

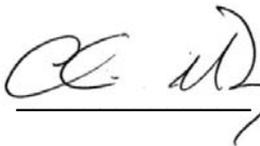
# Numbers of Visitors to Geothermal Attractions in the Waikato Region



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# 1 Introduction

This document provides the results of a survey conducted in the period from December 2001 to February 2002 which investigated the numbers of visitors from domestic and international sources visiting geothermal attractions in the Waikato Region.

Waikato Regional Council has identified the above parameters as environmental indicators. The reason for assembling such information is the Waikato Regional Council's statutory requirements to describe the state of the environment, as set out in Resource Management Act (1991) Section 35.

Geothermal attractions are an important part of the Waikato Region's economy, and have cultural importance to locals as well being an important tourist attraction. Visitor numbers provide an indicator of the cultural and economic significance of such attractions. Such indicators are used by Waikato Regional Council for setting policy, and planning monitoring programmes.

In 1995 approximately 50% of people visiting Taupo visited geothermal attractions. The demand for geothermal attractions was greater than for all other attractions covered in the survey [McDermott Fairgray, 1996]. More than one million tourists visit Rotorua each year. Major international sources of visitors to Rotorua include Australia, the USA, Japan, Germany, Britain, and the emerging Asian markets of South Korea and Taiwan (APR Consultants, 1994). In 1988/1989 tourism in Rotorua was estimated to have returned \$321 million as tourist expenditure, and provided jobs for up to 4,000 people. Rotorua has the highest throughput of overseas visitors per year, and Whakarewarewa is the most visited tourist attraction in New Zealand (Bay of Plenty Regional Council, 1999).

Approximately thirty percent of overseas visitors to New Zealand engage in geothermal sightseeing (Ministry of Energy, 1982). Seventy percent of visitors to Karapiti, Waiotapu, and Whakarewarewa are overseas visitors (Chrzanowski, 1997).

Survey data was collected from commercial site proprietors by telephone, by letter, and face to face. In some cases the results of site surveys by third parties were used, but in most cases the numbers were derived from observations by site proprietors or statistics kept by them. For those sites which do not have proprietors and for which no surveys had been conducted, numbers were estimated based on observations made during visits undertaken by Katherine Luketina or a contractor (Ashley Cody), or taken from estimates made by proprietors of nearby commercial facilities.

The numbers of visitors to commercial sites are not identified individually in order to preserve confidentiality.

This is the first time Waikato Regional Council has comprehensively collected visitor numbers data for all known sites in the Waikato Region. Visitor numbers to a few sites will in the future be collected annually by Ashley Cody as part of contract monitoring geothermal features.

## 2 What is a Geothermal Attraction?

The Proposed Waikato Regional Plan as amended by Decisions (February 2002) states:

The significant characteristics of the regional geothermal resource include:

- a) a virtually infinite source of thermal energy contained in rocks deep in the earth some of which is carried upwards by water to yield a finite practicably available thermal resource
- b) mineralised fluids (containing elements such as silica, lithium, sulphur, mercury and boron)
- c) biodiversity (a variety of unique genes, species and populations of plants, animals and micro-organisms)
- d) a wide variety of visual geothermal surface features
- e) the natural topography of the land within geothermal systems
- f) scenic and recreational values
- g) cultural and spiritual values.

This report defines a geothermal attraction as a publicly accessible site where geothermal characteristics are a primary recreational or tourist attraction. Enjoyment of most of these sites involves either experiencing geothermal activity such as geysers and fumaroles, or bathing in geothermal water. A smaller group of sites is the technology-related group, where people experience highly modified characteristic of geothermal technology. Currently this group contains two sites, the Wairakei borefield and the Prawn Park, where people undertake tours of the prawn park where prawns are grown in geothermally-heated ponds, and eat prawns in the café on site.

Public sites where geothermal heat is used to heat fresh water for recreational bathing are included where it is likely that the facility would not exist without the geothermal heat source. On the other hand, sites where geothermal heat is used for space heating and domestic water heating only are not included because it is considered likely that some other way would be found to heat the space if geothermal heat was not available.

Also excluded are sites where geothermal water is used in a domestic environment, such as homes, rest-homes, marae, and natural hot springs found within a built-up area that are used primarily by local residents.

### 3 Threats and Pressures Affecting Geothermal Attractions

The extent and variety of the significant characteristics of the regional geothermal resource are threatened by inappropriate use of geothermal resources and by the effects of other activities. Geothermal attractions are threatened by other uses such as electricity generation, and by the effects of high visitor numbers on the features and their surroundings.

In two geothermal systems, geysers and sinter-depositing springs have become extinct due to their flow being diverted to wells. The Wairakei-Tauhara springs at Spa Sights and Geyser Valley, including more than 70 geysers, and the sinter-depositing springs at Ohaaki are extinct in that their flow has stopped and cannot be recovered.

Several geothermal systems have had geysers and sinter-depositing springs inundated when hydro-electric lakes were created. For example, at Orakei Korako, an estimated 75% of the springs were drowned by the creation of Lake Ohakuri, including approximately 70 geysers and 200 alkaline hot springs [Lloyd, 1972].

Other geothermal features are threatened by different types of land use. For example, effects of farming include cattle trampling geothermal features, land drainage which reduces the flow of water to the features, the use of features as rubbish dumps, and the bull-dozing or other interference with features and the surrounding land to create amenities such as roads, flat areas, and housing sites. Forestry effects include draining geothermal pools to create a greater surface area for planting, and dead trees and harvesting debris falling or being pushed into geothermal pools.

Providing access to geothermal features changes the natural ambience and character of an area, and carries danger of vandalism of the features. In addition, litter finds its way into geothermal features and some features are trampled. Many natural hot pools used for bathing have been modified to provide more comfortable seating, easier access into the water, and higher water level.

Also at risk are the thermophilic micro-organisms, plants, and invertebrates that inhabit geothermal waters and surroundings. Any change in water temperature, the introduction of gravels and other alien materials, and trampling by humans can adversely affect habitats. In addition, some geothermal orchids and other plants are extremely rare and are vulnerable to theft by misguided collectors.

At Waiotapu, the walking route past the Champagne Pool is becoming eroded due to foot traffic and the ground level on the track is now lower than the water level in the pool. Also at Waiotapu, the pathway adjacent to the Primrose Terrace is made up of gravel, some of which finds its way onto the sinter terracing, causing changes in the appearance of the sinter, and promoting colonisation of the sinter by non-geothermal plants.

At Orakei Korako, extensive wooden boardwalks were built in 1998 and 1999 to replace gravelled pathways, which will greatly reduce erosional outwash of path gravels there, which has previously been a problem.

At Tokaanu many of the pools are artificially drained to ensure that their water level does not rise and inundate the path. The artificial draining of the pools and the channelling of water from one pool to another change the appearance and behaviour of the pools, and generally reduces activity such as geysering. It also affects the natural ecosystem of thermophilic micro-organisms in each pool.

## 4 Dangers of Geothermal Attractions

Providing access to geothermal features carries danger for human beings that can stray too close to hot water and unstable ground. In August 200, two teenagers died and a companion received critical burns after they fell into a boiling pool at Yellowstone National Park, USA.

Amoebic meningitis is caused by an organism which inhabits ground that comes into contact with geothermal water. It can pass into the brain when water containing the organism is forced up the nose, for example while diving in a geothermal pool. It is fatal in about half of all cases. There was a spate of deaths in the 1970s in New Zealand, another death in 2000, and a suspected case that did not result in death, also in 2000.

People who swim in natural and domestic pools do so at their own risk. A simple and effective precaution is to never put your head underwater. For public swimming facilities the best way to minimise the risk of amoebic meningitis getting into the swimming pool, in addition to the usual sanitation measures required, is to ensure that bore water is used instead of drawing water from a natural geothermal spring.

# 5 Results

The report defines geothermal attractions in six categories:

- Bathing as part of accommodation facilities: (22 sites)
- Free informal bathing: (7 sites)
- Pay bathing: (9 sites)
- Pay nature tourism: (3 sites)
- Free nature tourism: (3 sites)
- Technology-related sites: (2 sites)

These categories are described and the annual visitor number estimates provided below. The results are in most cases based on extrapolation of data, analysis of entry fee totals, and estimations based on observation. Most of the estimates therefore have a significant margin of error. Nevertheless, it is hoped that they are able to provide a useful benchmark for interested parties and for further surveys.

## 5.1 Bathing as part of accommodation facilities: (22 sites)

This category covers those accommodation facilities (hotels, motels, camping grounds, etc.) where geothermal bathing facilities are provided. The bathing water is either geothermal water or fresh water that has been heated by geothermal water. Bathing facilities found within private establishments such as dwellings, rest homes, and marae are not included.

The numbers provided per facility, in most cases, were the number of times the pools are used each day, or the number of people who use the pools in one day (including people who use the pool several times), but in some cases the numbers provided are those who use the pools during the course of their stay. These numbers are mostly based on either observation of pool use or an estimate taken from the average number of people staying per room per night times the occupancy rate times the percentage of people staying who use the pool. The numbers from each site are not identified individually to preserve confidentiality.

Annual visitor numbers are: Total: 175,300; Domestic: 111,500; International: 63,800. The error range is estimated to be approximately 15% for the overall number and 5% for the domestic/international division. Within the margin of error, visitor numbers range from around 149,000 to 201,600.

Sites surveyed are:

- Okoroire Hot Springs
- Miranda Holiday Park
- Hot Water Beach motor camp
- Totara Springs Christian Camp, Matamata
- All Seasons Holiday Park, Taupo
- Lake Taupo Holiday Park
- Baycrest Lodge, Taupo
- Bay View Motel, Taupo
- Boulevard Waters Motel, Taupo
- Chelmswood Manor, Taupo
- Clearwater Motor Lodge, Taupo
- Karaka Tree, Taupo
- Lakefront Motor Lodge, Taupo

- Manuels, Taupo
- Moana Reef Motel, Taupo
- Phoenix Timeshare Resort, Taupo
- Wairakei Resort Hotel
- Braxmere Lodge, Tokaanu
- Oasis Motel and Caravan Park, Tokaanu
- Rainbow Motels, Tokaanu
- Tokaanu Hotel
- Tokaanu Lodge Motel

## 5.2 Free informal bathing: (7 sites)

At various sites around the region, there are geothermal springs that are largely undeveloped, have no entry price, and are used for bathing. Some are on public land, while others are on private land, but are accessible to the public. In both cases, there may be facilities such as car parking, rudimentary concrete pools, and barbecue facilities. The sites covered in this survey are those which must be accessed by car. While most of these sites are mainly visited by New Zealanders, Hot Water Beach is the most visited site, and most of its visitors are busloads of overseas tourists. For the purposes of this survey sites such as the Waipahihi seeps in the middle of Taupo town which are used almost exclusively in an informal way by local residents are considered to be domestic sites and therefore excluded from the survey.

There are no official figures available for the sites studied in the survey, and no known formal surveys undertaken. In some cases, estimates have been provided by proprietors of nearby commercial facilities. In the remaining cases, estimates have been made according to local knowledge of the site by Ashley Cody and Katherine Luketina. Results are presented in Table 1 below.

**Table 1: Annual numbers of visitors to free informal bathing sites**

Site	No. of visitors	% domestic	No. domestic	No. foreign
Golden Springs Reserve, Reporoa	1,500	95	1,425	75
Butcher's Pool Reserve, Reporoa	3,500	95	3,325	175
Waiotapu Stream	4,000	95	3,800	200
Kerosene Creek, Waiotapu	10,000	80	8,000	2,000
Kawhia Beach Seeps	700	95	665	35
Hot Water Beach Seeps	130,000	40	52,000	78,000
Waihunuhunu, Lake Ohakuri	10,000	100	10,000	0
<b>Totals</b>	<b>159,700</b>		<b>79,215</b>	<b>80,485</b>

The error range is estimated to be approximately 40% for the overall number and 5% for the domestic/international division. Within the margin of error, visitor numbers range from around 95,800 to 223,600.

## 5.3 Pay bathing: (9 sites)

This category covers developed geothermal bathing facilities. The water is either geothermal water or fresh water that has been heated by geothermal heat. Hot pools attached to clubs such as golf and squash clubs are not included because they are only a secondary attraction of membership. Also excluded are sites used primarily in an educational context such as Swimwell in Taupo and school pools.

The numbers estimated per facility are the numbers of people who use the pools per day for a year. In most cases, these numbers have been reconstructed from an analysis of the annual takings and the estimated numbers in each payment system such as concession cards, group bookings, and age groups. The numbers from each site are not identified individually to preserve confidentiality.

Annual visitor numbers are: Total: 1,083,000; Domestic: 795,800; International: 287,200. The error range is estimated to be approximately 15% for the overall number and 5% for the domestic/international division. Within the margin of error, visitor numbers range from around 920,600 to 1,245,500.

Sites surveyed are:

- Waikite Baths
- Tokaanu Baths
- AC Baths
- Taupo Hot Springs
- Opal Hot Springs, Matamata
- Matamata Swimming Pool
- Te Aroha Hot Springs
- Waingaro Hot Springs
- Miranda Hot Springs

## 5.4 Pay nature tourism: (3 sites)

This category covers developed facilities which charge visitors to look at geothermal attractions such as geysers, boiling mud pools, sinter terraces, fumaroles, and hot springs. The numbers from each site are not identified individually to preserve confidentiality.

Annual visitor numbers are: Total: 276,000; Domestic: 77,400; International: 198,600. The error range is estimated to be approximately 5% for the overall number and 10% for the domestic/international division. Within the margin of error, visitor numbers range from around 262,200 to 289,800.

Sites surveyed are:

- Waiotapu
- Orakei Korako
- Wairakei Natural Thermal Valley

## 5.5 Free nature tourism: (3 sites)

This category covers facilities which provides free walks for visitors to look at geothermal attractions such as geysers, boiling mud pools, sinter terraces, fumaroles, and hot springs. The three sites in the region providing this facility are Karapiti (Craters of the Moon) at Wairakei, the thermal walk beside the public baths at Tokaanu, and the largely unknown Department of Conservation Reserve at Te Kopia. No records are kept for any of these sites, but at Karapiti the volunteer group overseeing the site was able to provide a good estimate of numbers. Visitor numbers to that site were also surveyed in 1997 [Chrzanowski, 1997]. Results are presented in Table 2 below.

**Table 2: Annual numbers of visitors to free nature tourism sites**

Site	No. of visitors	% domestic	No. domestic	No. foreign
Karapiti	50,000	37	18,500	31,500
Tokaanu Thermal Walk	4,000	90	3,600	400
Te Kopia Reserve	200	95	190	10
<b>Totals</b>	<b>54,200</b>		<b>22,290</b>	<b>31,910</b>

The error range is estimated to be approximately 30% for the overall number and 5% for the domestic/international division. Within the margin of error, visitor numbers range from around 37,900 to 70,500.

## **5.6 Technology-related sites: (2 sites)**

This category covers free unguided tours of the Wairakei Power Station borefield, and paying visitors to the Prawn Park, Wairakei. Visitor numbers to Wairakei were surveyed by Contact Energy Ltd in December 1999 – January 2000, and the annual visitor numbers have been extrapolated from that source. The numbers from each site are not identified individually to preserve confidentiality.

Annual visitor numbers are: Total: 297,800; Domestic: 160,000; International: 137,800. The error range is estimated to be approximately 30% for the overall number and 5% for the domestic/international division. Within the margin of error, visitor numbers range from around 208,400 to 387,100.

## 6 Comparison with Historical Data

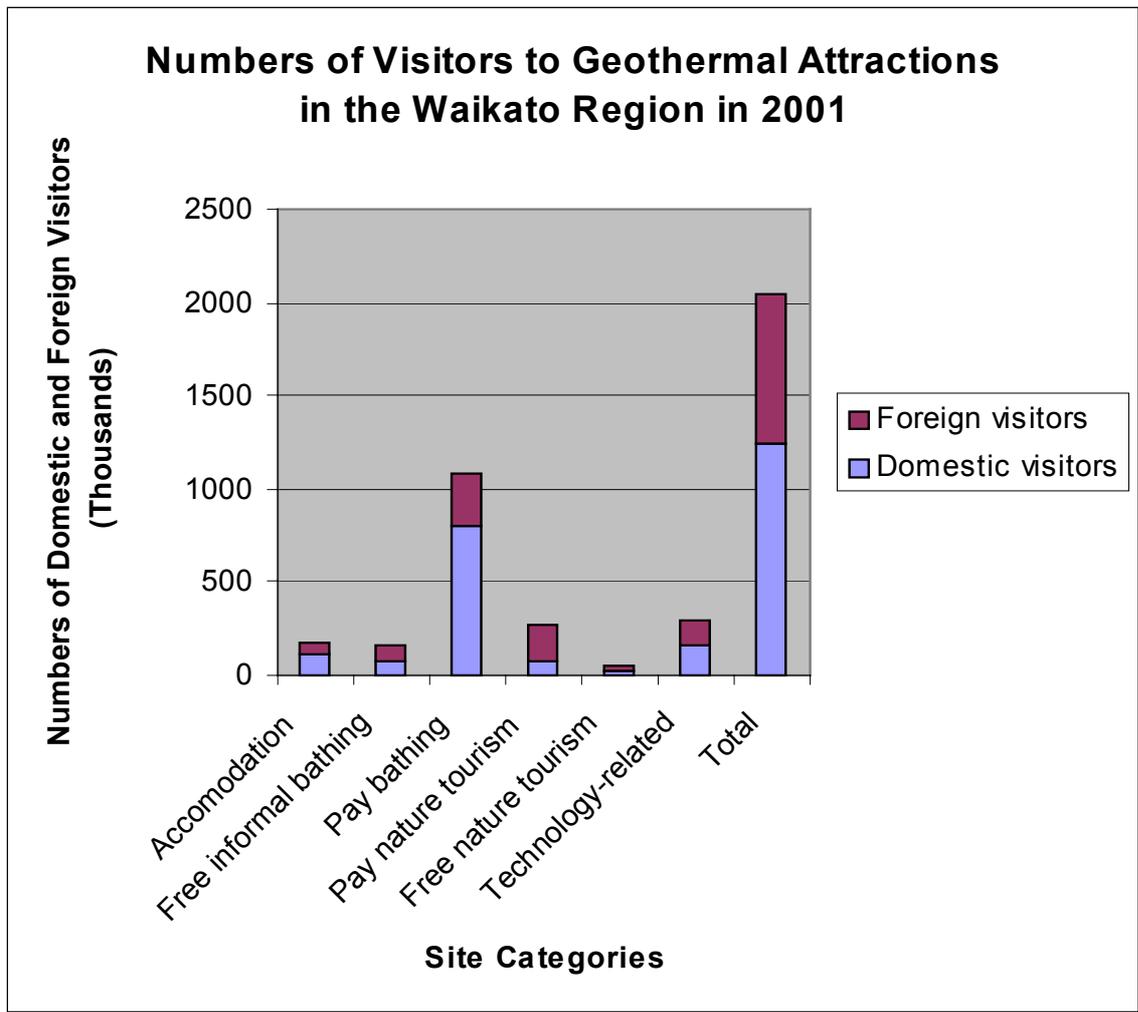
Available figures from previous confidential Environment Waikato surveys show that visitor numbers in the Pay Nature Tourism category have grown in the last twenty years. The growth rate for individual sites has been up to 300% over the 20 year period. The proportion of domestic tourists visiting one of these sites has increased since 1991. We do not have similar information for the other sites.

# 7 Summary of Results

The results of the survey are set out in Table 3 and the graph below. They indicate that geothermal attractions are an important resource for leisure for both locals and tourists. The results of the survey indicate that approximately 2 million people visit geothermal attractions in the Waikato Region each year, with 1.2 million of those being local and 800,000 being overseas visitors. Within the margins of error for each category, visitor numbers range from around 1,673,900 to 2,417,900.

**Table 3: Visitor Numbers to Geothermal Attractions**

Category	Number of visitors	Domestic visitors	Foreign Visitors
Bathing as part of accommodation facilities	175,300	111,500	63,800
Free informal bathing	159,700	79,200	80,500
Pay bathing	1,083,000	795,800	287,200
Pay nature tourism	276,000	77,400	198,600
Free nature tourism	54,200	22,300	31,900
Technology-related sites	297,800	160,000	137,800
<b>Total</b>	<b>2,046,000</b>	<b>1,246,200</b>	<b>799,800</b>



## 8 Conclusion

More than two million tourists visit geothermal attractions in the Waikato Region each year. This number would have a significant impact on the regional economy. Bathing is the greatest attraction, but nature tourism and technology-related sites are also particularly important.

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