



# Identifying Conservation Values, Park Experiences, and Development Preferences in the Otago Region of New Zealand

A summary of a Public Participation Geographic Information System Study in the Otago region



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# 1.0 Introduction

In January and February 2011 the Department of Conservation (DOC), University of Queensland, and the University of Waikato jointly conducted a pilot-study which collected public values, experiences, and development preferences for conservation land within the Otago region. This data was collected through a self-administered online mapping interface and questionnaire method known as Public Participation Geographic Information Systems (PPGIS).

This report provides an overview and summary of key findings of the pilot-study in Otago, and complements a similar study and report for Southland.

The objectives of the study were twofold:

- To identify the spatial location of conservation land values, experiences, and facilities/development preferences in the Otago Region of New Zealand.
- To evaluate an internet system for capturing and reporting community information regarding conservation management in New Zealand

The data collected in the study will be used for pre-consultation purposes for the second generation Conservation Management Strategy (CMS) for the Otago Region. A CMS is a 10-year regional strategy that provides direction for the management of public conservation lands and waters, and species for which DOC has responsibility.

Approximately 412 individuals provided information about their conservation area values, experiences and development preferences through the Otago Values website ([www.landscapemap2.org/otago](http://www.landscapemap2.org/otago)).

This study was the first PPGIS effort in New Zealand with the goal of identifying conservation area values, experiences, and development preferences. As a pilot effort, the project had mixed results. The positive aspects of the research project included:

- 1) Sufficient data was collected to assist DOC with the CMS planning process for the Otago region;
- 2) A PPGIS website that was robust and continuously available for mapping;
- 3) Results that provided basic descriptive information about the distribution of conservation area values, experiences, and development/facilities preferences in the region;
- 4) Feedback was received and lessons were learnt regarding how to improve the survey method for future projects.

## 2.0 Method

An interactive website was designed and promoted (<http://www.landscapemap2.org/otago>) that allowed Otago residents and visitors to conservation areas to identify and map their park experiences and values over a 50 day period (10 January to 28 February 2011).

Respondents were sought by inviting a random sample of residents from households in the Otago region to participate in the study (n=1000) by posting letters with instructions and access codes to complete the online survey. Visitors to conservation areas were also approached on-site and provided with instructions and access codes if they wanted to complete the survey online at their convenience. If their codes had not been used after a month from the start date, reminders were sent to these participants. Members of the public who heard about the survey through public promotion or word of mouth could also request access codes online to complete the survey. One means of promoting the website was contacting people on a DOC newsletter mailing list (n=972).

Values mapped by respondents were then symbolised according to their category value (e.g. aesthetic/scenic, wilderness, no development, etc) and 'hotspot' maps were generated under four different categories listed in **Table 1**. The resulting hotspot maps can be seen on pp 9-11.

**Table 1: Categories for PPGIS analysis and their grouped values**

Category	Values included
Natural Heritage	Scenic/Aesthetic Ecological/Life-sustaining Native Wildlife Native vegetation Marine Wilderness Solitude
Recreation	Recreation (non-facility based) Recreation (facility based)
Historic	Historic/cultural NZ identity/heritage Learning
Business enabling	Economic Energy development Natural resource development Tourism development Other development

A significant amount of qualitative data from annotated mapped markers in addition to questionnaire responses were also received. This data was thematically coded and then analysed.

Statistics for dominant 'values', 'experiences', and 'development preferences' were also calculated for conservation areas.

### 3.0 Distribution and response rate

A total of 9160 markers were mapped by the closing of the study representing 252 full responses (participant who mapped at least one spatial attribute and completed the survey questions) and 160 partial responses (participants who mapped at least one attribute but did not complete survey questions) for a total of 412 participants. These 412 individuals were comprised of 343 general public, 59 randomly sampled households, and 9 visitors. 83% of respondents were from Otago; 4% from Southland; 8% from other regions in NZ; and 2% were international visitors. Response rates for the survey are listed in **Table 2**.

**Table 2: Overview of response rates**

Respondent type	Number of codes distributed	Number of responses	Response rate	Total # of points plotted	Avg. # of points plotted per person
Postal distribution	940	59	6%	1277	22
On-site distribution	79	9	11%	131	15
Newsletter mailing list	962	343	?	7734	23
Code requested from web-site	?				
<b>Total</b>	<b>1981+</b>	<b>412</b>	<b>-</b>	<b>9160</b>	<b>22</b>

Response rates were lower than expected, particularly with regards to the postal distribution system. It is highly probable that some of the “general public” responses actually represent individuals from randomly sampled households or visitors that used the dynamic access code rather than the assigned access code but the actual number is indeterminate.

For this report the data was tidied to exclude duplicates, and points which were not within 1000m of a conservation unit in Otago. As a result the total number of points analysed was 7293. Points were mapped to a total of 773 conservation areas in Otago.

## 4.0 Results and analysis

### 4.1 Distribution of values by conservation area

**Table 3** shows the distribution of ‘values’ markers respondents placed by category, and by conservation area.

**Table 3:** Percentage of mapped values located within conservation areas in Otago Region. Bold/underlined values indicates the largest percentage for that category.

Conservation area (n)	Aesthetic (n=504)	Economic (n=42)	Historic (n=89)	Life sustaining (n=135)	Marine (n=45)	Native vegetation (227)	Native wildlife (n=221)	Recreation w/facilities (n=217)	Recreation (n=689)	Social interaction (n=44)	Special places (n=95)	Wilderness (n=177)
Mount Aspiring National Park (n=530)	22.5	0.8	0.9	3.0	0.0	8.5	9.2	12.3	24.7	1.5	5.5	11.1
Oteake Conservation Park (n=256)	23.0	1.6	3.5	7.4	0.0	6.3	2.0	7.0	36.3	1.2	3.9	7.8
Hawea Conservation Park (n=179)	21.2	5.6	0.6	7.3	0.0	8.9	6.7	7.8	34.1	0.6	0.6	6.7
Te Papanui Conservation Park (n=134)	14.2	0.7	1.5	14.2	0.0	11.2	9.7	3.0	26.1	1.5	5.2	<b>12.7</b>
Rock and Pillar Conservation Area (n=118)	15.3	0.0	3.4	9.3	0.0	16.1	10.2	5.9	24.6	3.4	5.9	5.9
Kopuwai Conservation Area (n=113)	20.4	0.0	4.4	6.2	0.0	15.9	5.3	4.4	30.1	0.0	6.2	7.1
Pisa Conservation Area (n=99)	25.3	4.0	2.0	3.0	0.0	3.0	6.1	10.1	37.4	1.0	2.0	6.1
Remarkables Conservation Area (n=98)	21.4	1.0	5.1	4.1	0.0	12.2	4.1	12.2	30.6	2.0	2.0	5.1
Catlins Conservation Park (n=103)	6.8	1.9	0.0	9.7	0.0	<b>22.3</b>	20.4	4.9	20.4	0.0	2.9	10.7
Otago Central Rail Trail (n=89)	15.7	7.9	15.7	5.6	0.0	4.5	3.4	16.9	16.9	6.7	5.6	1.1
Silverpeaks Scenic Reserve (n=77)	14.3	0.0	1.3	3.9	0.0	6.5	2.6	9.1	<b>50.6</b>	0.0	3.9	7.8
Nugget Point Lighthouse Reserve (n=73)	20.5	0.0	5.5	4.1	<b>26.0</b>	8.2	21.9	1.4	5.5	1.4	4.1	1.4
Mt Aurum Recreation Reserve (n=61)	26.2	1.6	21.3	1.6	0.0	4.9	1.6	4.9	31.1	0.0	0.0	6.6
Lower Dart Conservation Area (n=53)	22.6	0.0	1.9	3.8	0.0	11.3	20.8	3.8	24.5	0.0	1.9	9.4
Conservation Area - Sandfly Bay (n=52)	23.1	0.0	0.0	3.8	11.5	3.8	<b>26.9</b>	0.0	26.9	0.0	3.8	0.0
Allans Beach Recreation Reserve (n=48)	18.8	0.0	0.0	4.2	12.5	2.1	25.0	0.0	31.3	2.1	2.1	2.1
Flat Top Hill Conservation Area (n=45)	22.2	2.2	4.4	6.7	0.0	20.0	11.1	4.4	26.7	0.0	0.0	2.2
Papatowai Scenic Reserve (n=42)	26.2	2.4	2.4	0.0	9.5	11.9	19.0	7.1	14.3	4.8	2.4	0.0
Ben Lomond Scenic Reserve (n=40)	25.0	2.5	0.0	0.0	0.0	2.5	5.0	20.0	32.5	7.5	2.5	2.5
Tautuku Bay Scenic Reserve (n=41)	26.8	0.0	2.4	0.0	2.4	14.6	19.5	2.4	17.1	0.0	4.9	9.8
Tahakopa Bay Scenic Reserve (n=40)	15.0	0.0	10.0	5.0	2.5	17.5	7.5	2.5	25.0	0.0	<b>7.5</b>	7.5
Motatapu Conservation Area (n=43)	14.0	<b>11.6</b>	0.0	2.3	0.0	0.0	2.3	<b>41.9</b>	14.0	<b>9.3</b>	2.3	2.3
Macetown Historic Reserve (n=35)	25.7	0.0	<b>40.0</b>	0.0	0.0	2.9	0.0	5.7	17.1	5.7	2.9	0.0
Old Woman Range Conservation Area (n=33)	6.1	0.0	3.0	6.1	0.0	3.0	0.0	18.2	42.4	6.1	3.0	12.1
The Stack Conservation Area (n=43)	<b>32.6</b>	0.0	0.0	2.3	0.0	2.3	2.3	11.6	46.5	0.0	2.3	0.0
Warrington Local Purpose Reserve (Coastal Protection) (n=40)	17.5	0.0	0.0	<b>15.0</b>	20.0	5.0	15.0	7.5	12.5	5.0	2.5	0.0



Values in the Otago Region are unevenly distributed among the different conservation units. About 9 percent of all mapped values were located in Mount Aspiring National Park (n=530) followed by Oteake Conservation Park (4%, n=256) and Hawea Conservation Park (3%, n=179). The results show that aesthetics and recreation are important values for all conservation units, and were by far the most popular markers in the survey.

## 4.2 Distribution of experience by conservation area

**Table 4** shows the distribution of ‘experience’ markers respondents placed by category, and by conservation area.

**Table 4:** Percentage of mapped experiences located within conservation areas in Otago Region. Bold/underlined indicates the largest percentage for the category.

Conservation area	Poor access (n=36)	Crowding (n=8)	NZ identity (n=34)	Poor information (n=16)	Learning (n=27)	Negative experience (n=14)	Noise (n=15)	Positive experience (n=32)	Solitude (n=99)	Wildlife/ vegetation (n=36)
Mount Aspiring National Park (n=68)	4.4	4.4	1.5	2.9	8.8	8.8	8.8	10.3	39.7	10.3
Oteake Conservation Park (n=33)	9.1	0.0	15.2	0.0	3.0	6.1	3.0	9.1	39.4	15.2
Hawea Conservation Park (n=37)	29.7	2.7	8.1	2.7	5.4	10.8	2.7	<b>24.3</b>	10.8	2.7
Te Papanui Conservation Park (n=22)	13.6	0.0	9.1	0.0	9.1	0.0	0.0	4.5	36.4	<b>27.3</b>
Rock and Pillar Conservation Area (n=20)	15.0	0.0	15.0	5.0	5.0	0.0	0.0	5.0	35.0	20.0
Kopuwaiti Conservation Area (n=19)	5.3	0.0	10.5	10.5	0.0	0.0	10.5	5.3	<b>42.1</b>	15.8
Pisa Conservation Area (n=19)	<b>36.8</b>	0.0	5.3	<b>36.8</b>	5.3	0.0	0.0	0.0	15.8	0.0
Remarkables Conservation Area (n=19)	5.3	0.0	10.5	5.3	15.8	0.0	0.0	15.8	<b>42.1</b>	5.3
Silverpeaks Scenic Reserve (n=12)	16.7	0.0	0.0	16.7	0.0	0.0	0.0	0.0	41.7	25.0
Nugget Point Lighthouse Reserve (n=15)	6.7	<b>20.0</b>	13.3	0.0	20.0	0.0	0.0	20.0	6.7	13.3
Mt Aurum Recreation Reserve (n=18)	0.0	5.6	<b>38.9</b>	0.0	<b>22.2</b>	0.0	0.0	5.6	27.8	0.0
Lower Dart Conservation Area (n=12)	0.0	0.0	8.3	0.0	16.7	0.0	8.3	8.3	41.7	16.7
Macetown Historic Reserve (n=12)	8.3	0.0	33.3	0.0	8.3	<b>16.7</b>	0.0	8.3	25.0	0.0
Old Woman Range Conservation Area (n=11)	0.0	0.0	9.1	0.0	9.1	0.0	<b>36.4</b>	9.1	18.2	18.2

Experiences in the Otago Region are unevenly distributed among the different conservation areas. About 8 percent of all mapped experiences were located in Mount Aspiring National Park (n=68) followed by Oteake Conservation park (4%, n=33) and Hawea Conservation Park (4%, n=37). The results show that solitude experiences are the most popular, and common in most conservation areas with the exception of Nugget Point Lighthouse Reserve where crowding experiences were more frequent. The highest percentage of poor access and information experiences was recorded at the Pisa Conservation Area. Mount Aurum Recreation Reserve (encompasses Skippers Township) and Macetown Historic Reserve rated highly as areas that represented the NZ identity.

### 4.3 Distribution of development by conservation area

**Table 5** shows the distribution of ‘development preferences’ markers respondents placed by category, and by conservation area.

**Table 5:** Percentage of mapped development preferences located within conservation areas in Otago Region. Bold/underlined indicates the largest percentage for the category.

Conservation area	Energy (n=1)	Less facilities (n=1)	Less people (n=5)	More facilities (n=9)	More people (n=11)	Natural resource (n=0)	No development (n=80)	Other development (n=15)	Tourism (n=20)
Mount Aspiring National Park (n=41)	0.0	<b><u>2.4</u></b>	4.9	0.0	2.4	0.0	75.6	7.3	7.3
Oteake Conservation Park (n=22)	<b><u>4.5</u></b>	0.0	0.0	9.1	22.7	0.0	63.6	0.0	0.0
Hawea Conservation Park (n=12)	0.0	0.0	8.3	<b><u>25.0</u></b>	<b><u>25.0</u></b>	0.0	25.0	8.3	8.3
Te Papanui Conservation Park (n=12)	0.0	0.0	0.0	0.0	0.0	0.0	<b><u>91.7</u></b>	8.3	0.0
Pisa Conservation Area (n=10)	0.0	0.0	0.0	10.0	0.0	0.0	30.0	0.0	<b><u>60.0</u></b>
Remarkables Conservation Area (n=11)	0.0	0.0	0.0	0.0	0.0	0.0	63.6	0.0	36.4
Catlins Conservation Park (n=12)	0.0	0.0	<b><u>16.7</u></b>	8.3	0.0	0.0	75.0	0.0	0.0
Ben Lomond Scenic Reserve (n=12)	0.0	0.0	0.0	8.3	16.7	0.0	16.7	41.7	16.7
Seven Mile Recreation Reserve* (n=10)	0.0	0.0	0.0	10.0	0.0	0.0	0.0	<b><u>50.0</u></b>	40.0

\*The Seven Mile Reserve was not in the top 30 areas overall, but had a relatively high proportion of development markers

Development preferences in the Otago Region are unevenly distributed among the different conservation areas. About 7 percent of all mapped experiences were located in Mount Aspiring National Park (n=41) followed by Oteake Conservation Park (4%, n=22). The results indicate that no development preference is the dominant preference in around half the conservation areas, and the most popular in this group by far. The highest percentage of preferences for seeing fewer people was recorded at Catlins Conservation Park.

## 4.4 Dominant ‘values’, ‘experiences’ and ‘development’ preferences for conservation areas

The dominant values, experiences, and development preferences were calculated for each conservation area. **Table 6** presents this information where 10 or more values, experiences, or development preferences were mapped within a conservation area.

**Table 6:** Dominant values, experiences, and development preferences in Otago conservation areas

Conservation area	Dominant value	Dominant experience	Dominant development preference
Mount Aspiring National Park	Recreation	Solitude	No development
Oteake Conservation Park	Recreation	Solitude	No development
Hawea Conservation Park	Recreation	Poor access	No development More park facilities More people
Te Papanui Conservation Park	Recreation	Solitude	No development
Rock and Pillar Conservation Area	Recreation	Solitude	-
Kopuwai Conservation Area	Recreation	Solitude	-
Pisa Conservation Area	Recreation	Poor access Poor information	Tourism
Remarkables Conservation Area	Recreation	Solitude	No development
Catlins Conservation Park	Native vegetation	-	No development
Otago Central Rail Trail	Recreation	-	-
Silverpeaks Scenic Reserve	Recreation	Solitude	-
Nugget Point Lighthouse Reserve	Marine	Crowding Learning Positive experience	-
Mt Aurum Recreation Reserve	Recreation	NZ identity	-
Lower Dart Conservation Area	Recreation	Solitude	-
Conservation Area - Sandfly Bay	Recreation	-	-
Allans Beach Recreation Reserve	Recreation	-	-
Flat Top Hill Conservation Area	Recreation	-	-
Papatowai Scenic Reserve	Aesthetic	-	-
Ben Lomond Scenic Reserve	Recreation	-	Other development
Tautuku Bay Scenic Reserve	Aesthetic	-	-
Tahakopa Bay Scenic Reserve	Recreation	-	-
Motatapu Conservation Area	Recreation	-	-
Macetown Historic Reserve	Historic	NZ identity	-
Old Woman Range Conservation Area	Recreation	Noise	-
The Stack Conservation Area	Recreation	-	-
Warrington Local Purpose Reserve (Coastal Protection)	Marine	-	-

## 4.5 Hotspot mapping analysis

Figures 1 – 4 present the ‘hotspot’ mapping analysis for the four categories of Natural Heritage, Recreation, Historic, and Business Enabling and the values, experiences, and development preferences they encompass (see Table 1). Hotspot analyses represent the density of markers placed by respondents in relation to a spatial area. Red represents a high density of values while yellow represents a lower density. Low density or single marker placements within a 1km radius do not register as hotspot areas.

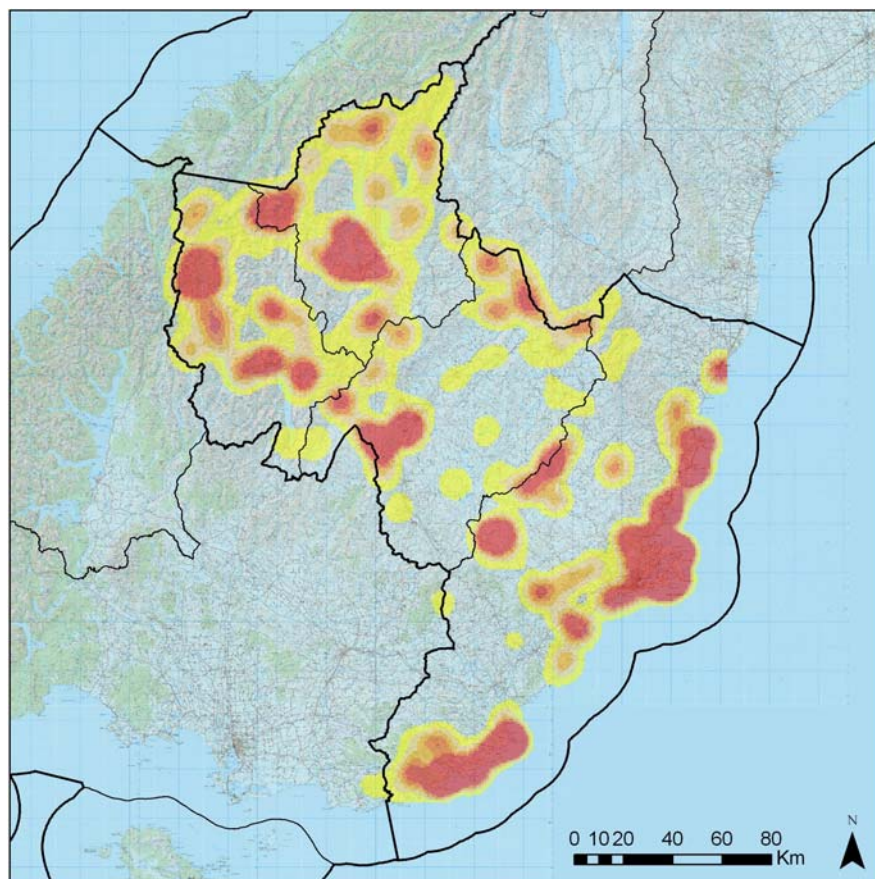
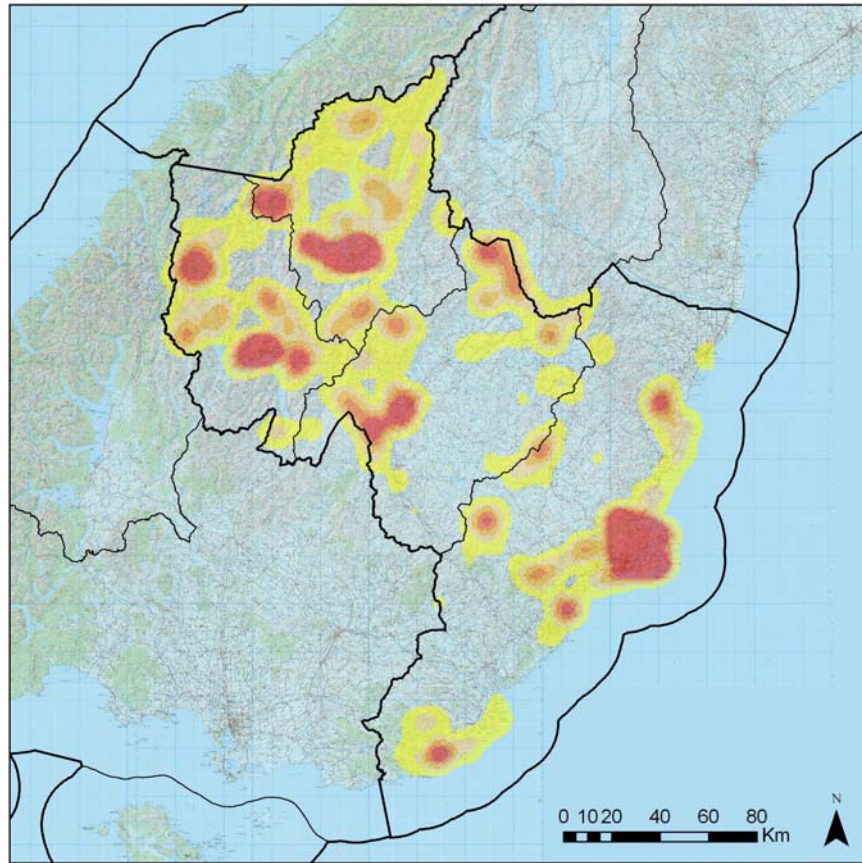


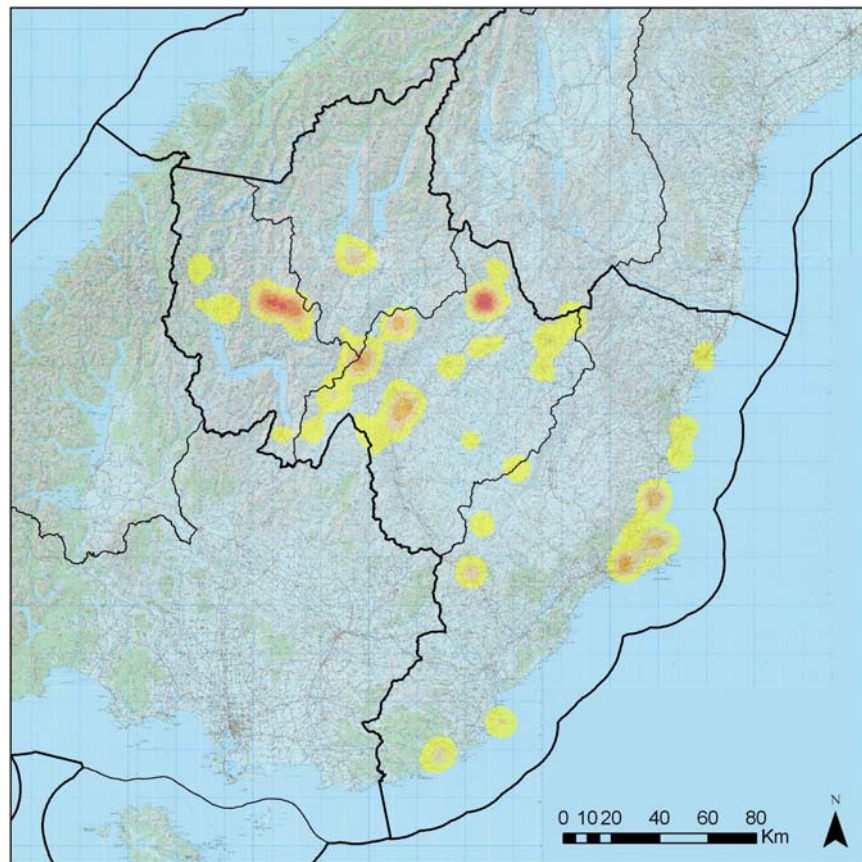
Figure 1: ‘Natural Heritage’ hotspot analysis

Figure 1 shows areas with the highest density of respondents’ natural heritage values are Otago Peninsula and the wider Dunedin area, north Otago coastline and Oamaru, Waipori and the Taieri River, the Catlins coast, Te Papanui Conservation Park, the Rock and Pillar Range, the Kopuwai Conservation Area and Alexandra surrounds, Oteake Conservation Park, the Nevis Valley, Remarkables and wider Queenstown area, Lake Wanaka and its shores, Matukituki West Branch, the Blue Pools, the Routeburn and Dart Valleys, and Glenorchy area.

Figure 2 shows areas with the highest density of respondents’ recreation values are the Otago Peninsula and wider Dunedin area, Taieri River Mouth and Papatowai, Oteake Conservation Park, Kopuwai Conservation Area and Alexandra surrounds, the Remarkables, Ben Lomond and Mount Crichton, Lake Wanaka shore and surrounds, Matukituki West Branch, and the Routeburn and Dart Valleys.



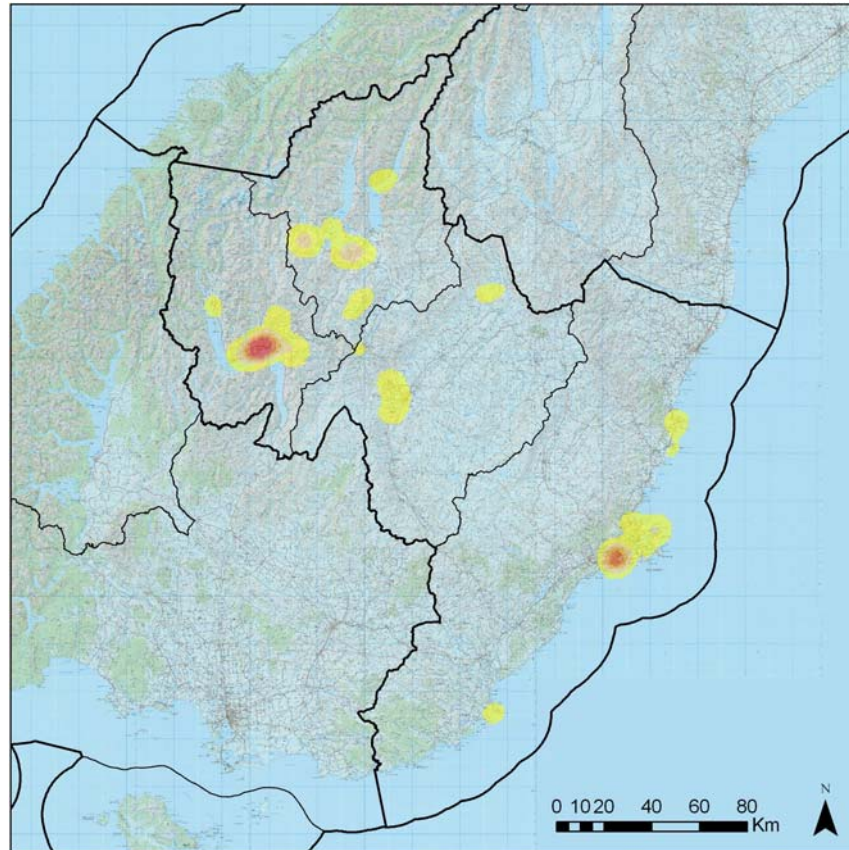
**Figure 2:** 'Recreation' hotspot analysis



**Figure 3:** 'Historic' hotspot analysis

**Figure 3** shows areas with the highest density of respondents' historic values are St Bathans, Skippers and Macetown, and Bannockburn, followed by Bendigo, Alexandra surrounds and the wider Dunedin area.

**Figure 4** shows areas with the highest density of respondents' business enabling values are concentrated around Queenstown and Dunedin, but also include Wanaka, Treble Cone and Taiaroa Head.



**Figure 4:** 'Business enabling' hotspot analysis

## 5.0 Recommendations for future studies

One of the objectives of the study was to evaluate how effective the PPGIS survey was for capturing and reporting community information regarding conservation management in New Zealand. As this study was the first PPGIS effort in New Zealand focusing on conservation management, many lessons were learnt as to how the application of PPGIS could be improved for future projects.

Feedback received from respondents and recommendations that may provide solutions are listed in **Table 7**.

Problem	Recommendation/Solution
<ul style="list-style-type: none"> <li>▪ Taking to much time too place all values and experiences</li> <li>▪ Respondents want to value areas, not individual points</li> </ul>	<ul style="list-style-type: none"> <li>▪ Minimise the number of different markers to approximately 10 (reduced from ~30).</li> <li>▪ Allow mapping of polygons/areas rather than individual points.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Unable to save points/points disappear</li> </ul>	<ul style="list-style-type: none"> <li>▪ Create a login system that uses respondents email address and password. Respondent's points were saved provided they used their unique access code when logging in, however this was not clearly communicated to users.</li> </ul>
<ul style="list-style-type: none"> <li>▪ The map did not provide enough detail/difficult to find places</li> </ul>	<ul style="list-style-type: none"> <li>▪ Provide a navigation bar that provides spatial bookmarks for key visitor sites to allow easy and quick navigation for respondents.</li> </ul>
<ul style="list-style-type: none"> <li>▪ The mapping interface is slow to load</li> </ul>	<ul style="list-style-type: none"> <li>▪ Respondents require broadband internet access to complete the survey within a sensible timeframe. Unfortunately, some rural areas in Otago do not have good access to broadband internet. An option would be to offer respondents access to a dedicated computer at a local visitor centre.</li> </ul>

In addition to issues with the mapping/questionnaire interface raised by the public, there are concerns with sampling that need to be addressed in future studies.

The quantitative data produced from the survey could not be considered statistically representative of the Otago population as responses were not from a true random sample, but to an extent 'self-selected' as the response method relied on the will and ability of a respondent to complete the survey. Although this bias can not be eliminated, it could be reduced with a larger sample size.

To achieve a larger sample size in future, it is recommended that postal distribution methods are avoided as they have proved to have an extremely low response rate. More effort and resources should be dedicated to public awareness and advertising of the survey in the media, and having computers in visitor centres which respondents can use. An incentive such as a reward or prize may also be increase response rates.