlation $r = .09$, $p < .01$ with "Engage in motorised leisure activities").

Table 10. Relation between CN and Activities when Spending Time in Nature

	Connectedness to nature
Enjoy and connect with nature	0.57
Enjoy a sense of peace, tranquillity and awe	0.52
Act to protect the natural environment	0.43
Rest and recover	0.36
Engage in any form of physical activities (e.g. walking, cycling, hiking)	0.3
Gardening	0.28
Pass through to reach my destination	0.28
Engage in social activities	0.23
Engage in cultural activities	0.23
Accompany children to an activity (n= 723)	0.22
Have a picnic or BBQ	0.21
Walk your dog (n= 1027)	0.2
Engage in motorised leisure activities (e.g. boating, trail-biking, off-roading)	0.09

Note: All correlations are significant at $p < .01$.

Other activities Victorians engage in when being in nature (EB3a)

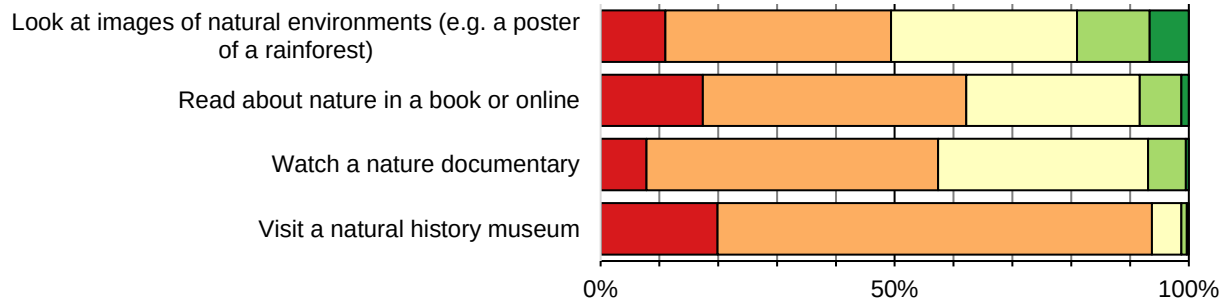
Other activities reflected more general ways that people spend time in nature such as walking and relaxing. Some respondents also provided specific recreational activities such as fishing, swimming, camping, yoga, meditation, or photography. Figure 28 provides an overview of the most common responses and a table of the 30 most frequently stated words can be found in Appendix G

Figure 28. Word Cloud Summarising Most Common Responses to "Other Activities Victorians Engage in when Being in Nature".

INDIRECT NATURE EXPERIENCE

Figure 29 shows the proportions of Victorians experiencing nature indirectly.

The most common indirect way of experiencing nature was to look at images of natural environments. Visiting a natural history museum is something that Victorians in general do less than once a year. See Appendix G for further information on general differences between groups on indirect nature experience.



Key

Figure 29. Proportions of Victorians Experiencing Nature Indirectly.

Relationship between CN and indirect nature experience

The general picture was similar to direct nature experiences and the more strongly Victorians felt connected to nature the more frequently they engaged in all forms of indirect nature experiences (see Table 11).

Table 11. Relation between CN and Indirect Nature Experience

	Connectedness to nature
Read about nature in a book or online	0.42
Look at images of natural environments (e.g. a poster of a rainforest)	0.40
Watch a nature documentary	0.37
Visit a natural history museum	0.19

Note: All correlations are significant at p <.01.

CHAPTER SUMMARY

This chapter sought to understand what Victorians did when they spent time in nature. The most common activities identified were walking the dog, some sort of physical activity, and parents spending time outside with children.

The more connected Victorians felt with nature, the more likely they were to engage in different activities in nature.

So, what does this mean?

- These measures provide a baseline against which to track the progress of the Biodiversity 2037 plan.
- Supporting Victorians to engage more frequently in these different activities might help increase their levels of connectedness.
- If there are differences between places where Victorians go to spend time in nature as opposed to places where they feel connected to nature, then the focus of policies or campaigns to increase levels of connectedness with nature could be to encourage people to perform more of the activities identified in this chapter in those special places of connection, i.e. national parks, beaches and gardens.

CHAPTER 4: ACTING TO PROTECT NATURE

CHAPTER INTRODUCTION

This chapter measures the frequency of the most common pro-environmental behaviours that Victorians reported to perform over the 12 months prior to completing the Foundational Survey and the most common pro-environmental behaviours they intend to do over the next 12 months. Socio-demographic patterns in these measures are also explored, as well as the most commonly identified barriers that Victorians say prevent them from performing pro-environmental behaviours.

In addition to identifying the most common pro-environmental behaviours, this chapter seeks to explore the relationship that these have with Victorians' levels of connection to nature. Namely, if you are highly connected to nature, then are you more likely to have performed a pro-environmental behaviour in the past 12 months or intend to perform one in the next 12 months?

A brief summary of the main findings concludes the chapter, together with consideration of their implications.

BIODIVERSITY PROTECTION BEHAVIOURS ON PROPERTY

Key facts

- A majority of Victorians who live on property or have yards (n = 2,272) reported at least occasionally (i.e., “sometimes”) managing pest plant and animal species (70%) and planting native plants on their property (68%).
- Of those Victorians who lived on rural property or acreage, 40% fenced their property and 11% registered part of their property.

Detail: biodiversity protection behaviours

Victorians living on rural property and those having access to their own backyard or front yard were asked about specific behaviours that help to protect biodiversity in Victoria.

The responses of 2,272 respondents who reported residing on a rural property/acreage or having a backyard/front yard are shown in Figure 30. Answers for 189 Victorians living on rural property/acreage are shown in Figure 31.

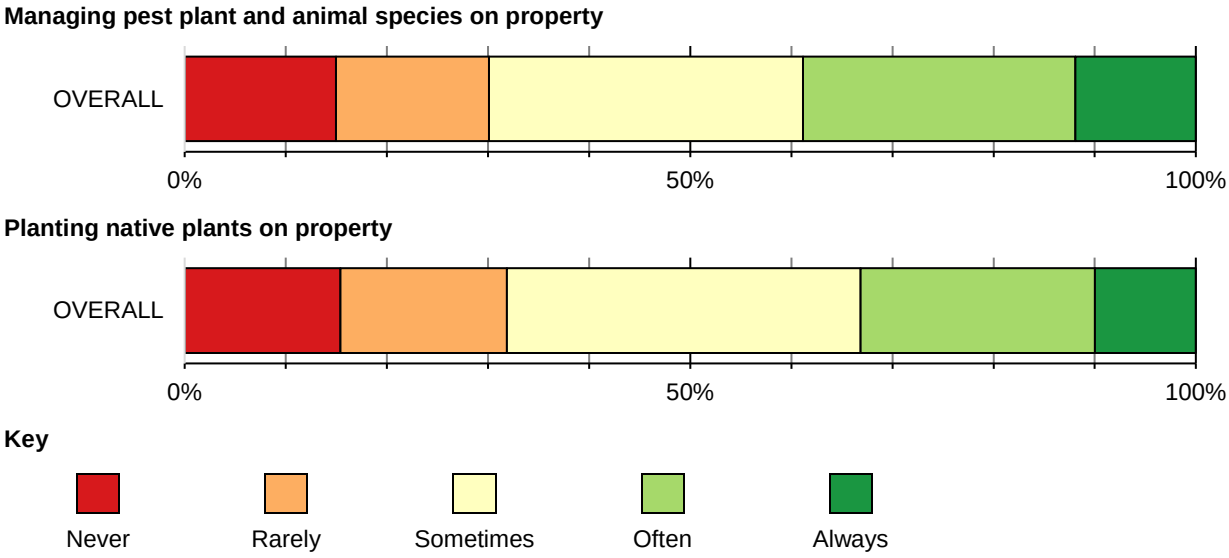


Figure 30. Frequency of Respondents Undertaking Biodiversity Relevant Activities on Property.

Relation with nature connectedness

The stronger respondents felt connected to nature, the more frequently they engaged in both types of activities:

- Managing pest plant and animal species on property (r = .20, p <.01)
- Planting native plants on property (r = .31, p <.01)

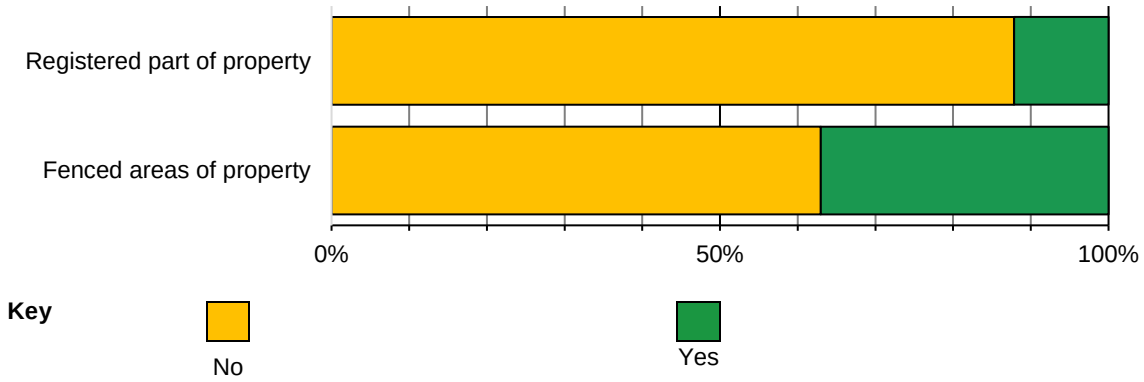


Figure 31. Engagement in Biodiversity Activities on Rural Property/Acreage (n = 189).

ENGAGEMENT IN PRO-ENVIRONMENTAL BEHAVIOURS IN THE LAST YEAR

Key facts: specific behaviours

Across 11 pro-environmental behaviours, Victorians most frequently (responded often or always):

1. Controlled the movement of their pets to keep them away from native animals
2. Reduced energy use
3. Used public transport

They least frequently (responded never or rarely):

1. Participated in community gardens or community composting
2. Collected information for science
3. Volunteered time for the environment

The more strongly Victorians felt connected to nature, the more frequently they:

1. Cleaned up litter in a public place
2. Donated money to organisations
3. Chose native plant species when planting or gardening

Key facts: clusters of public and private behaviours

Our analysis clustered public behaviours (e.g., volunteering) separately from private behaviours (e.g., choosing sustainable seafood).

Victorians who were more likely to enact private pro-environmental behaviours:

- Women (compared to men)
- Older Victorians (compared to younger Victorians)
- Victorians living outside Melbourne (compared to Melbourne residents).

Victorians who were more likely to enact public pro-environmental behaviours:

- Younger Victorians (compared to older Victorians)
- Melbourne residents (compared to Victorians living outside Melbourne)

Detail: specific behaviours enacted by Victorians

Figure 32 shows the engagement in specific behaviours across all Victorians.

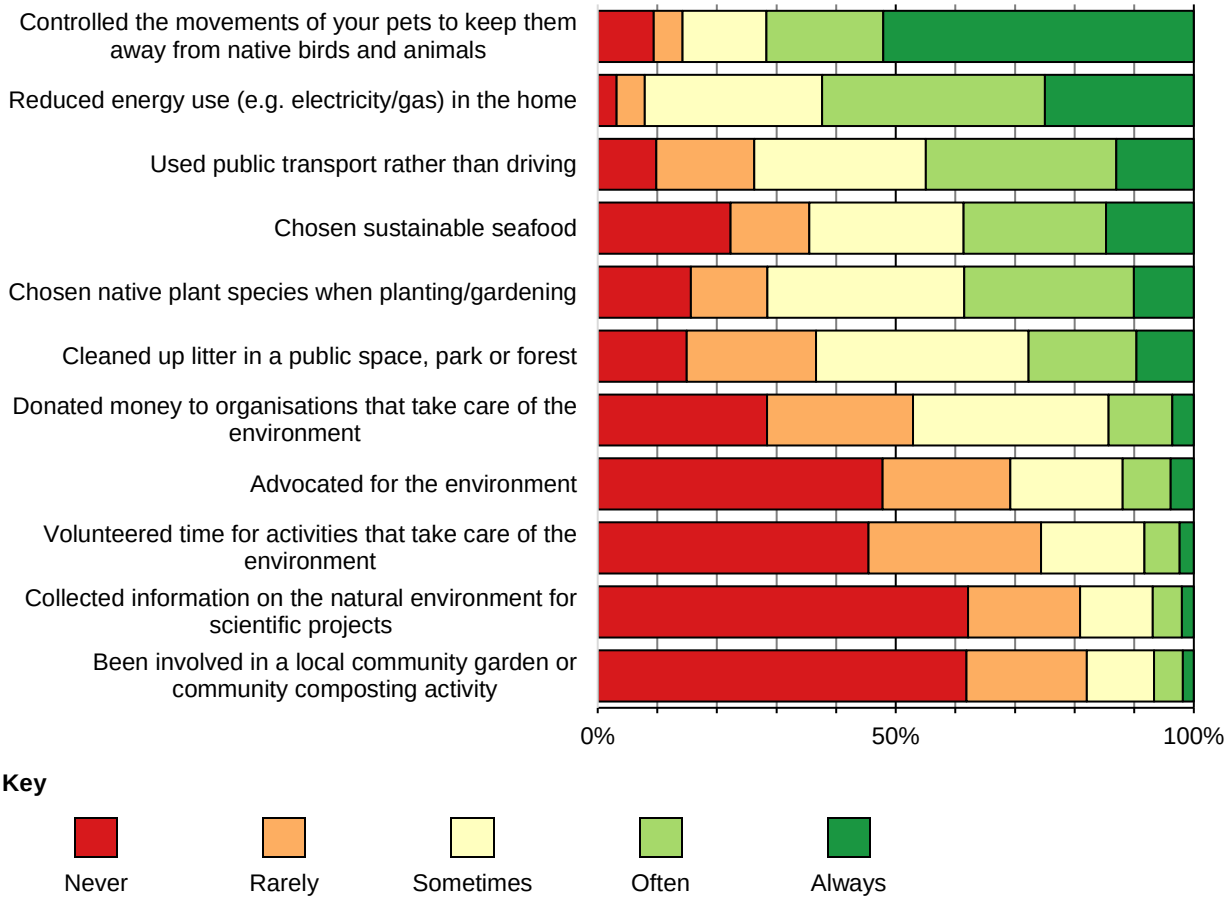


Figure 32. Frequency of Engagement in Pro-Environmental Behaviours over the past 12 Months.

Detail: public and private behaviour clusters

We asked Victorians about the frequency with which they engage in eleven pro-environmental behaviours in the last year. Answers were given on a scale ranging from 1 (never) to 5 (always). All items were factor analysed to reveal underlying, common response patterns. We identified two common factors which seem to suggest whether the behaviour was conducted at home (private) or in public. Behaviours described as "private" generally did not require coordinating or acting with others (e.g., planting native plants, controlling the movement of your pets). Public behaviours tended to involve working with others or acting in public. These behaviours include environmental volunteering, collecting scientific information (i.e., citizen science activities), and environmental advocacy.

Overall, these factors seem to align with public and private sphere behaviours described by Stern (2000). Grouping behaviours into public and private can help to investigate and promote behavioural spillover effects. Pro-environmental behavioural spillover describes the tendency that the performance of one pro-environmental behaviour increases the likelihood of performing another, particularly, when both behaviours are similar (Margetts & Kashima, 2016). Thus, promoting behaviours which catalyse the adoption of other similar behaviours is a promising way to increase pro-environmental actions and results of these groupings may help to identify spillover possibilities in the Victorian population (Kneebone & Smith, 2018, Thøgersen & Ölander, 2003).

Item 10 ('Cleaned up litter in a public space, park or forest) loaded almost equally well on both factors and item 5 ('Using public transport rather than driving') did not load on any factor (see Table 12). These two items were excluded. Mean scores for both factors were calculated (M_{public} PEB = 1.82, $M_{private}$ PEB = 3.23) and differences between females, males, age groups, region, and time spent in nature on those two factors are presented in Appendix H.

Table 12. Items Belonging to Past Public Sphere and Private Sphere Pro-Environmental Behaviours (PEB)

Factor 1: Public PEB (past)	Factor 2: Private PEB (past)
Collected information on the natural environment for scientific projects or databases (citizen science)	Reduced energy use (e.g. electricity/gas) in the home
Been involved in a local community garden or community composting activity	Chosen sustainable seafood
Volunteered time for activities that take care of the environment (e.g. planting trees, clearing weeds)	Chosen native plant species when planting/gardening
Advocated for the environment (by, for example, contacting businesses or politicians about environmental issues, signing pro-environment petitions, attending rallies etc.)	Controlled the movements of your pets to keep them away from native birds and animals (if applicable)
Donated money to organisations that take care of the environment	

Correlations between connectedness to nature (CN total) and past pro-environmental actions

Table 13 shows the correlations between the different past pro-environmental actions and connectedness to nature, pro-environmental / pro-social values, environmental awareness, and frequency of time in nature. Highest correlations per column are printed in bold for individual items (1-11).

Table 13. Relation of Past Pro-Environmental Actions with Environmental Factors

		CN Total	Pro-env / pro-social values	Environmental awareness	Frequency of time in nature
1.	Controlled the movements of your pets to keep them away from native birds and animals i.e. keep my cat inside at night	.29**	.28**	.30**	.16**
2.	Chosen native plant species when planting/gardening	.37**	.23**	.22**	.27**
3.	Reduced energy use (e.g. electricity/gas) in the home	.34**	.36**	.34**	.16**
4.	Chosen sustainable seafood	.36**	.26**	.23**	.17**
5.	Used public transport rather than driving	.10**	.12**	.11**	.08**
6.	Volunteered time for activities that take care of the environment (e.g. planting trees, clearing weeds)	.29**	.11**	.05**	.21**
7.	Collected information on the natural environment for scientific projects or databases (citizen science)	.20**	.04*	-0.02	.15**
8.	Donated money to organisations that take care of the environment	.37**	.24**	.21**	.17**
9.	Advocated for the environment	.33**	.20**	.15**	.18**
10.	Cleaned up litter in a public space, park or forest	.37**	.24**	.21**	.25**
11.	Been involved in a local community garden or community composting activity	.18**	.04*	-.04*	.17**
Public PEB (past)		.36**	.17**	.10**	.23**
Private PEB (past)		.48**	.39**	.37**	.28**
Mean PEB past all items		.49**	.33**	.27**	.31**

Note: *p<.05; **p<.01

See Appendix H for correlations with all five CN dimensions.

UPTAKE OF PRO-ENVIRONMENTAL BEHAVIOURS OVER THE NEXT 12 MONTHS

Key facts

Across 11 pro-environmental behaviours, Victorians most frequently (responded often or always) planned to:

1. Control the movement of their pets to keep them away from native animals
2. Reduce energy use
3. Use public transport

They least frequently (responded never or rarely) planned to:

1. Collect information for science
2. Participate in community gardens or community composting
3. Advocate for the environment

The more strongly Victorians felt connected to nature, the more frequently they planned to:

1. Advocate for the environment
2. Clean up litter in a public place
3. Volunteer time to organisations
4. Chose native plant species when planting or gardening

Key facts: clusters of public and private behaviours

Our analysis clustered public behaviours (e.g., volunteering) separately from private behaviours (e.g., choosing sustainable seafood).

Victorians who were more likely to plan to enact private pro-environmental behaviours:

- Women (compared to men)
- Older Victorians (compared to younger Victorians)
- Victorians living outside Melbourne (compared to Melbourne residents).

Victorians who were more likely to enact public pro-environmental behaviours:

- Women (compared to men)
- Younger Victorians (compared to older Victorians)
- Melbourne residents (compared to Victorians living outside Melbourne)

Detail: specific behaviours enacted by Victorians

Figure 33 shows the likelihood of the uptake of specific behaviours for all Victorians.

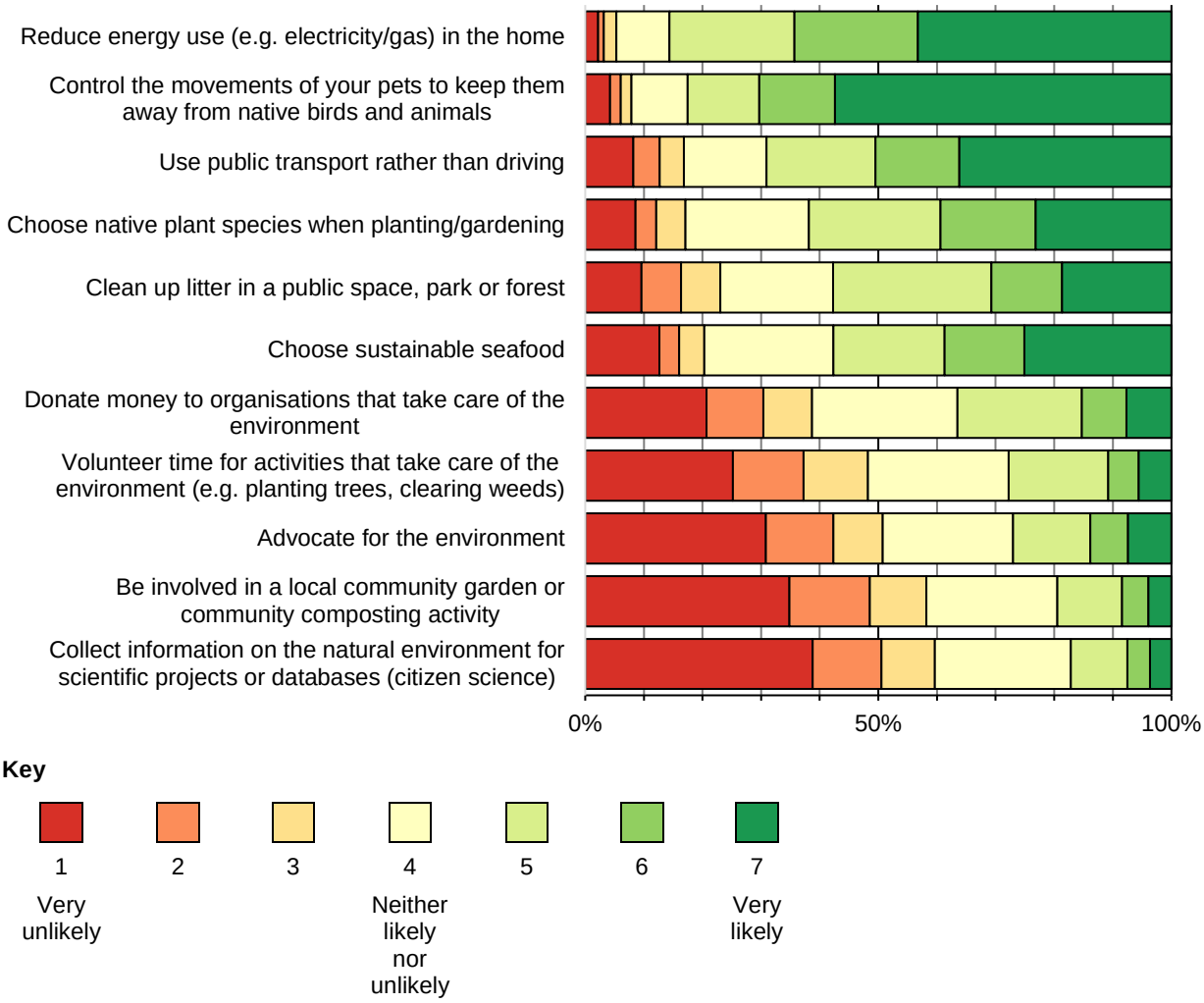


Figure 33. Likelihood to Engage in Pro-Environmental Behaviours over the next 12 Months.

Detail: public and private behaviour clusters

Upon asking Victorians about their engagement in 11 pro-environmental actions in the last year, we asked about the likelihood that they would take up or continue doing the same activities over the next 12 months.

The general procedure was similar to the previous question and factor analysis (again excluding the same two items as before for reasons of fit and consistency) revealed the same two underlying dimensions of public and private sphere pro-environmental behaviours. Further details about the factors can be found in Appendix H.

Correlations between connectedness to nature (CN total) and intended pro-environmental actions

Table 14 shows the correlations between the different intended pro-environmental actions and connectedness to nature, pro-environmental / pro-social values, environmental awareness, and frequency of time in nature. Highest correlations are printed in bold.

Table 14. Relation of Intended Pro-Environmental Actions with Environmental Factors

	CN Total	Pro-env / pro-social values	Environmental awareness	Frequency of time in nature
Control the movements of your pets to keep them away from native birds and animals	.32**	.35**	.37**	.17**
Choose native plant species when planting/gardening	.41**	.32**	.33**	**.24****
Reduce energy use (e.g. electricity/gas) in the home	.35**	**.42****	**.46****	.16**
Choose sustainable seafood	.39**	.32**	.31**	.16**
Use public transport rather than driving	.14**	.18**	.20**	.08**
Volunteer time for activities that take care of the environment (e.g. planting trees, clearing weeds)	.41**	.25**	.19**	.21**
Collect information on the natural environment for scientific projects or databases (citizen science)	.32**	.16**	.11**	.17**
Donate money to organisations that take care of the environment	.39**	.31**	.26**	.13**
Advocate for the environment	**.42****	.29**	.24**	.16**
Clean up litter in a public space, park or forest	**.42****	.33**	.31**	.23**
Be involved in a local community garden or community composting activity	.31**	.17**	.11**	.18**
Public PEB (likelihood)	.46**	.30**	.23**	.21**
Private PEB (likelihood)	.51**	.47**	.49**	.26**
Mean all items PEB (likelihood)	.56**	.44**	.40**	.27**

Note: *p<.05; **p<.01

See Appendix H for correlations with five CN dimensions.

Relation between past and intended pro-environmental behaviours

Further analysis revealed that all factors of past and likely pro-environmental behaviours were significantly positively related with each other (see Table 15). Positive correlations between past and intended (likelihood) actions are in line with research showing that past behaviours are well-suited as predictors for future behaviours (Ouellette & Wood, 1998).

The correlations between past and intended behaviours were also statistically significant and positive. This suggests some opportunity to influence Victorians who are currently engaged in private (public) behaviours to take up activities of a public (private) type. Figure 34 maps each individual pro-environmental behaviour item along the dimensions of engagement in the behaviour in the past and the likelihood to continue or take up the behaviour over the next 12 months, again showing the high correlation between past and intended behaviour.

Table 15. Correlations for Past and Intended Pro-Environmental Actions

		1	2	3	4	5	6
1.	Public PEB (past)	-					
2.	Private PEB (past)	.42**	-				
3.	Mean all items PEB (past)	.86**	.77**	-			
4.	Public PEB (likelihood)	.75**	.38**	.70**	-		
5.	Private PEB (likelihood)	.30**	.79**	.60**	.42**	-	
6.	Mean all items PEB (likelihood)	.66**	.62**	.79**	.89**	.74**	-

Note. ** p <.01

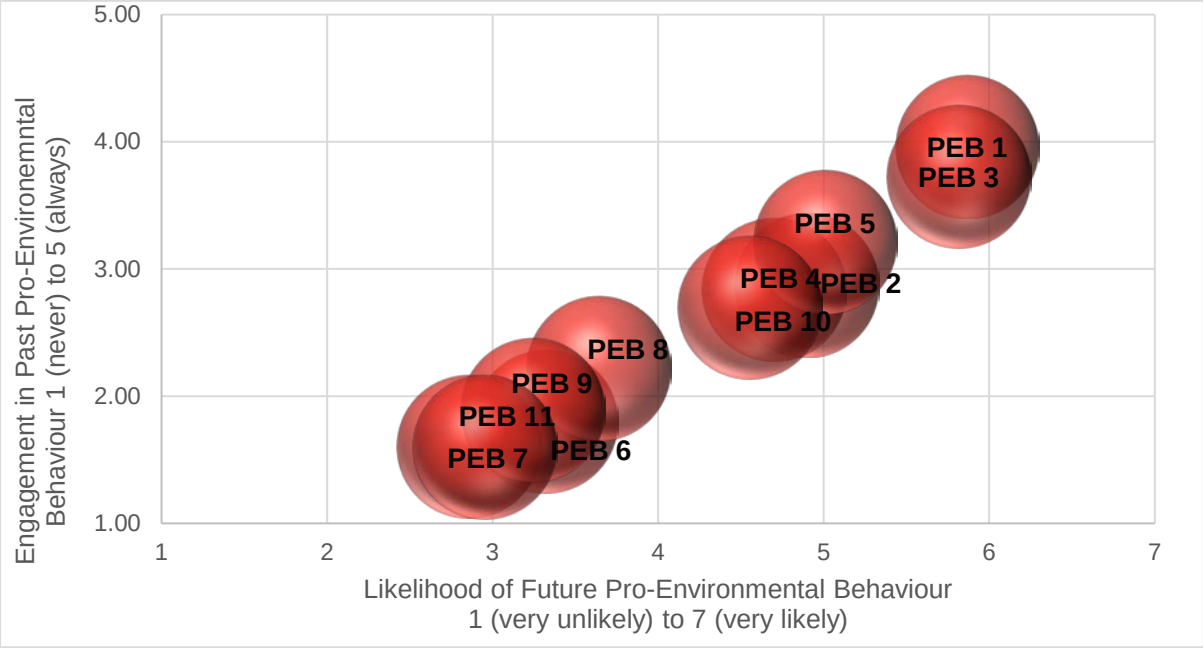


Figure 34. Mapping of All Eleven Pro-Environmental Items (see Question PEBpast and PEBlike for items description in Appendix A)

WHY VICTORIANS ARE NOT LIKELY TO TAKE UP OR CONTINUE PRO-ENVIRONMENTAL BEHAVIOURS

Respondents who indicated they were not likely to continue or take up each pro-environmental behaviour were then asked to describe why. The aim of this question was to elicit respondents perceived barriers to adoption. Responses were recorded verbatim and a random sample of 100 comments were coded to one of eight behavioural drivers shown in Table 16 (Darnton, 2008). Some responses were coded as 'not applicable' or 'no reason/not sure' where appropriate.

Table 16. Behavioural Barriers Used to Code Open-Text Responses

Barrier	Description
Attitudes	Overall favourable or unfavourable evaluation of engaging in a behaviour.
Social norms	Social rules indicating the common, expected and acceptable behaviours in a particular situation.
Capability	Physical, financial or psychological ability to do the behaviour.
Opportunity	Factors beyond the individual which provide the means to carry out the behaviour.
Habits	Behaviours repeatedly performed, in stable contexts, with little thought or deliberation.
Emotion	Actual or anticipated feelings in response to performing a behaviour.
Biases	Systematic and unconscious tendencies to behave in certain ways, leading to deviations from rational decision making.
Context	Structures / architecture in the environment that influence behaviour. Shared social and cultural expectations.
Attitudes	Overall favourable or unfavourable evaluation of engaging in a behaviour.

Table 17 reports the most common barriers for each behaviour, provides 95% confidence intervals (margins of error), and provides quotes that illustrate each barrier. It is worth noting that due to the unconscious and automatic nature of some drivers it is difficult for respondents to recognise or ascribe influence to certain barriers such as biases (0 comments), social norms (3 comments), and emotion (5 comments). See Appendix D for a complete list of example comments by barrier and behaviour.

As shown in Table 17, respondents perceived barriers differed across the relevant behaviours. For example, more than one half of coded responses for donating to environmental charities were attitudinal barriers (e.g. trust in charities). In contrast, time-consuming behaviours such as community gardening, citizen science, and volunteering were largely associated with capability barriers (time, physical ability, cost). Use of public transport was often limited by contextual factors, such as infrastructure, whereas using less energy was seen as an opportunity barrier as respondents felt they were already doing as much as possible.

With only one exception, the barriers chosen did not significantly differ between metro and regional areas (available sample sizes for these questions precluded testing for differences across more specific geographical areas). The exception was for using public transport, with people in regional areas more likely to mention contextual barriers (e.g. 'I live in an area where public transport is not overly viable').

Table 17. Barriers to Taking Up or Continuing Behaviours

Behaviour	Most commonly stated barriers	% of non-performers who stated barrier	95% confidence interval		Example text
			Lower	Upper	
Pet control	Opportunity	31	24.0	39.0	"My dog always sleeps inside"
	Attitude	29	22.0	38.0	"my choice - free country", "My dogs don't impact"
	Not applicable	17	11.0	23.8	"don't have these impact animals, only fish"
Native plants	Attitude	25	18.0	33.0	"Prefer non-native plants", "Freedom of choice"
	Context	21	14.0	28.0	"We are not allowed to alter the garden in our rental property"
	Capability	17	11.0	23.0	"too expensive", "Don't know what is native"
	Not applicable	17	11.0	23.0	"I don't garden"
Energy use	Opportunity	42	34.0	50.0	"don't use much anyway"
	Attitude	24	17.0	31.0	"why should I", "Comfort"
	Capability	11	7.0	16.0	"taking too much time"
Seafood choice	Not applicable	43	35.0	51.0	"I'm vegetarian", "I rarely eat seafood"
	Capability	22	14.0	30.0	"Availability and price"
	Opportunity	20	14.0	27.0	"don't eat too much seafood"
Public transport	Capability	37	28.0	46.0	"convenience", "takes too long"
	Context	22	15.0	29.0	"there is limited public transport where I live,"
	Opportunity	22	15.0	29.0	"Because don't need to use", "short trips only"
Volunteer	Capability	68	60.0	77.0	"Too old", "I don't really have the time"
	Attitude	14	8.0	20.0	"to timid", "Not really interested"
	Opportunity	12	7.0	17.0	"Unaware of where to volunteer"
Citizen science	Capability	40	31.0	49.0	"Unsure how to", "Physically unable to"
	Attitude	39	29.0	48.0	"don't feel I need to", "Not of interest to me"
	Opportunity	15	10.0	21.0	"haven't seen that opportunity"
Donate money	Attitude	53	45.0	61.0	"do not trust charities", "donate to other causes"
	Capability	37	29.0	46.0	"need money to pay BILLS"
	No reason/not sure	6	3.0	10.0	"Don't know"
Advocacy	Attitude	40	31.0	48.9	"Not interested", "Have no strong beliefs"
	Capability	38	30.7	46.0	"lack of time", "Illness"
	No reason/not sure	11	6.0	17.0	"Unsure"
Litter pickup	Capability	32	24.0	40.0	"I have no time or energy to do so"
	Opportunity	29	21.0	36.2	"I'm not outside that often"
	Attitude	18	12.0	24.0	"Not my responsibility", "Not interested"
Community gardening	Capability	43	35.0	52.0	"Not enough time", "Health reasons"
	Opportunity	28	20.0	36.0	"Don't live near one"
	Attitude	19	13.0	26.0	"not interested"

Note: 95% confidence intervals were computed using 1000 bootstrap resamples.

CHAPTER SUMMARY

This chapter sought to identify the most common pro-environmental behaviours that Victorians engaged in or intended to engage in. It found that:

- 70% of Victorians who live on property or have yards reported at least occasionally managing pest plant and animal species
- 68% of Victorians who live on property or have yards reported at least occasionally planting native plants on their property.
- 40% of Victorians who lived on rural property or acreage fenced their property
- 11% of Victorians who lived on rural property or acreage had registered part of their property.
- Victorians most frequently controlled the movement of their pets to keep them away from native animals, reduced energy use and used public transport over the past 12 months.
- Victorians least frequently participated in community gardens or community composting, collected information for science and volunteered time for the environment over the past 12 months.
- Victorians most frequently intend to control the movement of their pets to keep them away from native animals, reduce energy use and use public transport over the next 12 months.
- Victorians least frequently intend to collect information for science, participate in community gardens or community composting and advocate for the environment over the next 12 months.

Women, older Victorians and those living outside of Melbourne engaged more in private sphere pro-environmental behaviours over the past 12 months than men, younger Victorians and those living in Melbourne. Women, those living in Melbourne and younger Victorians engaged more in public sphere pro-environmental behaviours over the past 12 months than those living outside of Melbourne and older Victorians. There were similar socio-demographic patterns for Victorians intending to engage in public and private sphere behaviours in the next 12 months.

The more strongly Victorians felt connected to nature, the more frequently they cleaned up litter in a public place, donated money to organisations and chose native plant species when planting or gardening over the past 12 months. The more strongly they felt connected to nature, the more they intend to advocate for the environment, clean up litter in a public place, volunteer time to organisations and chose native plant species when planting or gardening.

So, what does this mean?

- These measures provide a baseline against which to track the progress of the Biodiversity 2037 plan, particularly for the target of getting 5 million Victorians acting to protect nature.
- While Victorians do engage, or intend to, in a number of pro-environmental behaviours, these are not necessarily all directly relevant to the Biodiversity 2037 plan. In fact, those behaviours that Victorians did less frequently are probably more relevant for the plan.
- Those more connected to nature engaged, or intended to engage, with behaviours that are more relevant for Biodiversity 2037. When developing policies or campaigns to encourage Victorians to take up behaviours that directly support Biodiversity 2037, the target behaviours might need to be made more specific or these policies and campaigns could focus on building Victorians' connection to nature and then linking to the relevant behaviours.
- Men, again, are a potential target group for policies and campaigns that encourage the uptake of pro-environmental behaviours.

CHAPTER 5: FROM CONNECTION TO ACTION

CHAPTER INTRODUCTION

This chapter explores the relationship between Victorians intention to engage in pro-environmental behaviours and the various measures explored in previous chapters, such as connection to nature, time spent in nature and environmental awareness. This is important to understand as it might point to particular influencers that could be deliberately used in policies or campaigns that seek to encourage more Victorians to act to protect nature.

A brief summary of the main findings concludes the chapter, together with consideration of their implications.

RELATIONSHIPS BETWEEN CONNECTION AND ACTION

Connection to nature is an important construct because it is related to a range of pro-environmental factors (see Table 18).

Table 18. Relation between CN and various Environmental Constructs

	Connectedness to nature
Pro-environmental / pro-social values	.62
Time spent in nature in the last year	.49
Engagement in pro-environmental actions	
Past year	.49
Next 12 months	.56
Environmental awareness	.53
Feeling of connectedness to	
Highly modified natural places (urban parks, garden, zoo)	.40
Un-modified natural places (national parks, beach, bushland)	.57
Perceived barriers to spending time in nature	-.34

Note: All correlations are significant at p <.01

What predicts the likelihood to take up pro-environmental actions besides connection to nature?

To address this issue, hierarchical linear regression was used. We controlled for past pro-environmental actions to focus on the likelihood to take up pro-environmental actions in the future independent of past pro-environmental actions. Furthermore, we controlled for participants' demographic characteristics (i.e., age, gender, region, education).

Statistical information

Past pro-environmental actions (Mean PEBpast items), age, gender, region (regional vs. Melbourne), and education were entered at Step 1, explaining 63% of variance in intended pro-environmental actions (Mean PEBlike items), $F(5, 2880) = 984.72$, $p < .001$.

CN identity and CN materialism[7], pro-environmental and pro-social values, feeling of connectedness to weakly and highly modified natural places, barriers to spending time in nature, environmental awareness, frequency of time spent in nature, and ratings of the state of the Victorian environment were entered at Step 2, explaining an additional 6% of the variance in the dependent variable, ΔR^2=.06, $F(9, 2871) = 62.35$, $p < .001$. At Step 2 the following predictors were significant: CN Identity (*beta* = .12), environmental awareness (*beta* = .10), feeling of connectedness to highly modified natural places (*beta* = .06), pro-environmental and pro-social values (*beta* = .05), CN materialism (*beta* =-.03).

The total variance explained by the model as a whole was R^2=.69, $F(14, 2871) = 459.19$, $p < .001$.

[7] To avoid problems of multicollinearity, we only included the CN dimensions that correlated strongest (positive and negative) with the dependent variable.

What does the analysis show?

Likelihood to take up pro-environmental actions is predicted by (importance of predictors in decreasing order)

- High connection with nature (particularly through identifying with the environment)
- High environmental awareness
- High feeling of connection to highly modified natural places (e.g., community garden, park, zoo, garden)
- Strong pro-environmental and pro-social values
- Low CN Materialism

The following variables did not provide any additional explanation of pro-environmental actions

- Time in nature
- Rating of the Victorian Environment
- Feeling of connection to weakly or un-modified natural places (wilderness)
- Barriers to spending time in nature (e.g., lack of time, having friends or family who do not like to spend time in nature)

What does it mean for DELWP?

To encourage Victorians to act to protect the Victorian environment beyond their current activities, the following conditions should be facilitated:

- Increase connection to nature (especially via identification with nature)
- Increase environmental awareness
- Nurture pro-environmental and pro-social values
- Strengthen feelings of connection to highly modified natural places
- Discourage nature connections based on materialism

Victorians differ in their connection to nature and can be grouped in three distinct groups: CN high, CN moderate, and CN low.

For each group, we repeated the analysis above to identify, which environmental factor is important for each group in order to increase the uptake of pro-environmental actions in the future (see Table 19).

What predicts the likelihood to take up pro-environmental actions for each group of connection with nature?

Table 19. Standardised Regression Coefficients, R^2, and Associate F Statistics for Regression Analysis for Uptake of Pro-Environmental Actions

Predictor	CN High *beta*	CN Moderate *beta*	CN Low *beta*
STEP 1	R^2=.55, F(5, 995) = 242.83**	R^2=.54, F(5, 1106) = 258.54**	R^2=.55, F(5, 767) = 186.32**
Past pro-environmental actions	0.72**	0.71**	0.74**
Age	-0.10**	-0.07**	-0.04
Region	-0.01	-0.03	0.02
Gender	0.03	0.04	0.06
Education	-0.01	0.04	0.01
STEP 2	ΔR^2=.04, F(9, 986) = 9.64**	ΔR^2=.05, F(9, 1097) = 15.73**	ΔR^2=.06, F(9, 758) = 12.72**
CN Identity	0.03	0.07**	0.13**
CN Materialism	-0.04	-0.05	-0.02
Pro-env / pro-social values	0.05	0.07**	0.04
Connectedness to human-made natural places	0.07**	0.07**	0.05
Connectedness to wilderness	0.00	0.01	0.06
Barriers to spending time in nature	-0.04	-0.02	0.02
Environmental awareness	0.11**	0.11**	0.09**
Time spent in nature	-0.06**	-0.01	0.00
Rating of Victorian environment	0.00	0.04	-0.03
TOTAL	R^2=.59, F(14, 986) = 99.71**	R^2=.59, F(14, 1097) = 113.52**	R^2=.61, F(9, 758) = 83.88**

Note: **p < .01

For Victorians with a high connection to nature

Findings show, to encourage **Victorians with a strong connection to nature (CN high)** to act to protect the Victorian environment above and beyond their current activities, the following conditions should be facilitated:

- Increase environmental awareness
- Strengthen feelings of connection to highly modified natural places

Although "time spent in nature" was a statistically significant and *negative* predictor of planned pro-environmental behaviours, we interpret this as a "rebound" effect. Specifically, those people who are highly-connected to nature but have not spent much time in nature over the past year may compensate by planning to take more pro-environmental behaviours in the following year. We caution against overinterpretation of this unexpected finding.

For Victorians with a moderate connection to nature

To encourage **Victorians with a moderate connection to nature (CN moderate)** to act to protect the Victorian environment above and beyond their current activities, the following conditions should be facilitated:

- Increase connection to nature (especially via identification with nature)
- Nurture pro-environmental and pro-social values
- Increase environmental awareness
- Strengthen feelings of connection to highly modified natural places

For Victorians with a low connection to nature

To encourage Victorians with a **low connection to nature (CN low)** to act to protect the Victorian environment above and beyond their current activities, the following conditions should be facilitated:

- Increase connection to nature (especially via identification with nature)
- Increase environmental awareness

FOCUS VOLUNTEERING

Motivating Victorians to volunteer time for activities that take care of nature is one of DELWPs priorities. To find out which environmental factor (e.g., connection, awareness, values) predicts the uptake of volunteering over the next year above and beyond volunteering activities in the past year, we used a similar analysis as above (see Table 20).

Table 20. Standardised Regression Coefficients, R^2, and Associate F Statistics for Regression Analysis for Uptake of Environmental Volunteering

Predictor	All Victorians *beta*	CN High *beta*	CN Moderate *beta*	CN Low *beta*
STEP 1	R^2=.39, F(5, 2880) = 367.21**	R^2=.40, F(5, 995) = 134.85**	R^2=.34, F(5, 1106) = 112.63**	R^2=.28, F(5, 767) = 58.77**
Volunteered in the last year	0.61**	0.59**	0.53**	0.52**
Age	-0.07**	-0.15**	-0.14**	-0.02
Region	-0.01	0.00	-0.01	0.00
Gender	0.06**	0.01	0.03	0.08
Education	0.01	-0.02	0.02	0.01
STEP 2	ΔR^2=.07, F(9, 2871) = 42.12**	ΔR^2=.02, F(9, 986) = 2.86**	ΔR^2=.03, F(9, 1097) = 5.58**	ΔR^2=.06, F(9, 758) = 7.23**
CN Identity	0.21**	0.04	0.10**	0.21**
CN Materialism	-0.02	0.00	-0.04	-0.03
Pro-env / pro-social values	0.04	0.04	0.06	-0.01
Connectedness to human-made natural places	0.03	0.03	0.04	0.04
Connectedness to wilderness	0.01	-0.01	-0.03	0.04
Barriers to spending time in nature	-0.04	-0.06	-0.04	-0.01
Environmental awareness	0.02	0.04	0.04	-0.02
Time spent in nature	-0.01	-0.01	0.01	-0.02
Rating of Victorian environment	0.00	-0.02	0.05	-0.06
TOTAL	R^2=.46, F(14, 2871) = 175.08**	R^2=.42, F(14, 986) = 50.81**	R^2=.37, F(14, 1097) = 45.31**	R^2=.33, F(9, 758) = 27.17**

Note: **p < .01

For all Victorians

Our analysis showed for all Victorians (n = 3090) that connecting with nature, particularly through identifying with nature, predicts the uptake of volunteering in the next 12 months. In other words, strengthening Victorians overall connection with nature has positive effects on the uptake of volunteering. None of the other predictors was significant. That means the other predictors did not contribute to any further prediction of volunteering in the future.

For Victorians with a high connection to nature

None of the environmental factors seem to be important for Victorians with a strong connection to nature.

For Victorians with a moderate or low connection to nature

The findings were the same as for all Victorians, thus strengthening connection with nature particularly via identifying with nature, is an important predictor for the uptake of volunteering activities over the next 12 months.

CHAPTER SUMMARY

This chapter sought to understand which of the different measures explored in previous chapters might influence the likelihood of Victorians engaging in pro-environmental behaviour. It found that Victorians are more likely to take up pro-environmental actions if they have (in decreasing order of importance):

1. A high connection with nature (particularly through identifying with the environment)
2. A high environmental awareness
3. A high feeling of connection to highly modified natural places (e.g., community garden, park, zoo, garden)
4. Strong pro-environmental and pro-social values

The following measures were not found to predict the likelihood of Victorians taking up pro-environmental behaviours:

- The time they spend in nature
- Their rating of the health of the Victorian environment
- Their feelings of connection to weakly or un-modified natural places (wilderness)
- The different barriers to spending time in nature (e.g., lack of time, having friends or family who do not like to spend time in nature)

So, what does this mean?

To encourage Victorians to act to protect the Victorian environment beyond what they are currently doing, policies and campaigns should be developed that facilitate:

- An increased sense of connection to nature amongst Victorians (especially their explicit sense of identity in relation to nature)
- Increase awareness of environmental conditions in Victoria
- Nurture pro-environmental and pro-social values
- Increase time spent and strengthen feelings of connection to highly modified natural places such as gardens

FINDINGS AND RECOMMENDATIONS

KEY FINDINGS

The Victorians Value Nature (VVN) Foundation Survey provides a baseline against which progress of the Protecting Victoria's Environment Biodiversity 2037 plan can be tracked. BehaviourWorks Australia collaborated with the VVN team to develop the survey. Although many Victorians already report strong pro-environmental values, a strong sense of connection, and high environmental awareness, there are key groups that can be identified for policies and campaigns aiming to increase awareness of the Victorian environment and levels of connection to nature.

RECOMMENDATIONS FOR KEY PRIORITIES IN VICTORIANS VALUE NATURE

Priorities established as part of the Victorians Value Nature goal in the Protecting Victoria's Environment Biodiversity 2037 plan include (1) raising the public's awareness of biodiversity, (2) facilitating opportunities for people to connect with nature and (3) increasing opportunities for Victorians to act to enhance nature.

Public awareness of biodiversity

Almost all Victorians (95%) were somewhat aware of the importance of a healthy Victorian environment and some of the key threats to it, agreeing to statements like "There are native plants and animals in Victoria that are at risk of serious decline or becoming extinct".

However, younger Victorians, men, and those who spent less time in nature tended to have lower awareness. Awareness was also related to pro-environmental and pro-social values, and psychological connection to nature.

We recommend that the VVN team raise public awareness of biodiversity by:

1. Fostering pro-environmental / pro-social values, psychological connection to nature, and providing opportunities for Victorians to spend time in nature
2. Targeting awareness campaigns to younger Victorians and men

Opportunities for people to connect with nature

A majority of Victorians frequently spend time in nature (60% at least once a week), with their own gardens and urban parks the most common natural location overall. Psychological connection to nature was associated with spending more time in nature. We expect this relationship to be reinforcing: feeling more connected to nature leads to spending more time in nature, and spending more time in nature leads to feeling more connected to nature. Indeed, the most common activities while in a natural setting were to "enjoy and connect with nature" and "enjoy a sense of peace, tranquility, and awe". Experimental studies have shown that undertaking activities in nature does positively affect CN (e.g., Lumber et al., 2017)

Accessing national parks, beaches, and their own gardens elicited the strongest feeling of connection to nature. A lack of time and few family or friends to spend time were the biggest barriers to Victorians spending more time in nature.

We recommend that the VVN team enhance opportunities for people to connect with nature by:

1. Reinforce the relationship between spending time in nature and feeling connected to nature:
    a. Encouraging activities that inspire a feeling of connection, peace and tranquility while spending time in natural environments

    b. Targeting campaigns for spending more time in national parks, beaches, and gardens
2. Address perceived barriers around lack of time or few activities for families and friends by encouraging spending time in more accessible natural environments (e.g., their own garden, neighbourhood parks)
3. Encourage Victorians to spend time in natural environments with which they are less familiar:
    a. For all Victorians: community gardens, zoos, or wildlife parks
    b. For Melbourne residents: agricultural areas, native bushland reserves and lakes and waterways
    c. For non-Melbourne residents: coastal areas, community gardens, zoos, urban parks, and urban green spaces
    d. For older Victorians: community gardens, national / state parks and zoos
    e. For younger Victorians: agricultural areas and home gardens

Opportunities for Victorians to act to enhance nature

Victorians do enact (and intend to continue enacting) pro-environmental behaviours, but the most frequent behaviours are independent of natural environments: reducing energy use and catching public transport. Pro-environmental behaviours specifically associated with protecting and enhancing nature such as collecting information for science, volunteering or advocating for the environment, were least common. An analysis of barriers to pro-environmental behaviours found that attitudes, opportunity and capability were frequently mentioned as reasons why Victorians did not enact these latter behaviours.

The survey did find an association between feeling connected to nature and, while in nature, acting to protect the natural environment. We recommend that the VVN team provide opportunities for Victorians to act to enhance nature by:

1. Teaching Victorians how they can volunteer, protect, or take other direct actions to enhance nature (addressing capability barrier)
2. Informing Victorians of existing avenues for pro-environmental behaviour while they are in nature (e.g., while visiting the beach, what citizen science actions can they take?) (addressing opportunity barrier)
3. Persuading Victorians of the importance or effectiveness of some pro-environmental behaviours (addressing attitude barrier)
4. Leveraging the association between connection to nature and willingness to act to protect the natural environment as part of a campaign
5. Leveraging existing pro-environmental behaviours such as reducing energy use and catching public transport to encourage Victorians to take up new pro-environmental behaviours, emphasising the consistency between the behaviours.

RECOMMENDATIONS FOR POLICY CAMPAIGN AND INTERVENTIONS: A FOCUS ON GARDENS

Victorians' identified their own gardens as primary opportunities to spend time in nature. Other urban green spaces such as parks, courtyards, and green roofs were next most used by Victorians. While there are differences in places that Victorians spend time in nature as opposed to places where they feel connected to nature, this overlaps in their own gardens. Policies and campaigns that focus on increasing connection to nature and spending time in nature could focus on gardens specifically, as opposed to national parks, which may suffer from greater accessibility barriers, particularly for those living in Melbourne. A focus on gardens might also overcome some of the commonly identified barriers to spending time in nature.

In the following, we focus on the importance of gardens as a point of connection to nature and provide suggestions for policy campaigns and interventions supported by findings of the academic literature. Research focusing on what it is that people value about gardening (Freeman, Dickinson, Porter, & van Heezik, 2012; Gross & Lane, 2007; Kiesling & Manning, 2010) highlight the following six themes (below) and thus support the garden as a place of connection to nature.

1	Escapism	Gardens offer a place to escape the stressful parts of life
2	Ownership and identity	Through gardening people can create and attach to places
3	Connectedness to nature	Connecting with plants and animals in the garden
4	Social relationships	Gardens are often places where families, friends, and neighbours come together for relaxation and celebrations and thus building social connections
5	Duty of caring	Taking responsibilities for plants and animals and thus showing affinity with and caring for the environment
6	Health	Physical and mental health improves when spending time in nature (also related to escapism)

What does it mean for DELWP?

Garden as leverage point for pro-environmental actions

Gardens represent an important part of Victorians connection with nature. They therefore seem to be an ideal starting position to support Biodiversity 2037 and to get 5 million Victorians to act for nature. Victorians spend most of the time in nature in their garden. It is in their gardens, where most Victorians connect and identify with nature potentially through gardening and caring for the little bit of nature that they feel responsible for. Although not measured in the survey, it is likely that Victorians experience physical and mental health benefits from being in their garden (de Vries, Verheij, Groenewegen, & Spreeuwenberg, 2003; Kaplan, 1995; Tenngart Ivarsson & Hagerhall, 2008). Thus, Victorians have positive memories and evaluations of their garden, which can be used as an important lever for further pro-environmental actions.

Victoria – the garden state: Strengthening Victorians connection with nature through their love for gardens

A campaign could benefit from these findings by focusing on Victorians as gardeners. This image is likely to be relevant and appealing for the majority of Victorians (e.g., "I identify as a Victorian. I identify as a gardener"). In line with social-identity theory which contends that a portion of one's self-concept is derived from perceived group membership (Turner & Oakes, 1986), identifying with nature through their garden is likely to increase general connection to nature and foster protection behaviours (Freeman et al., 2012). Identifying as a person for whom nature is an important part of who they are has been shown to be related to various pro-environmental outcomes like for example waste reduction, eco-shopping, water and energy conservation (Clayton, 2003; Clayton, 2012; Kashima, Paladino, & Margetts, 2014; Mayer & Frantz, 2004; Whitmarsh & O'Neill, 2010).

This strengthened and highlighted environmental identity fosters a stronger sense of connection to nature, which then can be paired with targeted actions that help to protect biodiversity in Victoria (see Figure 35 for an outline of key ideas). Here it is important to focus on different target groups. As identified in the report, Victorians differ in their connection to nature and particularly those with high and low connection scores are distinct groups.

Specific interventions should be designed for these groups. We will provide some recommendation for the different groups in the next section.

Figure 35. Key Aspects for Suggested Policy Campaign.

Designing specific interventions for Victorians with different level of connectedness to nature

The population segmentation on connectedness to nature identified three groups of Victorians of which two groups have very distinct characteristics as summarized again in Table 21.

Table 21. Key Characteristics of CN Low and CN High.

CN Low	Victorians with a low connection to nature are more likely to be ▪ Male ▪ Unemployed ▪ Speak only English at home ▪ Spent some of their childhood in Australia
CN High	Victorians with a high connection to nature are more likely to be ▪ Female ▪ 60+ ▪ Retired ▪ Work in the environmental sector

Target group: Men

Differences between men and women in regards to pro-environmental values and action are commonly reported in the literature (Dietz, Kalof, & Stern, 2002; Gifford & Nilsson, 2014; Zelezny, Poh-Pheng, & Aldrich, 2000). Some researchers (Brough, Wilkie, Jingjing, Isaac, & Gal, 2016) suggest that caring for the environment and particularly sustainable consumption is often associated with the traditional female gender role of caring and nurturing. Particularly when men's masculinity is threatened, engagement in pro-environmental actions reduces (Brough et al., 2016). This could be the case for Victorians with a low connection to nature in particular when they are unemployed, which may further threaten their gender identity. Making acting for the environment "manly" has been shown to increase environmental actions for men. Using male role models that have a high source credibility particularly for men with more traditional gender views (e.g., football coaches) may help to increase engagement in pro-environmental actions (Pornpitakpan, 2004). A potential area to start may be men sheds and cooperation between DELWP and men sheds could focus on activities that are perceived to be "manly" and benefit biodiversity in Victoria. (e.g., building nest boxes).

Target group: Younger Victorians

Engaging younger Victorians to act for nature can focus on various partnerships with organisations in which younger Victorians are prevalent. Universities and sport clubs are two potential partners, which are often open to pro-environmental views. Partnerships with organisations with a high rate of younger

employees are another potential avenue. There are also opportunities to implement interventions in specific locales and settings (e.g., workplaces) and targeting types of behaviours (e.g., personal and social; private and public) and demographic segments (e.g., younger individuals in full-time employment).

Some more innovative ideas of engaging younger people in biodiversity protection is the 'landcare for singles' approach which can be found in various states across Australia (e.g., Yarra Ranges Landcare Network https://www.yarrarangeslandcare.org.au/landcare-projects/landcare-for-singles.html). These projects offer great potential to engage younger Victorians to act to protect and have been found to attract individuals who were mostly completely new to landcare. It seems useful to support and expand these programs throughout Victoria and particularly within Melbourne.

Target group: Green Champions

Clearly, Victorians with a high connection to nature are the green champions for biodiversity. It is therefore important to appreciate and value the effort of these Victorians and also to strengthen their role model function. In particular, social norms (Cialdini, Reno, & Kallgren, 1990; Goldstein, Cialdini, & Griskevicius, 2008) and role modelling (Osbaldiston & Schott, 2011; Steg & Vlek, 2009; Sussman, Greeno, Gifford, & Scannell, 2013) have been shown to influence people's pro-environmental actions. Accordingly, communicating how many other people engage in a particular behaviour can prompt people to engage in pro-environmental actions (Goldstein et al., 2008). Furthermore, in a meta-analysis by Osbaldiston and Schott (2011), role modelling has been found to be an effective intervention for the instigation of pro-environmental behaviour. Social modelling encompasses any kind of passing of information via demonstration or discussion, which includes the initiators personally engaging in the behaviour (Osbaldiston & Schott, 2011).

Interventions could focus and promote those Victorians so that their positive impact on Victoria's environment becomes more recognised. By doing so, more and more Victorians may see that these Green Champions are similar to themselves and realise their own potential to act to protect nature.

Some ideas to promote Victoria's Green Champion could be competitions on various biodiversity related topics for bird clubs, nature clubs or citizen science projects. Furthermore, it is important for DELWP to support those Victorians that are highly connected to nature and that act to protect nature. Support should come in financial ways to allow expanding their work, but also in information and education about how to best act to protect for Victoria's environment.

LEVERAGING THE BWA METHOD FOR NEXT STEPS

The BehaviourWorks Australia (BWA) method consists of Exploration, Deep Dive, and Application (Figure 36). The VVN Foundations Survey forms part of the Deep Dive phase. It was informed by a detailed literature review and BWA & DELWP expert input (Exploration phase).

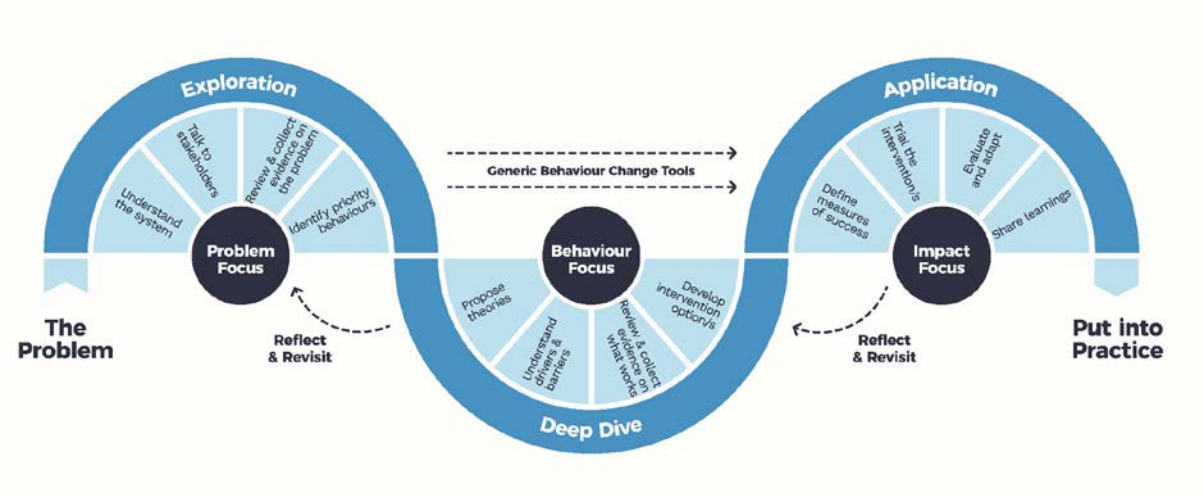


Figure 36. BehaviourWorks Australia Method Framework.

It is important to consider the Foundations Survey findings through the lens of the BWA method to ensure that Application of the findings is successful and that the VVN project can realise its impact.

Define measures of success

Regardless of the target group or campaign, it is important that DELWP identifies actions that are most important for Victoria's biodiversity and promotes these actions. The foundation survey has found that in general Victorians scored highly on the environmental awareness questions and are generally willing to protect nature, however, a clear strategy of what and how to protect needs to be given by DELWP to focus on actions with the biggest impact on biodiversity. Furthermore, clarity about actions to promote biodiversity in Victoria is needed to define measures of success for interventions or campaigns. If pro-environmental actions are not defined in a clear and precise way, it is also not possible to measure the success of a campaign or intervention.

Trial the intervention/s, evaluate and adapt

Within this report we recommend various actions to strengthen Victorians connectedness to nature and increase their engagement in pro-environmental actions. It is important to trial and test any intervention to measure its effectiveness and maximise its potential to scale.

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APPENDIX A: VVN FOUNDATIONS SURVEY

INTRODUCTION & SCREENING

Intro: Thank you for your interest in this study. Before continuing, please read the information below carefully.

This study is being conducted by Monash University on behalf of the Department of Environment, Land, Water and Planning. The aim of the study is to understand Victorians attitudes towards and use of the natural environment. Your survey responses will help to inform government policy and funding of programs into the future. This is an opportunity for you to have your say.

If you participate, we will only need about 20 minutes of your time to complete this online survey.

Your participation is completely voluntary and you can withdraw at any point during the survey. If you withdraw, any responses you provided will not be used.

Your answers will remain anonymous and will only be accessible by the research team. There should be no discomfort for you, other than the time taken to complete the survey.

At the end of the research a report will be prepared for the Department in summary format, so that no individual can be identified. The research findings may also be submitted for publication or used in conference presentations (also in summary format). All data collected will be securely transferred to and stored on the Monash University network with restricted access. The data may be retained and used by the research team for comparative purposes in the future.

If you have any concerns or complaints about the project, you can contact the Executive Officer of the Monash University Human Research Ethics Committee.

Project number: 14010
Executive Officer

Monash University Human Research Ethics Committee (MUHREC)

Room 111, Building 3e

Research Office

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PreDem1: First, we'd like to collect some information about you to make sure we are surveying a representative group of the Victorian population.

Age: Please specify your age:

1. _____ years [PROGRAMMER NOTE: ALLOW NUMERIC RESPONSES ONLY, IF <18 TERMINATE]

Gen: Please specify your gender:

1. Female
2. Male
3. Other (specify): _____

Pcode: And what is the postcode of your main residence? [PROGRAMMER NOTE: TERMINATE IF OUTSIDE VIC]

1. _____

SECTION A: NATURE CONNECTION

NDF: What comes to mind when you think of 'nature'? Please describe in your own words.

1. [OPEN TEXT]

[PROGRAMMER NOTE: EMPHASIZE WORDS IN BOLD]

ND: In this survey, we would like you to think about nature as everything that is not made by humans. This includes all the ***animals, plants***, and ***vegetation*** in ***land*** and ***water*** habitats, located in ***urban*** and ***rural*** areas, and including ***highly modified landscapes*** through to ***pristine wilderness*** areas on land and in the water.

CN1. Please rate the extent to which you agree or disagree with the following statements:

[PROGRAMMER NOTE: RANDOMISE STATEMENTS]	**Strongly disagree (1)**	**(2)**	**(3)**	**Neither agree nor disagree (4)**	**(5)**	**(6)**	**Strongly agree (7)**
1. I think of myself as an 'environmentalist'							
2. I think of myself as someone who is very concerned about taking care of nature							
3. Protecting nature is an important part of who I am							
4. My relationship to nature is a big part of how I think about myself							
5. I feel uneasy if I am away from nature for too long							
6. I feel right at home when I am in nature							
7. Feeling connected to nature helps me deal with everyday stress							
8. I feel a strong emotional connection to nature							
9. I enjoy spending time in nature							
10. I like to get outdoors whenever I get the chance							
11. Being in nature allows me to do the things I like doing most							
12. Getting away on an overnight trip in nature is something I do as often as I can							
13. Forests are valuable mostly because they produce wood products, jobs and income for people							
14. Meeting the needs of people requires sacrificing some natural areas							
15. In order to provide us with the goods and services we need we can't avoid nature being degraded.							
16. Natural areas are important to people because we use them for recreation							
17. My connection to nature is something I would describe as "spiritual"							
18. Everything in nature is connected (e.g. animals, plants, humans, water, air, land, fire, etc.)							
19. Human beings and nature are connected by the same 'energy' or 'life-force'							
20. Human wellbeing depends upon living in harmony with nature							

SECTION B: ENVIRONMENTAL VALUES

EV1.

Please indicate how much you support or oppose each of these as a guiding principle in YOUR life.

When you use the scale, please recognise that 1 means that the value is a guiding principle you are strongly opposed to; 4 means that the value is not important as a guiding principle in your life; and 7 means that you strongly support the use of the value as a guiding principle in your life.

[PROGRAMMER NOTE: RANDOMISE STATEMENTS]	Strongly oppose 1	2	3	Not important 4	5	6	Strongly support 7
1. Protecting the environment: preserving nature							
2. Unity with nature: fitting into nature							
3. Respecting the earth: harmony with other species							
4. Preventing pollution: protecting natural resources							
5. A world at peace: free of war and conflict							
6. Social justice: correcting injustice, care for the weak							
7. Equality: equal opportunity for all							
8. Helpful: working for the welfare of others							
9. Authority: the right to lead or command							
10. Influential: having an impact on people and events							
11. Wealth: material possessions, money							
12. Social power: control over others, dominance							

SECTION C: ENGAGEMENT BEHAVIOURS

EB1. In the last year, about how often have you generally spent time in nature?

1. Every day
2. Every other day
3. At least once a week
4. At least once a fortnight
5. At least once a month
6. At least twice a year
7. At least once a year
8. Less than once a year
9. Never

EB2. In the last year, how often have you spent time in/at the following places?

[PROGRAMMER NOTE: RANDOMISE STATEMENTS]	**Never (1)**	**Less than once a year (2)**	**At least once a year (3)**	**At least twice a year (4**	**At least once a month (5)**	**At least once a fortnight (6)**	**At least once a week (7)**	**Every day (8)**
1. A national park, state forest or other protected natural areas								
2. A lake, river or other waterways								
3. A zoo or wildlife park								
4. An urban park with grassy lawns and trees								
5. A native bushland reserve								
6. An agricultural area								
7. The beach or coastal areas								
8. Your own garden at home								
9. A “green” urban space like a green roof or leafy courtyard								
10. A community garden								

EB2a. Are there any other places where you spend time in nature?

1. [OPEN TEXT]

EC1.Please indicate how connected you feel to nature in/at the following places:

[PROGRAMMER NOTE: DISPLAY ITEMS FROM EB2 =>2; RANDOMISE STATEMENTS]	**Not connected at all** (1)	(2)	(3)	**Neither connected nor disconnected** (4)	(5)	(6)	**Very strongly connected** (7)
1. A national park, state forest or other protected natural areas							
2. A lake, river or other waterways							
3. A zoo or wildlife park							
4. An urban park with grassy lawns and trees							
5. A native bushland reserve							
6. An agricultural area							
7. The beach or coastal areas							
8. Your own garden at home							
9. A “green” urban space like a green roof or leafy courtyard							
10. A community garden							

EC1a. Are there any other places not listed above where you feel connected to nature? If yes, please describe.

1. [OPEN TEXT]

ECHS. Are you a parent or guardian of a child or children (17 years or younger)?

1. Yes
2. No

TIN. Please indicate the extent to which you agree or disagree with the following statements:

[PROGRAMMER NOTE: RANDOMISE STATEMENTS]	**Strongly disagree (1)**	**(2)**	**(3)**	**Neither agree nor disagree (4)**	**(5)**	**(6)**	**Strongly agree (7)**
1. I spend as much time as possible in nature							
*(DISPLAY IF ECHS=1) 2. It is important to me that my child/children spend time in nature							
3. I don't like spending time in nature							
4. It is difficult for me to access nature							
5. Few of my family or friends spend time in nature							
6. I don't have time to get out into nature							
7. I would like to spend more time in nature							

EBS3. What type of pet do you own (please select as many as apply)?
[PROGRAMMER NOTE: ALLOW MULTIPLE RESPONSES]

1. I don't own a pet [EXCLUSIVE]
2. Dog
3. Cat
4. Other (specify) _____

EB3. When you spend time in nature how often do you do the following?

[PROGRAMMER NOTE: RANDOMISE STATEMENTS]	Never (1)	Less than once a year (2)	At least once a year (3)	At least twice a year (4)	At least once a month (5)	At least once a fortnight (6)	At least once a week (7)	Every day (8)
1. Rest and recover								
2. Engage in social activities								
*(DISPLAY IF ECHS=1) 3. Accompany children to an activity								
4. Engage in any form of physical activities								
5. Engage in motorised leisure activities (e.g. boating, trail-biking, off-roading)								
6. Enjoy a sense of peace, tranquillity and awe								
7. Engage in cultural activities								
8. Enjoy and connect with nature								
9. Have a picnic or BBQ								
*(DISPLAY IF EBS3=2) 10. Walk your dog								
11. Gardening								
12. Pass through to reach my destination								
13. Act to protect the natural environment								

EB3a.Are there any other things you do when you are in nature?

1. [OPEN TEXT]

EB4. And how often do you do the following?

[PROGRAMMER NOTE: RANDOMISE STATEMENTS]	Never (1)	Less than once a year (2)	At least once a year (3)	At least twice a year (4)	At least once a month (5)	At least once a fortnight (6)	At least once a week (7)	Every day (8)
1. Visit a natural history museum								
2. Watch a nature documentary								
3. Look at images of natural environments (e.g. a poster of a rainforest)								
4. Read about nature in a book or online								

SECTION D: AWARENESS

EK1. How would you rate the health of the natural environment in Victoria today?

1. Very poor
2. Poor
3. Neither poor nor good
4. Good
5. Very good
6. I don't know

EK2. Please indicate the extent to which you agree or disagree with the following statements:

[PROGRAMMER NOTE: RANDOMISE STATEMENTS]	**Strongly disagree (1)**	**(2)**	**(3)**	**Neither agree nor disagree (4)**	**(5)**	**(6)**	**Strongly agree (7)**
1. A healthy natural environment is essential to the production of food, clean air and water.							
2. A healthy natural environment can help to protect people from the impacts of climate change.							
3. A healthy natural environment is important for Victoria's economy.							
4. Variety in native plants and animals is a sign of a healthy natural environment.							
5. The urban environment can provide an important home for Victoria's native plants and animals.							
6. A healthy environment is important to the wellbeing of people and communities.							
7. There are native plants and animals in Victoria that are at risk of serious decline or becoming extinct.							
8. Clearing of land is a threat to Victoria's natural environment.							
9. Foreign plants and animals can negatively impact our native plants and animals.							
10. Household waste, such as plastics and chemicals, can pose a threat to Victoria's natural environment.							
11. Climate change will harm the state's native plants and animals.							

SECTION E: BEHAVIOUR

Pre PEB1. For the next few questions we'd like to know a little bit more about you and some of the activities you may or may not engage in. We understand that not all of these options are available to all people.

PEB1. How would you describe the area that you live in?

1. Inner city
2. Urban / suburban
3. Peri-urban (areas that lie just outside a city or town's suburban fringe)
4. Rural
5. None of the above

PEB2.What kind of outside space do you have at your main residence?

1. Rural property / acreage
2. Backyard / front yard
3. Private courtyard
4. Communal courtyard / garden
5. Balcony / terrace
6. None of the above

PEBS3. Do you own the property you are living on?

1. Yes
2. No

*(DISPLAY IF PEB2=1, 2)
PEB3a. How often have you done each of the following activities on your property?

[PROGRAMMER NOTE: RANDOMISE STATEMENTS]	**Never (1)**	**Rarely (2)**	**Sometimes (3)**	**Often (4)**	**Always (5)**
1. Managed pest plant and animal species on your property					
2. Plant native plants on your property					

*(DISPLAY IF PEB2=1)

PEB3b. And have you undertaken any of the following activities?

[PROGRAMMER NOTE: RANDOMISE STATEMENTS]	Yes	No
1. Fenced areas of your property (e.g. creeks / remnant forest areas) to help protect native plants and animals		
2. Registered part of your property with a land conservation program (covenant)		

PEBpast. In the last year, how often have you done each of the following activities?

[PROGRAMMER NOTE: RANDOMISE STATEMENTS]	**Never (1)**	**Rarely (2)**	**Sometimes (3)**	**Often (4)**	**Always (5)**
*(DISPLAY IF EBS3=2, 3, 4) 1. Controlled the movements of your pets to keep them away from native birds and animals i.e. keep my cat inside at night					
2. Chosen native plant species when planting / gardening					
3. Reduced energy use (e.g. electricity/gas) in the home					
4. Chosen sustainable seafood					
5. Used public transport rather than driving					
6. Volunteered time for activities that take care of the environment (e.g. planting trees, clearing weeds)					
7. Collected information on the natural environment for scientific projects or databases (citizen science)					
8. Donated money to organisations that take care of the environment					
9. Advocated for the environment (by, for example, contacting businesses or politicians about environmental issues, signing pro-environment petitions, attending rallies etc.)					
10. Cleaned up litter in a public space, park or forest					
11. Been involved in a local community garden or community composting activity					

PEBlike. How likely or unlikely is it that you would take up (or continue doing) the following activities over *the next 12 months*?

[PROGRAMMER NOTE: RANDOMISE STATEMENTS]	**Very unlikely (1)**	**(2)**	**(3)**	**Neither likely nor unlikely (4)**	**(5)**	**(6)**	**Very likely (7)**
*(DISPLAY IF EBS3=2, 3, 4) 1. Control the movements of your pets to keep them away from native birds and animals i.e. keep my cat inside at night							
2. Choose native plant species when planting/gardening							
3. Reduce energy use (e.g. electricity/gas) in the home							
4. Choose sustainable seafood							
5. Use public transport rather than driving							
6. Volunteer time for activities that take care of the environment (e.g. planting trees, clearing weeds)							
7. Collect information on the natural environment for scientific projects or databases (citizen science)							
8. Donate money to organisations that take care of the environment							
9. Advocate for the environment (by, for example, contacting businesses or politicians about environmental issues, signing pro-environment petitions, attending rallies etc.)							
10. Clean up litter in a public space, park or forest							
11. Be involved in a local community garden or community composting activity							

*(DISPLAY IF PEBlike STATEMENT <= 4 – repeat for each statement [responses will be coded to barriers of behaviour])
BAR1: Why are you not likely to <INSERT TEXT FROM PEBlike > more often?

1. (SPECIFY: open text)

*(DISPLAY IF PEBpast STATEMENT <= 2 AND PEBlike STATEMENT >=5 – repeat for each statement [responses will be coded to drivers of behaviour])
DRI1: You indicated that you are likely to <INSERT TEXT FROM PEBlike > but that you haven't done this much (or at all) over the past 12 months. Why are you likely to <INSERT TEXT FROM PEBlike > more frequently over the next 12 months?

SECTION F: DEMOGRAPHICS

PreDem2: You're almost at the end of the survey. This last section is to help us learn a little more about you.

EmpStat: What is your current employment status? (If employed but currently on leave, this would still be classified as employed)

1. Employed full time (30 or more hours)
2. Employed part time (less than 30 hours)
3. Employed casually
4. Self-employed
5. Student only
6. Student and working full time (30 or more hours)
7. Student and working part time (less than 30 hours per week)
8. Engaged in home duties or volunteer work
9. Retired
10. Unemployed

Enviro. Do you work in the environment sector?

1. Yes
2. No

Edu: What is the highest level of education qualification you have completed?

1. Year 10 or below
2. Year 11
3. Year 12
4. Certificate I/II
5. Certificate III/IV
6. Diploma / Advanced Diploma
7. Bachelor's degree
8. Graduate diploma / Graduate certificate
9. Postgraduate degree

Disab: Do you identify as having a disability?

1. Yes
2. No

ATSI: Do you identify as Aboriginal or Torres Strait Islander?

1. Yes, Aboriginal
2. Yes, Torres Strait Islander
3. Yes, Aboriginal and Torres Strait Islander
4. No

LOTE: Besides English, what is the main language you speak at home?

1. Only English
2. Other (SPECIFY)

COB: In which country were you born?

1. Australia
2. Other (SPECIFY)

*(IF COB=2)
ARR: In what year did you arrive in Australia?

1. _____ (year)

COC: Did you spend any of your childhood living in Australia?

1. Yes
2. No

(ALL)
PI: What is your approximate HOUSEHOLD income?
This refers to the total income from all household occupants, and includes income from wages and salaries, government benefits, pensions, allowances and any other income you usually receive, before deductions for tax, superannuation contributions, health insurance, amounts salary sacrificed, or any other automatic deductions.

1. $1-$199 per week ($1-$10,399 per year)
2. $200-$299 per week ($10,400-$15,599 per year)
3. $300-$399 per week ($15,600-$20,799 per year)
4. $400-$599 per week ($20,800-$31,199 per year)
5. $600-$799 per week ($31,200-$41,599 per year)
6. $800-$999 per week ($41,600-$51,999 per year)
7. $1,000-$1,249 per week ($52,000-$64,999 per year)
8. $1,250-$1,499 per week ($65,000-$77,999 per year)
9. $1,500-$1,999 per week ($78,000-$103,999 per year)
10. $2,000 $2,499 per week ($104,000-$129,999 per year)
11. $2,500-$2,999 per week ($130,000-$155,999 per year)
12. $3,000-$3,499 per week ($156,000-$181,999 per year)
13. $3,500-$3,999 per week ($182,000-$207,999 per year)
14. $4,000-$4,999 per week ($208,000-$259,999 per year)
15. $5,000 or more per week ($260,000 or more per year)
16. Negative or nil income
17. Prefer not to answer

CLOSE

End: That's the end of the survey. Thank you for your time and for the responses you provided today. Just a reminder, all your responses will remain anonymous and will be reported in summary format only. If you have any concerns about the ethical aspects of this study you can contact the Executive Officer of the Monash University Human Research Ethics Committee.

Executive Officer

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APPENDIX B: DESCRIPTION OF SAMPLE

Appendix Table 1. Demographic Characteristics of Respondents (n=3090)

Variable	Response Category	% Respondents VVN
Gender	Female	50.2
	Male	49.7
	Other	.1
Age	18-29	19.3
	30-39	18.4
	40-49	17.3
	50-59	17.9
	Over 60	27.1
	Mean Age	46.97
Region	Melbourne	76.1
	Rest of Victoria	23.9
SA4 regions	Ballarat	2.5
	Bendigo	2.1
	Geelong	5.0
	Hume	2.2
	Latrobe - Gippsland	3.5
	Melbourne - Inner	19.1
	Melbourne - Inner East	7.6
	Melbourne - Inner South	9.2
	Melbourne - North East	6.9
	Melbourne - North West	5.2
	Melbourne - Outer East	8.5
	Melbourne - South East	10.3
	Melbourne - West	9.9
	Mornington Peninsula	4.5
	North West	1.3
	Shepparton	1.0
	Warrnambool and South West	1.1
Employment status	Employed full time (30 or more hours)	45.4
	Employed part time (less than 30 hours)	11.6
	Employed casually	4.4
	Self-employed	7.1
	Student only	2.4
	Student and working full time (30 or more hours)	0.3
	Student and working part time (less than 30 hours per week)	2.3
	Engaged in home duties or volunteer work	5.5
	Retired	18.0
	Unemployed	3.0
Employed in environment sector	Yes	2.5
	No	97.5
Highest level of education	Year 10 or below	5.5
	Year 11	4.8
	Year 12	13.2
	Certificate I/II	2.4
	Certificate III/IV	8.2
	Diploma/Advanced Diploma	13.1
	Bachelor's degree	29.0
	Graduate diploma/Graduate certificate	7.0
	Postgraduate degree	16.9
Household make-up	Household with child/children	23.4
	Household without children	76.6

Pets	No	49.6
	Dog	33.2
	Cat	21.3
	Other	6.4
Residence area	Inner city	18.4
	Urban / suburban	60.8
	Peri-urban	9
	Rural	11.3
	Other	.5
Outside Space	Rural property / acreage	6.1
	Backyard / front yard	67.4
	Private courtyard	11.6
	Communal courtyard / garden	2.9
	Balcony / terrace	9.8
	None of the above	2.1
Hone tenure	Own	68.3
	Rent	31.7
Disability	Identify as having a disability	9.5
	Identify as not having a disability	89.4
	Prefer not to say	1
Aboriginal or Torres Strait Islander	Aboriginal	.8
	Torres Strait Islander	.1
	Aboriginal and Torres Strait Islander	.1
	No	98.5
	Prefer not to say	.5
Main language at home	English	87.3
	Other	11.3
	Prefer not to say	1.3
Country of birth	Australia	75.3
	Other	23
	Prefer not to say	1.7
Childhood spent in Australia	Yes	79.2
	No	20.8

APPENDIX C: CONNECTION TO NATURE

CONFIRMATORY FACTOR ANALYSIS OF CONNECTION TO NATURE (CN) ITEMS

Twenty questions were used to measure the different dimensions of CN which were developed from other measurement approaches in the literature. Participants reported their responses on 7-point scales ranging from "strongly disagree" to "strongly agree" to randomly presented statements concerning the theoretical domains of interest: Attachment, Identity, Materialism, Experiential, and Spirituality. These responses were subjected to Confirmatory Factor Analysis to determine the accuracy of the measurement process.

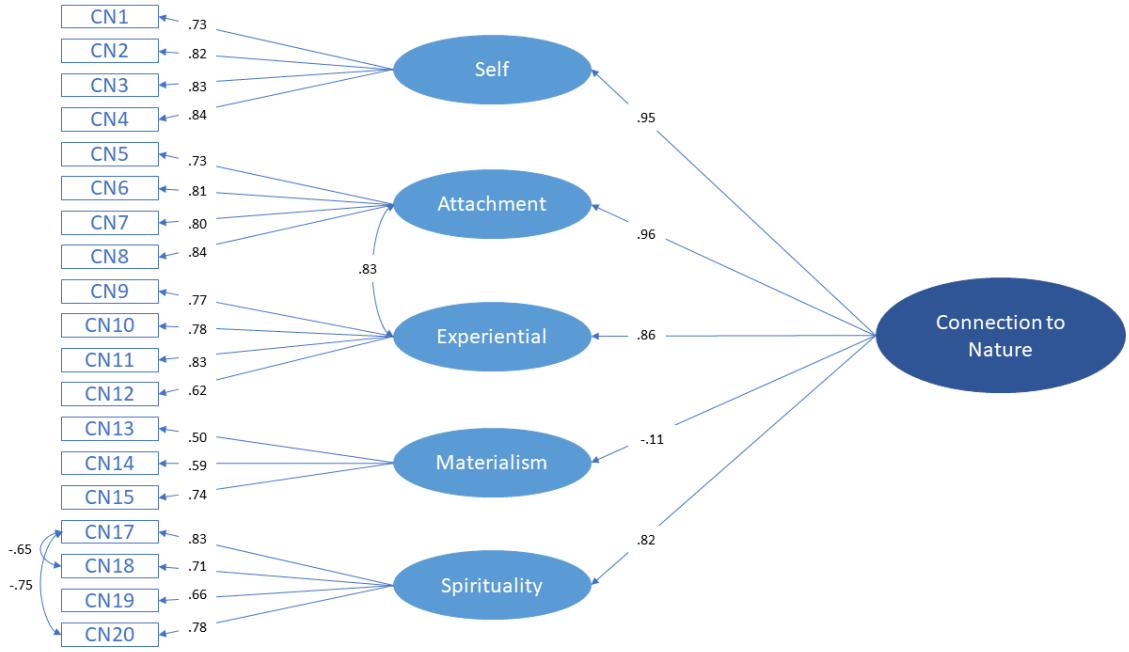
Appendix Table 2. Please rate the extent to which you agree or disagree with the following statements:

		Mean	Standard Deviation	Factor Loading	Scale Reliability
CN1	I think of myself as an 'environmentalist'	4.28	1.57	.73	.88
CN2	I think of myself as someone who is very concerned about taking care of nature	5.18	1.33	.82	
CN3	Protecting nature is an important part of who I am	5.18	1.37	.83	
CN4	My relationship to nature is a big part of how I think about myself	4.62	1.48	.83	
CN5	I feel uneasy if I am away from nature for too long	4.40	1.57	.73	.87
CN6	I feel right at home when I am in nature	5.24	1.33	.81	
CN7	Feeling connected to nature helps me deal with everyday stress	5.17	1.43	.80	
CN8	I feel a strong emotional connection to nature	4.97	1.48	.84	
CN9	I enjoy spending time in nature	5.80	1.19	.77	.84
CN10	I like to get outdoors whenever I get the chance	5.46	1.31	.78	
CN11	Being in nature allows me to do the things I like doing most	4.99	1.35	.84	
CN12	Getting away on an overnight trip in nature is something I do as often as I can	4.09	1.70	.63	
CN13	Forests are valuable mostly because they produce wood products, jobs and income for people	3.80	1.86	.51	.64[b]
CN14	Meeting the needs of people requires sacrificing some natural areas	4.14	1.54	.60	
CN15	In order to provide us with the goods and services we need we can't avoid nature being degraded.	4.10	1.76	.74	
CN16	Natural areas are important to people because we use them for recreation	5.63	1.21	.12	
CN17	My connection to nature is something I would describe as "spiritual"	4.06	1.75	.83	.77
CN18	Everything in nature is connected (e.g. animals, plants, humans, water, air, land, fire, etc.)	6.06	1.15	.71	
CN19	Human beings and nature are connected by the same 'energy' or 'life-force'	5.07	1.52	.66	
CN20	Human wellbeing depends upon living in harmony with nature	5.84	1.20	.78	

Note. Items 1-4=Identity; items 5-8=Attachment; items 9-12=Experiential; items 13-16=Materialism; items 17-20=Spirituality. Reliability statistic calculated without CN16.

The results of the analysis supported removing one variable (CN 16 in Appendix Table 2) from the CN scale because it proved to be a poor measure of the Materialism dimension it was intended to reflect.

The remaining 19 items were found to be good measures of their respective CN dimensions. Furthermore, the five CN dimensions were found to be related to an overarching CN variable to varying degrees (see figure below). Attachment and Identity were the dimensions most similar to the overarching concept of CN. In contrast, Materialism had the weakest relationship with CN, and this correlation was negative in nature. That is, higher levels of CN were (marginally) associated with lower levels of Materialism.



Appendix Figure 1. Confirmatory Factor Analysis Model of the CN Scale Items

Sub-scales of each CN dimension were constructed as well as a total CN variable representing the combination of the five dimensions. Paired t-tests were undertaken to identify mean differences between the dimensions with the results reported in the table below. The means of all variables were significantly different between one another with the largest differences occurring for Spirituality and Materialism and Experiential and Materialism. In both cases, the mean of Materialism was significantly lower.

Appendix Table 3. Results of Paired Samples Test for CN Dimensions

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
1	Identity - Attachment	-0.13	0.80	0.01	-0.16	-0.10	-9.226	3089	.000
2	Identity - Experiential	-0.27	0.92	0.02	-0.31	-0.24	-16.525	3089	.000
3	Identity - Materialism	0.80	1.89	0.03	0.73	0.87	23.525	3089	.000
4	Identity - Spirituality	-0.44	0.91	0.02	-0.48	-0.41	-27.084	3089	.000
5	Attachment - Experiential	-0.14	0.76	0.01	-0.17	-0.11	-10.382	3089	.000
6	Attachment - Materialism	0.93	1.87	0.03	0.87	1.00	27.783	3089	.000
7	Attachment - Spirituality	-0.31	0.88	0.02	-0.34	-0.28	-19.581	3089	.000
8	Experiential - Materialism	1.07	1.73	0.03	1.01	1.14	34.419	3089	.000
9	Experiential - Spirituality	-0.17	1.00	0.02	-0.20	-0.13	-9.436	3089	.000
10	Materialism - Spirituality	-1.24	1.74	0.03	-1.30	-1.18	-39.769	3089	.000

APPENDIX D: EXAMPLE COMMENTS FOR BEHAVIOURAL BARRIER CODING

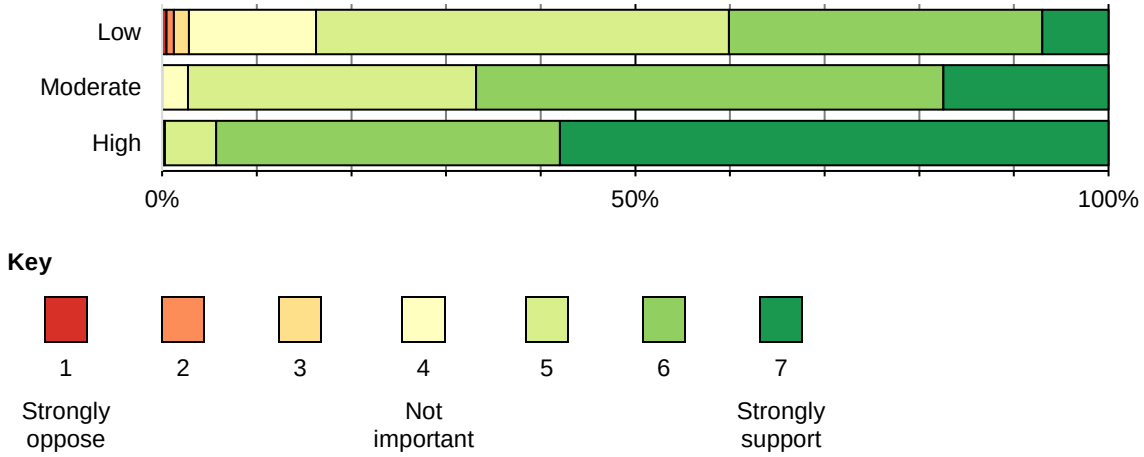
	Pet control	Native plants	Energy use	Seafood choice	Public transport	Volunteer	Citizen science	Donate money	Advocacy	Litter pickup	Community gardening
Attitude	"my choice - free country" "My dogs don't impact."	"Prefer non-native plants" "Freedom of choice"	"it makes no difference" "why should I" "Comfort"	"Who cares" "It doesn't concern me"	"I prefer to use my car" "I dont trust it"	"to timid" "Not really interested"	"don't feel I need to" "Not of interest to me."	"do not trust charities" "donate to other causes"	"It's not my thing" "Not interested" "Have no strong beliefs"	"Not my responsibility" "Not interested"	"not interested"
Social norms	"I have a partner who doesn't like animals in the house"	-	"I'm not the only one living here."	-	-	-	-	-	-	-	-
Capability	"No time." "Too difficult"	"too expensive" "Don't know what is native"	"Too much effort" "taking too much time"	"Availability and price" "I never heard of it"	"easier to drive" "convenience" "takes too long"	"Too old" "I don't really have the time" "Busy mum"	"no time" "Unsure how to" "Physically unable to"	"need money to pay BILLS" "financial pressures"	"lack of time" "Illness" "Wouldnt know how"	"I have no time or energy to do so." "Physical disability."	"Not enough time." "Health reasons"
Opportunity	"My dog always sleeps inside" "I already do, cats are inside only"	"Garden is already established" "I rarely garden"	"don't use much anyway" "Already feel I do that as much as possible"	"Rarely eat seafood" "do not buy seafood"	"Because don't need to use" "short trips only"	"Unaware of where to volunteer" "I do other things to help people"	"havent seen that oportunity"	"Already donate to lots of charities"	"I would sign a petition but never attend a rally" "No opportunity"	"Do not go to these areas very much." "I'm not outside that often"	"Don't live near one" "i don't know of any"
Habits	"Forget to actually"	-	"I have not thought about it and the need to do so"	"Never thought about it"	-	-	-	-	"I'm more likely to make changes in my day to day..."	"To be honest, I haven't thought about it much."	-
Emotions	-	-	-	-	-	-	-	-	-	"gross"	-
Biases	-	-	-	-	-	-	-	-	-	-	-
Context	"Don't need to my dog stays in my backyard"	"We are not allowed to alter the garden in our rental property."	"I don't have control over it"	"Unclear labelling"	"there is limited public transport where I live,"	-	-	-	-	"because it might be dirty"	-
N/A	"We have birds"	"I don't garden."	-	"vegetarian, (dont eat seafood)"	"na"	"N/A"	"na"	-	"just because"	"don't know"	"I am not a gardener"
No reason/ not sure	"i don't know"	"not sure"	"because" "do not know"	"Not sure"	"None"	"Not sure"	"Just wouldn't"	"no specific reason"	"na"	"Na"	"No response"

APPENDIX E: CHAPTER 1 ENVIRONMENTAL PSYCHOLOGY

POPULATION SEGMENTATION

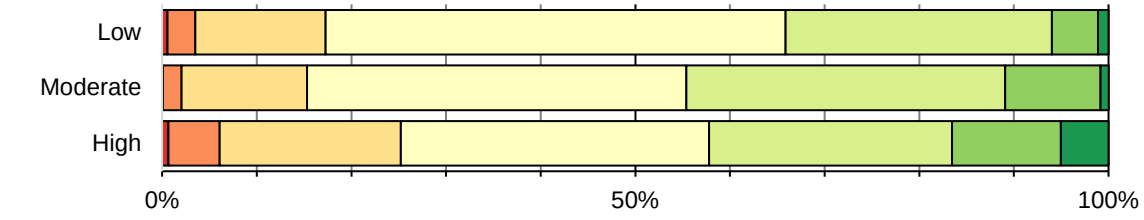
Environmental values

The charts shown below show that the proportion of participants in the high CN group were more likely to strongly support the pro-environmental / pro-social values compared with those in the moderate and low CN groups. Moreover, there were more moderate CN participants offering strong support compared with low CN participants. This observation notwithstanding, nearly 50% of the moderate CN group and about one-third of the low CN group endorsed the value position at point 6 on the rating scale. By and large, most participants supported pro-environmental / pro-social values to some extent, but those with a high connection to nature were most likely to offer the strongest support.



Appendix Figure 2. Distribution of Pro-Environmental / Pro-Social Value Orientation by CN Group.

The pattern of responses for the self-interested value orientation showed a different pattern to that observed for pro-environmental / pro-social value. A greater proportion of low CN participants, compared with those in the moderate and high CN groups, were likely to see self-interested values as not important. Moreover, this was also true for moderate CN participants relative to high CN participants. Support for self-intrested values was *not* more apparent among the low CN group but was more likely for the moderate and high CN.



Appendix Figure 3. Distribution of the Self-Interested Value Orientation by CN Group.

Places of connection by place

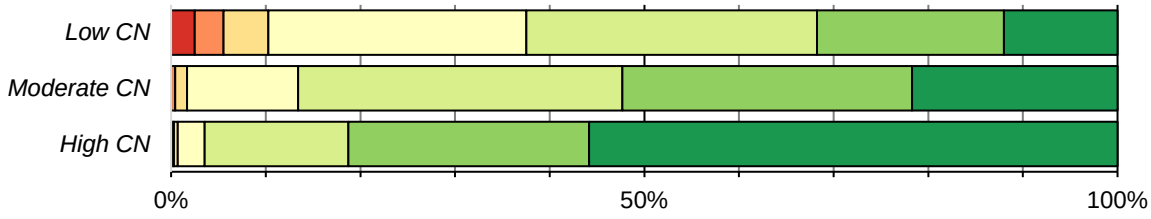
The distributions of the responses to the places that Victorians may or may not be connected to were analysed to identify any association with the three CN groups. The first four charts in the figure below indicate that national parks, waterways, native bushland and beaches are clearly the focus of connection for the high CN group of participants. The highest rating was attributed to these four types of weakly modified environments by around 45%-50% of the high CN group. Furthermore, the low and

moderate CN groups showed reasoable connection to these environments but large subgroups of these clusters opted for middle points of the rating scale to describe their levels of connection.

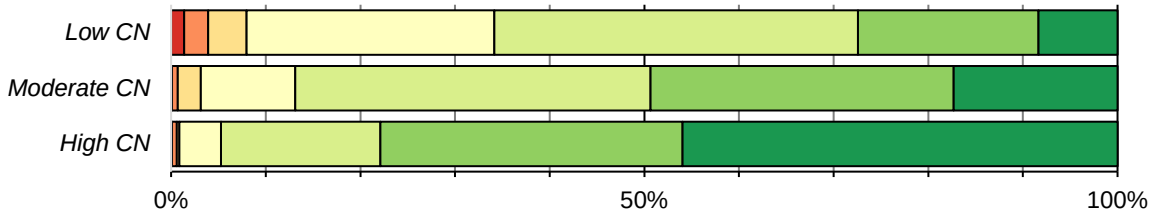
The next five charts displaying the response distributions for the highly modified types of environments (i.e., 'green' urban spaces; community gardens; urban parks; zoos; and, agricultural areas) show a response pattern which is somewhat normally distributed where the responses of the low and moderate CN groups are concerned. The low and moderate CN groups in particular comprised reasonable proportions of individuals rating their connection as either "neither connected or disconnected" or only a moderate degree of connection.

The ratings for connection to home gardens had a distribution similar to those observed where weakly modified environments were concerned. That is, around 50% of participants in the high CN group had a very strong connection to their home gardens, and reasonable proporitions of low and moderate CN individuals reported moderate-high levels of connection. The distribution of responses for these groups suggests that home gardens are perhaps perceived differently to other kinds of human-modified environments. This may have to do with identity processes that are symbolic of non-environmental aspects of the self-concept and/or with gardening philosophies that privilege native flora and fauna.

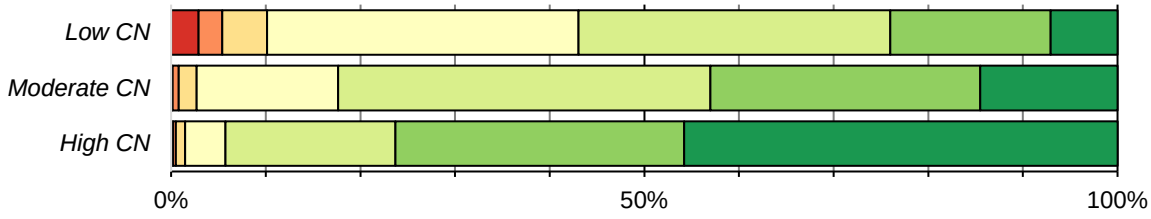
National parks, state forest



Lakes, rivers, waterways



Native bushland reserve



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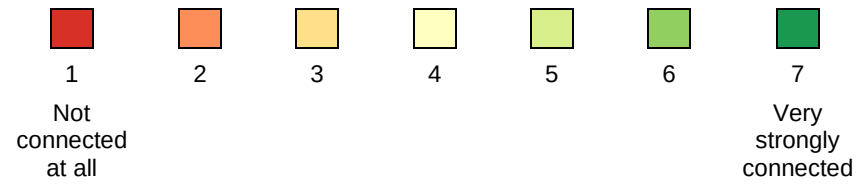
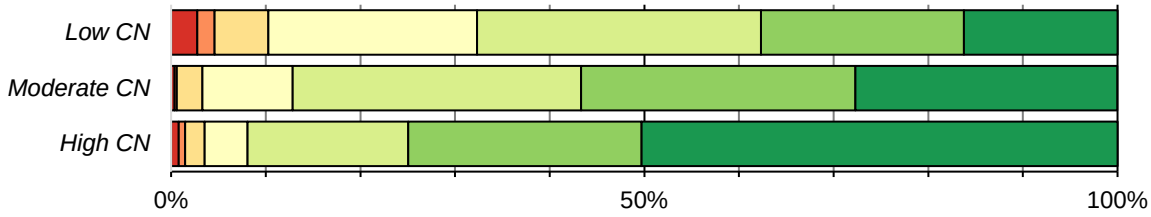
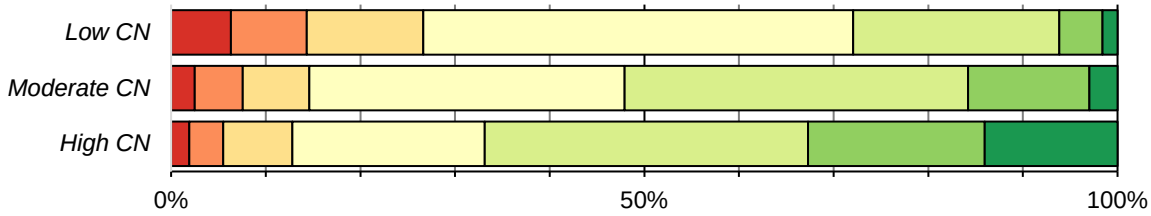


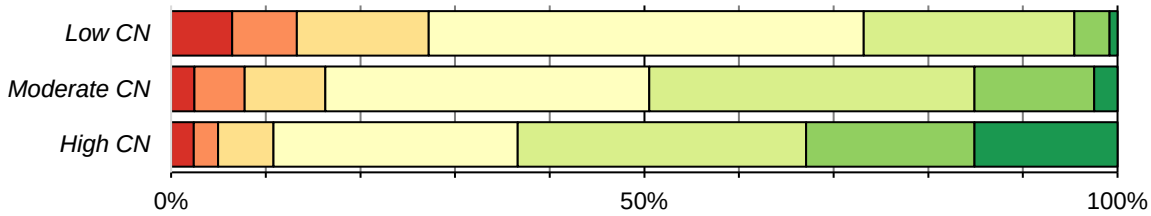
Beaches, coastal areas



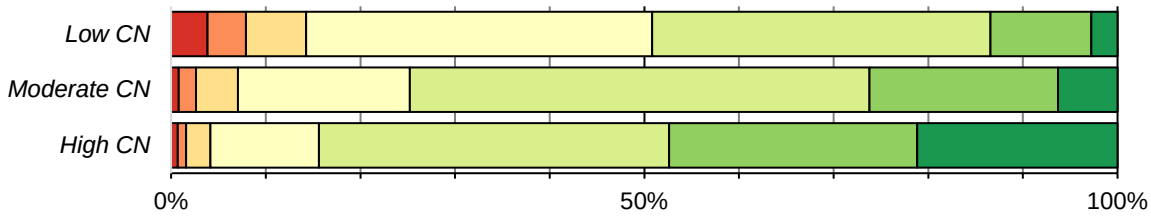
'Green' urban space



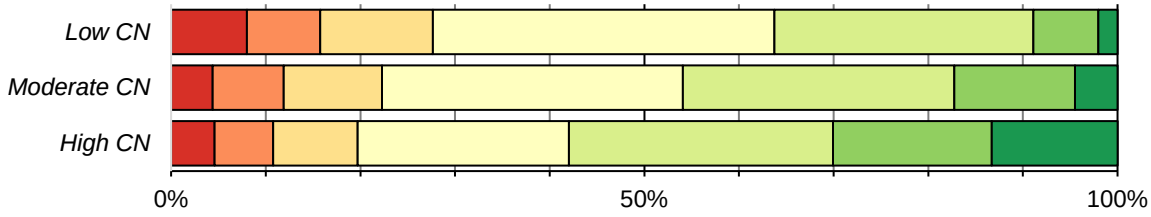
Community gardens



Urban parks



Zoos, wildlife parks



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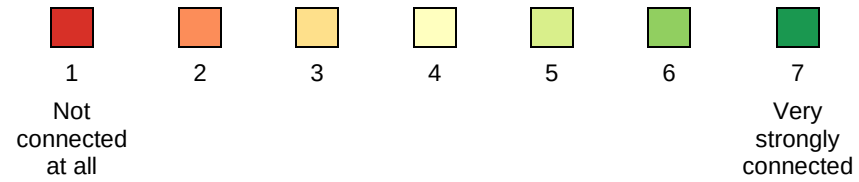
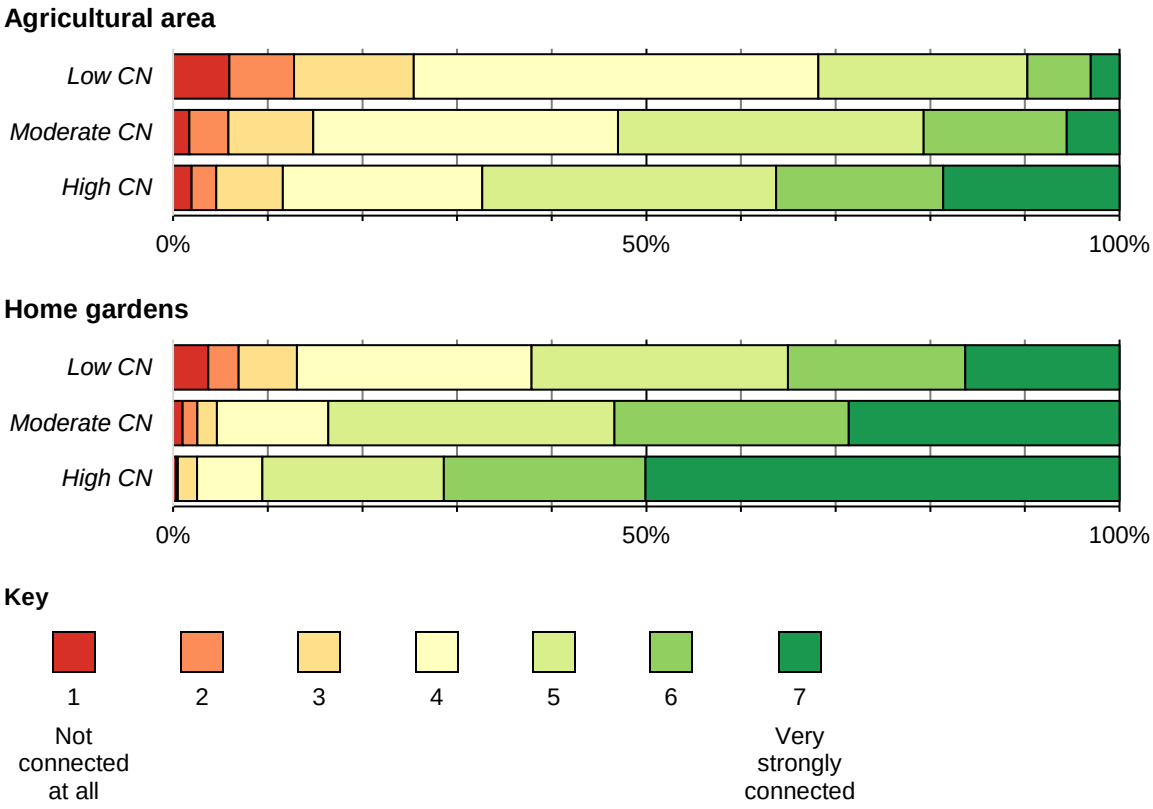




Appendix Figure 4. Places of Connection Response Distributions by CN Group.

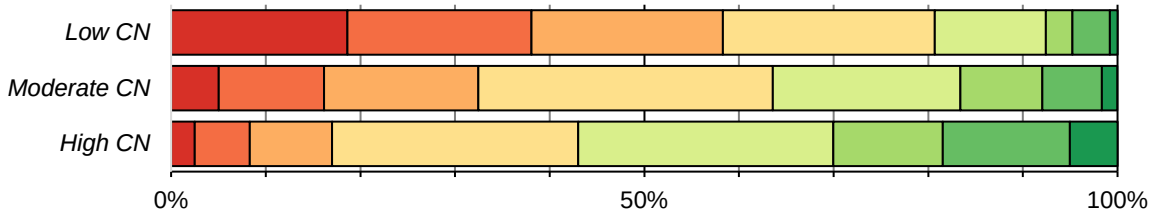
Places where Victorians spend time in nature

The figure below shows how many of the participants in the three CN groups spend time in nature at a range of locations (e.g., national parks, home garden, agricultural areas, etc.) featuring in Section EB2 of the questionnaire. The first seven charts show a pattern of responding where high CN participants were likely to be at the high end of the distribution followed by moderate CN participants and then low CN participants. This patterns was most evident for native bushland reserves but weaker in subsequent charts (e.g., beaches and coastal areas). Therefore, to varying extents, the reponses to locations described by this general response style are ones in which the levels of the CN groups, by-and-large, coincided with the frequency of visitation.

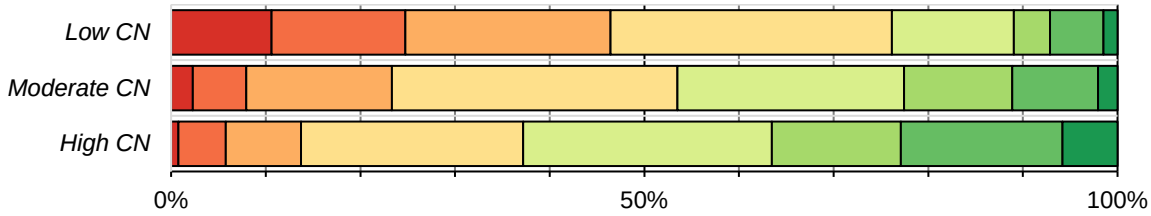
Of these first seven charts, participants in the high CN group had more frequent visitation to their home gardens and local urban parks, suggesting that proximity may play a role in facilitating engagement with nature. Incidentally, these environments were also those prefered by more low and moderate CN individuals although, as noted earlier, the frequency of visitation for these groups tended to be lower.

The second general response pattern observed in the charts numbered 8 through 10 indicated that participants in all three CN groups (but especially those in the low CN group) were more likely to report lower levels of visitation to community gardens, zoos and wildlife park, and ‘green’ urban spaces. This pattern was clearest in the responses to the frequency of visitation to community gardens and weakest for green urban spaces. The least visited environments judging from the frequency data were community gardens and zoos and wildlife parks. These was particularly the case where the group of low CN individuals was concerned.

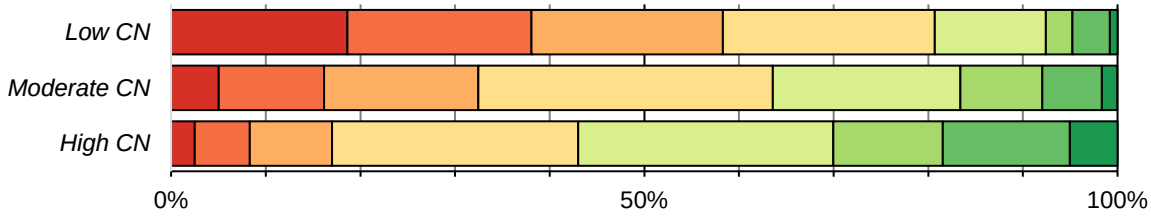
Native bushland reserve



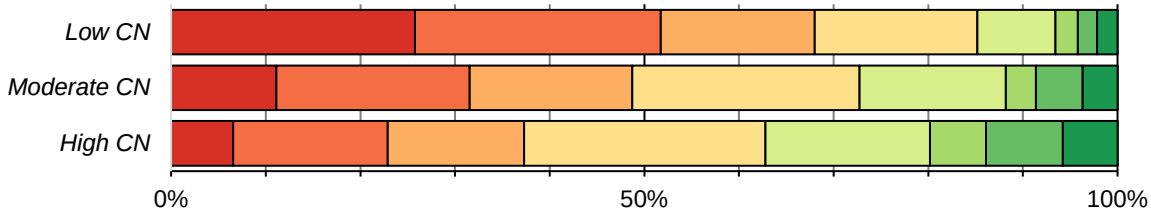
Lake, river waterway



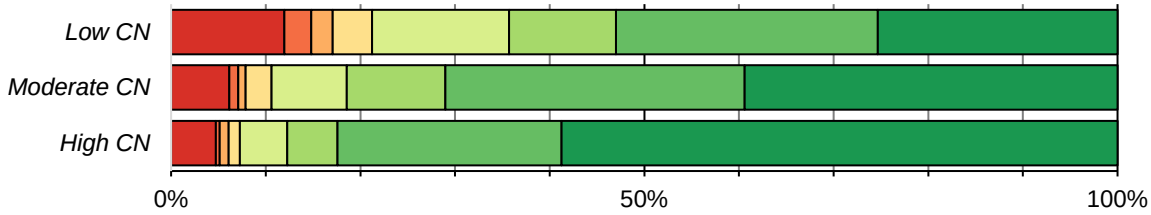
National park



Agricultural areas



Home garden



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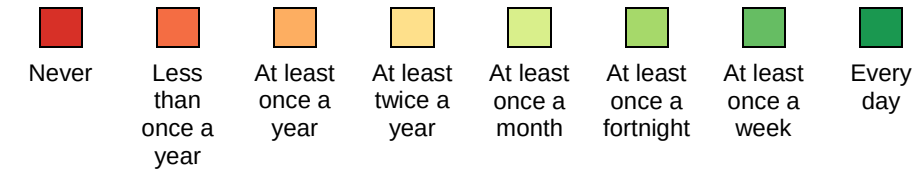
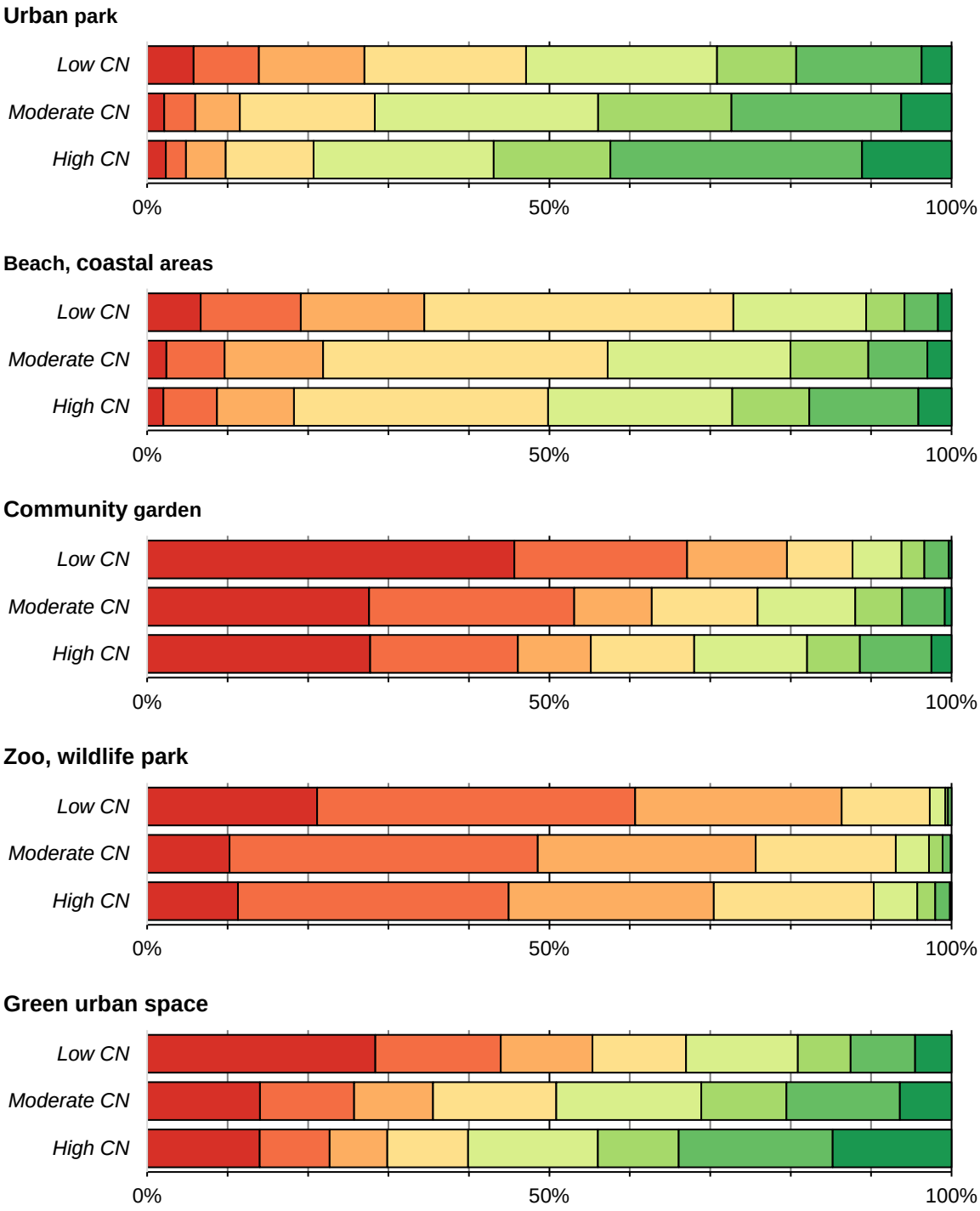




Appendix Figure 5. General Response Patterns for where Victorians Spend Time in Nature.

Appendix Table 4. Where Victorians spend time in nature by CN

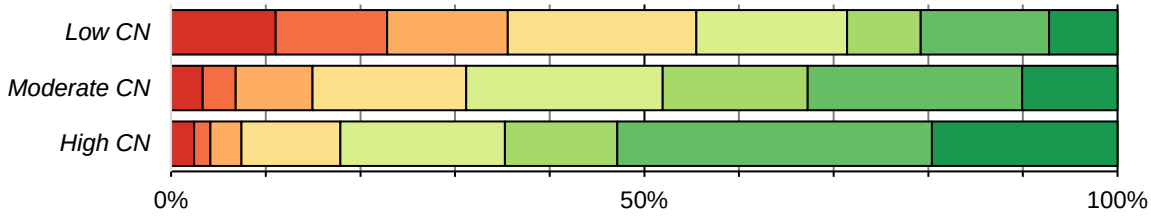
Place	Cluster	Never	Less than once a year	At least once a year	At least twice a year	At least once a month	At least once a fortnight	At least once a week	Every day
EB2_1. A national park, state forest or other protected natural areas	High CN	3%	6%	9%	26%	27%	12%	13%	5%
	Mod CN	5%	11%	16%	31%	20%	9%	6%	2%
	Low CN	19%	19%	20%	22%	12%	3%	4%	1%
EB2_2. A lake, river or other waterways	High CN	1%	5%	8%	23%	26%	14%	17%	6%
	Mod CN	2%	6%	15%	30%	24%	11%	9%	2%
	Low CN	11%	14%	22%	30%	13%	4%	6%	1%
EB2_3. A zoo or wildlife park	High CN	11%	34%	26%	20%	5%	2%	2%	0%
	Mod CN	10%	38%	27%	17%	4%	2%	1%	0%
	Low CN	21%	40%	26%	11%	2%	0%	0%	0%
EB2_4. An urban park with grassy lawns and trees	High CN	2%	3%	5%	11%	22%	14%	31%	11%
	Mod CN	2%	4%	6%	17%	28%	17%	21%	6%
	Low CN	6%	8%	13%	20%	24%	10%	16%	4%
EB2_5. A native bushland reserve	High CN	3%	6%	9%	26%	27%	12%	13%	5%
	Mod CN	5%	11%	16%	31%	20%	9%	6%	2%
	Low CN	19%	19%	20%	22%	12%	3%	4%	1%
EB2_6. An agricultural area	High CN	7%	16%	14%	26%	17%	6%	8%	6%
	Mod CN	11%	20%	17%	24%	15%	3%	5%	4%
	Low CN	26%	26%	16%	17%	8%	2%	2%	2%
EB2_7. The beach or coastal areas	High CN	2%	7%	10%	32%	23%	10%	14%	4%
	Mod CN	2%	7%	12%	35%	23%	10%	7%	3%
	Low CN	7%	12%	15%	38%	16%	5%	4%	2%
EB2_8. Your own garden at home	High CN	5%	0%	1%	1%	5%	5%	24%	59%
	Mod CN	6%	1%	1%	3%	8%	10%	32%	39%
	Low CN	12%	3%	2%	4%	14%	11%	28%	25%
EB2_9. A 'green' urban space like a green roof or leafy courtyard	High CN	14%	9%	7%	10%	16%	10%	19%	15%
	Mod CN	14%	12%	10%	15%	18%	11%	14%	6%
	Low CN	28%	16%	11%	12%	14%	7%	8%	5%
EB2_10. A community garden	High CN	28%	18%	9%	13%	14%	7%	9%	3%
	Mod CN	28%	25%	10%	13%	12%	6%	5%	1%
	Low CN	46%	21%	12%	8%	6%	3%	3%	0%

Activities Victorians undertake when spending time in nature

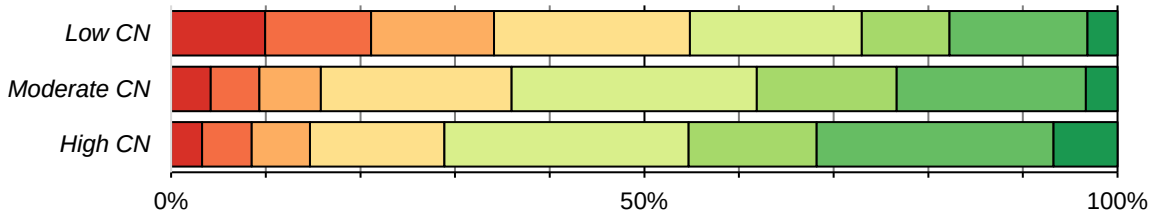
A study of the distributions of the activity variables shows that in all cases, greater proportions of individuals with high and moderate levels of CN are more frequently active in nature compared with low CN participants. In many of these cases, greater frequency of activity was reported by high CN participants than individuals in the moderate CN group. Exceptions included participating in cultural activities, accompanying children and engaging in motorised leisure where the distributions of the two groups were similar.

Some activities were relatively more frequently engaged in for all CN groups. For example, larger proportions in all CN groups reported participating in some form of physical activity and walking the dog, and lower frequency rates were observed for participating in motorised leisure activities. However, whenever an activity implied some connection to environmental values (e.g., protecting nature, obtaining some kind of restorative benefit from nature) High CN participants were considerably more likely to engage in it with greater frequency than low CN participants (see, for example, Charts 1, 6, 8, 11 and 13).

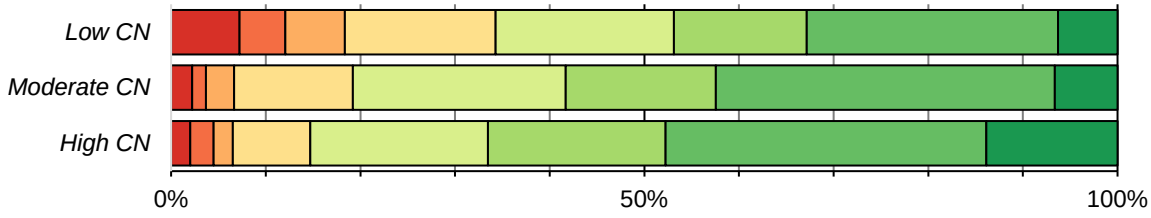
Rest and recover



Engage in social activities



Accompany children



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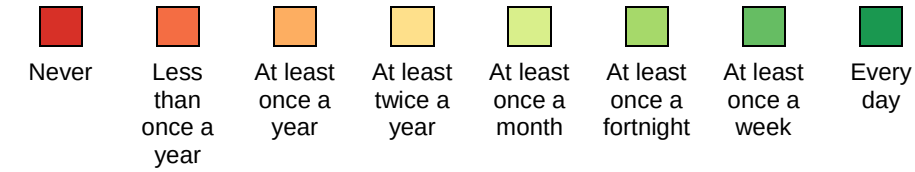
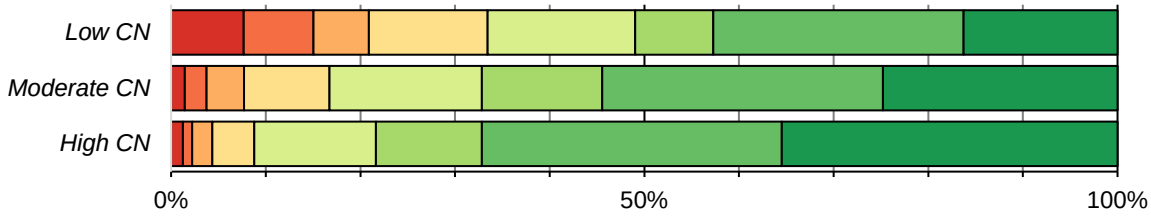
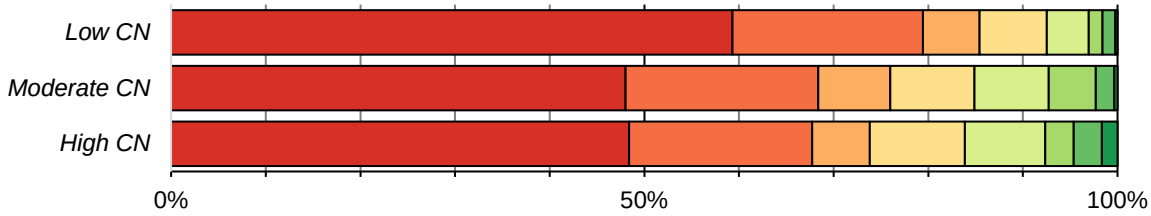


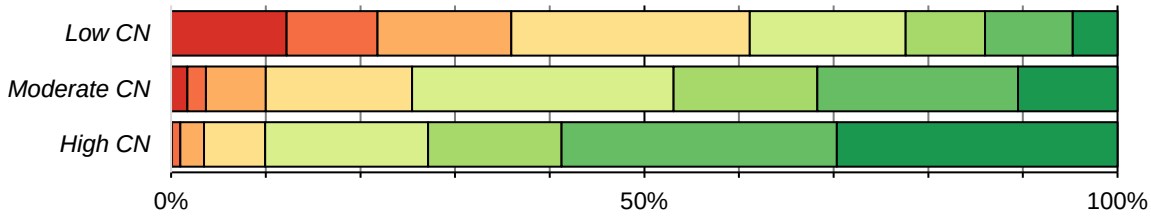
Engage in physical activities



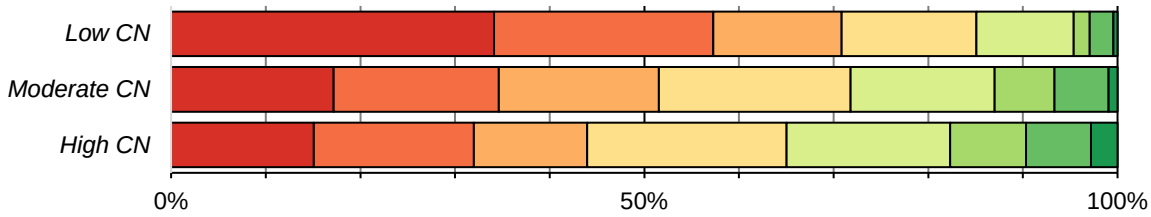
Engage in motorised leisure



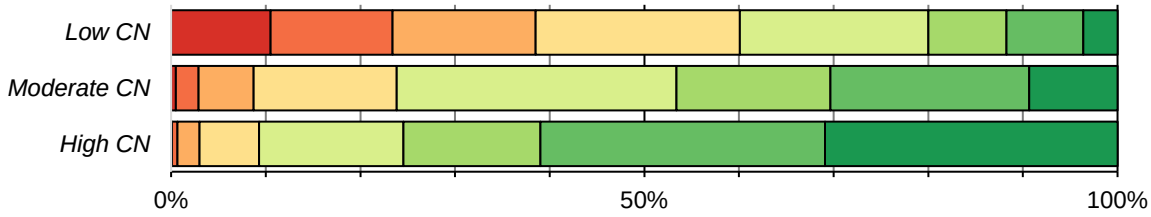
Enjoy a sense of peace



Engage in cultural activities



Enjoy nature



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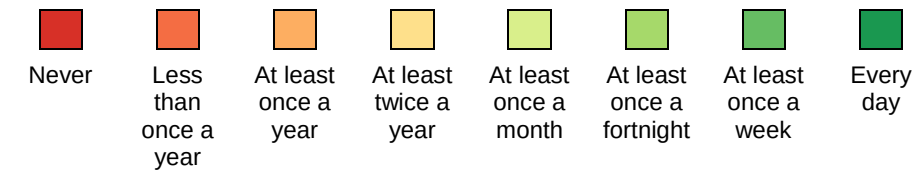
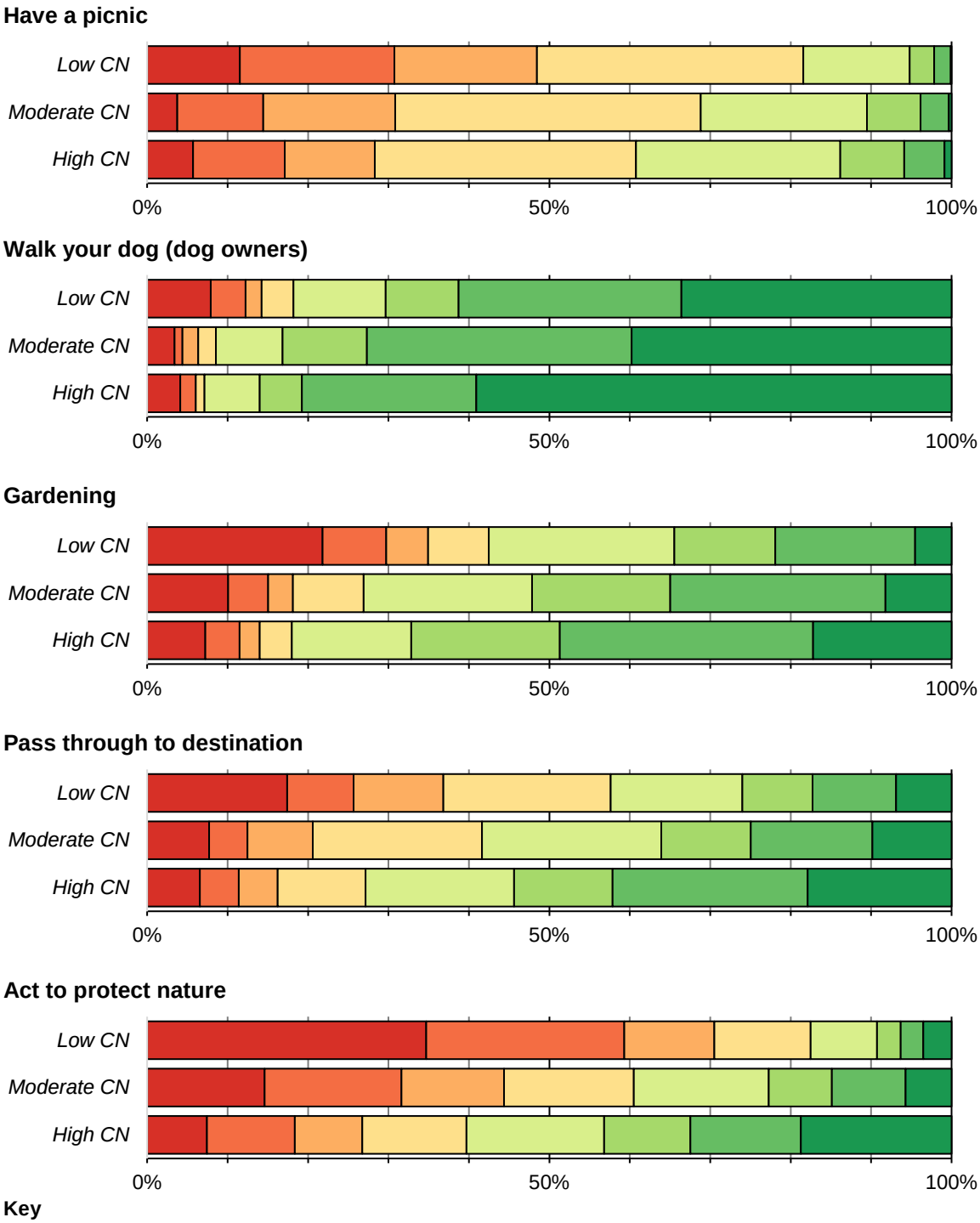




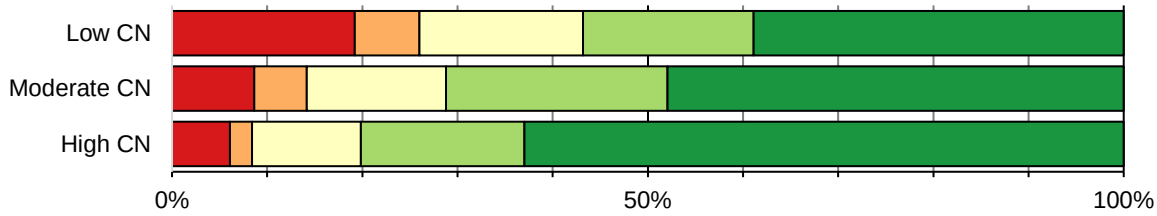
Appendix Figure 6. Response patterns by CN group for activities Victorians undertake when spending time in nature

Appendix Table 5. Activities Victorians undertake when spending time in nature

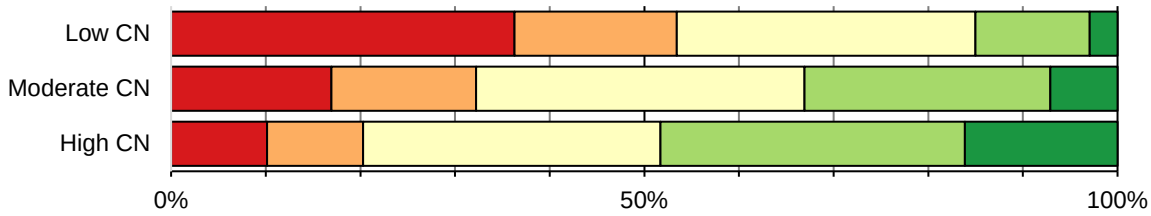
Place	Cluster	Never	Less than once a year	At least once a year	At least twice a year	At least once a month	At least once a fortnight	At least once a week	Every day
EB3_1. Rest and recover	High CN	2%	2%	3%	10%	17%	12%	33%	20%
	Mod CN	3%	4%	8%	16%	21%	15%	23%	10%
	Low CN	11%	12%	13%	20%	16%	8%	14%	7%
EB3_2. Engage in social activities	High CN	3%	5%	6%	14%	26%	14%	25%	7%
	Mod CN	4%	5%	6%	20%	26%	15%	20%	3%
	Low CN	10%	11%	13%	21%	18%	9%	15%	3%
EB3_3. Accompany children to an activity	High CN	2%	2%	2%	8%	19%	19%	34%	14%
	Mod CN	2%	1%	3%	13%	23%	16%	36%	7%
	Low CN	7%	5%	6%	16%	19%	14%	27%	6%
EB3_4. Engage in any form of physical activities (e.g. walking, cycling, hiking)	High CN	1%	1%	2%	4%	13%	11%	32%	35%
	Mod CN	1%	2%	4%	9%	16%	13%	30%	25%
	Low CN	8%	7%	6%	13%	16%	8%	26%	16%
EB3_5. Engage in motorised leisure activities (e.g. boating, trail-biking, off-roading)	High CN	48%	19%	6%	10%	9%	3%	3%	2%
	Mod CN	48%	20%	8%	9%	8%	5%	2%	0%
	Low CN	59%	20%	6%	7%	4%	1%	1%	0%
EB3_6. Enjoy a sense of peace, tranquillity and awe	High CN	0%	1%	3%	6%	17%	14%	29%	30%
	Mod CN	2%	2%	6%	15%	28%	15%	21%	11%
	Low CN	12%	10%	14%	25%	16%	8%	9%	5%
EB3_7. Engage in cultural activities	High CN	15%	17%	12%	21%	17%	8%	7%	3%
	Mod CN	17%	17%	17%	20%	15%	6%	6%	1%
	Low CN	34%	23%	14%	14%	10%	2%	2%	0%
EB3_8. Enjoy and connect with nature	High CN	0%	1%	2%	6%	15%	14%	30%	31%
	Mod CN	1%	2%	6%	15%	30%	16%	21%	9%
	Low CN	11%	13%	15%	22%	20%	8%	8%	4%
EB3_9. Have a picnic or BBQ	High CN	6%	11%	11%	32%	25%	8%	5%	1%
	Mod CN	4%	11%	16%	38%	21%	7%	4%	0%
	Low CN	12%	19%	18%	33%	13%	3%	2%	0%
EB3_10. Walk your dog	High CN	4%	2%	0%	1%	7%	5%	22%	59%
	Mod CN	3%	1%	2%	2%	8%	10%	33%	40%
	Low CN	8%	4%	2%	4%	11%	9%	28%	34%
EB3_11. Gardening	High CN	7%	4%	3%	4%	15%	18%	31%	17%
	Mod CN	10%	5%	3%	9%	21%	17%	27%	8%
	Low CN	22%	8%	5%	8%	23%	13%	17%	5%
EB3_12. Pass through to reach my destination	High CN	7%	5%	5%	11%	18%	12%	24%	18%
	Mod CN	8%	5%	8%	21%	22%	11%	15%	10%
	Low CN	17%	8%	11%	21%	16%	9%	10%	7%
EB3_13. Act to protect the natural environment	High CN	7%	11%	8%	13%	17%	11%	14%	19%
	Mod CN	15%	17%	13%	16%	17%	8%	9%	6%
	Low CN	35%	25%	11%	12%	8%	3%	3%	4%

Past pro-environmental behaviours

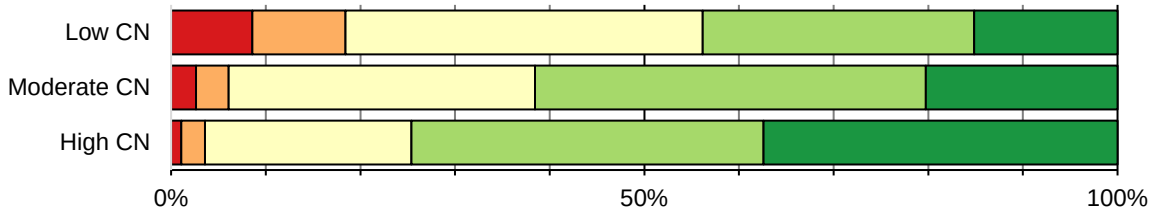
Controlled the movements of your pet (pet owners)



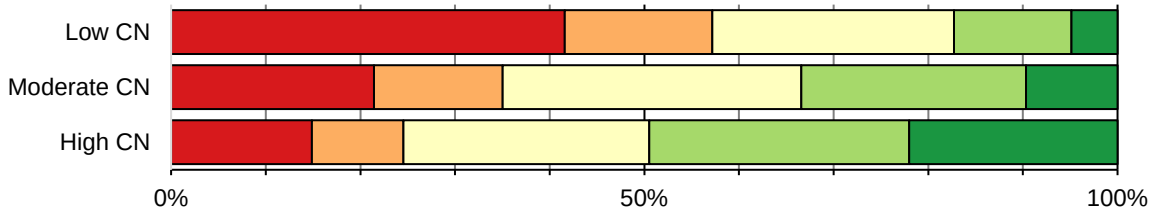
Plant native plants



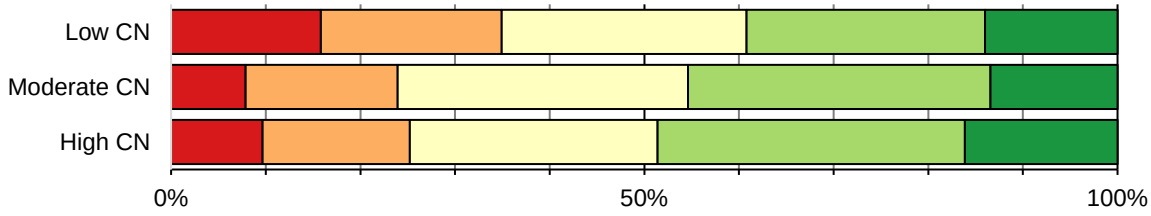
Reduce energy use



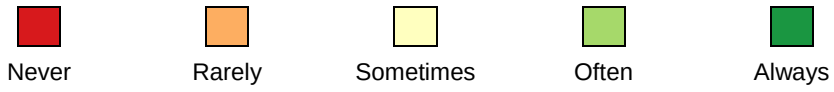
Chosen sustainable seafood



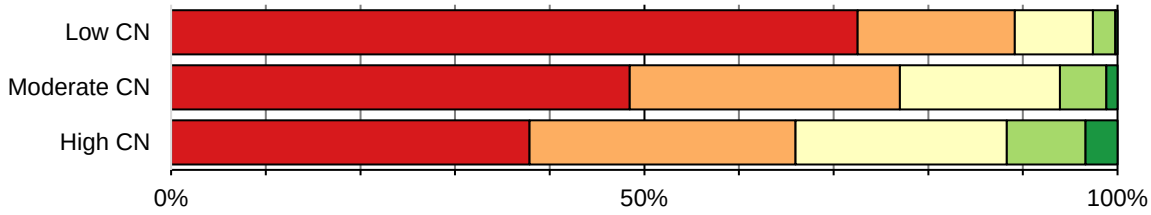
Used public transport rather than driving



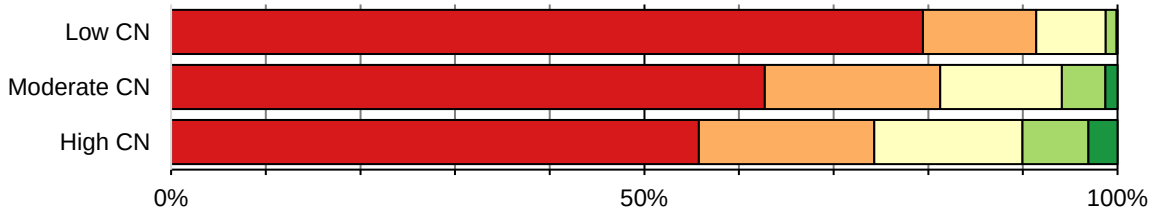
Key



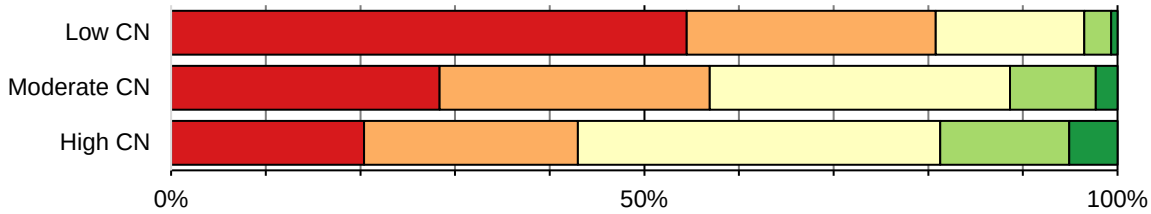
Volunteered for environmental activities



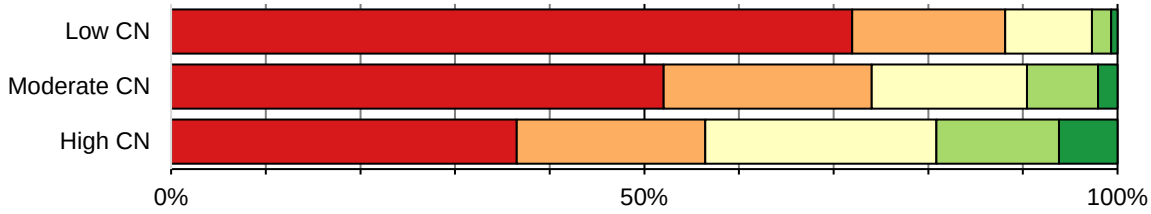
Collected scientific information



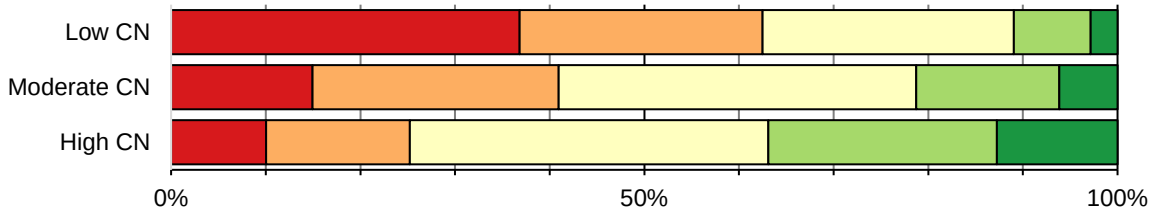
Donated money for the environment



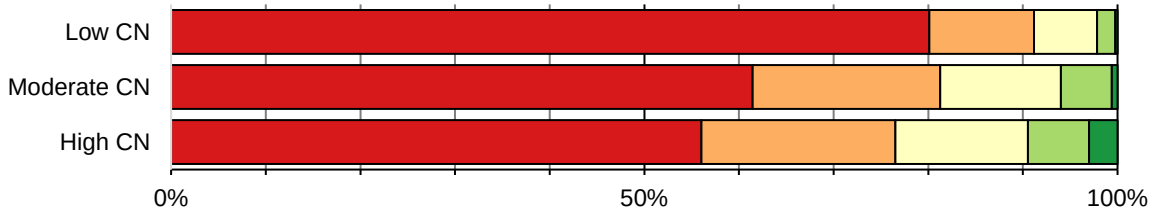
Advocated for the environment



Cleaned up litter in public places



Been involved in a community garden



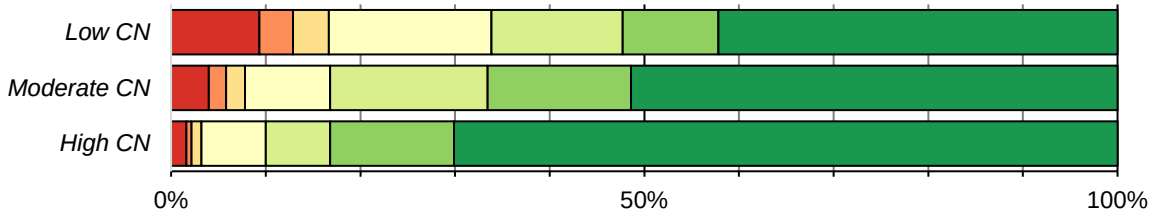
Appendix Figure 7. Pro-environmental behaviours over the past 12 months by CN cluster

Appendix Table 6. Victorians' frequency of pro-environmental behaviours over the past 12 months by CN cluster

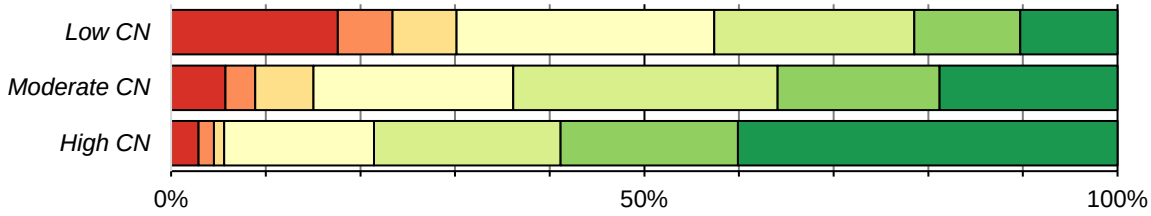
Place	Cluster	Never	Less than once a year	At least once a year	At least twice a year	At least once a month
PEBPAST_1. Controlled the movements of your pets to keep them away from native birds and animals	High CN	2%	2%	3%	10%	17%
	Mod CN	3%	4%	8%	16%	21%
	Low CN	11%	12%	13%	20%	16%
PEBPAST_2. Chosen native plant species when planting/gardening	High CN	3%	5%	6%	14%	26%
	Mod CN	4%	5%	6%	20%	26%
	Low CN	10%	11%	13%	21%	18%
PEBPAST_3. Reduced energy use (e.g. electricity/gas) in the home	High CN	2%	2%	2%	8%	19%
	Mod CN	2%	1%	3%	13%	23%
	Low CN	7%	5%	6%	16%	19%
PEBPAST_4. Chosen sustainable seafood	High CN	1%	1%	2%	4%	13%
	Mod CN	1%	2%	4%	9%	16%
	Low CN	8%	7%	6%	13%	16%
PEBPAST_5. Used public transport rather than driving	High CN	48%	19%	6%	10%	9%
	Mod CN	48%	20%	8%	9%	8%
	Low CN	59%	20%	6%	7%	4%
PEBPAST_6. Volunteered time for activities that take care of the environment	High CN	0%	1%	3%	6%	17%
	Mod CN	2%	2%	6%	15%	28%
	Low CN	12%	10%	14%	25%	16%
PEBPAST_7. Collected information on the natural environment for scientific projects or databases	High CN	15%	17%	12%	21%	17%
	Mod CN	17%	17%	17%	20%	15%
	Low CN	34%	23%	14%	14%	10%
PEBPAST_8. Donated money to organisations that take care of the environment	High CN	0%	1%	2%	6%	15%
	Mod CN	1%	2%	6%	15%	30%
	Low CN	11%	13%	15%	22%	20%
PEBPAST_9. Advocated for the environment	High CN	6%	11%	11%	32%	25%
	Mod CN	4%	11%	16%	38%	21%
	Low CN	12%	19%	18%	33%	13%
PEBPAST_10. Cleaned up litter in a public space, park or forest	High CN	4%	2%	0%	1%	7%
	Mod CN	3%	1%	2%	2%	8%
	Low CN	8%	4%	2%	4%	11%
PEBPAST_11. Been involved in a local community garden or community composting activity	High CN	7%	4%	3%	4%	15%
	Mod CN	10%	5%	3%	9%	21%
	Low CN	22%	8%	5%	8%	23%

Intended pro-environmental behaviours

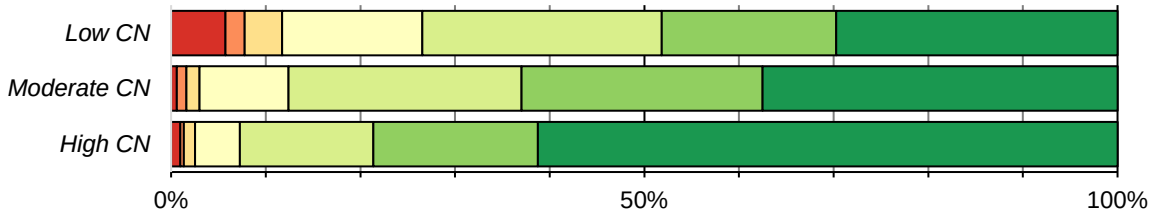
Control the movement of your pets



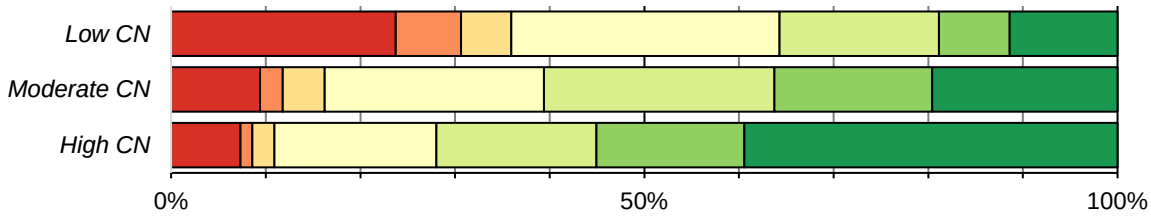
Plant native plants



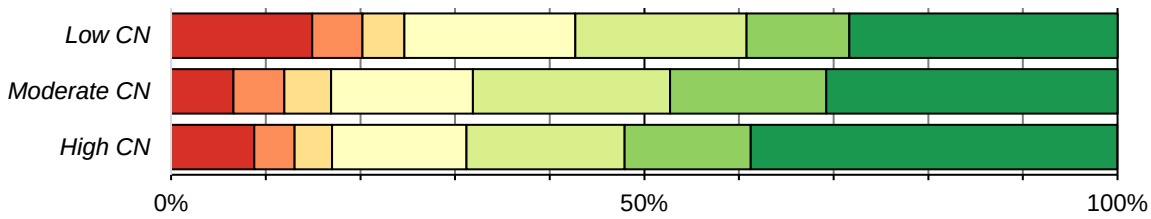
Reduce energy use



Choose sustainable seafood



Use public transport rather than driving



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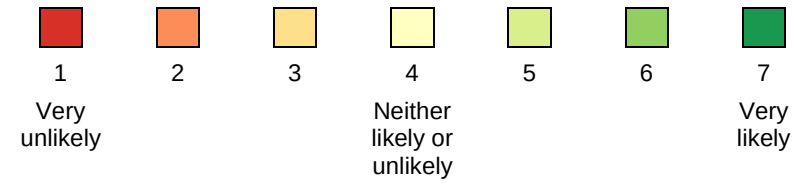
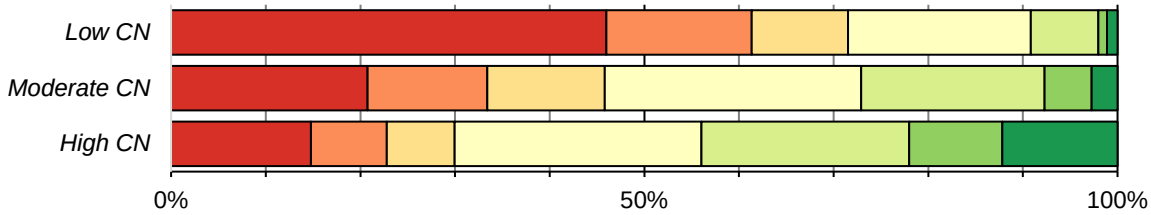
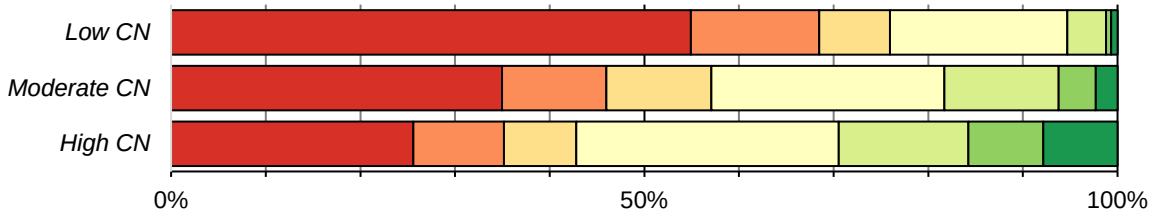


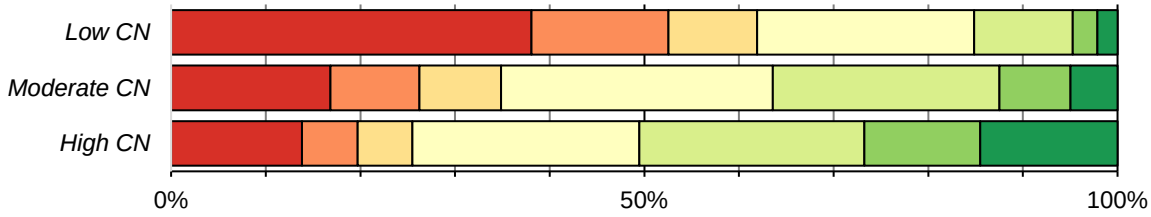
Volunteer for the environment



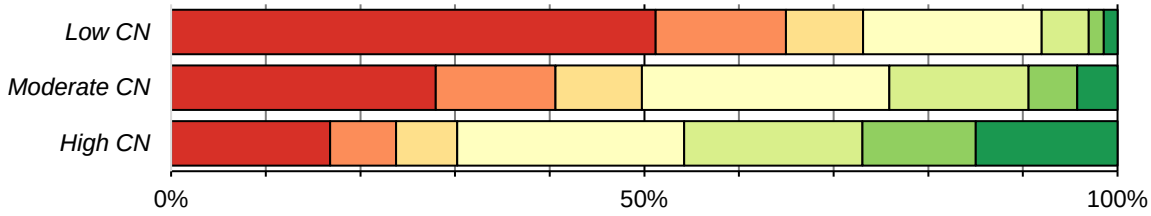
Collect scientific information



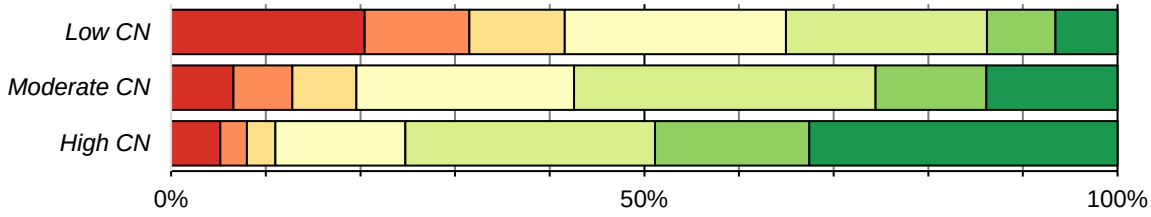
Donate money for the environment



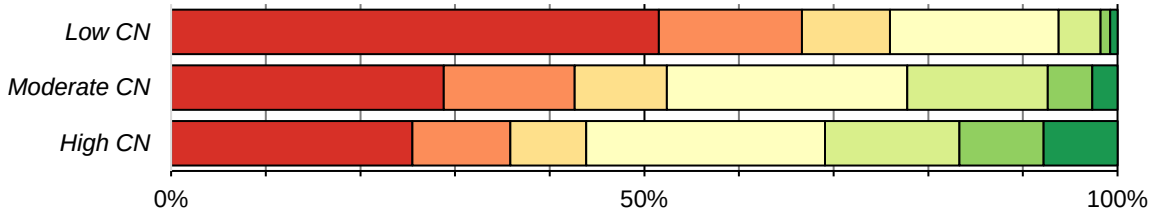
Advocate for the environment



Clean up litter



Be involved in a community garden



Appendix Figure 8. Intended pro-environmental behaviours over the next 12 months segmented by CN cluster

Appendix Table 7. Likelihood ratings of intended pro-environmental behaviours over the next 12 months

Place	Cluster	Very unlikely (1)	2	3	Neither likely nor unlikely (4)	5	6	Very likely (7)
PEBLIKE_1. Control the movements of your pets to keep them away from native birds and animals	High CN	2%	1%	1%	7%	7%	13%	70%
	Mod CN	4%	2%	2%	9%	17%	15%	51%
	Low CN	9%	4%	4%	17%	14%	10%	42%
PEBLIKE_2. Choose native plant species when planting /gardening	High CN	3%	2%	1%	16%	20%	19%	40%
	Mod CN	6%	3%	6%	21%	28%	17%	19%
	Low CN	18%	6%	7%	27%	21%	11%	10%
PEBLIKE_3. Reduce energy use (e.g. electricity/gas) in the home	High CN	1%	0%	1%	5%	14%	17%	61%
	Mod CN	1%	1%	1%	9%	25%	25%	38%
	Low CN	6%	2%	4%	15%	25%	18%	30%
PEBLIKE_4. Choose sustainable seafood	High CN	7%	1%	2%	17%	17%	16%	39%
	Mod CN	9%	2%	4%	23%	24%	17%	20%
	Low CN	24%	7%	5%	28%	17%	7%	11%
PEBLIKE_5. Use public transport rather than driving	High CN	9%	4%	4%	14%	17%	13%	39%
	Mod CN	7%	5%	5%	15%	21%	16%	31%
	Low CN	15%	5%	4%	18%	18%	11%	28%
PEBLIKE_6. Volunteer time for activities that take care of the environment	High CN	15%	8%	7%	26%	22%	10%	12%
	Mod CN	21%	13%	12%	27%	19%	5%	3%
	Low CN	46%	15%	10%	19%	7%	1%	1%
PEBLIKE_7. Collect information on the natural environment for scientific projects or databases	High CN	26%	10%	8%	28%	14%	8%	8%
	Mod CN	35%	11%	11%	25%	12%	4%	2%
	Low CN	55%	14%	7%	19%	4%	1%	1%
PEBLIKE_8. Donate money to organisations that take care of the environment	High CN	14%	6%	6%	24%	24%	12%	14%
	Mod CN	17%	9%	9%	29%	24%	8%	5%
	Low CN	38%	14%	9%	23%	10%	3%	2%
PEBLIKE_9. Advocate for the environment	High CN	17%	7%	6%	24%	19%	12%	15%
	Mod CN	28%	13%	9%	26%	15%	5%	4%
	Low CN	51%	14%	8%	19%	5%	2%	1%
PEBLIKE_10. Clean up litter in a public space, park or forest	High CN	5%	3%	3%	14%	26%	16%	33%
	Mod CN	7%	6%	7%	23%	32%	12%	14%
	Low CN	20%	11%	10%	23%	21%	7%	7%
PEBLIKE_11. Be involved in a local community garden or community composting activity	High CN	26%	10%	8%	25%	14%	9%	8%
	Mod CN	29%	14%	10%	25%	15%	5%	3%
	Low CN	52%	15%	9%	18%	4%	1%	1%

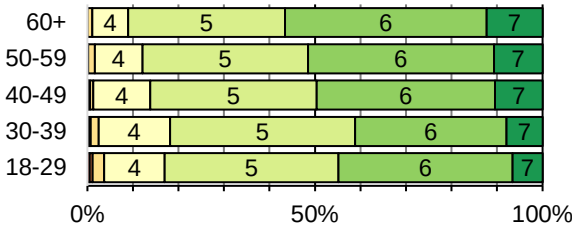
ENVIRONMENTAL VALUES

Victorians by gender, age, region, and time in nature: responses to values items

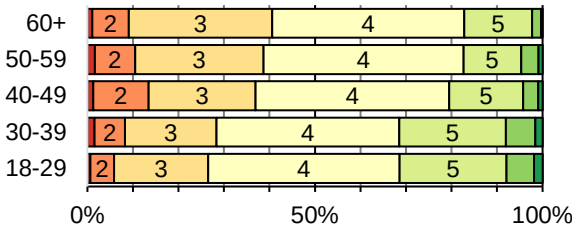
The figures below show Victorians' values by gender, age, region, and frequency of time spent in nature.

Age group

Pro-environmental / pro-social values

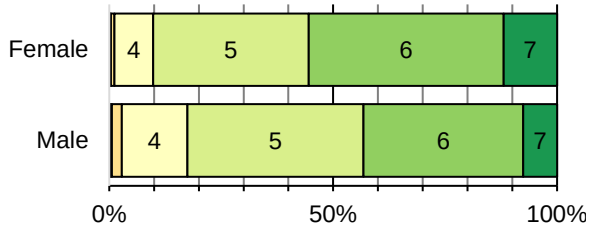


Self-interested values

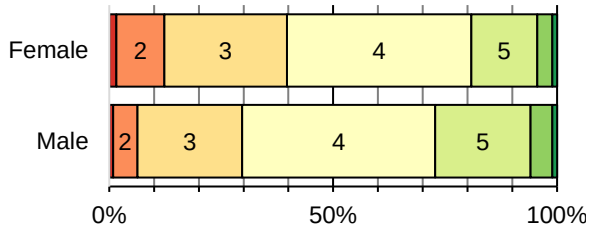


Gender

Pro-environmental / pro-social values

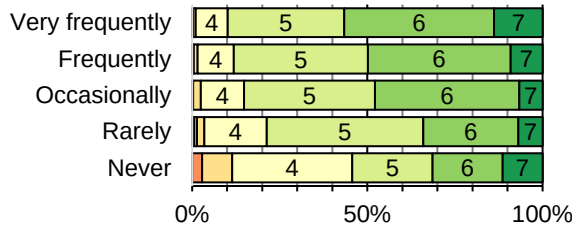


Self-interested values

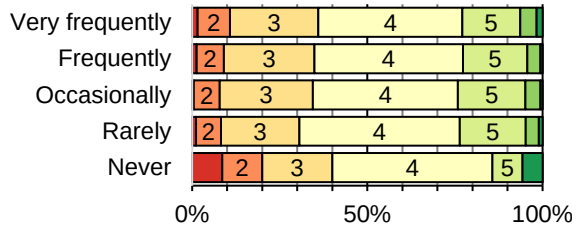


Frequency of time spent in nature

Pro-environmental / pro-social values

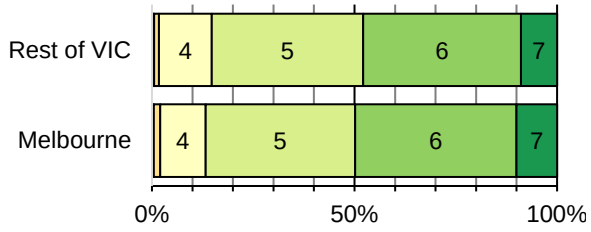


Self-interested values

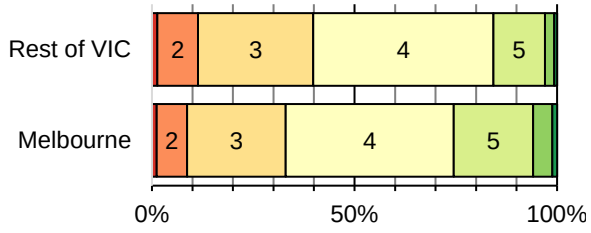


Region

Pro-environmental / pro-social values



Self-interested values



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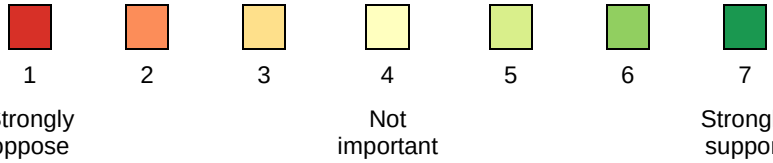


Appendix Figure 9. Victorians' pro-environmental/pro-social and self-interested environmental values by Gender, Age, Region, and Frequency of Time Spent in Nature.

Relationship between pro-environmental / pro-social and self-interested values

Expressing pro-environmental / pro-social values were uncorrelated with self-interested values due to their extraction as separate factors in a principal components analysis (r = 0.01).

Differences in values between groups

All reported differences between groups are significant at p <.01.

Gender

Environmental values differed between males and females with females supporting more pro-environmental / pro-social values as a guiding principle in their life and males supporting more self-interested values.

Age

Overall, there were differences between the age groups with older people endorsing stronger pro-environmental / pro-social values, while younger respondents showed higher support for self-interested values.

Region

Pro-environmental / pro-social values did not differ between people living in urban or rural areas of Victoria; however, self-interested values were stronger for Melbournians than Victorians living in rural areas.

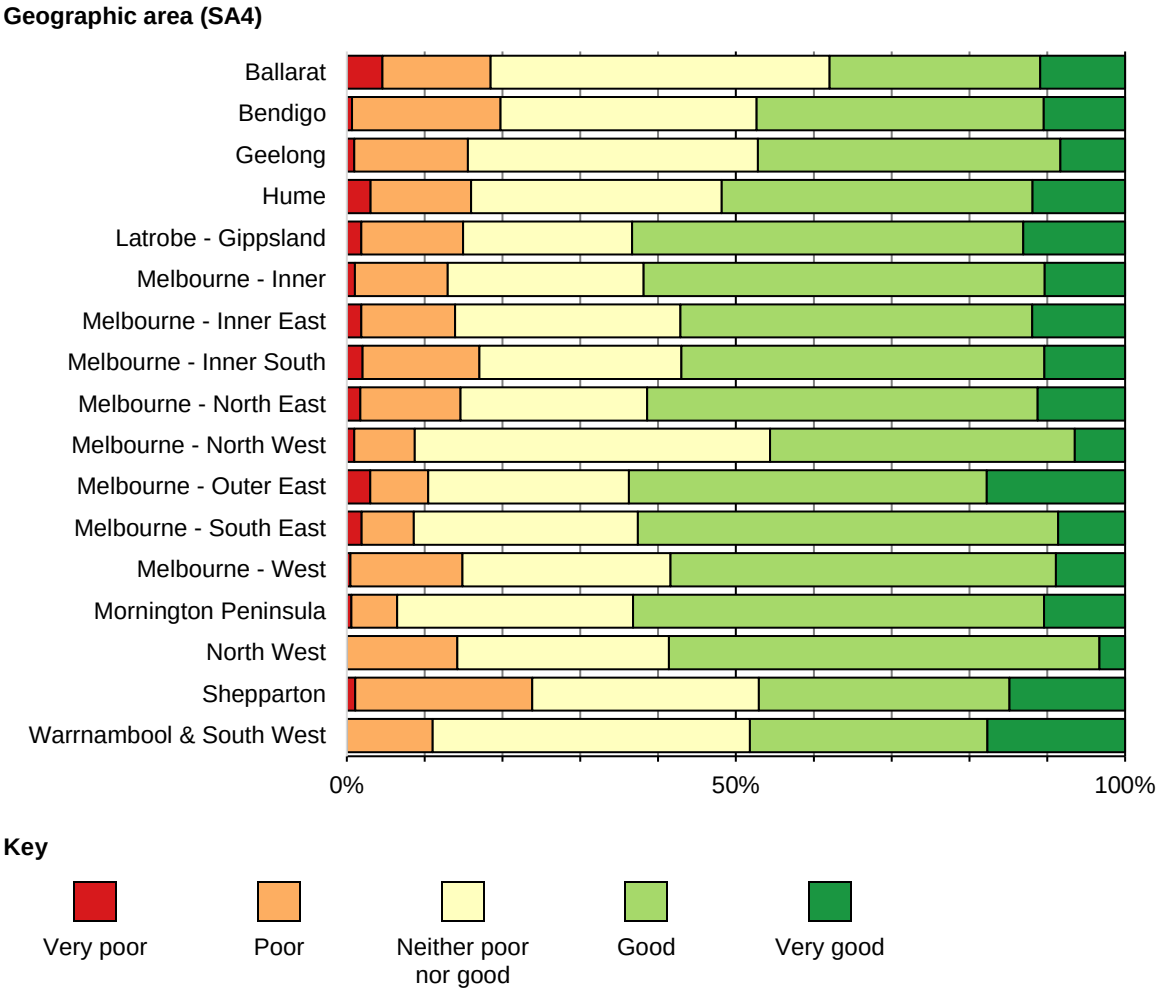
Frequency of time spent in nature

The more frequently people spent time in nature, the more strongly they endorsed pro-environmental / pro-social values (or vice versa). Self-interested values did not differ between people spending much or little time in nature.

Relationship between CN and environmental values

Feeling connected to nature was strongly positively correlated with pro-environmental / pro-social values (r = .62, p <.01) and only weakly negatively with self-interested values values (r = -.06, p <.01).

HEALTH OF VICTORIAN NATURAL ENVIRONMENT



Appendix Figure 10. Ratings about the Health of the Natural Environment in Victoria by geographic regions.

Differences in ratings between groups

All reported differences between groups are significant at p <.01.

Gender

Men and women differed in their ratings about the health of the Victorian environment with women having a less optimistic judgment (higher ratings of poor and lower ratings of very good). More women than men stated they don't know.

Age

Victorians of different ages overall did not differ in their ratings about the state of the environment. The only exception was in regard to the 'very good' rating with older age groups (50-59 years and 60+ years) rating the health of the environment in Victoria as better than younger Victorians.

Region

Overall, rural residents rated the health of the natural environment in Victoria as poorer compared to urban residents.

Time spent in nature

In general, health ratings did not differ by the frequency with which respondents spent time in nature, except for ratings of 'good'. Within this category, those spending frequent time in nature were more likely to state the health of the natural environment as good compared to those never spending time in nature.

Relationship between CN and nature health ratings

There was a weak negative correlation between nature connectedness and ratings about the Health of the Victorian natural environment. The more strongly Victorians felt connected to nature the lower they rated the health of Victoria's environment, although this correlation was relatively small in magnitude (r = -.12, p <.01).

ENVIRONMENTAL AWARENESS

Factor analysis revealed that all items loaded onto one underlying factor to which we refer as 'environmental awareness'. The mean across all items was calculated. Overall agreement on the environmental knowledge score was high for Victorians (M = 5.86).

Differences in environmental awareness between groups

All reported differences between groups are significant at p <.01.

Gender

Women had a higher environmental awareness score than men.

Age

Victorians of different age differed in their environmental awareness score with older respondents showing a higher environmental awareness score compared to younger.

Region

The environmental awareness score did not differ between urban or rural respondents.

Time spent in nature

The more frequently respondents spent time in nature, the higher their environmental awareness score.

Relationship between CN and environmental knowledge

Overall, nature connectedness was strongly positively correlated with environmental awareness (r = .53, p <.01) and Victorians feeling strongly connected to nature, scored higher on the environmental awareness scores. Interestingly, the Materialism subscale correlated negatively with environmental awareness score and the more respondents agreed to Materialism items the lower their agreement on the environmental awareness score (r = -.24, p <.01).

Descriptive statistics for environmental knowledge questions

EK Item	Mean	SD
EK2_1. A healthy natural environment is essential to the production of food, clean air and water.	6.25	1
EK2_2. A healthy natural environment can help to protect people from the impacts of climate change.	5.74	1.331
EK2_3. A healthy natural environment is important for Victoria's economy.	6.01	1.097
EK2_4. Variety in native plants and animals is a sign of a healthy natural environment.	6.01	1.091
EK2_5. The urban environment can provide an important home for Victoria's native plants and animals.	5.34	1.377
EK2_6. A healthy environment is important to the wellbeing of people and communities.	6.19	1.024
EK2_7. There are native plants and animals in Victoria that are at risk of serious decline or becoming extinct.	5.65	1.275
EK2_8. Clearing of land is a threat to Victoria's natural environment.	5.69	1.325
EK2_9. Foreign plants and animals can negatively impact our native plants and animals.	5.83	1.306
EK2_10. Household waste, such as plastics and chemicals, can pose a threat to Victoria's natural environment.	6.2	1.118
EK2_11. Climate change will harm the state's native plants and animals.	5.59	1.5

EK Item	Cluster	1	2	3	4	5	6	7	Mean
EK2_1. A healthy natural environment is essential to the production of food, clean air and water.	High CN	0%	0%	0%	1%	5%	15%	78%	6.69
	Mod CN	0%	0%	1%	3%	16%	29%	51%	6.21
	Low CN	0%	1%	1%	11%	22%	29%	36%	5.79
EK2_2. A healthy natural environment can help to protect people from the impacts of climate change.	High CN	1%	0%	1%	8%	9%	21%	60%	6.27
	Mod CN	1%	0%	1%	11%	23%	29%	34%	5.74
	Low CN	3%	2%	5%	21%	24%	23%	22%	5.13
EK2_3. A healthy natural environment is important for Victoria's economy.	High CN	0%	0%	0%	3%	7%	20%	69%	6.54
	Mod CN	0%	0%	1%	5%	24%	33%	37%	5.96
	Low CN	1%	1%	2%	16%	30%	26%	24%	5.46
EK2_4. Variety in native plants and animals is a sign of a healthy natural environment.	High CN	0%	0%	0%	4%	7%	23%	65%	6.5
	Mod CN	0%	0%	1%	8%	20%	32%	38%	5.95
	Low CN	1%	1%	2%	17%	28%	26%	26%	5.52
EK2_5. The urban environment can provide an important home for Victoria's native	High CN	1%	2%	5%	11%	18%	22%	41%	5.76
	Mod CN	1%	2%	5%	17%	29%	27%	19%	5.31

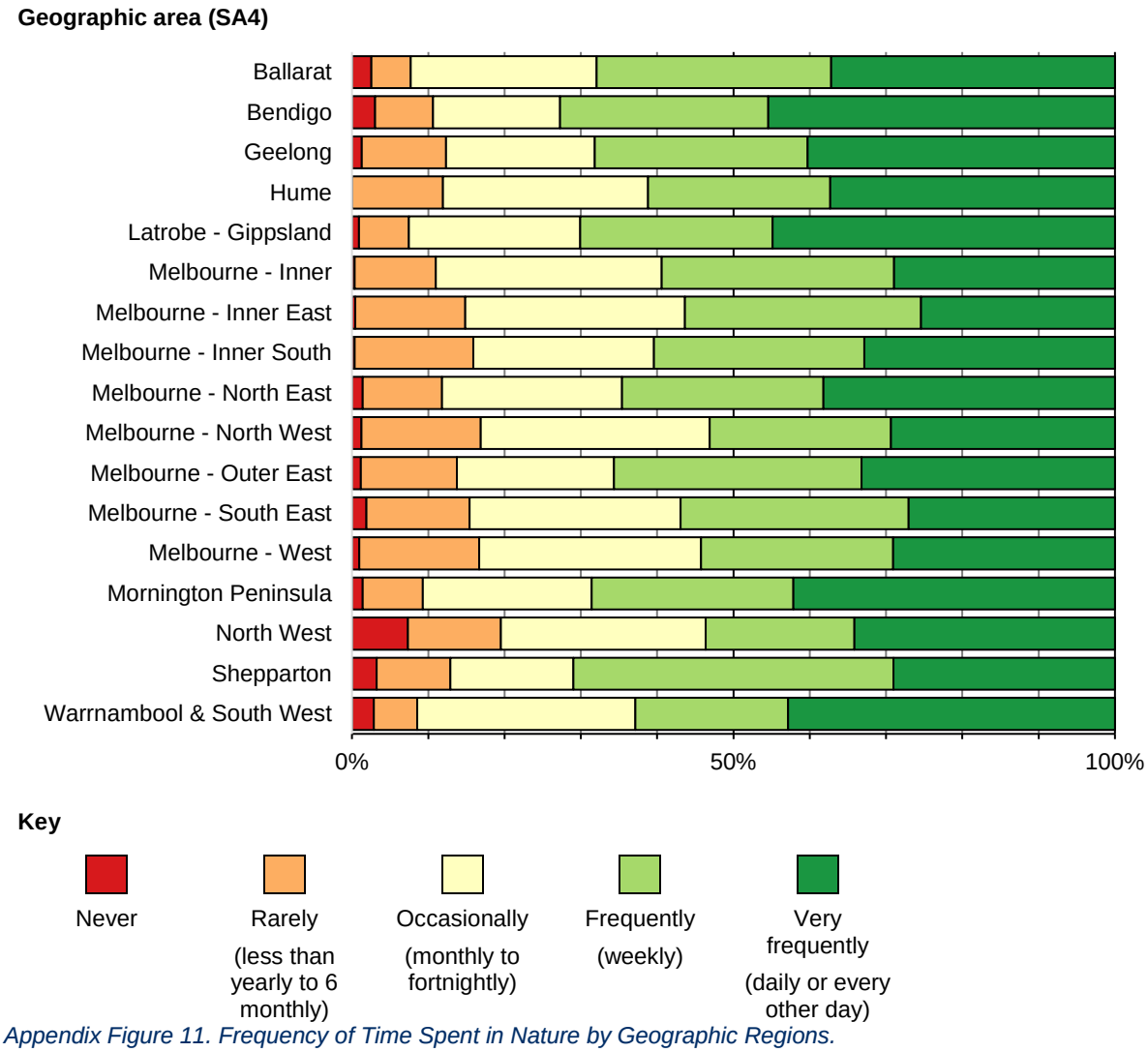
plants and animals.	Low CN	2%	2%	7%	25%	32%	19%	14%	4.89
EK2_6. A healthy environment is important to the wellbeing of people and communities.	High CN	0%	0%	0%	1%	4%	16%	79%	6.71
	Mod CN	0%	0%	1%	4%	16%	32%	47%	6.15
	Low CN	1%	1%	2%	11%	28%	30%	27%	5.63
EK2_7. There are native plants and animals in Victoria that are at risk of serious decline or becoming extinct.	High CN	0%	0%	1%	10%	14%	19%	55%	6.18
	Mod CN	0%	0%	2%	17%	27%	22%	32%	5.61
	Low CN	1%	1%	3%	30%	26%	19%	19%	5.1
EK2_8. Clearing of land is a threat to Victoria's natural environment.	High CN	1%	0%	1%	5%	10%	21%	61%	6.31
	Mod CN	1%	1%	2%	13%	26%	27%	30%	5.6
	Low CN	2%	2%	6%	23%	26%	23%	18%	5.08
EK2_9. Foreign plants and animals can negatively impact our native plants and animals.	High CN	1%	1%	2%	9%	12%	19%	57%	6.17
	Mod CN	1%	1%	3%	12%	20%	25%	38%	5.76
	Low CN	1%	1%	3%	18%	22%	23%	32%	5.54
EK2_10. Household waste, such as plastics and chemicals, can pose a threat to Victoria's natural environment.	High CN	1%	0%	1%	2%	5%	15%	77%	6.62
	Mod CN	0%	1%	1%	4%	18%	23%	53%	6.17
	Low CN	1%	1%	2%	10%	23%	26%	36%	5.73
EK2_11. Climate change will harm the state's native plants and animals.	High CN	2%	1%	2%	9%	10%	18%	58%	6.06
	Mod CN	2%	1%	2%	13%	21%	26%	35%	5.59
	Low CN	4%	3%	5%	23%	20%	20%	26%	5.05
1 = strongly disagree 4 = neither agree nor disagree 7 = strongly agree									

APPENDIX F: CHAPTER 2 TIME IN NATURE, PLACES IN NATURE AND THEIR MEANING

This appendix provides additional analyses for the following survey variables discussed in the main text Chapter 2:

- Frequency of time spent in nature over the past 12 months (EB1)
- Barriers to spending time in nature (TIN)
- Places in nature where Victorians spent time (EB2, EB2a)
- Places of connection in nature (EC1, EC1a)

FREQUENCY OF TIME SPENT IN NATURE



Appendix Figure 11. Frequency of Time Spent in Nature by Geographic Regions.

Differences between groups in frequency of time spent in nature

All reported differences between groups are significant at p <.01.

Gender

A higher proportion of women spent time in nature very frequently, whereas a higher proportion of men spent time in nature 'occasionally' or 'rarely' compared to women. These differences may be related to the different employment situations with men being more often employed full time and women more often working part time.

Age

Overall, Victorians aged 60+ visited nature most frequently, potentially being a result of their retirement status. Those in their 30s represented the highest group spending occasionally time in nature and those in their 40s chose most often rarely.

Region

Victorians in rural areas visited nature more frequently over the past year than metropolitans and more Melbournians reported to spend occasionally and never time in nature compared to those in the rest of Victoria. Differences of time spent in nature between rural and urban Victorians may be a result of the fact that Melbournians find it more difficult to access nature than rural residences.

BARRIERS TO SPENDING TIME IN NATURE

The table below describes in detail the mean ratings by major groups for each barrier.

Appendix Table 8. Mean Ratings of each Barrier by Group

Barrier	Overall mean	Gender		Age group				
		Male	Female	18-29	30-39	40-49	50-59	60+
I don't like spending time in nature	2.07	2.20	1.94	2.34	2.40	2.08	1.82	1.80
It is difficult for me to access nature	3.04	3.09	2.99	3.54	3.36	3.13	2.71	2.65
Few of my family or friends spend time in nature	3.86	3.90	3.83	4.15	4.07	3.94	3.64	3.61
I don't have time to get out into nature	3.47	3.50	3.45	4.02	3.97	3.64	3.33	2.74

Barrier		Region		Frequency of time spent in nature				
		Melbourne	Rest of VIC	Never	Rarely	Occasionally	Frequently	Very frequently
I don't like spending time in nature		2.13	1.88	3.77	2.78	2.17	1.96	1.75
It is difficult for me to access nature		3.17	2.64	3.63	3.77	3.35	2.99	2.55
Few of my family or friends spend time in nature		3.89	3.76	4.17	4.25	4.00	3.74	3.70
I don't have time to get out into nature		3.59	3.11	4.06	4.22	3.87	3.46	2.87

PLACES IN NATURE WHERE VICTORIANS SPENT TIME

Differences between groups in time spent in different places

We summarised the overall differences between males, females, the different age groups, and urban versus rural residency in the table below. All significant differences are reported at $p < .01$. The more frequently Victorians spent time in nature, the more often they visited all ten places

Appendix Table 9. Summary of Differences between Gender, Age, and Region in regards to Time Spent in Different Places

Place in nature	Gender	Age	Region
A national park, state forest or other protected natural areas	-	More younger than older Victorians	-
A lake, river or other waterways	-	-	More rural than urban residents
A zoo or wildlife park	-	More younger than older Victorians	More urban than rural residents
An urban park with grassy lawns and trees	-	-	More urban than rural residents
A native bushland reserve	-	-	More rural than urban residents
An agricultural area	More male than female	More older than younger Victorians	More rural than urban residents
The beach or coastal areas	-	-	More urban than rural residents
Your own garden at home	More female than male	More older than younger Victorians	More rural than urban residents
A 'green' urban space like a green roof or leafy courtyard		-	More urban than rural residents
A community garden	More female than male	More younger than older Victorians	More urban than rural residents

Note. Differences refer to overall time spent in different locations; (-) indicates that there was no difference between groups.

Other places to spend time in nature

Appendix Table 10. Frequency of Top 30 Words (after the Removal of Filler Words)

#	word	frequency	#	word	freq	#	word	frequency
1	garden	61	11	overseas	23	21	trees	14
2	parks	47	12	home	23	22	lake	13
3	local	40	13	course	22	23	birds	12
4	beach	40	14	holidays	19	24	walks	11
5	walking	39	15	farm	18	25	sea	11
6	area	38	16	country	16	26	work	11
7	park	34	17	bush	15	27	camping	10
8	mountains	30	18	river	15	28	fishing	10
9	ocean	27	19	national	15	29	natural	10
10	golf	26	20	walk	14	30	outback	9

PLACES OF CONNECTION

Differences between groups in clusters of connection

Highly modified natural places	Weakly or un-modified natural places
A 'green' urban space like a green roof or leafy courtyard	A national park, state forest or other protected natural areas
A community garden	A lake, river or other waterways
An urban park with grassy lawns and trees	A native bushland reserve
A zoo or wildlife park	The beach or coastal areas
Your own garden at home	
An agricultural area	

All reported differences between groups are significant at p <.01

Gender

Overall, women felt a stronger sense of connectedness to nature in both type of places (i.e., highly modified and weakly modified natural places) compared to men.

Age

In general, older respondents felt a stronger sense of connectedness to both types of natural places compared to younger respondents.

Region

Victorians living in urban or rural areas did not differ in their feeling of connectedness to highly and weakly modified natural places.

Time spent in nature

The more frequently Victorians spent time in nature the stronger they felt connected to both types of natural places.

Relation between nature connectedness and feeling of connectedness to different places

Overall, feeling connected to nature was moderately positively correlated with feeling of connection to highly modified natural places (r = .40, p <.01) and strongly positively to weakly or un-modified natural places(r = .57, p < .01). These findings indicate that more natural and unmodified places seem to be more align to a sense of connectedness to nature.

Places of connection: mean score for each natural place and each group

Appendix Table 11. Mean feelings of connectedness to each place by gender, age, region, and frequency of time spent in nature.

Place	Overall mean	Gender		Age group				
		Male	Female	18-29	30-39	40-49	50-59	60+
A national park, state forest or other protected natural areas	5.66	5.57	5.75	5.59	5.55	5.66	5.78	5.70
A lake, river or other waterways	5.57	5.45	5.68	5.39	5.49	5.54	5.65	5.70
A zoo or wildlife park	4.33	4.23	4.43	4.17	4.33	4.45	4.38	4.35
An urban park with grassy lawns and trees	4.98	4.85	5.10	4.78	4.83	5.01	5.05	5.14
A native bushland reserve	5.47	5.39	5.55	5.31	5.41	5.48	5.59	5.54
An agricultural area	4.60	4.53	4.68	4.43	4.47	4.61	4.75	4.70
The beach or coastal areas	5.65	5.50	5.80	5.55	5.61	5.64	5.82	5.63
Your own garden at home	5.57	5.41	5.72	4.97	5.15	5.50	5.81	6.07
A 'green' urban space like a green roof or leafy courtyard	4.48	4.42	4.55	4.42	4.43	4.41	4.49	4.61
A community garden	4.47	4.35	4.59	4.52	4.50	4.48	4.43	4.42

Place	Region		Frequency of time spent in nature				
	Melbourne	Rest of VIC	Never	Rarely	Occasionally	Frequently	Very frequently
A national park, state forest or other protected natural areas	5.65	5.69	4.50	5.07	5.58	5.69	5.88
A lake, river or other waterways	5.54	5.66	4.64	4.98	5.49	5.60	5.80
A zoo or wildlife park	4.37	4.22	3.50	4.12	4.30	4.35	4.41
An urban park with grassy lawns and trees	5.04	4.78	3.89	4.48	4.81	5.02	5.27
A native bushland reserve	5.44	5.57	4.42	4.86	5.30	5.52	5.75
An agricultural area	4.52	4.85	3.10	4.00	4.44	4.63	4.87
The beach or coastal areas	5.66	5.61	4.43	5.05	5.51	5.74	5.90
Your own garden at home	5.48	5.81	4.79	4.96	5.34	5.63	5.91
A 'green' urban space like a green roof or leafy courtyard	4.53	4.30	3.27	4.02	4.36	4.53	4.67
A community garden	4.48	4.42	2.80	4.11	4.32	4.49	4.66

Further places of connection

Appendix Table 12. 30 Most Frequently Mentioned Words

#	word	frequency	#	word	frequency	#	word	frequency
1	mountains	23	11	beach	9	21	home	5
2	gardens	23	12	local	8	22	river	4
3	nature	19	13	walking	7	23	birds	4
4	parks	12	14	trees	7	24	national	4
5	place	10	15	ocean	7	25	australian	4
6	bush	10	16	natural	7	26	city	4
7	golf	10	17	areas	7	27	desert	4
8	sea	10	18	sky	6	28	urban	4
9	anywhere	9	19	botanical	6	29	land	4
10	course	9	20	outback	6	30	every	4

APPENDIX G: CHAPTER 3 ACTIVITIES IN NATURE

This appendix provides additional analyses for the following survey variables discussed in the main text Chapter 3:

- Activities when spending time in nature (EB3)
- Indirect nature experience (EB4)

ACTIVITIES WHEN SPENDING TIME IN NATURE

Differences in activities when spending time in nature between groups

To summarise whether the frequency of each activity differed depending on gender, age, region, and time spent in nature, we grouped the recording of each activity into:

- Regularly (at least once a month)
- Irregularly (between twice a year and less than once a year) and
- Never.

This process helped to provide an overview and differences for gender, age, and region are shown in the table below. The more frequently Victorians spent time in nature, the more often they engage in all kinds of activities.

Appendix Table 13. Differences in Activities in Nature between Gender, Age, and Region

	Gender	Age	Region
Rest and recover	-	-	-
Engage in social activities	-	More younger than older Victorians	-
Accompany children to an activity (n=723)	-	-	-
Engage in any form of physical activities	-	-	More rural than urban residents
Engage in motorised leisure activities	More male than female	More younger than older Victorians	-
Enjoy a sense of peace, tranquillity and awe	More female than male	More older than younger Victorians	-
Engage in cultural activities	-	More younger than older Victorians	More urban than rural residents
Enjoy and connect with nature	More female than male	-	-
Have a picnic or BBQ	-	More younger than older Victorians	-
Walk your dog (n=1027)	-	-	-
Gardening	-	More older than younger Victorians	More rural than urban residents
Pass through to reach my destination	-	More younger than older Victorians	-
Act to protect the natural environment	-	-	-

Other activities Victorians engage in when being in nature

Appendix Table 14. 30 Most Frequently Stated Words Regarding Other Things to Do in Nature (EB3a)

#	word	frequency	#	word	frequency	#	word	frequency
1	enjoy	24	11	look	11	21	life	7
2	relax	17	12	nature	10	22	wildlife	7
3	walking	15	13	listen	9	23	bush	6
4	read	15	14	beach	9	24	watching	6
5	walk	14	15	watch	9	25	rubbish	6
6	fishing	14	16	photography	9	26	breathe	5
7	play	13	17	bird	8	27	swimming	5
8	birds	12	18	swim	8	28	home	5
9	sit	12	19	air	7	29	activities	5
10	think	11	20	golf	7	30	scenery	5

INDIRECT NATURE EXPERIENCE

Differences in indirect nature experience between groups

We used the same approach as for the previous question looking at activities in nature. The table below summarises the main findings. Differences between groups are significant at $p < .01$. The more frequently Victorians spent time in nature, the more often they engage in all forms of indirect nature experience

Appendix Table 15. Differences in Indirect Nature Experiences between Gender, Age, and Region

	Gender	Age	Region
Read about nature in a book or online	-	-	-
Look at images of natural environments (e.g. a poster of a rainforest)	-	-	-
Watch a nature documentary	More male than female	More older than younger Victorians	More rural than urban residents
Visit a natural history museum	More male than female	More younger than older Victorians	More urban than rural residents

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APPENDIX H: CHAPTER 4 ACTING TO PROTECT NATURE

This appendix provides additional analyses for survey variables discussed in the main text Chapter 4:

- Engagement in pro-environmental behaviours in the past year (PEBpast)
- Uptake of pro-environmental behaviours over the next 12 months (PEBlike)

ENGAGEMENT IN PRO-ENVIRONMENTAL BEHAVIOURS IN THE LAST YEAR

Correlations between connectedness to nature dimensions and past pro-environmental behaviours

Appendix Table 16. Correlation of past pro-environmental behaviours with CN dimensions

Variable	CN Total	CN Attachment	CN Identity	CN Materialism	CN Experiential	CN Spiritual
Controlled the movements of your pets to keep them away from native birds and animals	.29**	.25**	.25**	-.17**	.17**	.22**
Chosen native plant species when planting/gardening	.37**	.34**	.38**	-.04*	.34**	.28**
Reduced energy use (e.g. electricity/gas) in the home	.34**	.28**	.34**	-.10**	.25**	.30**
Chosen sustainable seafood	.36**	.31**	.37**	-.09**	.29**	.28**
Used public transport rather than driving	.10**	.07**	.11**	-.05**	.08**	.06**
Volunteered time for activities that take care of the environment	.29**	.29**	.33**	.04*	.29**	.22**
Collected information on the natural environment for scientific projects or databases (citizen science)	.20**	.22**	.27**	.14**	.22**	.17**
Donated money to organisations that take care of the environment	.37**	.32**	.40**	-.09**	.28**	.29**
Advocated for the environment	.33**	.29**	.39**	-.04*	.25**	.25**
Cleaned up litter in a public space, park or forest	.37**	.33**	.37**	-.08**	.33**	.26**
Been involved in a local community garden or community composting activity	.18**	.21**	.25**	.13**	.20**	.17**
Public past pro-environmental behaviour	.36**	.35**	.43**	.04*	.32**	.29**
Private past pro-environmental behaviour	.48**	.43**	.49**	-.12**	.39**	.39**
Mean all pro-environmental items (1-11)	.49**	.45**	.54**	-.06**	.42**	.39**

Differences between groups in public and private PEB (past)

All reported differences between groups are significant at p <.01.

Gender

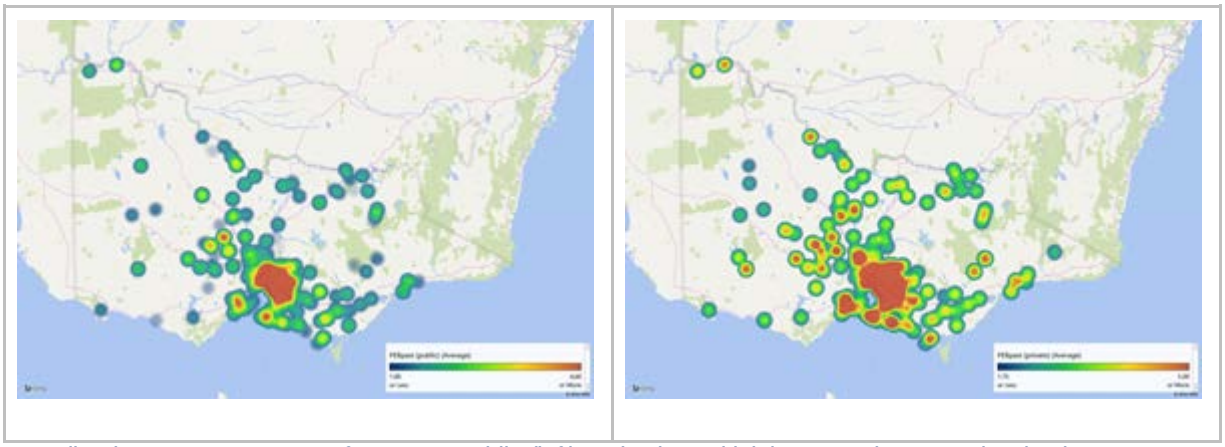
In the last year, females were more engaged in private pro-environmental behaviours than males. Males and females did not differ on public pro-environmental behaviours.

Age

Engagement in public and private pro-environmental behaviours differed between age groups. Overall, younger Victorians were more engaged in public, whereas older Victorians were more engaged in private pro-environmental behaviours.

Region

Residents in urban and rural regions of Victoria also differed on both types of behaviours with urban residents showing more engagement in public and rural residents more engagement in private pro-environmental behaviours. The figure below shows a heat map of average public (left) and private (right) pro-environmental behaviours across Victoria.



Appendix Figure 12. Heat Map of Average Public (left) and Private (right) Pro-Environmental Behaviours across Victoria

Time spent in nature

The more time Victorians spent in nature, the more they engaged in both types (i.e., public and private) of pro-environmental behaviours.

UPTAKE OF PRO-ENVIRONMENTAL BEHAVIOURS OVER THE NEXT 12 MONTHS

Correlations between connectedness to nature dimensions and planned pro-environmental behaviours

Appendix Table 17. Correlation of past pro-environmental behaviours with CN dimensions

Planned pro-environmental behaviour (PEBlike)	CN Total	CN Attachment	CN Identity	CN Materialism	CN Experiential	CN Spiritual
Control the movements of your pets to keep them away from native birds and animals	.32**	.28**	.28**	-.15**	.21**	.26**
Choose native plant species when planting/gardening	.41**	.36**	.39**	-.11**	.35**	.33**
Reduce energy use (e.g. electricity/gas) in the home	.35**	.28**	.32**	-.12**	.26**	.32**
Choose sustainable seafood	.39**	.33**	.38**	-.12**	.30**	.31**
Use public transport rather than driving	.14**	.10**	.15**	-.08**	.10**	.09**
Volunteer time for activities that take care of the environment	.41**	.39**	.43**	-.04*	.37**	.33**
Collect information on the natural environment for scientific projects or databases (citizen science)	.32**	.32**	.38**	.05*	.30**	.27**
Donate money to organisations that take care of the environment	.39**	.33**	.41**	-.11**	.29**	.31**
Advocate for the environment	.42**	.37**	.47**	-.10**	.31**	.34**
Clean up litter in a public space, park or forest	.42**	.37**	.41**	-.12**	.36**	.31**
Be involved in a local community garden or community composting activity	.31**	.30**	.35**	.05**	.29**	.28**
Public planned pro-environmental behaviour	.46**	.42**	.51**	-.04*	.39**	.38**
Private planned pro-environmental behaviour	.51**	.44**	.49**	-.16**	.41**	.42**
Mean all pro-environmental items (1-11)	.56**	.50**	.58**	-.12**	.46**	.45**

Differences between groups in public and private PEB (likelihood)

Gender

Unlike past pro-environmental behaviours where women reported higher engagement on private but were not different on public behaviours, women reported a higher likelihood to engage in both types of behaviours (public and private) over the next 12 months compared to men.

Age

As for past pro-environmental behaviours, the likelihood to take up or continue public pro-environmental activities was higher for younger Victorians, whereas the likelihood for private pro-environmental behaviours was higher for older Victorians.

Region

Differences between urban and rural Victorians were marginally significant (p = .01) and Melbournians were slightly more likely to take up or continue public pro-environmental behaviours (M_{urban} = 3.24, M_{rural} = 3.08) whereas non-Melbournians were slightly more likely to take up or continue private pro-environmental behaviours (M_{rural} = 5.31, M_{urban} = 5.18). Thus, replicating the pattern from past pro-environmental behaviours.

Time spent in nature

Similar to past pro-environmental behaviours, the more time Victorians spent in nature the higher their likelihood to take up or continue public and private pro-environmental behaviours over the next 12 months.