BAY OF PLENTY REGIONAL COUNCIL
TOI MOANA

Valuing geothermal attributes in the Bay of Plenty region

Results of a survey of visitors to four geothermal sites in Rotorua

Bay of Plenty Regional Council
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Glossary

The following descriptions are for the terms as used in this report:

Gross Regional Product (GRP):	GRP is the total of all value-added within the region, with some adjustments. In this report we use GDP in relation to the Bay of Plenty region and the Rotorua district, noting the relevant geographic area in the text (e.g. Bay of Plenty region or Rotorua district).
Opportunity cost:	The opportunity cost is the value of the alternative forgone to visit geothermal sites. In this study it is represented as one-third of the individual's income multiplied by the time taken to travel to and from the site.
Recreation value:	The recreation value is an indicator of the value an individual places on visiting geothermal sites. It is calculated as the cost of travel and admissions, and the opportunity cost of travelling to and from the geothermal site/s. These costs are allocated, based on the purpose of the trip and the number of activities undertaken. The recreation value is a conservative indicator of value because it represents the lower bound of what the individual is prepared to pay to visit a geothermal site.
Revealed preference:	Revealed preference is a method of analysing the actual choices made by individuals to calculate values. In this case, the actual spending in visiting geothermal parks used to calculate the recreation value. Revealed preference differs from 'stated preference' which asks people how much they would be willing to pay.
Value added:	Value added is a measure of economic output. It is measured by the direct expenditure by visitors (on goods and services such as accommodation, food and entertainment) minus the costs of producing those goods/services.

Executive Summary

The Bay of Plenty Regional Council is currently gathering information to inform a review of the management of geothermal resources, and to develop policy for future management. A gap in the understanding of how the community values geothermal surface features was identified, and a survey of visitors to geothermal sites was designed to address this.

The survey

Staff from the Bay of Plenty and Waikato Regional Councils together developed similar surveys to elicit and estimate geothermal values, and in early 2017, Versus Research interviewed 161 domestic and international visitors at four geothermal sites in the Bay of Plenty region. The Waikato Regional Council carried out their survey at about the same time. The survey included qualitative and quantitative questions, with the purpose of:

1 Identifying the geothermal surface feature attributes people value, eliciting the reasons for those values, understanding why people visit geothermal sites, and why they choose to visit particular sites,

2 Estimating the recreational value (travel cost) for visitors to the Bay of Plenty geothermal resource in 2016, and

3 Estimating the contribution of geothermal tourism to the Bay of Plenty economy in 2016.

The Bay of Plenty sites were:

- Kuirau Park - a public park in the middle of Rotorua city.
- Te Puia - a commercial attraction on the edge of Rotorua City offering a variety of tourism experiences in a geothermal setting.
- Waimangu Volcanic Valley - a commercial attraction 25 km south of Rotorua city, featuring geothermal in a natural setting.
- Whakarewarewa – The living Māori Village - a commercial attraction on the edge of Rotorua city offering a variety of tourism experiences in a geothermal setting.

Why people visit and what they value

- About half the domestic visitors and two-thirds of the international visitors said their visit to the area was specifically to see geothermal sites.
- Iconic geothermal features such as geysers and bubbling mud pools were of most interest to the greatest number of visitors across all sites. A small number of respondents expressed a high level of interest in less visible features, such as geothermal vegetation and colourful rocks and minerals.
- Accessibility (e.g. close by) and cost were important reasons for about one-third of visitors' choice of site, confirming the value of Kuirau Park, which is free to visit and in the heart of Rotorua city.
- The uniqueness of geothermal was important to nearly one-third of visitors. People also said they wanted to experience geothermal themselves and/or to share the experience with their family or friends. Verbatim quotes provided in the report confirm a sense of wonder that people feel when visiting these geothermal sites.
- More than half the visitors said that what they most liked about the site they visited was being close to the geothermal activity.
- Many people said that more information or signage would improve their experience. This was particularly the case for visitors to Kuirau Park.

Valuing the recreation experience

Travel cost analysis was used to estimate the individual's value of the experience. To do this, the cost of travel to the site, admission costs and spending on the trip was calculated (based on survey questions) and proportioned depending on the purpose of the trip and number of activities undertaken.

Total estimated annual domestic visits to geothermal sites are 0.83M to 1.18M, and the average travel cost per visitor is $55. The implied recreation value for domestic visitors is $59.3M to $64.3M/year.

Total estimated annual international visits to geothermal sites are 416,000 to 461,500 and the average travel cost per visitor is $75. The implied recreation value for international visitors is $31.3M to $34.8M/year.

Valuing the contribution to the regional economy

The direct contribution of geothermal recreation to the Bay of Plenty regional economy was estimated to be $90.2M to $117.9M in 2016. When indirect value added is included, the economic contribution of the sector is $138.0M to $180.3M. With induced effects, the annual contribution increases to $141.6M to $185.0M/year.

Based on the output of the geothermal tourism sector, the direct employment is estimated to be 2,052 to 2,681 jobs. Direct and indirect employment is 2,627 to 3,432 jobs, and with induced effects, the total is 2,668 to 3,486 jobs.

Limitations and assumptions

The survey sample is assumed to be relatively representative of geothermal visitors to the Bay of Plenty region. The inclusion of visitors to Waikato geothermal sites increased the sample size, and improved the robustness of results.

The Domestic Visitor Survey has not been undertaken since 2012, and there is little or no current information about domestic trips. Best efforts have been made to estimate the number of visits, and results have been compared with available information (see Appendix 6). The use of ranges reflects the incomplete information.

1 Introduction

Geothermal resources contribute directly to the Bay of Plenty economy through tourism, electricity generation, and heating, but its value is not restricted to economic uses. People value geothermal for cultural and historical reasons, as part of the physical landscape of the region, and as a unique ecosystem for plants and insects that have developed to survive in that environment.

The role of the Bay of Plenty Regional Council is to manage the geothermal resource in a way that enables people to provide for their social, cultural, and economic wellbeing, while sustaining the geothermal resource for the needs of future generations.

In early 2017, the Waikato and Bay of Plenty regional councils surveyed visitors to geothermal sites in their respective regions, to provide information for geothermal management policy. Staff from both councils worked together to develop the survey.

The Bay of Plenty Regional Council surveyed visitors at Kuirau Park, Te Puia, Waimangu Volcanic Valley, and Whakarewarewa – The Living Māori Village. The survey included qualitative and quantitative questions, with the aim of:

1 Identifying the geothermal attributes people value, eliciting the reasons for those values, understanding why people visit geothermal sites, and why they choose to visit particular sites,

2 Estimating the recreational value (travel cost) for visitors to the Bay of Plenty geothermal resource in 2016, and

3 Estimating the contribution of geothermal tourism to the Bay of Plenty economy in 2016.

In economic terms, the estimates of value provided by (2) and (3) are use values. Energy generation is another direct use value. Use values fall into three categories; direct, indirect and future option values. Indirect uses include functional benefits such as water purification, waste treatment and mineral cycling, and future options include possibilities such as development of drugs, genetic resources and recreational options.[1] Non-use values include bequest – the benefits of the geothermal to future generations, altruistic – knowing that others may benefit, and existence – the satisfaction that we get from knowing geothermal exists. A diagram of total economic value is provided in Appendix 1.

This report provides an estimate of the value of tourism direct use for one year (2016). As noted in the report, the non-market value (2) is considered a conservative value because travel cost is based on what people pay to visit the geothermal site, as opposed to the maximum they would be prepared to pay.

Section 2 of this report describes the survey and sample. In section 3, the results of the qualitative questions are provided. These results focus on why people visit geothermal sites and the features and attributes of greatest interest to visitors. Verbatim quotes are included. Section 4 provides the method and results for the recreational valuation for geothermal in the Bay of Plenty and the contribution of geothermal tourism to the Bay of Plenty economy. Section 5 provides a discussion that addresses the robustness of results, and describes the assumptions and limitations. Section 6 presents the key findings.

[1] Barns and Luketina, 2011.

2 The survey

A survey was designed to gather information from visitors to geothermal sites in the Bay of Plenty and Waikato regions. The purpose of the survey was to gain information about how people value geothermal attributes and to estimate the recreation value and the contribution of geothermal tourism to the regional economies. The reason for collaborating on the survey was to ensure results would be comparable across the two regions, which have the majority of geothermal resources in the North Island.

Bay of Plenty region

The survey was administered at four geothermal sites in the Bay of Plenty (Figure 1). The survey sites comprised one public attraction and three commercial attractions:

- Kuirau Park - a public park in the middle of Rotorua city.
- Te Puia - a commercial attraction on the edge of Rotorua city offering a variety of tourism experience in a geothermal setting.
- Waimangu Volcanic Valley - a commercial attraction 25 km south of Rotorua city, featuring geothermal in a natural setting.
- Whakarewarewa – The living Māori Village - a commercial attraction on the edge of Rotorua city offering a variety of tourism experience in a geothermal setting.

The survey included open and closed questions.[2] The open questions were designed to elicit information about the geothermal attributes that people value and why they hold those values. The closed questions provided quantitative information to estimate annual (2016) recreation value of geothermal sites and the contribution to the regional economy (GDP) in 2016.

Two interviewers spent up to eight hours at each site, approaching visitors to request interviews. Survey respondents included locals (people living in Rotorua), and domestic and international visitors. Where people were in a group, only one person from each group was surveyed. People in organised tour parties were not approached at the request of commercial site management.

In the Bay of Plenty region, 161 interviews were completed (Table 1). Nearly half the respondents were visiting Kuirau Park (46%) and the balance were visiting paid sites: Te Puia (29%), Whakarewarewa (16%) and Waimangu Volcanic Valley (9%). Thirty two percent declined to be interviewed.

Table 1: Number of respondents from Bay of Plenty[3]

Site	Completed	Refused	Refusal rate
Kuirau Park	74	19	20%
Te Puia	46	42	48%
Waimangu Volcanic Valley	15	6	29%
Whakarewarewa	26	9	26%
Total	161	76	32%

[2] See Appendix 2 for the survey document.
[3] See Appendix 3 for demographic summary.

Figure 1: Interview sites in the Bay of Plenty region

The Waikato region

The Waikato interviews were undertaken in the way described above. The Waikato survey document included fewer qualitative questions about why particular sites and features were valued, and the mix of sites surveyed differed. The Waikato survey sites comprised:

- Six commercial hot pool businesses.
- Four commercial geothermal attractions.
- One natural, non-commercial hot water spring at Hot Water Beach, Coromandel Peninsula.

The Waikato regional survey comprised 205 completed surveys, with a similar refusal rate.

The sample

Domestic visitors

Domestic visitors interviewed at Bay of Plenty sites were more likely to be from Auckland or the Bay of Plenty (Table 2). In the Waikato region, domestic visitors were most likely to be from Auckland or the Waikato region. Combining the two surveys, New Zealand residents made up 13% of total survey respondents. Of the 104 New Zealand residents, 42% were from Auckland, 25% from Waikato, 12% from the Bay of Plenty, and 12% from Wellington. Nine percent of geothermal visitors were visiting sites in their own region.

Table 2: Domestic visitors – residence location by geothermal destination

Region of residence	Bay of Plenty sites		Waikato sites	
	Number	*Percentage*	Number	*Percentage*
Outside New Zealand	138	86%	124	60%
Auckland	7	4%	33	16%
Bay of Plenty	6	4%	6	3%
Hawkes Bay	-	-	4	2%
Manawatu-Whanganui	1	1%	1	>0.5%
Taranaki	1	1%	2	1%
South Island	4	2%	1	>0.5%
Waikato	-	-	26	13%
Wellington	4	2%	8	4%
	161	100%	205	100%

The most recent national domestic travel survey was undertaken in 2012. The Domestic Travel Survey was a survey of approximately 15,000 households per year from 1999 to 2012. It was used to estimate the characteristics of New Zealand domestic tourism, such as number and length of trips, and tourism spend by purpose of visit.[4] The Domestic Travel Survey has not been replaced with any other national survey of domestic travel, so 2012 is the most recent year of reliable information on domestic travel.

In the 2012 Domestic Travel Survey, domestic visitors to geothermal sites and hot pools in the Bay of Plenty were most likely to be from Auckland (43%), Waikato (22%), the Bay of Plenty (13%), and Wellington (7%). The absence of Waikato residents in the Bay of Plenty survey (Table 2) suggests people from the Waikato are probably underrepresented in the 2012 sample. The 2012 survey, visitors to Waikato geothermal sites were most likely to be from Auckland (38%), Waikato (28%), the Bay of Plenty (14%), Wellington (5%) and the Manawatu-Whanganui region (5%).

International visitors

In the Bay of Plenty and Waikato Regional Council surveys the majority of respondents were international visitors (Table 3). The main residence countries across the two surveys were similar. Germany, the United Kingdom and Australia accounted for 58% of overseas visitors interviewed at Bay of Plenty sites, while Australia, European countries other than Germany and France, and the United Kingdom accounted for 57% of overseas visitors interviewed at Waikato sites.

[4] Ministry of Business, Innovation and Employment.

Combining the survey data, of the 262 international visitors, 21% were from the United Kingdom, 19% were from Germany, 18% were from Australia, and 17% were from South American countries (e.g. Argentina). People from Asian countries made up 6% of international visitors, although national statistics suggest that people from Asian countries are a large percentage of visitors to geothermal sites. The low number may indicate a preference for organised tour parties (not interviewed).

Table 3: International visitors – residence location by destination

Country of residence	Bay of Plenty region		Waikato region	
	Number	*Percentage*	Number	*Percentage*
Africa	-	-	2	1%
Asia	10	7%	5	4%
Australia	20	14%	28	20%
France	9	7%	5	4%
Germany	30	22%	19	14%
Other Americas	8	6%	6	4%
Other Europe	16	12%	28	20%
United Kingdom	31	22%	24	17%
United States	14	10%	7	5%
	138		124	

3 Survey results – qualitative responses

An important objective of the Bay of Plenty survey was to draw qualitative information from respondents about how and why they valued particular geothermal attributes. Additional questions were included in the Bay of Plenty survey to meet that objective.

Geothermal features most interested in visiting

Survey respondents (161) were asked which geothermal features were they most interested in visiting, and were able to provide multiple answers. Across the four sites, 54% of respondents said they were most interested in visiting geysers. Other features of most interest were bubbling mud pools (35%), colourful rocks and minerals (11%), steaming ground (4%), clear pools (3%), bathing pools (2%), craters (2%) and geothermal vegetation (1%). Two percent of respondents identified sinter/silica terraces, geothermal landscape and artistic values. Four percent of respondents said that they were interested in anything geothermal.

Geothermal features differed between sites and were reflected in respondents' expressions of interest. Bubbling mud pools was the most likely response for visitors interviewed at Kuirau Park, followed by geysers and coloured rocks and minerals (Figure 2). Geysers were of most interest at the three paid sites, although there was also a high level of interest in bubbling mud pools and colourful rocks and minerals.

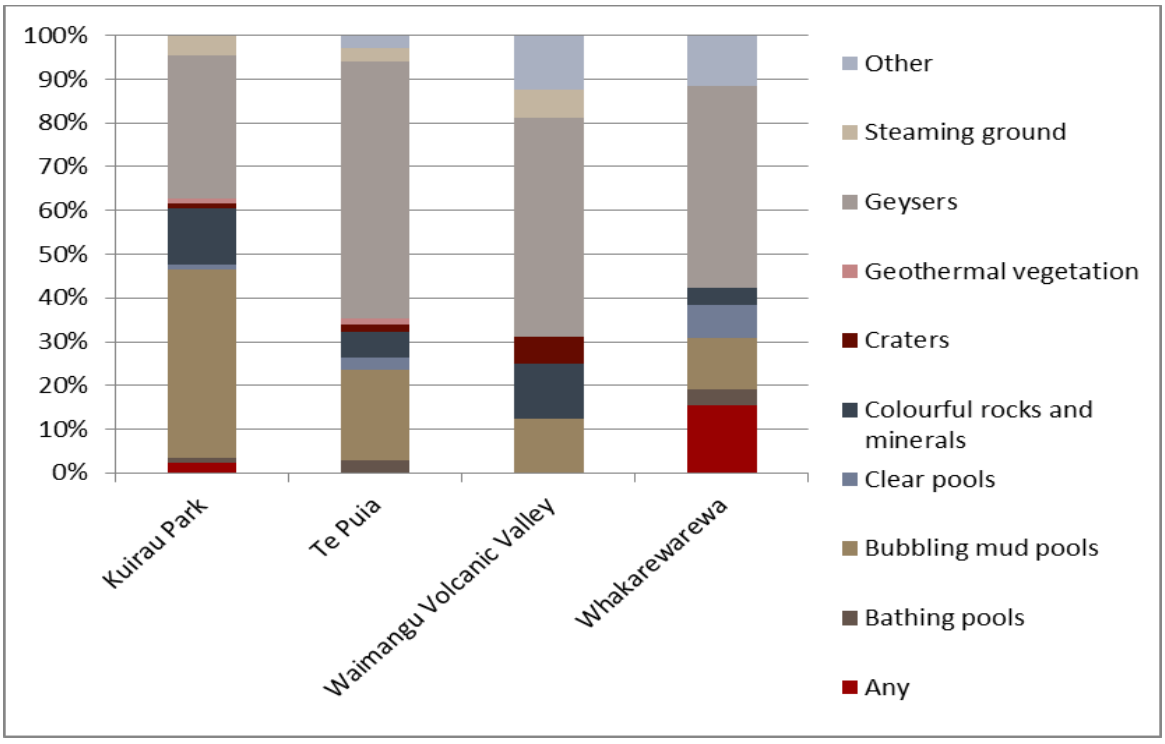


Figure 2: Geothermal features most interested in visiting

Reasons for visiting the geothermal site

Survey respondents expressed a range of reasons for visiting the site where they were interviewed (Figure 3). Accessibility and cost was important, such as the site was free, close to where they were staying, or on the way to where they were going. The uniqueness of geothermal rated highly, as did specific geothermal features of interest (e.g. geysers and boiling mud). The variety of attractions within a site was important to some decisions to visit; some visitors to Te Puia and Whakarewarewa referred to Māori culture as part of the reason for choosing to visit those sites. About 12% of respondents said they were making a repeat visit or were bringing family or friends to share the experience.

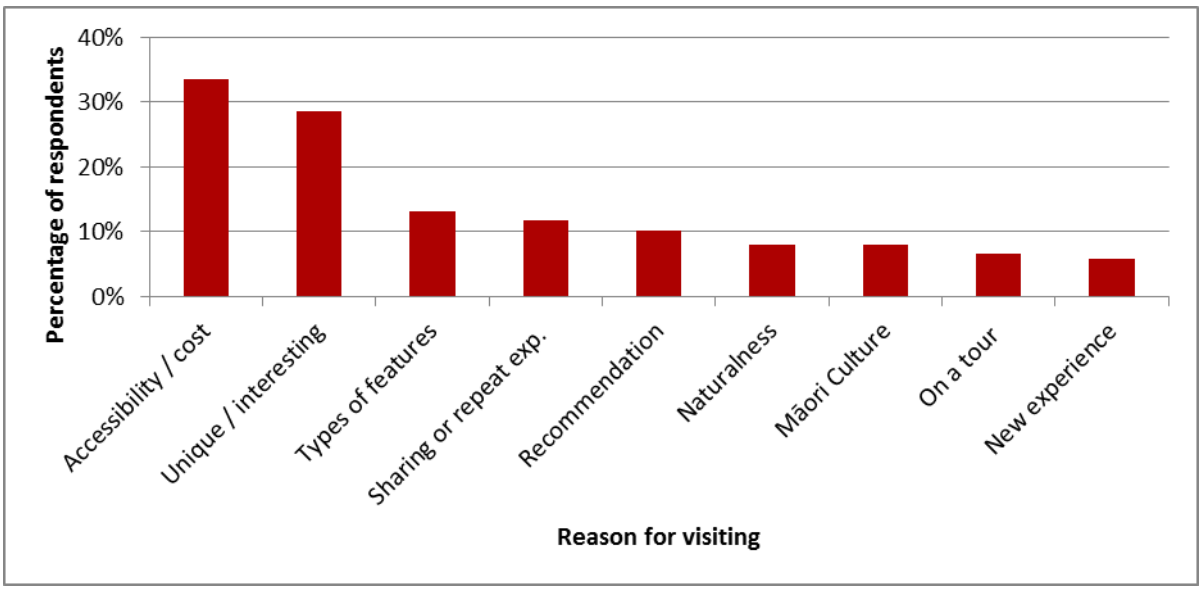


Figure 3: Reasons for visiting the geothermal site

Most liked about this geothermal site

Respondents were asked what they liked most about the site they were visiting (Figure 4). People could provide multiple responses. The most frequent response was liking the close physical proximity to geothermal activity (55% of visitors referred to this). The next most frequent response was accessibility (16%) followed by uniqueness (13%). Seventeen percent of respondents did not answer this question.

Descriptors used for naturalness of sites included the scenery, the trees, the stream, and the smell. People said they felt relaxed, chilled. Family friendly was appreciated by people with children. Valued facilities included footpaths, signage, and accessibility. The wider tourist experience offered at some sites (e.g. Maori culture, haka, and kiwi) was important to some respondents. Respondents also appreciated friendly and helpful staff.

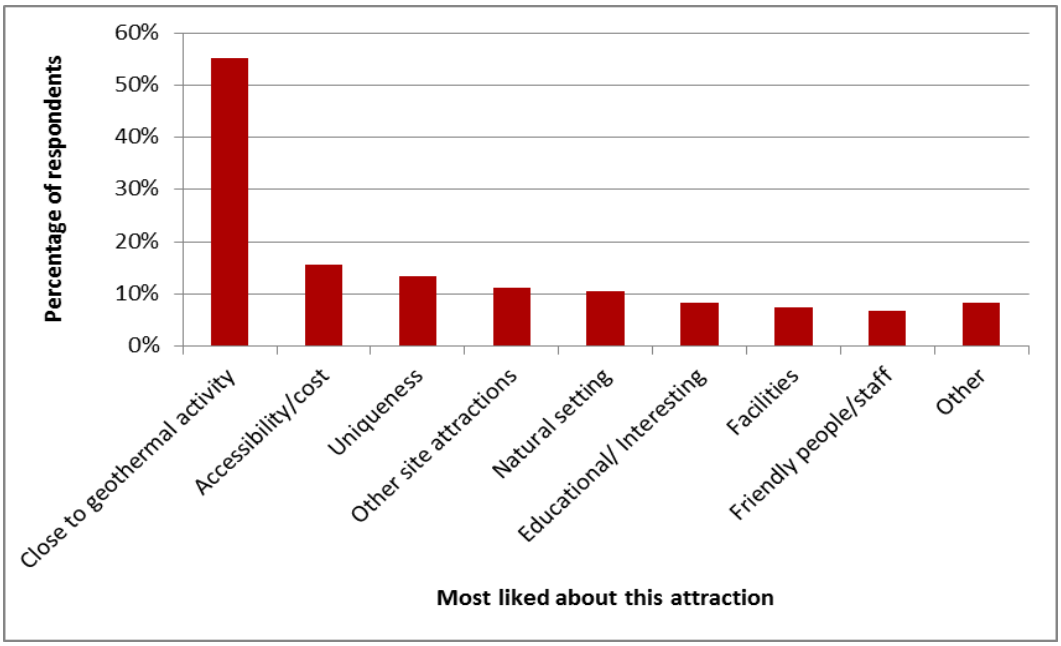
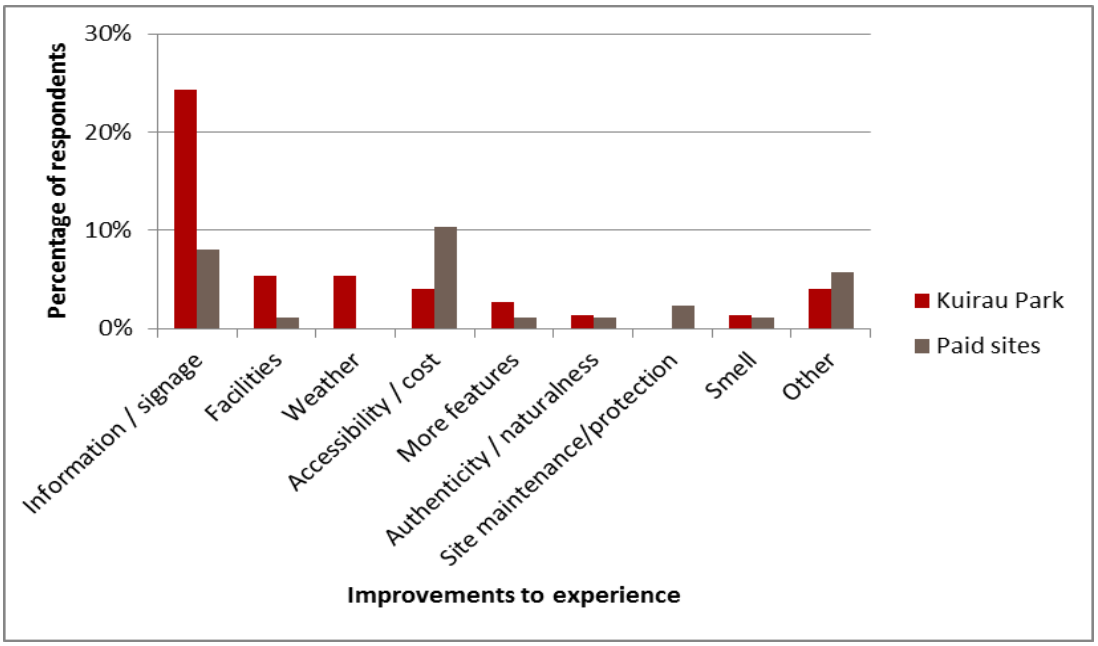


Figure 4: Most liked at this geothermal site

Improving the experience

Respondents were asked what would improve their experience at the site they were visiting. Thirty nine percent of respondents identified potential improvements. About 25% of visitors to Kuirau Park suggested information and signage, compared with 8% of visitors at paid sites. This included more information about preserving the sites and geology, and provision of maps. Accessibility was an issue for a small number of respondents (including well-formed tracks, viewing platforms and crowding), as was price (a desire for more free sites). Overall, 14% of respondents suggested impractical improvements such as increasing the number of features, improving the weather, and eliminating the geothermal smell.

Figure 5: Improvements to experience at site



Kuirau Park

Kuirau Park is a public park in a geothermal setting on the southern side of Lake Rotorua, walking distance from Rotorua city centre. Kuirau Park offers visitors the opportunity to freely view and experience much of what is exceptional about geothermal activity. Walkways enable visitors to see geothermal features including a crater lake, mud pools, hot springs and free thermal foot baths. The most notable exception at Kuirau Park is the absence of geyser activity.

Foot baths, Kuirau Park

Spread over approximately 30 ha, Kuirau Park combines playing fields, open grassed areas, formed gardens and native vegetation settings. Much of the vegetation is unique to the geothermal environment and includes examples of rare and threatened geothermal plant species.

The park is family friendly, with barbecues, picnic tables and a children's playground. It is sometimes used as a wedding venue, and a food market is held in the park on Saturday mornings.

The park is well set up for recreational visitors, but the educational opportunities have perhaps not been fully realised, with only a small amount of directional or informative signage for visitors.

New Zealanders made up 19% of the 74 people interviewed at Kuirau Park; three respondents were from Rotorua. Of the overseas visitors, visitors from the United Kingdom were the most frequently interviewed (24%), followed by Germany (16%) and the United States (14%).

Respondents at Kuirau Park were most likely to have had a verbal recommendation (28%), or have found it by chance (17%). About 15% of respondents reported visiting the park previously, or knowing of it prior to their visit.

> *We were staying close, and saw it on the way to town.*
>
> *I've known about it for about 40 years.*
>
> *I grew up here.*

When asked why they chose to visit Kuirau Park, the most frequent responses were location (close to town) (19%), free and accessible (19%), geothermal features (hot pools and boiling mud) (14%), and naturalness and uniqueness (11%).

> *It's amazing and it's free.*
>
> *We don't have this in Australia.*
>
> *It's a unique area and I haven't been here before.*
>
> *There's stuff for the kids to do.*
>
> *All the different things, nature etc.*

Half the respondents said what they liked most about the park was being close to geothermal activity. Nineteen percent said they liked most that it was accessible or free, and 12% said they liked the uniqueness. Other responses included the scenery, the trees, the gardens, and '*all of it*'.

Respondents were asked what would improve their experience. Half said that their experience could be improved. Of those, 50% suggested better information and signage. Other responses included improved facilities, more features, better security, and better viewing platforms.

When asked which geothermal features were of most interest, 47% of respondents said they were most interested in bubbling mud pools. Geysers were of interest to 36%, and colourful rocks and minerals to 14%. Other features of interest were steaming ground, bathing pools, clear pools, craters and geothermal vegetation. Two people said that they were interested in anything geothermal.

Sixty-one percent respondents planned to visit other geothermal sites, although most had not decided which sites.

Te Puia

Te Puia is a commercial attraction providing a cultural experience in a geothermal environment. Te Puia spans 70 ha within Te Whakarewarewa Valley, on the southern edge of Rotorua city. Geothermal features are extensive and varied, including mud pools, hot springs, silica formations, thermally tolerant and rare plant species, and the famous Pohutu Geyser. Formed pathways, information and signage, and viewing areas lead visitors through the attraction so they may easily see the geothermal features whilst protecting the surrounding unique geothermal environment.

Pohutu Geyser, Te Puia

Te Puia has multiple attractions. It has a kiwi house, and a national school for teaching Maori wood carving, weaving, stone and bone carving. Examples of Maori architecture are part of the Te Puia experience.

New Zealanders made up 6% of the 46 people interviewed at Te Puia. Of the international visitors, those from the United Kingdom and the United States were the biggest groups (17%), followed by visitors from Germany (15%). Te Puia had the widest range of nationalities of the geothermal sites, including Australian, Canadian, Danish, Dutch, Finnish, French, Indian, Romanian and Swedish.

Of respondents, 37% had found Te Puia in a guidebook. Verbal recommendations were also a likely source (26%). Nine percent of visitors said they had visited previously; one person reported finding Te Puia by chance.

> *I've known about it for about 16 years.*

While the geysers were an important drawcard for people visiting Te Puia (15%), the range of attractions was important to visitors. Twenty two percent of respondents referred to the Māori cultural experience and the kiwi house. Other responses included the uniqueness (11%), the scenery, the walk, and '*all of it*'.

> *Everything in one place.*
>
> *It seemed cool - we don't have it in Sweden.*
>
> *I've never seen a geyser or kiwi before.*
>
> *[I wanted to] show my son what New Zealand culture is.*

When asked what would improve their experience at Te Puia, one-third of respondents made suggestions for improvement. One request was for more geothermal features, and another was to increase awareness about environmental preservation. Other suggestions were business related, including increasing access for disabled people, strengthening built structures, managing crowding, and providing more information about features.

Respondents were asked which geothermal features they were most interested in. Eighty seven percent of respondents said geysers; 30% said bubbling mud pools. Other responses were bathing pools, clear pools, colourful rocks and minerals, sinter/silica terraces, craters, steaming ground, and geothermal vegetation.

A quarter (26%) of respondents planned to visit other geothermal sites.

Whakarewarewa – The Living Māori Village

Te Whakarewarewa – The Living Māori Village is a commercial attraction, showing Māori culture and heritage within a geothermal environment. Whakarewarewa is on the southern edge of Rotorua city. Geothermal features include geothermal fields over steaming lakes and past bubbling mud. Visitors can enjoy a geothermally cooked hangi meal. The attraction includes a cultural performance, with a Kapa Haka Group performing traditional Māori song and dance, and offers overnight stays on the marae.

Whakarewarewa is owned and operated by residents who go about their daily activities as visitors come and go. Education is a focus, with the GNS room offering additional information on many of the features present in the geothermal landscape. Pathways, signs and guides provide information on the geothermal features.

New Zealanders made up 19% of the 26 Whakarewarewa respondents. Of overseas visitors, 35% were from the United Kingdom and 19% from Germany. Other nationalities were American (US), Australian and Dutch.

Respondents were most likely to have had a verbal recommendation (35%). Some visitors were familiar with Whakarewarewa, or had come with a family member (20%). Few people found Whakarewarewa by chance.

> *My wife has been here before.*
>
> *I've known about it since I was a kid.*

Respondents visited Whakarewarewa for Māori culture (31%), and because it sounded interesting (15%). Eleven percent of respondents said that it was less expensive than some of the other options.

> *I wanted to see the haka, history and culture.*
>
> *I've been before and it's interesting.*
>
> *The book said it was cheaper and you can see the same things.*

Two respondents chose Whakarewarewa because of the geothermal features ('*to see the geyser*' and '*interesting volcanic activity*'), but overall the responses suggested that visiting Whakarewarewa was about the package offered, rather than individual parts.

Of the 26 respondents, 35% respondents said the best thing about their visit was the geothermal activity, 27% people said that the visit was educational or interesting, and 23% people referred to the friendly staff. Other responses were the uniqueness of the Māori cultural experience and the authenticity of the experience.

When asked what would improve their experience, 35% respondents said that their experience could be improved. One suggestion was to avoid built structures close to features. The remaining suggestions were about the business, and included reducing prices, providing information, increasing maintenance and managing crowding. Thirty-eight percent of respondents said that their experience could not be improved.

When asked which geothermal features were of greatest interest, nearly half the respondents said geysers (46%), followed by bubbling mud pools (12%). Other geothermal features of high interest were clear pools (8%), bathing pools (4%), colourful rocks and minerals (4%), landscape (4%). Eleven percent said they liked any geothermal feature, and 8% people said they didn't know.

Thirty-five percent of respondents said they planned to visit other geothermal sites but most had not decided which sites.

Waimangu Volcanic Valley

The Waimangu Volcanic Valley is 25 km south of Rotorua city, and is a commercial attraction where visitors can experience the natural geothermal environment. It has walking trails (45 minutes to 4 hours), and boat rides on Lake Rotomahana.

Waimangu is a rift valley formed by the eruption of Mount Tarawera in 1886, and so was wholly created within written history; it is the only geothermal system in the world to have this unique status.

The valley is home to the full range of geothermal features including geysers, several internationally classified sinter/silica terraces, steaming pools, craters, fumaroles and extensive geothermal vegetation, with many examples of rare and unusually adapted geothermal species. Regenerating New Zealand native forest and native birdlife form the backdrop for this geothermal attraction.

The Waimangu Volcanic Valley had the least interviews (11) of the four Bay of Plenty sites. One respondent was a New Zealander. Of the international visitors, 26% were from the United Kingdom. Other nationalities represented were Australian, Canadian, German, Dutch, South Korean, Swiss, and American (US).

Visitors were most likely to have found Waimangu in a guidebook (33%), or on an internet search (27%). No-one reported finding it by chance.

When asked why they chose to visit Waimangu, the focus of the responses was an appreciation of the geothermal nature of the site.

> *Because of the geysers.*
>
> *To see the geothermal activity and it had a good review.*
>
> *It's one of a kind.*
>
> *Seen it on TV.*

'Geothermal activity' was the most frequent (45%) response to the question about what respondents liked best.

When asked what would improve the experience at Waimangu, just two respondents made suggestions. Both responses were business related: improving parking and reducing prices.

When asked which geothermal features interested them most, most visitors said geysers were of greatest interest. Other features of most interest were bubbling mud pools, colourful rocks and minerals, craters, and steaming ground. One person said they had a general interest in geothermal, and two people said they didn't know.

Of the 11 respondents, 27% were planning to visit other geothermal sites. These included White Island and Craters of the Moon.

4 Survey results – quantitative responses

The following results are the pooled responses for both surveys, except where otherwise identified.

Group composition

Of the 104 domestic visitors, the average per group was four. Families were the most common group – that is, the interviewee with spouse, children and/or other relatives. In 20% of cases, the interviewee was travelling with spouse/partner, girlfriend/boyfriend only. Thirteen percent of people were travelling with friends, and 5% of people were with colleagues. Eight percent of visitors travelled alone.

Of the 262 international visitors, the average per group was 2.4. Just over half the interviewees 53% were travelling with their spouse/partner, girlfriend/boyfriend only, 19% were travelling with friends, and 2% were travelling with colleagues. Five per cent of interviewees were travelling alone.

Trip purpose

Of the 104 domestic visitors, 53% said the main purpose of their trip was to visit geothermal sites. Other reasons for the trip included holiday and sightseeing (24%), outdoor recreation (11%), visiting friends and family (7%), and education (4%). Two people said their visit was the result of a stopover between destinations. Domestic visitors at Bay of Plenty sites were more likely (than Waikato visitors) to say the purpose of their trip was to visit geothermal sites.

Of the 262 international visitors, 67% of interviewees said the main purpose of their trip was to visit geothermal sites. Other reasons included holidaying or sightseeing (18%), a stopover between destinations (14%), outdoor recreation (3%), visiting family and friends (3%) and culture (3%).

Distance and mode of travel

The average distance and travel time for domestic visitors was 118 km and 2 hours. International visitors averaged 145 km and 2.4 hours. People interviewed at Bay of Plenty geothermal sites had travelled greater distances on average than those interviewed in the Waikato region.

Of the 23 domestic visitors at the Bay of Plenty geothermal sites, the average distance and time travelled was 185 km and 3 hours. Visitors to Kuirau Park travelled an average of 132 km taking just over 2 hours on average (including three in-region visitors travelling less than one kilometre each). Visitors to the paid sites travelled an average of 267 km, taking 4.5 hours. Most domestic visitors (83%) travelled by private car (Table 4).

The average distance and travel time for the 138 international visitors to Bay of Plenty geothermal sites was 177 km and 3 hours. The average distance and travel times were similar for people visiting Kuirau Park and the paid sites. Most international visitors (85%) were on a multi-destination trip with 61% travelling by rental vehicle (Table 4).

Table 4: Travel mode by type of visitor (Bay of Plenty)

	Air	Bus or train	Private vehicle	Rental vehicle	Taxi or shuttle	Walk or cycle	Other	Total
Domestic	1	1	19	1	-	2	-	23
International	1	14	29	84	4	1	5	138

The cost of travel

The overall travel cost (travel plus admission) per adult was $54 for domestic visitors and $75 for international visitors (after adjusting for multi-purpose trips). Average travel costs were higher for Bay of Plenty visitors than for Waikato visitors.

For domestic visitors at Bay of Plenty sites, the average travel cost (travel plus admission) was $72 per person (after adjusting for multi-purpose trips). For visitors to Kuirau Park the average travel cost was $40; for the paid sites the average travel cost was $120. Visitors to Kuirau Park were (on average) doing more activities on their trip than visitors to paid sites. Many people interviewed at Kuirau Park said they found the park by chance, so for these people, the visit is likely to have been an addition to other planned activities.

For international visitors at Bay of Plenty sites, the average travel cost (travel plus admission) was $89 per person (after adjusting for multi-purpose trips). The figure for Kuirau Park was $67 and the paid sites $106. The average number of different activities for international visitors was 1.3, although some travellers indicated visiting multiple geothermal sites, which was counted as one activity.

Trip expenditure

Interviewees were asked to estimate their total spending in the area on this trip. The total spending per adult for both regions was $233 for domestic visitors and $238 for international travellers (adjusted for multi-purpose trips). Total spending per adult by domestic visitors is similar between the two regions, although visitors to the Bay of Plenty spent more on accommodation and food, and less on entertainment, fuel and admission charges than their Waikato counterparts. Total spending per adult by international visitors was about 37% higher for visitors interviewed at Waikato sites. International visitors interviewed at Waikato sites spent less on admission charges, but more in all other areas (accommodation, food, entertainment, fuel and other) than their Bay of Plenty counterparts.

The average spending per trip for visitors to Bay of Plenty geothermal sites is shown in Table 5 (in some cases the figures include spending on non-geothermal attractions). On average, domestic visitors spent more per trip than international visitors. Domestic visitors spent more on accommodation, food and petrol, while international visitors spent more on entertainment, transfers and admissions. Although international visitors travel further to reach the geothermal site, domestic visitors reported spending more on petrol (Table 5). One reason may be that international visitors start their journey with a rental car already full of petrol (Luketina, Olubode and Phillips, 2017).

In the Bay of Plenty, domestic visitors stayed an average of 2.3 nights in the area[5], compared to 1.9 nights for international visitors. Of visitors staying overnight but not visiting family and friends, 16% had no accommodation costs, and 62% had accommodation costs greater than $100. The range in accommodation costs from $0-$3000, with higher costs for longer stays. Total spending was similar between domestic and international visitors at the paid sites.

[5] Excluding in-region tourists.

Table 5: Mean spending on this trip, by visitor type (pre-allocation)[6]

	Accomm	Food	Entertainment	Transfers	Fuel	Admission	Other	Total	Per adult
Kuirau Park									
Total	194.17	121.90	70.73	4.85	36.07	42.51	3.63	437.92	189.60
Dom	281.90	171.43	38.46	-	62.31	32.50	-	559.29	217.20
Int'l	172.64	110.15	78.50	6.04	29.76	45.02	4.53	409.60	183.16
Paid Sites (Te Puia, Waimunga Valley, Whakarewarewa)									
Total	231.62	91.79	21.39	1.21	23.49	97.27	17.68	425.32	217.78
Dom	270.00	141.67	7.14	-	26.67	75.11	14.29	470.11	231.02
Int'l	227.42	85.64	22.92	1.34	23.06	99.86	18.05	420.15	216.25
The Bay of Plenty sites									
Total	213.58	105.97	45.17	2.96	29.38	72.70	10.91	431.11	204.83
Dom	277.75	159.78	27.50	-	47.73	49.17	5.00	524.39	222.61
Int'l	202.61	96.60	48.14	3.47	26.05	76.77	11.92	415.57	201.86

[6] Spending figures are for the trip. For this reason, visitors to Kuirau Park also report admission charges.

5 Estimating the recreational value

The recreation value is an indicator of the value an individual places on visiting geothermal sites or attractions. It is calculated as the cost of travel, admission and the opportunity cost of travelling to and from the geothermal site. The proportion of those costs allocated to the geothermal recreation value is based on the purpose of the trip and the number of other activities undertaken.

The recreation value is a conservative indicator of value because it represents the lower bound of what the individual is prepared to pay to visit a geothermal site.

The travel cost method was used to estimate the annual recreation value of geothermal sites in the Bay of Plenty region. The travel cost method is a *revealed preference* method of economic valuation used to calculate the value of something that cannot be obtained through market prices. The aim of the method is to calculate people's willingness to pay.

Method

The survey included questions on the region of origin for travel, travel mode, fuel costs, admission costs and annual income. The responses to these were inputs to the recreational value calculations.

The cost of travel is based on distance travelled and the opportunity cost of travel time. The distance cost is calculated at the marginal cost of $0.20/km (fuel cost[7]). The opportunity cost of time is based on a fraction of an individual's hourly wage. Admission costs are in addition to the costs of travel.

Where the main purpose of the trip to the area was to visit geothermal sites, the total travel cost was attributed to geothermal, and calculated from the (New Zealand) origin. Many visitors were on multiple purpose trips (47% of Bay of Plenty interviewees, 33% overall). Where a trip has multiple destinations or activities the proportion attributed to geothermal is split between the activities and travel was calculated from the nearest urban centre.

Where appropriate, the survey responses for the Bay of Plenty and Waikato regions were pooled to increase the sample size and the validity of the results.

Estimating visitor numbers

Domestic visitors

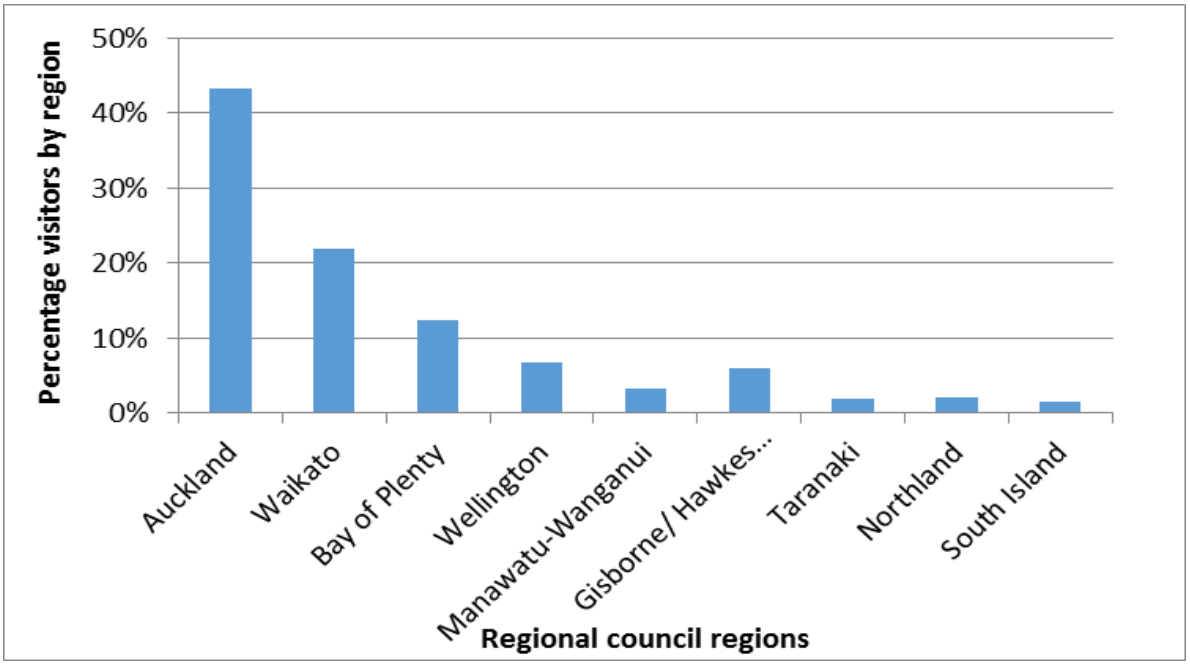
The most recent data on the number of domestic visitors is provided by the 2012 Domestic Travel Survey. In the Waikato region, the approach to estimating the number of domestic visitors to geothermal sites was to include a question about visits nationally representative survey run by UMR – a market research firm (Luketina, Olubode and Phillips, 2016). The total number of visits by domestic visitors to geothermal sites in the Waikato region was estimated at 905,000 in 2016.[8]

[7] This is based on average light vehicle fuel economy of 9.25 litres per 100 km (https://www.transport.govt.nz/assets/Uploads/Research/Documents/Fleet-reports/The-NZ-Vehicle-Fleet-2016-web.pdf) and $2.10 per litre.

[8] The poll revealed that 16% of people surveyed had visited Waikato geothermal site/s in the past 12 months. Based on the poll results the estimated number of visits to Waikato geothermal sites was 905,000.

The method used to estimate Bay of Plenty domestic visitors was based on the results obtained for the Waikato analysis and the relationship between the visitors to each region shown in the 2012 Domestic Travel Survey.[9] In the 2012 Domestic Travel Survey, the number of visitors to Bay of Plenty geothermal sites was 30% higher than those to Waikato sites. Assuming the relationship holds, the total visits by domestic visitors to Bay of Plenty geothermal sites is estimated to be 1.18M for 2016.

In 2012, visitors to the Bay of Plenty geothermal sites were most likely to be from Auckland (43%), Waikato (22%) or the Bay of Plenty (13%) regions. Relatively few visitors were from the South Island regions (Figure 6). For the purpose of this analysis, the pattern of visits by origin is assumed to similar to the travel pattern in the 2012.



Source: Ministry for Tourism (2012)

Figure 6: Domestic visitors to Bay of Plenty geothermal sites by region of origin, 2012

International visitors

The total number of international visitors to the Bay of Plenty region is provided by the International Visitor Survey (Statistics NZ, 2017). In the year to December 2016, an estimated 11.4M international visitors arrived in New Zealand. Of those, 1,044,139 visited geothermal parks.

The International Visitor Survey provides visitor numbers by tourism regions (RTOs), which differ from regional council regions.[10] In Table 6, the total number of international visitors to geothermal sites has been allocated to tourist regions based on the total visitor share of total visitors for each tourist region. For example, of the 1.9M international visitors to the five tourist regions in Table 6, 44% visited Rotorua. Based on this, it is assumed that the 44% of the 1.04M geothermal park visitors visit Rotorua. This implies 416,000-461,500 international visitors visited geothermal sites in the Bay of Plenty in 2016.

[9] Refer Appendix 4 for more detail on the calculation.

[10] See Appendix 5 for a map of regional council and tourism region boundaries.

The Rotorua tourist region straddles the Waikato and Bay of Plenty regions. In the absence of information about the split between visitors to the two regional council regions, it has been assumed that 70-80% of visitors to that tourist region visit Bay of Plenty geothermal parks.

Table 6: Share of international visitors to tourism regions to December 2016

	Total	Bay of Plenty RTO	Coromandel RTO	Rotorua RTO	Waikato RTO	North Canterbury RTO
International visitors	1,892,675	165,027	252,514	834,715	447,487	192,932
Share of visitors	100%	9%	13%	44%	24%	10%
Geothermal attraction visitors	1,044,139	93,973	135,738	459,421	107,397	104,414
% applied to BOP economy		100%	0	70-80%	0	0

Results

Domestic visitors

Based on the survey results, the average travel cost allocated to geothermal sites is $55 per adult. Using the estimated 1.18M domestic visits to geothermal sites in the Bay of Plenty region as an upper bound, and a more conservative 830,000 as a lower bound (see discussion), the implied recreation value for domestic visitors to geothermal sites in the Bay of Plenty in 2016 is $59.3M to $64.3M/year.

International visitors

The average travel cost allocated to geothermal sites is $75 per adult for international visitors. This value is about 150% that of domestic visitors, and reflects a higher spend on admissions, and greater distances travelled. The implied value recreation value of Bay of Plenty geothermal sites to international visitors in 2016 is $31.3M - $34.8M/year.

6 Estimating the contribution to the regional economy

The contribution of geothermal tourism to the regional economy is measured in terms of the contribution to GDP (using 'value-added').

Method

To estimate the geothermal recreation contribution to the Bay of Plenty GDP, spending information was collected in the survey. Spending comprised mainly of accommodation, meals, entertainment, shopping, fuel, and admissions. For each survey respondent, the fraction of spending was allocated to geothermal recreation based on the purpose of the trip (geothermal or not) and other activities planned per trip. Total spending is shown in Table 8 (gross output).

The contribution of geothermal tourism to the regional economy is assessed as direct, indirect and induced value-added effects. The direct effect is the goods and services supplied by the sector, less the costs of producing those goods and services. The indirect effects are the impacts of the geothermal tourism sector on other businesses – such as businesses supplying goods and services to the geothermal tourism sector. The induced effects are the flow-on effects from wages and salaries paid to people working in the sector, now available in the economy. Employment is also estimated in terms of direct (in the tourism sector), indirect (sectors supplying the tourism sector) and induced effects (effects of additional salaries and wages).

Value-added multipliers specific to tourism in the Bay of Plenty economy were used to estimate the contribution of geothermal tourism. The multipliers were estimated by Market Economics Limited for the report *Valuing uses of the Bay of Plenty Regional Geothermal Resource* (Conroy and Donald, 2014). Multipliers may change with structural changes to sectors of the economy, but the Conroy and Donald (2014) multipliers are based on the best currently available information.

Table 7: Multipliers for geothermal tourism, Bay of Plenty

	Output	Type 1	Type 2
Economy	0.56	1.53	1.57
Employment	12.74/1,000,000	1.28	1.30

Results

The average domestic visitors spend was $233/adult. After adjusting for multipurpose trips, the spending allocated to the geothermal tourism sector is $122/adult. The estimated total spending by domestic visitors was $101M to $143.6M in the 2016 year.

The average international visitor spend was $238/adult. After adjusting for multipurpose trips, the average spend is $145 per adult. The estimated total spending by international visitors is $60.1M-$66.8M (Table 8).

After subtracting costs of output from gross output, the direct value-added contribution to the regional economy is $90.2M to $117.9M. When indirect value added is included, the economic contribution of the sector is $138.0M- $180.3M. With induced effects, the annual contribution increases to $141.6M to $185.0M/year.

Table 8: Contribution of geothermal tourism to the Bay of Plenty economy

Visitor type	Number of visits		Average spend per visit $	Gross output $m		Contribution to regional economy (GDP)					
	Low estimate	High estimate		Low	High	Direct value added $m		Direct and indirect $m		Direct, indirect and induced $m	
						Low	High	Low	High	Low	High
Domestic	827,402	1,177,402	$122	101.0	143.7	56.6	80.5	86.5	123.1	88.8	126.3
International	415,568	461,510	$145	60.1	66.8	33.7	37.4	51.5	57.2	52.9	58.7
Total	1,242,970	1,638,912	-	161.1	210.5	90.2	117.9	138.0	180.3	141.6	185.0

Based on the output of the geothermal tourism sector, the direct employment is estimated to be 2,052 to 2,681 jobs (Table 9).[11] Direct and indirect employment is 2,627 to 3,432 jobs, and with induced effects, the total is 2,668 to 3,486 jobs.

Table 9: Contribution of geothermal tourism to Bay of Plenty employment

	Direct value added		Direct and indirect		Direct, indirect and induced	
	High	**Low**	**High**	**Low**	**High**	**Low**
Number employed	2,052	2,681	2,627	3,432	2,668	3,486

Total value-added or GDP for the Bay of Plenty for the year ended March 2016 was $13.1bn[12]. Value-added that is dependent on geothermal tourism, including flow on effects, comprises about 1.4%-1.9% of Bay of Plenty GDP.

[11] This is total jobs, which may be full time or part time, and includes employed business owners.
[12] Statistics New Zealand. Provisional Gross Domestic Product by Region to March 2016.

7 Discussion

The survey sample

The Bay of Plenty and Waikato surveys differed in the types of geothermal sites. The Waikato survey had a strong focus on geothermal pools in that region (six of 11 sites were hot pools), and had a relatively large number of sites. In contrast, the Bay of Plenty survey focused on four sites only, one of these a free site (Kuirau Park), and three paid sites (two with attractions additional to geothermal, such as Māori culture). The Bay of Plenty sites did not include hot pools.

The types of sites targeted by each survey help to explain the different proportions of domestic to international visitors in each survey. For example, international visitor numbers were greatest at the sites with geothermal features, such as steaming pools, bubbling mud and geysers – these are the sites that the Bay of Plenty survey focused on. Two of the Bay of Plenty sites included cultural shows, with international visitors being the target audience. In contrast, most of the hot pool sites had a larger proportion of domestic visitors.

Out of domestic visitors, the Waikato survey had a greater proportion of Auckland and Waikato-based respondents. Auckland and Waikato residents visited the hot pools in relatively high proportions compared with the sites with geothermal features. This is probably a distance effect. For example, hot pool sites less than 200 km of Auckland had large numbers of Auckland-based visitors than sites further away. At the Lost Springs (Whitianga), Miranda, Te Aroha and Waingaro Hot Springs, more Auckland and Waikato visitors were surveyed than the pools near Taupō (DeBretts and Waikete). This suggests that had the Bay of Plenty included hot pools in parts of the region nearer to Auckland, the numbers of Auckland residents may have been higher.

Given the observations about distance and the clustering of the Bay of Plenty sites, combining the data from both surveys would better represent costs of travel and distances when extrapolating the results to the region.

Although the survey results, when combined, provide a sufficiently large sample (104 and 262 domestic and international visitors respectively) to suggest a reasonable degree of confidence in the results, estimates have been compared with other available information to check consistency. Refer to Appendix 6 for the table of estimates and the sources those have been compared with.

Expenditure

The type of sites targeted by the survey can influence the outputs. For example, visitors to non-bathing sites reported admission and travel costs that were 2.5 and 1.25 times higher (respectively) than for bathing sites. Given that the recreation value is made up of admission plus travel cost (including opportunity cost), and spending is an input to the GDP calculation, the mix of sites is important.

To check the representativeness of expenditure estimates, the survey results were checked against the 2012 Domestic Travel Survey and the 2016 International Visitor Survey. For both types of visitors, the results of the survey were considered reasonable (refer Appendix 6).

Number of domestic and international visitors

Domestic visitors

The absence of recent and reliable domestic tourism data makes it difficult to confidently estimate the number of visitors to regional geothermal sites. The most recent figure for domestic tourism to the Bay of Plenty region is provided by the 2012 Domestic Travel Survey 2012. In that year, 95,258 visitors made 2,206,347 trips to the region. Nine percent of these visitors went to geothermal attractions and/or hot pools. Visitors travelling less than 40 km (one-way) were not included in the Domestic Travel Survey.

The Bay of Plenty estimate of total domestic visitors to geothermal sites relies on the results of a national survey about visitors to geothermal sites in the Waikato region, and the 2012 relationship between the number of visits to geothermal attractions in the two regions. In the current analysis, the estimated visitors include people travelling less than 40 km to a site, and so would capture more visitors than the Domestic Travel Survey. For example, in the national survey, 34% of visitors to Waikato geothermal attractions were from the Waikato region, although distances travelled were not recorded.

In addition to the wider collection of visitors, the Gross Domestic Product (GDP) from tourism grew significantly from 2012 to 2016. In Rotorua, where the majority of the Bay of Plenty geothermal attractions are, the tourism contribution to the Rotorua District economy (GDP) grew from $309.6M in 2012 to $458.7M in 2016 (48%).[13]

In the 2012 Domestic Tourism Survey, the estimated number of domestic trips to Bay of Plenty geothermal sites is around 300,000. If that figure increased with the increase in Rotorua District GDP (48%), then domestic tourism in 2016 might be around 450,000. Inclusion of in-region and local visitors travelling less than 40 km would be expected to have a large and positive (but unknown) impact on the number of trips. Based on this information, it seemed reasonable to set a lower bound for the domestic visitor numbers at 830,000 (350,000 less than the 1.18M upper bound which was based on the number of visitors to the Waikato geothermal sites, and the relationship between visitors to Waikato and the Bay of Plenty from the 2012 Domestic Travel Survey). This provided a range for estimating the recreation value of geothermal and the contribution to the regional economy.

[13] https://ecoprofile.infometrics.co.nz/Rotorua%2bDistrict/Tourism/TourismGdp

9 Conclusions

Geothermal sites make an important contribution to domestic and international tourism in the Bay of Plenty, and particularly to the Rotorua area. In early 2017, the Bay of Plenty Regional Council and Waikato Regional Council surveyed 262 international and 104 domestic visitors at geothermal sites in the two regions. The key findings from the Bay of Plenty survey are:

- Visitors to geothermal sites are interested in a wide range of geothermal features. Geysers and bubbling mud pools are the two features of greatest interest.
- The uniqueness and interesting nature of geothermal is an important drawcard to the Rotorua area. The opportunity to be close to geothermal activity was highly valued by many of the people surveyed.
- Convenience and cost is a factor for people in deciding which sites to visit.
- Free sites, such as Kuirau Park, have an important role in allowing all people access to geothermal sites in a convenient and cost-free form.

The total number of visitors to geothermal sites in the region was estimated to calculate the recreation value of geothermal sites, the contribution to the regional economy and the contribution to employment in the region.

- In 2016, 827,000-1,177,000 domestic and 416,000-461,000 international travellers visited free and paid geothermal sites in the Bay of Plenty region.
- The average recreation value of a trip to visit a geothermal site was $55 per adult for domestic visitors, and $75 per adult for international travellers. When aggregated to the estimated visits for that year, the recreation value to the domestic visitors was $59M to $64M, and for international visitors was $31M-$35M. This estimate of recreation value is conservative; the value people hold for a place/site/attraction is at least as high as their cost of visiting that place/site/attraction.
- The estimated direct contribution of geothermal sites to the Bay of Plenty economy in 2016 was $90M-$118M. When the direct, indirect and induced effects were counted, the contribution was $141M-$185M. Economic activity dependent on geothermal tourism accounts for approximately 1.4% of the region's GDP.
- Geothermal tourism directly provides 2,051-2,681 jobs; when direct, indirect and induced effects are included the jobs provided are 2,668-3,486.
- The concentration of geothermal sites in the Rotorua district means the economic contribution and jobs are concentrated in that area, contributing significantly to the Rotorua economy.

The survey has provided information about values held by domestic and international visitors to geothermal sites in the region. The combination of the Bay of Plenty and Waikato region results has increased the sample size and breadth, and added to the reliability of the results.

The values estimated in this report relate to direct use values for recreation. The value for recreation use for individuals is based on travel cost, so is a conservative estimate given that it is calculated on what visitors pay – an alternative approach would be to survey visitors about what they would be prepared to pay. Values for future options, indirect uses, and bequest and existence values for geothermal resources have not been estimated. These could provide areas of value to explore in future research.

The lack of representative, detailed and recent data about domestic tourists has required the authors to rely on assumptions. These assumptions have been checked against other available information to ensure they are reasonable. However, regular surveying of domestic tourists' travel would enhance the ability to accurately estimate the contribution of geothermal tourism to the local economy.

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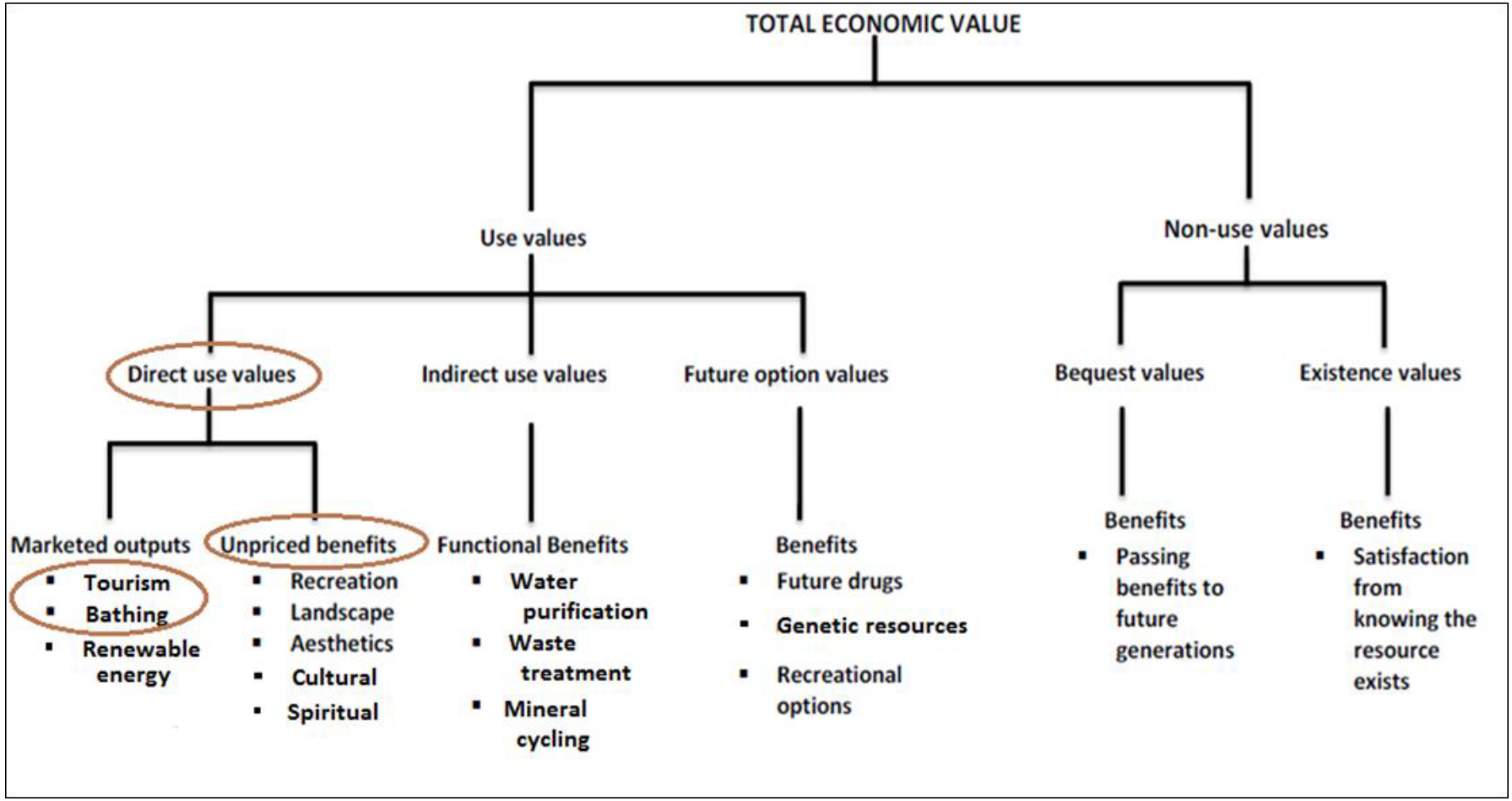
Appendices

Appendix 1:
Total economic value diagram



This is a commonly used diagram for total economic value. While not assessing the total economic value in this report, the diagram is helpful in showing where the values estimated sit within the use and non-use values. Regarding the direct use values, travel cost includes marketed outputs and unpriced benefits, and provides a conservative estimate of value based on the cost of travel.

Appendix 2:
Survey document

1.1 Firstly, which country do you live in? (*Circle one*)	1.2 Which New Zealand city or town do you live in? *(Record Verbatim)*
New Zealand	
Overseas *(Specify country)*	

1.3 Where did you travel from to get to this area? *(Record Verbatim)*
FOR NZ RESIDENTS: We want to know their hometown location or previous location if it is a multi-destination trip. **FOR INTERNATIONAL TRAVELLERS**: We want to know their previous location in NZ, e.g., Auckland, not where they are currently staying today.

1.4 What mode(s) of transport did you use to get here from your previous location? *(Probe, record closest codes, multiple answers allowed)*	
1	Aircraft
2	Private vehicle
3	Rental vehicle
4	Taxi or shuttle
5	Bus or train
6	Walk or cycle
7	Other (e.g. skateboard, wheelchair, mobility scooter)

1.5 Who else travelled with you? *(Probe, record closest codes, multiple answers allowed)*		How many are travelling with you? *(Ask of those selected at 1.5)*
1	Spouse/partner/boyfriend/girlfriend	
2	Children who are part of your family (12 or under)	
3	Teenagers who are part of your family	
4	Other relative(s)	
5	Friend(s)	
6	Colleague(s)	
7	Other people in a tour group	
8	No others/travelling alone	

2.1 Was visiting geothermal attractions the main purpose of your visit to this area? *(Circle one only)*		
1	Yes	Skip to 2.3
2	No	Ask 2.2

2.2 What was the main purpose? *(Probe, record closest codes, multiple answers allowed)*	
1	Visiting friends or family
2	Education or conference
3	Business
4	Family holiday/Holiday
5	Other (please specify)

2.3 How did you hear about this site you are currently visiting? *(Do not read out, code closest, multiple answers allowed)*	
1	Word-of-mouth
2	Internet Search
3	I-Site
4	Brochure
5	Travel Guide
6	Part of tour itinerary
5	Other (please specify)

2.4 Who decided you would visit this particular site? *(Probe, record closest codes, multiple answers allowed)*		
1	I did	Ask 2.5
2	Someone else in my group did	Skip to 3.1
3	The tour operator did	Skip to 3.1

2.5 Why did you choose to visit this site? *(Record Verbatim)*

3.1 How many nights did you stay in the area? (Circle one)	
1	1 night
2	2 nights

3	3 nights to a week
4	More than a week
5	None
6	Live in the area

3.2 What is your best estimate of expenditure in the area for this trip? *(Record approximate amounts for each)*		
1	Accommodation	$
2	Food and beverages	$
3	Entertainment and shopping	$
4	Drop offs and transfers	$
5	Petrol	$
6	Admissions or entry fees	$
7	Other expenditure	$

4.1 What did you like most about this site? *(Do not read out, code closest, multiple answers allowed – prompt if needed)*	
1	Being close to geothermal activity
2	Ease of access
3	Educational/interesting
4	Friendly people/staff
5	Scenic
6	Unique environment
7	Good information
8	Facilities
9	Other *(Please specify)*
	Don't know

4.2 What would improve your experience at this site? (Do *not read out, code closest, multiple answers aloud, prompt if needed)*	
1	Viewing platforms
2	Signage
3	Accessibility
4	Protection of vegetation around sites

5	Retaining naturalness of features
6	Avoiding built structures close to features
7	Other *(Please specify)*
	Nothing
	Don't know

5.1 What other activities have you done, or are you planning to do, in the area on this trip? (Record *Verbatim)*

5.2 Have you planned, or are you planning to visit any other geothermal sites on this trip? *(*Circle *one)*	5.2a Which ones? *(Record Verbatim)*
Yes	
No	

5.3 What types of geothermal features are you most interested in visiting during your stay? *(Do not read out, closest code, multiple answers allowed, prompt if needed)*	
1	Mud pools
2	Bubbling mud pools
3	Steaming ground
4	Geysers
5	Clear pools
6	Bathing pools
7	Sinter/Silica Terraces
8	Geothermal vegetation
9	Craters
10	Colourful rocks and minerals
11	Other *(Please specify)*
	Any
	None
	Don't know

Appendix 3:
Survey respondent demographics

Total respondents	161	
	New Zealanders	23
	Overseas visitors	138
Age Groupings	15-19	6
	20-29	38
	30-39	16
	40-49	22
	50-59	29
	60-69	36
	70+	14
Qualification	High school	29
	Diploma or trade cert	27
	University degree	37
	Post-grad degree	63
	Refused	5
Ethnicity	Not recorded	
Gender	Female	82
	Male	78
	Refused	1
Household income	<$30,000	18
	$30,000-$50,000	17
	$50,000-$70,000	19
	$70,000-$100,000	20
	$100,000-$150,000	24
	>$150,000	1
	Refused	62

Appendix 4:
Estimating the total domestic visitors in 2016

The Domestic Travel Survey[14] was most recently undertaken since 2012. To estimate the number of visitors to Waikato region geothermal sites the Waikato Regional Council included a question in a nationally representative survey (UMR).

Estimating the total number of visitors to geothermal sites in the Bay of Plenty for 2016:

1 In the Domestic Travel Survey (2012) the average annual number of visitors to geothermal sites in the Waikato and Bay of Plenty regions is 940,000 and 1,227,000 respectively. On average, the number of visitors to geothermal sites in the Bay of Plenty region was 30.5% higher than visitors to the Waikato region.

2 In 2016, 16% of 750 (120) people aged 16+ years who responded to a UMR national survey said they had visited a geothermal attraction in the Waikato region in the past 12 months. The number of visits varied by region of origin, with the highest number of visits per person in Auckland (248). Some people reported visiting multiple times. The total number of visits to the Waikato region was estimated at 905,476 visits.

3 Assuming the relationship between visitors to the two regions is constant (i.e. Bay of Plenty visitor numbers are 30% greater than Waikato numbers), an estimated 1,181,646 visited the geothermal attractions in the Bay of Plenty in 2016.

Where the domestic visitors were from:

In 2012, visitors to the Bay of Plenty from Wellington and Tasman were most likely to visit geothermal attractions (14%), although the number of visitors from Tasman were few. About 4.4% of Bay of Plenty people travelling within the region visited geothermal attractions. Of those, 43% were from Auckland; 22% were from the Waikato region, and 13% were from the Bay of Plenty. Less than 2% of visitors were from the South Island.

Assuming that the 2016 origin of visitors is similar to 2012, and the multiple visit numbers are similar to those of visitors to the Waikato region, the estimated number of visitors to geothermal sites in the Bay of Plenty in 2016 was about 1.3M. Of those, 474,000, 368,000 and 209,000 would be from the Auckland, Waikato and Bay of Plenty regions respectively (Table 9).

Table 10: Origin of visitors to BOP geothermal attractions

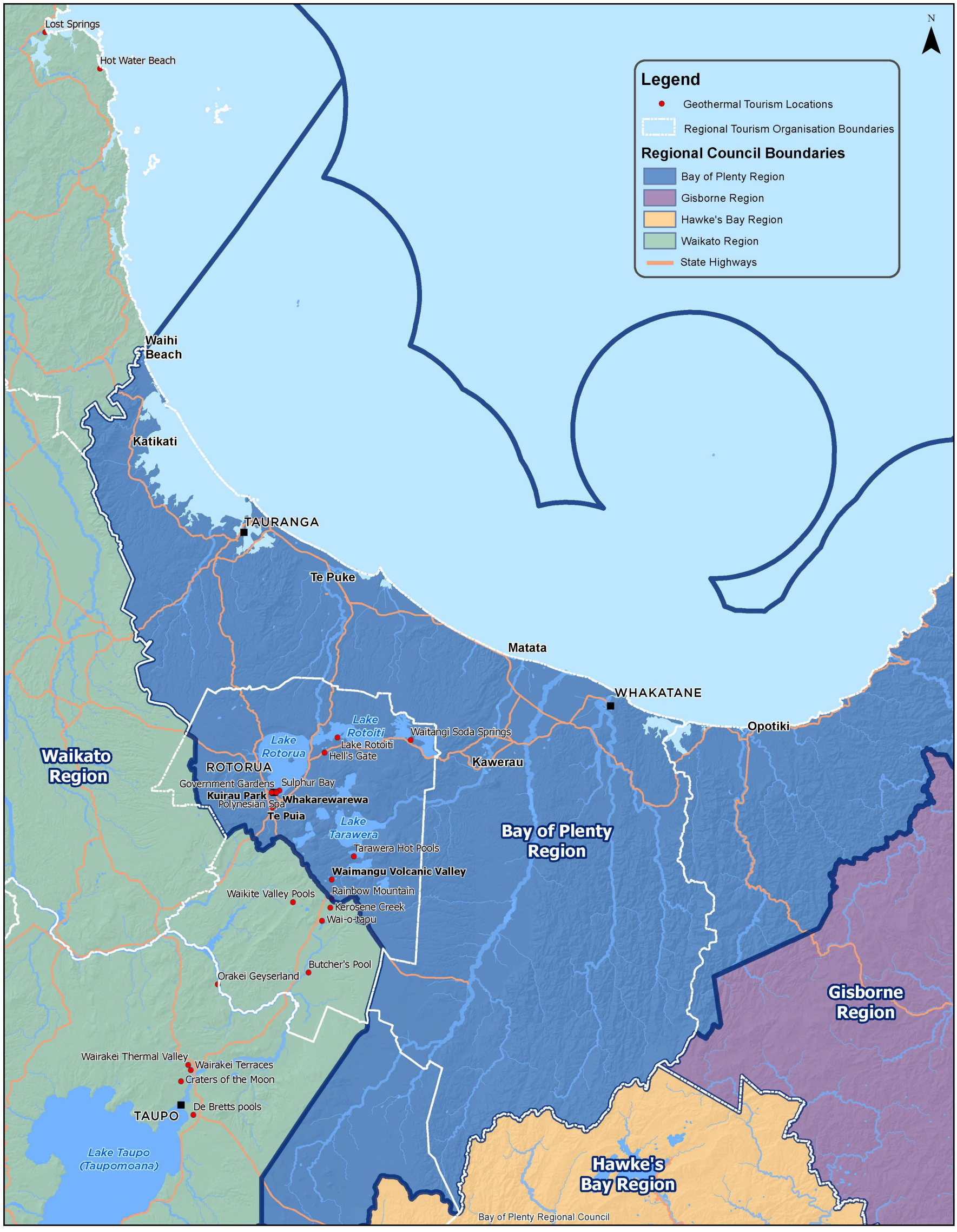
Region	Geothermal/ hot pool visitors	% of all geothermal visitors	Total visitors surveyed	% of total visitors to the region	2016 estimation from origin*
Auckland	530	43.2%	4230	12.5%	473 880
Waikato	269	21.9%	3754	7.2%	368 031
Bay of Plenty	153	12.5%	3442	4.4%	209 326
Wellington	83	6.8%	587	14.1%	71 739

[14] The Domestic Travel survey is an annual survey of approximately 15000 people aged 15 years of older.

Region	Geothermal/ hot pool visitors	% of all geothermal visitors	Total visitors surveyed	% of total visitors to the region	2016 estimation from origin*
Manawatu-Wanganui	40	3.3%	484	8.3%	30 725
Hawkes Bay	47	3.8%	369	12.7%	54 975
Gisborne	30	2.4%	312	9.6%	35 090
Taranaki	23	1.9%	231	10.0%	14 395
Northland	25	2.0%	214	11.7%	15 647
Canterbury	19	1.5%	175	10.9%	15 466
Otago	4	0.3%	50	8.0%	3 256
Nelson	0	0.0%	28	0.0%	0
Southland	0	0.0%	23	0.0%	0
Marlborough	2	0.2%	21	9.5%	1 628
West Coast	1	0.1%	9	11.1%	814
Tasman	1	0.1%	7	14.3%	814
TOTAL	**1 227**		**13 969**		**1 295 787**

*The total number of visits is the number of visitors from region of origin, multiplied by the average number of visits per person from that region.

Appendix 5:
Map of Regional Council and tourism region boundaries



BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Projection and Grid Information
HORIZONTAL DATUM: New Zealand Geodetic Datum 2000
For practical purposes, NZGD2000 equates to WGS84
VERTICAL DATUM: Moturiki
PROJECTION: New Zealand Transverse Mercator 2000

Geothermal Tourism Locations

Scale 1:655000

10 0 10 20 30
Kilometres

GSP_555249_GeothermalTourismLocations
Sheet 1 of 1
Printed 17/09/2018

Appendix 6:
Estimates and comparisons

	Estimates	Sources for estimate comparisons
Number of domestic tourists	The BOP study estimates 1.18M domestic visits to geothermal sites in the Bay of Plenty region in 2016. These were made up of people visiting the area for the purpose of visiting geothermal sites, and people visiting for other reasons and seeing geothermal sites while in the area. The estimate relies on the correctness of the visitor estimate Waikato Regional Council obtained from the national survey. 'Yes' responses may be overestimated due to people not correctly identifying the region they visited (e.g. responding yes for the Waikato region when they in fact visited the Bay of Plenty region). The estimate also assumes the relationship of domestic tourists to the Bay of Plenty and Waikato regions remains as it was in the latest domestic Travel Survey (2012). In that year, the number of tourists to geothermal attractions the Bay of Plenty region was 30% higher than to the Waikato region. There is no reason to expect that the ratio has changed. Given 2012 Domestic Travel Survey results, the estimated number of domestic trips with visits to geothermal sites may have been around 300,000. If that figure increased with the increase in Rotorua District GDP (50%), then the figure is around 450,000. Inclusion of in-region and local visitors travelling less than 40 km would be expected to have a large and positive impact on the number of trips. The large	The Rotorua District straddles the Bay of Plenty and Waikato regions (see Appendix 4 for map). Most of the geothermal sites in the Bay of Plenty are in the Rotorua area. Rotorua Economic Development Limited record that Rotorua hosts about 3.3M visitors per year. They do not differentiate between international and domestic visitors. The Rotorua Attractions and Activities Monitor recorded 981,120 visits by domestic visitors to attractions and activities in the Rotorua District in the year to March 2017. This is the sum of visits to 25 paid sites participating in the monitor. Visits exceed the number of visitors; visitors who visit more than one site are counted at each site.[15] Conroy and Donald (2014) estimated that there were 112,300 day trips and 60,500 trips of 2.3 nights on average in 2012. This is about 172,800 visitors. These estimates were based on assumptions in relation to the Domestic Travel Survey results. The Domestic Travel Survey (2012) undertaken by MBIE recorded 95,258 visitors to the Bay of Plenty RTO making 2,206,347 trips (average of 23 trips per visitor), and 62,977 trips to the Rotorua RTO making 1,506,055 trips (average of 24 trips per visitor). In 2012, 9% of domestic visitors to the to the Bay of Plenty region visited geothermal attractions and/or hot pools. Visitors travelling less than 40 km (one-way) were not included in the Domestic Travel Survey, but were included in the BOPRC and Waikato surveys. In the UMR poll (undertaken by WRC), 34% of visitors to Waikato geothermal sites were from the Waikato region, although distances travelled were not recorded. In 2012, the contribution of tourism to GDP in the Rotorua District was $309.6M. In 2016 the contribution was estimated at $458.7M, or 48% higher.[16] This increase will be positively correlated to increased visits to attractions and activities in the district, including geothermal attractions. The Domestic Growth Insight Tool developed by Tourism Aotearoa (formerly Tourism NZ) for tourism providers suggests there is an annual market of 146,712 day trips and 123,591 multiday trips for domestic tourists interested in geothermal parks, and easily able to travel to Rotorua. In addition to this market there are potential travellers who are

[15] Summary report of the Rotorua Attractions and Activities Monitor http://www.rotoruanz.com/RNZ/media/Media-Library/Business/Do%20Business/Research%20and%20Statistics/RAAMSummary.pdf
[16] https://ecoprofile.infometrics.co.nz/Rotorua%2bDistrict/Tourism/TourismGdp

	Estimates	Sources for estimate comparisons
	number of domestic visitors to sites in the Rotorua area lends support to a high estimate. If the estimate is incorrect, it is likely that it overestimates the number of visitors, possibly by 250,000-350,000. On the basis of the information available, it was decided to change the point estimate for visitors to a range.	interested but not easily able to travel, and those who do not have a particular interest, but would visit geothermal parks while in Rotorua area. DGiT is the result of a survey of 6000 New Zealanders on their recreational travel habits and motivations for travel.
Spending by domestic tourists	The BOP average spending for visits to the area was $233/adult/trip. After filtering for multipurpose trips, the average spending per adult was $122/trip. This figure is from the spending on accommodation, food, entertainment, transfers, fuel and admission costs, then allocated to geothermal based on whether the person was visiting the area to see geothermal sites, or visiting the area for some other reasons, and visited geothermal sites while there. The spending figure is similar to the result from the Waikato survey, and the 2012 Domestic Travel Survey. The estimate obtained from the BOP survey seems reasonable.	Conroy and Donald (2014) estimated $118/adult/day for day trips, and $124/adult/day for overnight trips based on the 2012 Domestic Travel Survey. The results from the Waikato survey were similar, at $243/trip, and $114/trip after filtering for multipurpose trips.
Number of international tourists	The BOP estimate of international visitors to geothermal sites was 415,568 to 461,510 in 2016. This analysis used the number of visitors to geothermal parks, and then allocated them based on the relative proportion of visitors to regions with geothermal parks (as did the Waikato region analysis). The use of just the visitors to geothermal parks may have understated the estimate, however, adding the two figures would likely overstate through double counting, and also, not all hot pools are geothermal. The estimate obtained from the BOP survey seems reasonable.	Conroy and Donald (2014) estimated 494,520 to March 2013 based on assumptions made with the International Visitor Survey results. The NZ International Visitor Survey provides the total number of international visitors (11.4M in 2016), and the number of visitors to geothermal parks (1,044,139) and hot pools (868,767). It does not break the figures for geothermal visitors down by region (either RTO or RC). The Rotorua district reports domestic expenditure (total) by international tourists at $360M and by domestic tourists at $447M for year to December 2017, which suggests that the number of domestic tourists is greater than international tourists, given that the spending per adult by the different groups is similar.

	Estimates	Sources for estimate comparisons
Spending by international tourists	For the BOP survey, average spending for visits to the area was $238/adult/visit, reducing to $145/adult/visit when adjusted for multipurpose visits. International visitors stayed in the area for 1.9 days on average. This figure is from the spending on accommodation, food, entertainment, transfers, fuel and admission costs, then allocated to geothermal based on whether the person was visiting the area to see geothermal sites, or visiting the area for some other reasons, and visited geothermal sites while there. The estimate obtained from the BOP survey seems reasonable.	Conroy and Donald (2014) estimated $111/adult/day. The International Visitor Survey recorded the mean visitor spend of $183.06/night (2016).
Contribution to the regional economy	The BOP estimate the contribution of geothermal tourism to the regional economy, as measured by direct value added, to be $90.2M-$117.8M. Direct and indirect value added is $138.0M-$180.3M, and direct, indirect and induced to be $141.6M-$185.0M. The range estimates obtained from the BOP survey seem reasonable.	Tourism contributed an estimated $13.0bn to New Zealand's GDP in 2016 (Infometrics). This is about 5% of national GDP (Statistics New Zealand). In 2016, GDP for the Bay of Plenty region was $13.1bn (Statistics New Zealand). The results of the BOPRC survey suggest that the geothermal tourism accounts for about 1.5% of the regional economy (direct, indirect and induced effects). The location of geothermal resources makes this effect uneven throughout the region. For example, the effect will be much stronger in the Rotorua District where many of the geothermal resources are located. In that area, the contribution of tourism to the local economy is about 12.4%. Geothermal tourism could be expected to be a relatively large part of that. Conroy and Donald (2014) estimated the 2012 contribution of geothermal tourism to the Bay of Plenty economy as $86.9 (direct), $133.0 (direct and indirect) and $208.6 (direct, indirect and induced). At that time the authors predicted a strong (27%) increase in the daily spend of international visitors, resulting in a significant increase in GDP from geothermal tourism in 2016. Spending per visitor increased by about 10% from 2012 to 2016, which would have reduced the predicted estimates.
Contribution to employment in the BOP region	The BOP survey estimated the contribution of geothermal tourism to jobs in the region of 2,052 to 2,681 (direct); 2,627 to 3,431 (direct and indirect); and 2,668 to 3,485 (direct, indirect and induced). The estimate of employment depends mostly on the gross output (total spending) of tourists. The information collected on spending is aligned with that	Conroy and Donald (2014) estimated jobs from tourism at 1,978, 2,532 and 2,571 (direct, indirect and induced respectively) in 2012. The strong growth predicted in the daily spending of international visitors flowed through into employment which was predicted to increase to 3,022, 3,869 and 3,929 in 2016. Spending data in the International Visitor Survey showed a modest increase of 10% in the four years from 2012 to 2016, which meant the increased employment did not eventuate. The estimates in the BOPRC report is based on multipliers provided in 2012 for tourism in the region. The continuing validity of the multipliers relies on the structure of the

	Estimates	Sources for estimate comparisons
	collected nationally, and provides a reasonable estimate. The range estimates obtained from the BOP survey seem reasonable.	industry remaining relatively stable. There is no evidence that this has shifted sufficiently to make a significant difference to results.