

# Aquatic Pest Plant Survey 2010

Prepared by Clinton Neilson and Stephanie Jeffries, Summer Students



Environment Bay of Plenty  
Internal Report 2010/03  
March 2010

5 Quay Street  
P O Box 364  
Whakatane  
NEW ZEALAND

*Working with our communities for a better environment  
E mahi ngatahi e pai ake ai te taiao*







# Aquatic Pest Plant Survey 2010

Internal Report 2010/03

March 2010

Environment Bay of Plenty  
5 Quay Street  
PO Box 364  
Whakatane 3158  
NEW ZEALAND

---

Prepared by Clinton Neilson and Stephanie Jeffries for  
Richard Mallinson

---



## Acknowledgements

---

Thanks to Richard Mallinson for his guidance with this project and also to Hamish Lass for his support. Thanks also to Johlene Kelly and Amy Greaves from the Department of Conservation (DOC) for their continued work against aquatic pests not only in the Bay of Plenty but also within the Waikato region. Thanks to Des Pooley (Environment Bay of Plenty - Whakatane) and Tim Senior (Environment Bay of Plenty - Opotiki) for their assistance and advice on survey sites.



## Executive summary

---

The Bay of Plenty region boasts a variety of natural lake and river systems that not only provide essential environments for native fauna and flora but also benefit the social and economic functioning of the region through recreation and tourism.

Threats to these systems occur in the form of invasive aquatic pests such as Didymo (*Didymosphenia geminata*) and Hornwort (*Ceratophyllum demersum*). These pests are spread through the primary vector of human transferral with the aid of mediums such as boats, trailers and similar types of recreational accessories.

In August 2004 representatives from Department of Conservation (DOC), Fish and Game, Environment Bay of Plenty, Te Arawa Lakes Trust, Land Information New Zealand, The Rotorua District Council and Landward Management formed the Aquatic Pest Technical Advisory Group (APTAG).

A survey was created by APTAG which directed questions at those that utilised the boat ramps and waterways within the Bay of Plenty region. Two students are employed each summer by Environment Bay of Plenty to hand-out Biosecurity New Zealand (BNZ) promotional packs including key-rings, prop flags, pens, stickers and information packs on aquatic pest plants and *D. geminata* as well as to engage in conversation whilst targeting specific queries relevant to the survey.

The survey questions focus on where the vessel was last used, where the person is from and if they regularly clean their vessel between using waterways. Perceived awareness of aquatic pests and interest in the problems are also gauged by the surveyors including what type of vessel they were using and what recreational activity they were engaging in.

For the 2009/2010 survey nearly 500 people were surveyed with the majority of vessel owners visiting the Rotorua Lakes reigning from the Rotorua area itself. It was also found that 67% of the people surveyed had a good level of interest in aquatic pest plant issues and 40% had a high level of awareness of aquatic pest plant issues. Overall it was also discovered that 16% of those surveyed had an excellent awareness of didymo with 48% having a good awareness and 31% minimal awareness.

Students also visited retail, tourism outlets and attended organised sporting events in the Bay of Plenty region. In general the majority of staff and competitors who were liaised with were receptive and concerned with the current state of aquatic pest issues.



# Contents

---

<b>Acknowledgements</b>	i
<b>Executive summary</b>	iii
<b>Part 1: Introduction</b>	1
<b>Part 2: Methods</b>	3
2.1 Boat ramp surveys	3
2.2 River users surveys	7
2.3 Retail education	8
2.4 Event Education	9
<b>Part 3: Results and discussion</b>	11
3.1 Boat ramp surveys	11
3.2 River user surveys	16
3.3 Retail education	17
3.4 Event education	18
3.5 General comments made by lake users during the survey period	19
3.6 Questions asked by lake users during the survey period	20
<b>Part 4: Recommendations and conclusions</b>	21
4.1 Boat ramp users' survey	21
4.2 River users' survey	22
4.3 Retail education	22
4.4 Events	23
<b>Part 5: References</b>	25
<b>Appendix I – Sites visited to promote aquatic pests and Didymo awareness</b>	

<b>Appendix II – Boat ramp survey form</b>	33
<b>Appendix III – Sites visited in the Rotorua district</b>	35
<b>Appendix IV – Sites visited in Whakatane district</b>	37
<b>Appendix V – Sites visited in the Western Bay of Plenty district</b>	39
<b>Appendix VI – Sites visited in the Opotiki district</b>	41
<b>Appendix VII – List of biosecurity paraphernalia and products distributed</b>	43

## **Figures**

Figure 1	Stop the Spread Signage	2
Figure 2	Weed loading at Lake Rotoiti's Hinehopu Ramp	3
Figure 3	Manawahe Ramp at Lake Rotoma	7
Figure 4	Whakatane River via Ruatoki North	8
Figure 5	NZ Water Ski Racing preliminaries at Lake Rotoma	9
Figure 6	Percentages of vessels checked for weed prior to launching.	11
Figure 7	Hornwort draped over Lake Rotoehu users trailers at Otautu Bay ramp	12
Figure 9	Water body vessel last visited.	13
Figure 10	Vessel types surveyed.	13
Figure 11	Recreational purposes.	14
Figure 12	Perceived level of interest of aquatic pest issues.	14
Figure 13	Perceived level of awareness for aquatic pests.	15
Figure 14	Perceived level of awareness of didymo.	15
Figure 15	Differences in the perceived level of awareness of aquatic pest issues between surveys carried out on BOP waterways between summer 2003/2004 and summer 2009/2010.	16
Figure 16	Tarawera River Slalom Course in Kawerau	17
Figure 17	Talking to public at the Fish and Game Boat Fishing Seminar	19

## Part 1: Introduction

---

The lakes and rivers within the Bay of Plenty region are natural resources that offer significant environmental, economic and social benefits to surrounding communities.

They are a major draw-card for tourists with tourism directly and indirectly responsible for contributing \$9.3 billion to New Zealand's economy and providing 9.4% of the total workforce in New Zealand in 2009 (Ministry of Tourism, 2009). Therefore it is vital to the economic stability and growth that the biosecurity and subsequent health of the lakes is prioritised accordingly.

Currently the lakes within the Bay of Plenty region have one known invasive fish species, *Gambusia affinis*. However the main threats to the lakes is from four known invasive plant species that have established throughout them. These weeds include *Elodea canadensis* (Canadian pondweed), *Lagarosiphon major*, *Egeria densa* (dense oxygen weed) and *Ceratophyllum demersum* (Hornwort). These species have spread throughout all ten lakes within the Rotorua district with lakes Tarawera and Rotorua having all four species present and lakes Okataina and Rotoma having only two of the four species. Lake Rotoehu has had the most visually noticeable impact from *C. demersum* with the lake constantly suffering from over-growth of the species.

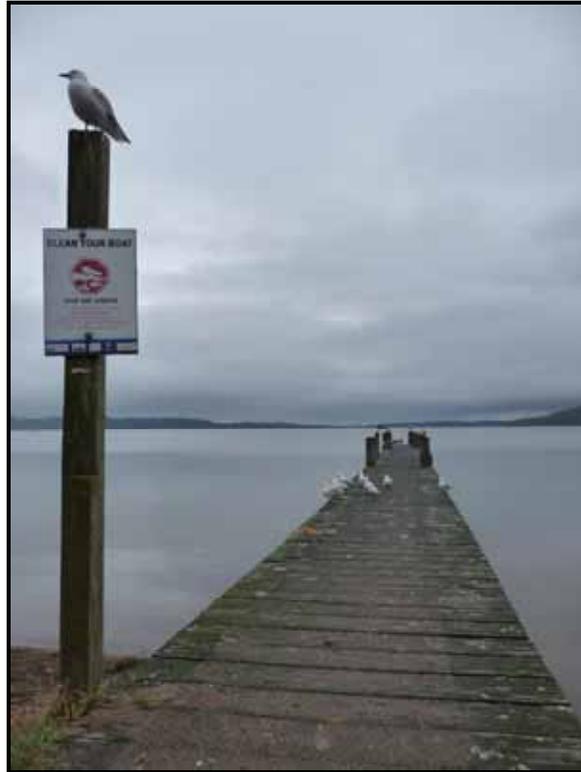
While pest plants are known to the lakes of the Rotorua district there is another major biosecurity threat from a freshwater diatom alga known as Didymo (*Didymosphenia geminata*) or 'rock snot'. This invasive species is native to the Northern Hemisphere where it has gradually spread through Northern Europe and North America. DNA testing on the origins of Didymo within New Zealand concluded the infestation originated from North America with humans being suspected as the main vector of transferral (BNZ, n.d). *D. geminata* was discovered in Waiau and Mararoa Rivers in Southland, New Zealand in October, 2004. At present, the South Island has been declared as a controlled area for Didymo (BNZ, 2008) while the North Island is thought to be Didymo free.

Temperate to cooler water temperatures along with suitable substrate, high-light availability, moderate flow velocity and either neutral or slightly alkaline pH levels all aid in the establishment of *D. geminata* (BNZ, 2007). Transferral of *D. geminata* can be achieved through a single drop of water and once this species has entered a new habitat it can remain undetected for several years as it is a single-cell diatom that is naked to the human-eye. Only once this species 'blooms' and forms dense mats does it become visible to humans and by then the species has established. Currently there is no method for removal or control of *D. geminata* once it has established itself within a waterway.

Awareness of this highly invasive species is vital in order to stop it spreading throughout New Zealand's waterways. A campaign designed by Biosecurity New Zealand (BNZ) focus on three main ways to minimise the impact of *D. geminata* through the slogan 'Check, Clean, Dry'. Focused on all people that utilise waterways the message is; if moving between waterways 'Check' and remove all obvious clumps from items that have been in the water. 'Clean' all items for at least one minute with a 5% detergent solution. 'Dry' all items completely for a period of at least 48 hours (especially if cleaning is not practical).

A 2006 study conducted through BNZ assessed the economical impact of *D. geminata* to New Zealand over the period 2004/2005 to 2010/2011 to be between \$58 million and \$285 million (BNZ, n.d). The economical impact along with social and environmental impacts enhances the need for education and promotion of awareness.

This report will firstly outline the research that was undertaken by detailing the collection of data from boat ramps and rivers in the Bay of Plenty region. It will then describe the aquatic pest and Didymo awareness programme aimed at the retail and tourism sector and also organised sporting events carried out on Bay of Plenty lakes and rivers. Results from the surveys will then be analysed and discussed in conjunction with the outcomes from visits to retail and tourism businesses. This report will then provide recommendations and conclusions from this study to assist in any aquatic pest and Didymo awareness projects undertaken in the future.



*Figure 1 Stop the Spread Signage at Lake Rotorua*

## Part 2: Methods

---

In order to achieve a broad range of contact for the survey a variety of locations within the Bay of Plenty region were visited between the dates 21 November 2009 to 7 February 2010. Boat ramps, retail outlets that sold fishing gear, accommodation, events and river access points were all visited continuously throughout the summer period in order to gain a broad demographic of people using the waterways and to ensure information was spread accordingly.

### 2.1 Boat ramp surveys

During the period 21 November 2009 to 7 February 2010 boat ramps and river access points within the Bay of Plenty region were visited and surveyed by Environment Bay of Plenty employees Clinton Neilson and Stephanie Jeffries and also by DOC employee Amy Greaves, who also visited the Waikato region.

The survey method and questionnaire (Appendix II) used was similar to that used in previous years with the exception of Amy Greaves who, along with Johlene Kelly, decided to forgo the surveys and to distribute information only.

The process of the surveying carried out by Clinton Neilson and Stephanie Jeffries involved working both weekdays and weekends. Weekend hours started later in the day and then carried on into early evening. This ensured that the early risers would be reached, as they normally returned to the ramps around midday and those that started later in the day were surveyed in the evening.

Once at the ramp the vehicle would be parked and users of the ramps/access points were approached. A short period of time was taken to assess the people that were to be surveyed before approaching them in order to gain confirmation that they were not hurried or stressed and therefore would be able to talk.

Once approached information relating to the survey was gathered by the Environment Bay of Plenty workers while chatting to the people. Equipment being used, origin of the user, last place their gear was used, where they usually use their gear and whether it was cleaned before use was information that was all noted whilst talking with the people. Promotional packs (containing information brochures on pest plant, pest fish species and Didymo, key ring, prop flag and lollipops, etc) that were provided and partly funded by BNZ were handed out as further sources of information.

Once all the necessary information was collected the survey sheets were filled out in the vehicle away from the people just surveyed.



Figure 2 Weed loading at Lake Rotoiti's Hinehopu Ramp

The following lists the boat ramps where the surveys took place and can be found as labelled GPS waypoints in Appendix III Rotorua District Map:

- **Lake Rotorua**
  - Hannah's Bay
  - Ngongotaha
  - Hamurana
  - Hamurana Springs
  - Sulphur Point
  - Lake Front
  - Okawa Bay Pte Ramp
- **Lake Rotoehu**
  - Kennedy Bay
  - Otautu Bay
- **Lake Okareka**
  - Boyes Beach
  - Acacia Point Reserve
- **Lake Rotoma**
  - Merge Lodge
  - Matahi Spit
- **Lake Okataina**
- **Lake Rotoiti**
  - Otaramarae
  - Ohau Channel
  - Gisborne Point
  - Hinehopu
- **Lake Tikitapu (Blue Lake)**
- **Lake Tarawera**
  - The Landing
  - Boatshed Bay
  - Stoney Point
  - Otumutu Bay
- **Lake Rerewhakaaitu**
- **Lake Rotokakahi (Green Lake)**

Of the above lakes and boat ramps, all but two of the lakes were visited on a weekly basis. Lake Rerewhakaaitu and Lake Rotokakahi were visited less frequently as it was found that the same people were using the lakes (camping at the DOC site around Lake Rerewhakaaitu and Lake Rotokakahi is a privately owned lake with no public access). Lake Matahina and Aniwhenua were visited once during the survey period as this is quite an isolated lake with very few users.

In addition to the regular field work, on the 12<sup>th</sup> January one of the Environment Bay of Plenty students went on board the amphibious vessel known as the Rotorua 'Duck'. This vessel has daily visits to three of the lakes within the Rotorua district; Lake Tikitapu, Lake Okareka and Lake Tarawera. The purpose of the trip was a chance for the student to view the practises that the vessel operators have in place in order to ensure no weeds are spread between the three lakes.

At completion of the survey period the data from the two Environment Bay of Plenty students was collated. To enable comparisons to be made between the data, some previously separated categories were combined in order to produce results that would make sense. Firstly, the origins of lake users were expanded to regional categories with the local districts incorporated as follows:

- **Rotorua Region**
  - Ngongotaha
  - Rotoiti
  - Rotoma
  - Rotorua
  - Okareka
  - Tarawera
  - Okataina
  - Rotoehu
  - Hamurana
  - Rerewhakaaitu
- **Whakatane Region**
  - Whakatane
  - Te Teko
  - Opotiki
  - Ohope
  - Kawerau
  - Murupara
  - Aniwhenua
  - Matahina
  - Paengaroa
- **Tauranga Region**
  - Tauranga
  - Omokoroa
  - Papamoa
  - Te Puke
  - Maketu
  - Katikati
  - Pukehina
  - Mount Maunganui
  - Tauriko
  - McLaren Falls
  - Wairoa

- **Waikato Region**
  - Hamilton
  - Cambridge
  - Te Awamutu
  - Morrinsville
  - Te Aroha
  - Tokoroa
  - Paeroa
  - Tirau
  - Ngatea
  - Huntly
  - Ngaruawahia
  - Whanganui
  - Raglan
- **Coromandel Region**
  - Whangamata
  - Whitianga
  - Thames
  - Pauanui
  - Waihi
- **Wellington Region**
  - Wellington and surrounding suburbs (e.g. Marton)
  - Paraparaumu
  - Levin
- **Taranaki Region**
  - New Plymouth
  - Hawera
  - Stratford
- **Overseas**
  - France
  - Sweden
  - Germany
  - South Africa
  - Australia
  - America
  - Canada
  - Slovakia
  - Scotland

Secondly, the categories for recreational users of the lake were expanded. This means that 'skiing' should be read as waterskiing, wakeboarding and/or sea-biscuiting. Thirdly, some of the respondents to the survey were going on overnight excursions on their vessels; this was included in the term 'other'. This was done to indicate that the lake user was using the lake for consecutive days in the same manner.



Figure 3 Manawahe Ramp at Lake Rotoma

## 2.2 River users surveys

In addition to the boat ramp surveys roving surveys were undertaken along popular river locations. This included daily, weekly and fortnightly visits to the following areas which are found as sequential Appendices:

- **Rotorua District** (Appendix III)
  - Ngongotaha River Mouth and Access Points
  - Hamurana Springs Mouth
  - Waiteiti River Mouth
  - Awahou River Mouth
  - Ohau Channel
- **Whakatane District** (Appendix IV)
  - Whakatane River
  - Tarawera River
  - Rangitaiki River
  - Aniwhenua Dam
  - Matahina Dam
- **Western Bay of Plenty District** (Appendix V)
  - Wairoa River
  - McLaren Falls
  - Ruahihi Power Station
- **Opotiki District** (Appendix VI)
  - Waioeka River

Access points to rivers were used to find people along with the blue and white Fish and Game anglers access signs which indicated known and popular fishing spots. This was particularly helpful along the Waioeka River which mainly had just the Fish and Game signs to indicate river access points.

River users were approached in the same manner as those at boat ramps. Where appropriate, river users were greeted and then invited into a conversation where questions relating to the survey were included. Paraphernalia was distributed to those that were surveyed and the survey sheets filled out in the vehicle away from those that were just surveyed.

Due to accessibility and time constraints, rivers within the Upper and Lower Whakatane and Opotiki districts were surveyed less frequently compared to rivers within the Rotorua and Tauranga districts. Day trips to the further afield rivers were organised during the busier time of the summer period in order to ensure there would be people to survey. Several sites within the Rotorua district could be surveyed on a daily to weekly basis therefore allowing for flexibility should boat ramps be empty or lakes closed.

Data of river users was categorised the same way to the lake user's survey data and incorporated into these results as the amount of people surveyed at the river access points did not warrant exclusive results and figures.



*Figure 4 Whakatane River via Ruatoki North.*

### 2.3 Retail education

During the period 12<sup>th</sup> November 2009 through till the 6<sup>th</sup> of February (Waitangi Day) 2010 retail outlets of interest were visited to provide information in the form of BNZ collateral to promote understanding and awareness of aquatic pest issues in the BOP. By visiting these businesses we aimed to increase the quality of information to the operators in the hope that this up to date information would filter down through to the consumer using their equipment in freshwater ways. Retail outlets targeted include (for a list of those visited and what resources were distributed see Appendix I):

- Tourist Accommodation
- Retail Outlets that sell fishing and/or boating equipment
- Retail Outlets that sell fishing licences
- Stores or petrol stations in close proximity to waterways or main routes
- Tourist information sites
- Fishing Clubs

At each outlet staff was informed about aquatic pest issues in their locality and the Rotorua Lakes district in particular. Further, the impending threat of Didymo to our region was highlighted focusing on the South Island river systems, which is now a controlled area, and the threat this poses to North Island waterways. We also followed up any queries or returned to some businesses such as some of the motor camps in Rotorua to provide further resources and information as required.

Collateral provided to these businesses include; information packs (brochure, pen, sticker), brochures (Korean, Chinese, Japanese, Maori, English, German, Hebrew, French, Dutch), Lollipops, Prop Flags, Simple Green in spray bottles and A3 and A4 posters for common areas.

## 2.4 Event Education

Sporting events were seen as an opportunity to reach a large number of potential water users at a single point. Major events that were scheduled to take place during the summer period at or near fresh water ways within the Bay of Plenty region were researched at the beginning of November. Event organisers were contacted in order to arrange times to meet and to determine what paraphernalia they thought appropriate to distribute to their contestants.

Events attended and/or supplied with resources were as follows:

- Annual International Trout Fishing Tournament
- Fish and Game Boat Fishing Seminar
- Scouts Regatta
- NZ Slalom kayaking events (Kawerau)
- NZ Water Ski Racing Association
- Eve's Multisport Aquathon
- Regional High School Rowing Regatta

Depending on the nature of the event and the organisers, lollipops, stickers and information brochures were handed out creating a platform for discussions with competitors, supporters and spectators.



Figure 5 NZ Water Ski Racing preliminaries at Lake Rotoma.



## Part 3: Results and discussion

### 3.1 Boat ramp surveys

From the period 21 November 2009 to 7 February 2010, 463 surveys were completed at the Rotorua District and the Upper and Lower Whakatane district boat ramps. Results of the boat ramps surveys are as follows.

#### 3.1.1 Was the vessel checked before launching and was weed found?

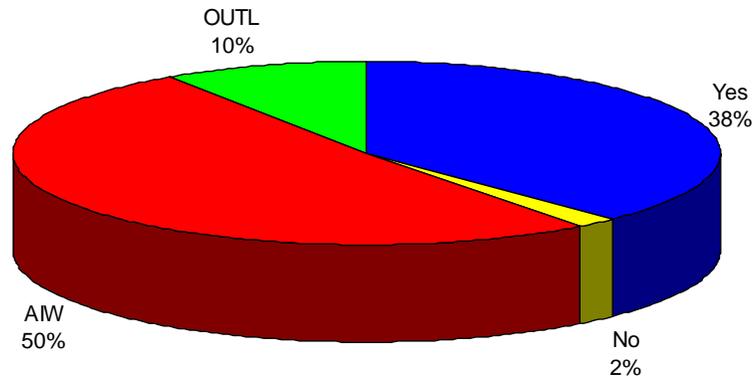


Figure 6 Percentages of vessels checked for weed prior to launching.

Figure 3 indicates that 38% of surveyed lake users checked their vessels for weed prior to launching. However the majority of persons (50%) surveyed were Already In Water (AIW) so it is unknown whether or not they had checked their vessels for weed before and after launching. In general we targeted people who were waiting for the driver to come back to the vessel and/or had just pulled up and were waiting for the driver to back their trailer down the ramp. The reasoning behind this was that the people waiting with the vessel were more relaxed and responsive.

Figure 3 also points out that 10% of the people surveyed claimed to Only Use This Lake (OUTL) and 2% answered negatively to checking their vessels prior to launching. It was also found that overall 8% of people were found to have some visible form of aquatic pest on either their vessel or trailer. An increase in weed loading at ramps particularly at Lake Rotoehu's Otautu Bay ramp and Lake Rotoiti's Hinehopu ramp attributed to a higher percentage than previous years results. This increase is a cause for concern as previously indicated vessels and trailers are primary vectors of weed transferral and in the case of Lake Rotoehu which is infested with Hornwort it is a very short distance for this species of weed to be transferred to Lake Rotoma which does not contain Hornwort.

Some reasons which could contribute to an increase in weed at ramps and collectively may be because of increased temperatures and local weather regimes. The abundance of weed to be removed and the effort and time it would take to remove weed particles is a definite deterrent to removal. In some instances it was found that some boat owners were not concerned at all with removing any weed that was visible on their equipment and even after being advised to remove the weed fragments disregarded the advice.



Figure 7 *Hornwort draped over Lake Rotoehu users trailers at Otautu Bay ramp.*

### 3.1.2 Origin of the vessel and vessel owner

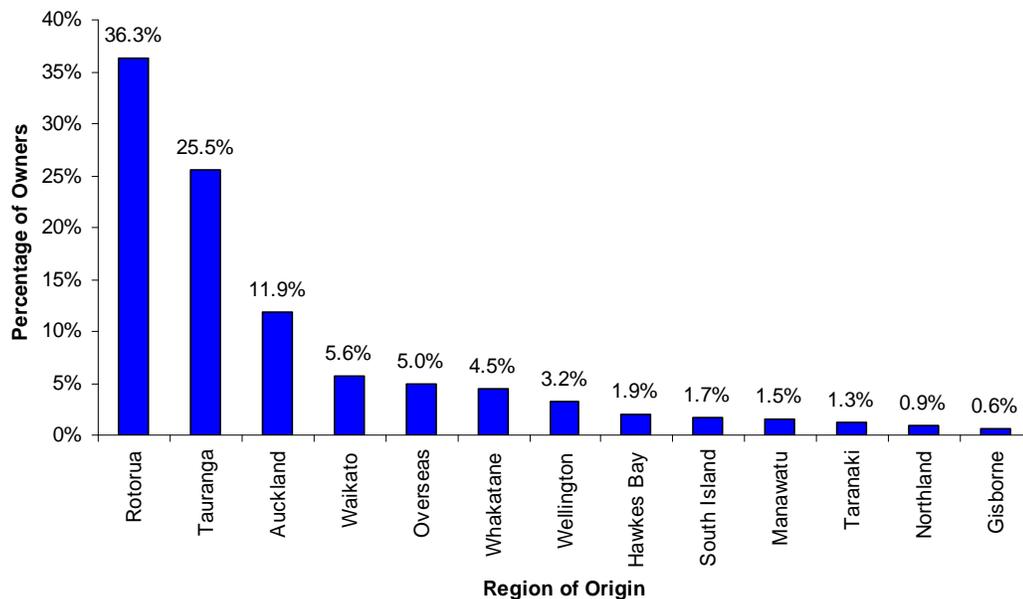


Figure 8 *Percentages of vessel owners from each.*

As following with the trends of recent years Figure 4 reveals that Rotorua, Tauranga and Auckland were the three primary regions of origin of vessels owners using BOP waterways. However this summer Tauranga's percentage (25.5%) has increased by 5.9% from last summers which was offset by Rotorua's decline from 39% to 36.3% this summer. Whakatane vessel owners at 4.5% were less than the Waikato regions results of 5.6% maybe due to conditions of the Waikato fresh waterways.

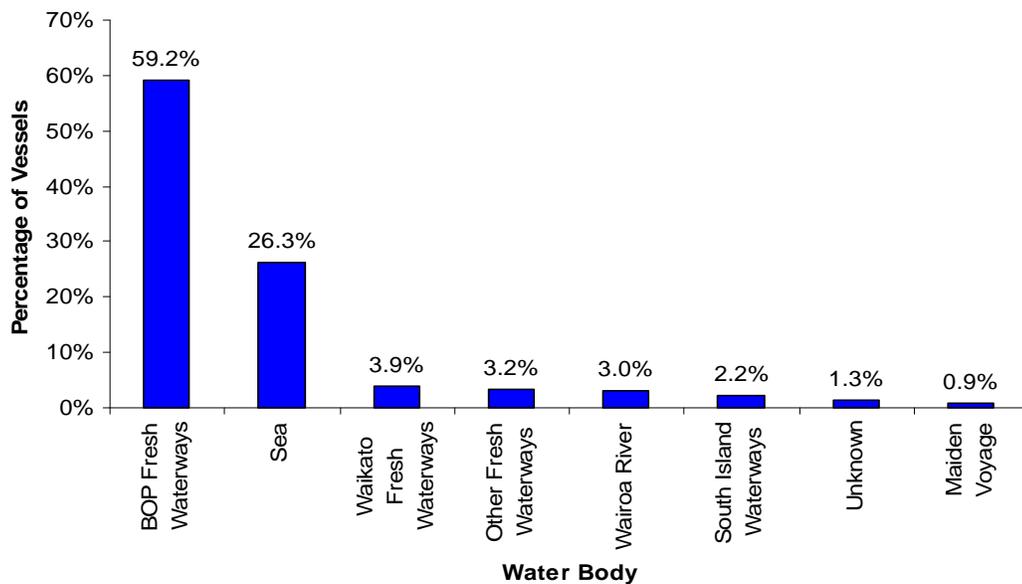


Figure 9 Water body vessel last visited.

Figure 9 designates 59.2% of vessels had previously visited BOP fresh waterways which was approximately a 10% decline compared to the last two years results. Vessels which had last visited the sea increased from 22.2% last summer to 26.3% which may be a reflection of more settled sea conditions and better fishing. There was also a rise in vessel numbers which had last visited South Island waterways this season. With the South Island now a controlled area for Didymo it will be interesting to see if biosecurity measures are working and if the increased inclination of vessels visiting the BOP will continue as South Island waterways become more of an issue to use.

### 3.1.3 Types of vessels and their recreational purpose

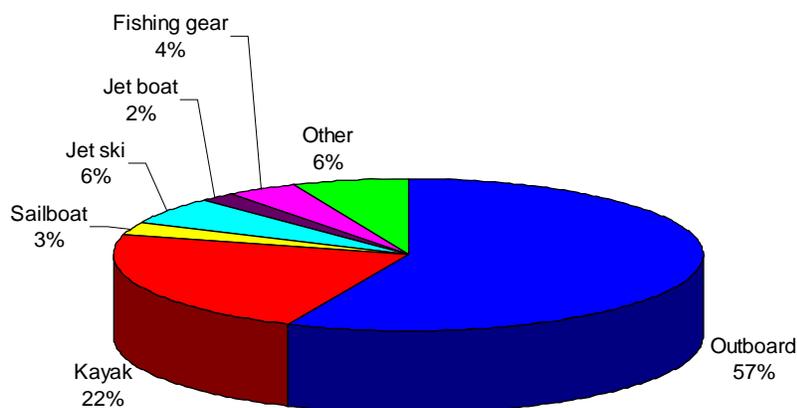


Figure 10 Vessel types surveyed.

Figure 10 highlights that the outboard powered vessel was the most common type of vessel (57%) surveyed this summer and this is similar to the last few years survey results. However there was a marked increase in kayaks out on the BOP fresh waterways this year (22%) compared to only 9% last season. This may be due to kayaks being a more convenient and cost effective recreational activity but could also be due to the more frequent visits to the Kawerau national slalom racing events enhanced by the newly renovated Tarawera riverbanks.

All other results were similar to last years with fishing gear a difficult percentage to ascertain as fresh water fly fishing gear on a vessel are versatile pieces of equipment.

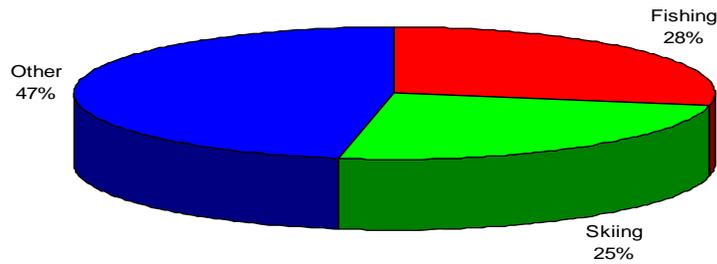


Figure 11 Recreational purposes.

With many of the surveyed people this summer engaging in several activities at one time e.g. kayaking for leisure or out to a campsite while trolling a fishing line it is becoming a lot more difficult to categorise each individual surveyed. This season we have classified people who have mentioned that they are only fishing or skiing into these individual categories as seen in Figure 11. Indiscernible recreational purposes or people engaging in multiple recreational activities have been grouped as 'other'. Therefore 'other' makes up the largest percentage (47%) of those surveyed with 'fishing' (28%) and 'skiing' (25%) having little difference at all.

### 3.1.4 Perceived levels of interest and awareness of aquatic pests

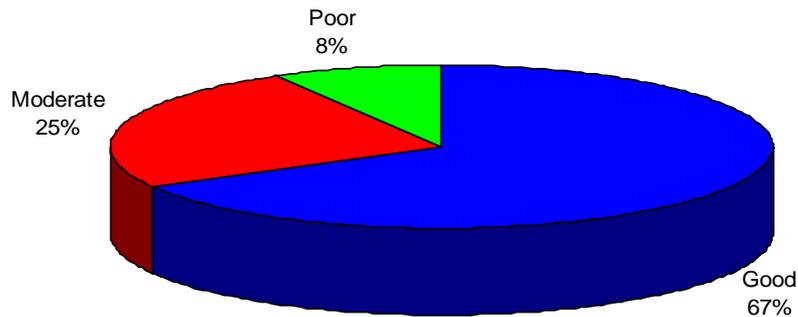


Figure 12 Perceived level of interest of aquatic pest issues.

Figure 12 outlines that 67% of those surveyed had a good level of interest in aquatic pest issues which is an 8% increase from last year. Only 8% of the people weren't really interested in what we had to convey, down from 12% last season which was encouraging. However these are perceived levels and it must be reiterated that each surveyor and how they are received and responded to will be dissimilar for each of those surveyed.

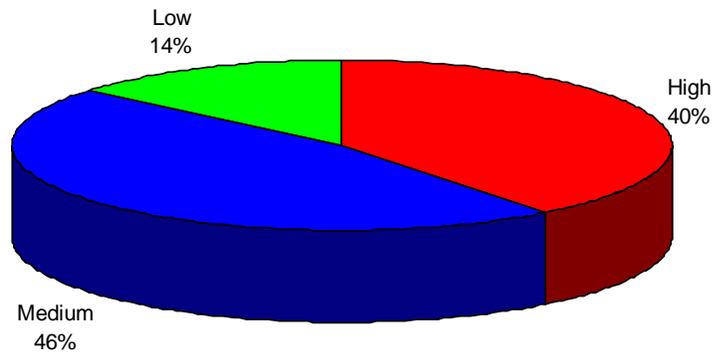


Figure 13 Perceived level of awareness for aquatic pests.

Figure 13 shows there was an increase of perceived awareness this year for aquatic pests with the result being 40% compared to 24% last season. As mentioned previously this is unique to each surveyors own interpretations. Overall if we engaged in a constructive conversation about aquatic pest issues with someone observing or citing relevant information this was perceived as a high awareness. If they indicated that they hadn't heard of any issues or were unaware of checking, cleaning or drying any of their equipment then they were perceived to have a low level of awareness. The 46% of people surveyed with a medium perceived level of awareness were people who seemed to be somewhere between these two parameters.

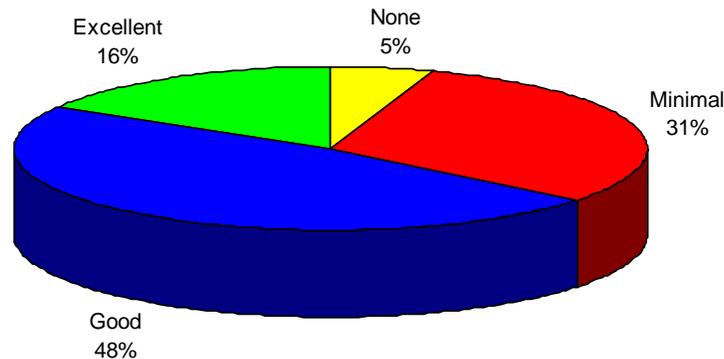


Figure 14 Perceived level of awareness of didymo.

The perceived level of awareness for Didymo this summer had 64% of people categorised as having excellent or good results (Figure 14). Neilson and Fletcher (2008) reported a 70% combined perceived level of awareness which signifies a small drop that could simply be subtleties in surveying. In general it was apparent that people knew what Didymo was but were uncertain if it had reached the North Island yet. Typically it was found that overseas visitors using the waterways did not know what Didymo was and the threat that it posed to our waterways.

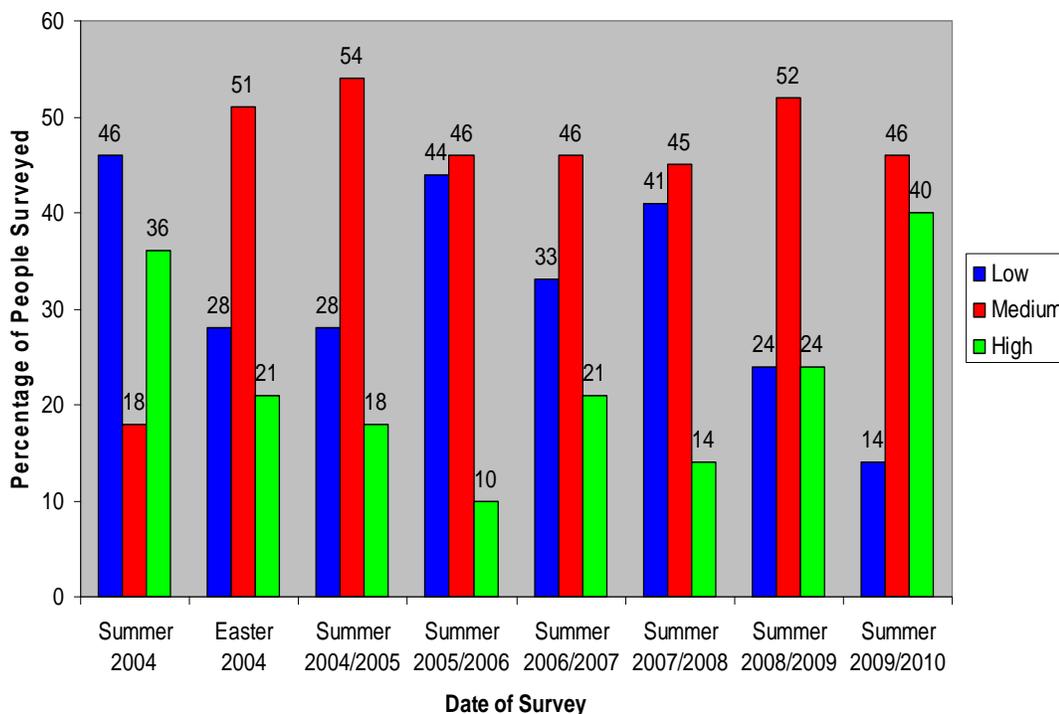


Figure 15 Differences in the perceived level of awareness of aquatic pest issues between surveys carried out on BOP waterways between summer 2003/2004 and summer 2009/2010.

Figure 15 signifies that there has been a 32% increase in medium and high perceived levels of awareness over the last six years. Subsequently there has been a shift in perceived low levels of awareness with Figure 15 illustrating a gradual decline in low levels of awareness since this program commenced. However there is considerable fluctuation between results which as stated previously may be indicative of individual perceptions. It is comforting nevertheless that it can be assumed from these results that peoples awareness of aquatic pest issues overall is increasing. Through continual education and promotion of aquatic pest prevention practices optimistically it will become habitual behaviour for BOP fresh waterway users.

### 3.2 River user surveys

This summer as with last seasons results, and the fact that only two surveyors were operating this season, it was found that the amount of people at river access sites were minimal. As a result of this numbers at river access sites were added to the lake users surveys figures to provide a larger sample for more symptomatic outcomes.

The Waioeka sites as seen in Appendix VI were travelled over the summer period on multiple days throughout the Christmas break only to find that on some of these days no one was using the waterways at all. The Waiteti stream mouth which can be found in Appendix III was a popular site to visit although some fishers were found at Ngongotaha sites on the same day. Most people we came across at river sites were very responsive and up to date with aquatic pest issues. One group we came across informed us that 'Didymo Dave' was the best man at their wedding and even gave a spiel as part of his best man speech.



Figure 16 Tarawera River Slalom Course in Kawerau.

### 3.3 Retail education

A total of 62 hotels, motels and camping grounds along with 25 retail and tourism outlets were visited throughout the Bay of Plenty region during the summer period of 2009/2010. The vast majority of businesses visited showed enthusiasm and support for distributing information relating to Didymo and aquatic pest plants. If a slightly uninterested response was given when handing out the brochures a brief explanation was given as to the negative effects that the spread of aquatic pest plants could have on the tourism industry and the importance of their role in helping reduce this from happening. Once this was mentioned there was usually an increase in questions relating to what exactly could be done to reduce aquatic pest plants spreading.

There was noticeable recognition from the people that were spoken to with in regards to remembering the same handouts from previous years.

The majority of hotels and motels visited preferred the brochures only for display within the reception area while a few asked for extra items such as posters and stickers. Of the camping grounds that were visited all were happy to display posters within their laundry areas and to hand out spray bottles filled with 5% simple green solution to guests that had boats. Extra paraphernalia (key rings, pens, stickers and aquatic pest brochures) was given to the All Seasons Holiday Park in Hannah's Bay due to the enthusiasm of the camp ground owners. This camp ground holds a popular annual trout fishing contest which sees the return of guests from around New Zealand and Australia. Due to this competition and to ensure the future success of it, the camp ground owners were extremely enthusiastic to do all they could to stop the spread of aquatic pest plants and to inform their guests of the importance of Didymo awareness.

All hotels and motels visited mentioned a decrease in the amount of visitors during the summer period of 2009/2010 with most still having vacancies throughout the Christmas and New Years' period compared to previous years when they have been completely full. All of the camping grounds visited reported being booked out during this same period thus showing a possible link with the recession in people returning to camping which is the less expensive way of spending their holidays.

### 3.4 Event education

When possible it was arranged by the two Environment Bay of Plenty workers to speak at event meetings. By speaking at events a wide audience, ranging from novices to professionals in all sorts of sporting domains, is reached within a short amount of time. It is also advantageous that, while most of the audience may not necessarily utilise the lakes on a regular basis, having casual contact with the lakes through participating in events makes them significant users.

The following provides a brief outline of the events that were attended by Clinton Neilson and Stephanie Jeffries and the activities and/or resources provided for each:

- Annual Trout Fishing Tournament
  - Richard Mallinson attended a meeting held by the club for the entrants and set up a stall with Didymo posters and paraphernalia within the clubhouse.
- Fish and Game Boat Fishing Seminar
  - Spoke to audience that was predominantly trout fishers.
  - Provided information packs to individuals containing aquatic pest plant and Didymo information along with boat float key rings, stickers, pens and prop flags.
- Scouts Regatta
  - Provided information packs to scout master who distributed them out amongst scout leaders who then went on to inform their scout groups.
- NZ Slalom kayaking events (Kawerau)
  - Information packs were handed out to individuals while talking with them before their races. By arriving early to the event there was plenty of time to talk to competitors as they were setting up their gear without delaying them.
  - This event should be visited two or three times as they run over consecutive days with different competitors arriving each day.
- NZ Water Ski Racing Association
  - Contact was made with the event organiser / co-ordinator
  - Competitors were given a speech during their morning meeting on aquatic pests.
  - Information packs were distributed with a few t-shirts given to the organiser for spot prizes.
- Eve's Multisport Aquathon
  - Contact was made with the event organiser / co-ordinator
  - Promotional items (key rings, pest plant and Didymo awareness brochures, lollipops and beanies) were supplied and put into competitor's race packs with the beanies being used as spot prizes.
- Regional High School Rowing Regatta
  - Promotional items (Didymo and pest plant awareness brochures, lollipops and stickers) were distributed to head coaches of each school that was competing.
  - Lollipops were given out to the competitors where a few questions were asked in order to gauge pest plant awareness.

The BNZ lollipops were a great treat to give to children and adults alike and proved a good ice-breaker when entering into a conversation with people. The overall response from event organisers and competitors was very positive and the majority of competitors showed a sound knowledge base on Didymo and certain aquatic pest plants.



Figure 17 Talking to public at the Fish and Game Boat Fishing Seminar.

### 3.5 **General comments made by lake users during the survey period**

- One couple from the South Island commented that they see Didymo banners all over the island but yet knew nothing of what Didymo actually was or what the message 'Check, Clean, Dry' meant.
- One man surveyed said that he drives to Mt Maunganui most days from Rotorua and passes the Ohau channel diversion wall. He said that he has noticed on a few occasions a line of weed heading down towards the Kaituna River.
- Quite a few people travelling into Rotorua via the Whakarewarewa forest mentioned seeing the Didymo banners that were put up by Johlene Kelly of DOC.
- A kayaker that lives in Australia said his kayak was not checked or cleaned when he entered into New Zealand by the quarantine inspectors at Auckland airport. He mentioned when entering Australia his kayak is always frozen by customs then delivered to him.
- A boatie that has a permanent mooring at Boatshed Bay ramp on Lake Tarawera said he had packs from us from the last three years and was becoming annoyed as he felt he was being harassed by us each year.
- There was a report of an alleged sighting of Didymo at Waipa Mill site halfway up the Rosewater track. When investigated there was no Didymo found in the stream.
- There were a few maiden voyages of vessels around the lakes. Quite often the lakes were being used for people to test their new boat before heading out to sea. People considered the lakes to be safer than the sea.

- One man who has been fly fishing for decades on Waiteti River thought the water level of Lake Rotorua was significantly low compared to 20-30 years prior. He has also noticed a white discharge after heavy rain coming from a storm pipe in Waiteti River and believed that the weed beds in Lake Okataina kept trout around. He noticed this after the weeds had been sprayed and there was a lack of fish thereafter.
- Several kayakers confirmed that there is a trend with them moving from the play-wave at the Wairoa River around lunchtime to the Kaituna River during the weekends that the dam is released. They play on the Wairoa River play wave in the morning practising skills then move onto the Kaituna to complete a run.
- Eleven comments were received in regards to the diversion wall on Lake Rotoiti. Seven people believed that the wall was working and that the lake was becoming cleaner while four people believed it not to be.
- 'Didymo Dave' was mentioned by one man that was surveyed on the Waioeka River. Said Dave sprayed his wetsuit and gave him information on Didymo.
- One man that was using the Aniwhenua Dam said that the size of the trout here were smaller this year when compared to previous years. He has camped here annually for eight years.

### 3.6 **Questions asked by lake users during the survey period**

- Has Didymo reached the North Island yet?
- Are there any wash down facilities at the ramps? Something like a hose was suggested.
- Can we (Environment Bay of Plenty students) take action with people who were not obeying the five knot rule? One resident at Otaramarae boat ramp had details of a repeat offender that he wanted us to take action against.
- Where were the best places to park a car and trailer – this question was asked a few times especially around the busy period of Christmas and New Years' when there were limited spaces available.
- One question that was asked quite a few times was in relation to where the popular fishing spots were on various lakes.
- What was being done about Lake Rotoehu? One resident of Rotoehu was upset as he believed that there was a lack of action to combat the hornwort problem in the lake. He was later supplied with information outlining the Lake Rotoehu Action Plan and details of his local community group.
- Will the Simple Green solution cause fading of fabric if it is sprayed onto it?
- What causes the blue green algae blooms in the lakes?

## Part 4: Recommendations and conclusions

---

### 4.1 Boat ramp users' survey

- There were a significant number of people who commented that they remembered or still had information from us (meaning Environment Bay of Plenty workers) from previous years. This is good feedback as it shows people are aware of the pest plants in the lakes and that the message has been spread well.
- Making note and possibly recording the daily / weekly weather patterns could help in determining factors that are affecting the amount of people using the lakes and rivers. It was noted that due to relatively strong westerly winds throughout the earlier summer period that the lakes were not suitable for most recreational users thus decreasing lake-user numbers.
- Strong westerly winds also caused heavy weed loading around certain ramps (Lake Rotoehu; Otautu Bay and Kennedy Bay, Lake Rotoiti; Hinehopu Bay). Increase with weeds caught on trailers was noted with people using these ramps. It is recommended that a pitch fork or shovel is always in the back of the vehicle so weed can be cleared from the ramps. This will help decrease the chance of weed becoming caught in trailers as they exit the ramp.
- Promotion of community care groups would be ideal in order to inform and encourage people to become more involved with the lakes. There were instances where local people who owned property around certain lakes were quite upset with the condition of the lake and expected immediate action to resolve the problem/s. By being involved with community care groups these people would have the knowledge as to action plans that are in place for certain lakes and would also be a part of decisions – they would be given a 'voice', so to speak, which would increase their community spirit knowing they are a part of important issues and resolutions.
- There was a noticeable increase of the pest plant Hornwort in Lake Rotoehu due to warm temperatures coupled with the lakes shallow topography. This was noticed while surveying the Otautu Bay ramp and by talking to users of the ramp and noticing the amount of weed on trailers. This increase was reported back to Richard Mallinson who made the decision to commence harvesting earlier than scheduled. Spraying with the chemical Diquat was also another measure used to minimise this pest plant.
- Use of personal jetty's meant that these people were not accessible to survey. It was noticed that a lot of holiday homes, especially around Lake Rotoiti, had boats anchored outside their properties where we could not access them by land. A recommendation to combat this would be to either approach the homes that surround the lake and talk to the owners or to join the Coastguard when patrolling and survey people out on the lakes.
- When surveying around Lake Rerewhakaaitu, Matahina Dam and Aniwhenua Dam during the Christmas period there were a lot of people who were repeat campers in the same spots, most of them having camped there each year for 10-15 years. These are good people to meet up with as they have accumulated knowledge and appreciation of the lakes as they want to be able to continue returning to them year after year.

- A recommendation is a change to the survey sheet in particular the question 'Origin of vessel/equipment (last water body where used)'. This can be seen to be quite an invasive query when talking with people. A possible replacement could be 'What other lakes do you use?' This would then give a broader idea as to how much of a threat the particular person is to spreading weeds (i.e.; if they use just one or two lakes then the threat is low, if they use all lakes then the threat could be high).

## 4.2 River users' survey

- Dividing your time up between visiting the lakes and the rivers needs to be arranged so you make day trips worthwhile. Rivers (such as the Rangitaiki and Waioeka) are much quieter than the lakes and can take a whole day of driving to get to and back from so it is advised that these areas are visited during peak holiday times such as the Christmas and New Year weeks.
- Many of the kayakers surveyed at the Kaituna River (Okere Falls) and the Wairoa River (Tauranga) appeared quite rushed and distracted when approached as they were about to enter the river. It is recommended that when surveying these rivers that you position yourself at take-out points where the kayakers are exiting the rivers. For the Wairoa River there is a field opposite the play wave and put-in that looks down to where kayakers exit the river and there is usually a tent with a bbq operating. This is a perfect place to approach them as they have finished their run on the river and will be in a more relaxed frame of mind.
- A relatively high amount of product to distribute is needed for the surveys and frequent checks should be made to ensure you are well stocked. This is especially important over the Christmas and New Years' period when the BNZ office is closed for the holidays and is the busiest time for surveying and handing out the products. Whatever is left over can be used in the subsequent year of surveying.
- The majority of people that were surveyed seemed happy to chat and to accept the packs of information that were available to them. However there were a few occasions where people came across as aggressive or rude to the surveyors. In these instances it is advised that you simply leave the conversation without entering into an argument. It is important to remember that you are representing Environment Bay of Plenty therefore you are accountable for any and all actions that you take.

## 4.3 Retail education

- If possible, distribute information paraphernalia before the Christmas and New Years period to hotels, motels, holiday parks and retail outlets. This time of the year is one of the busiest times for tourism, retail and outings for people and by getting the information pamphlets, posters and spray bottles out early the retail owners will be able to distribute the information to more people.
- Encourage hotel/motel owners and/or managers to place posters in communal areas such as laundries and games rooms. This will ensure that the majority of guests will be exposed to them and also help prompt them into cleaning their gear correctly.
- Recommend to the hotel/motel owner or manager that the information pamphlets should ideally be placed into the compendiums in guests rooms. These are commonly browsed by guests when they have time to relax and absorb the information provided.

#### 4.4 Events

- Event organisers are best contacted as early as possible before their event takes place. This allows the opportunity to include information packs and brochures into event packages and also for you to supply BNZ paraphernalia as possible spot prizes to competitors. It is recommended that you also check with Sherryn Owen, who is the Water Administration Officer in the Rotorua office in charge of lakes closures, when events are happening and who to get hold of.
- If possible arrange with the event organiser(s) to speak during one of their meetings. Usually this is a good opportunity to talk about aquatic pest plants and Didymo to a captive audience of competitors and supporters.
- Ensure that an effort is made to provide custodians that have decontamination stations with 'Simple Green' or 'Snot Off'. Murray Redpath (Redpath Farm Gate (Appendix VI)) is a great custodian who has the Waioeka River running through his farmland and allows tourists to stay on his land for river access. It is important that we look after those that in turn look after our waterways.



## Part 5: References

---

- Biosecurity New Zealand. (n.d) (BNZ, n.d), *Pests and Diseases: Didymo, Economic Impacts*. Accessed on 25/01/2010, Available at: <http://www.biosecurity.govt.nz/pests/Didymo/research#eia>
- Ministry of Tourism. (2009, December). *Key Tourism Statistics*. Accessed on 11/01/2010, Available at: <http://www.tourismresearch.govt.nz/DOCUMENTS/Key%20Statistics/KeyTourismStatisticsDec2009.pdf>
- Kilroy C, Lagerstedt A, Davey A and K Robinson (2006), 'Studies on the survivability of the invasive *Didymosphenia geminata* under a range of environmental chemical conditions', NIWA Client Report: CHC2006 – 116, NIWA Project MAF06506, Christchurch.
- Neilson C D and N Fletcher (2008), 'Aquatic Pest and Didymo Awareness Report for the Bay of Plenty', *Environment Bay of Plenty Internal Report 2007 / 08*, Environment Bay of Plenty, Whakatane, N.Z.



---

# Appendices

---



# Appendix I – Sites visited to promote aquatic pests and Didymo awareness

---

## Sights visited to promote aquatic pests and Didymo awareness

### 1. Rotorua sites

<b>Hotels/Motels</b>	<b>Name</b>	<b>BNZ Products Distributed</b>
	Aaryn Court	Posters, Brochures
	Acacia Lodge Motel	Brochures only
	Acapulco Motel	Brochures only
	Ace Motor Lodge	Brochures only
	Alpine Conference and Hotel Centre	Brochures only
	Ambassador Thermal Motel	Brochures only
	Ascot on Fenton	Posters, Brochures
	Ashleigh Court	Brochures only
	Aywon Motel	Brochures only
	Baden Lodge	Brochures only
	Bel Aire Motel	Brochures only
	Best Inn Rotorua	Brochures only
	Birchwood Spa Motel	Posters, Brochures
	Boulevard	Brochures only
	Brylin Motel	Brochures only
	Capri Court	Brochures only
	Cedar Lodge Motel	Brochures only
	Coachmans Motor Inn	Brochures only
	Distinction Rotorua	Brochures only
	Duxton Hotel	Brochures only
	Emerald Spa Resort	Brochures only
	Executive On Fenton	Brochures only
	Fenton Court Motel	Brochures only
	Four Canoes	Brochures only
	Gateway Motel	Brochures only
	Geneva Motor Lodge	Brochures only
	Golden Glow Motel	Brochures only
	Gwendoline Court	Brochures only
	Heywoods	Posters, Brochures, Stickers
	La Mirage	Brochures only
	Malfroy Motor Lodge	Brochures only
	Malones Motel	Brochures only
	Marama Resort	Brochures only
	Midway Motel	Brochures only
	New Castle	Brochures only
	Novotel	Brochures only
	Pineland	Brochures only
	Pohutu Lodge	Posters, Brochures
	Quality Hotel	Brochures only
	Regal Palms	Brochures only
	Rob Roy	Brochures only
	Rose Court	Brochures only
	Rotorua Mini Suites	Posters, Brochures
	Rotorua Motor Lodge	Posters, Brochures
	Rotorua Thermal Park	Brochures only
	Rydges	Brochures only
	Silver Fern Motor Inn	Brochures only
	Silver Oaks	Posters, Brochures

	Studio Motel	Brochures only
	Sulphur City Motel	Posters, Brochures
	Te Puia	Posters, Brochures
	The Heritage	Posters, Brochures
	Tuscany Villas	Posters, Brochures
	Ventura Inn and Suites	Brochures only
	Wylie Court	Brochures only
	X Base Backpackers	Posters, Brochures
<b>Camping Grounds</b>		
	All Seasons Holiday Park - Hannahs Bay	Posters, Brochures, Key Rings, Spray Bottles
	Blue Lake Top 10 Holiday Park	Posters, Brochures
	Holdens Bay Top 10 Holiday Park	Posters, Brochures, Spray Bottles Brochures, Key rings, Stickers, Prop flags
	Lake Rotoiti Holiday Park	
<b>Retail Outlets</b>		
	Outdoorsman Headquarters	Brochures only
	Hamills	Brochures only
	River Rats	Brochures, Key Rings
<b>Schools</b>	<i>Regional High School Rowing Regatta</i>	
	Hamilton Boys	Brochures, Lollipops
	Hamilton Girls	Brochures, Lollipops
	Otumoetai College	Brochures, Lollipops
	Tauranga Boys	Brochures, Lollipops
	Tauranga Girls	Brochures, Lollipops
	North Shore High School	Brochures, Lollipops
	Cambridge College	Brochures, Lollipops
	Whakatane High	Brochures, Lollipops
	Whanganui High School	Brochures, Lollipops
	Mercer Boys' High	Brochures, Lollipops
<b>Tauranga sites</b>		
<b>Hotels/Motels</b>		
	Loft 109 Backpackers	Posters, Brochures
	Harbour side City Backpackers	Posters, Brochures
	Tauranga Central Backpackers	Posters, Brochures
<b>Retail Outlets</b>		
	Burnsco Marine	Brochures only
	Hunting and Fishing	Brochures only
	Wright Sports	Brochures only
	Canoe and Kayak	Brochures only
	Hunting and Fishing	Brochures only
	Bivouac Outdoor	Brochures only
	Stoney Path	Brochures only
	Sportsworld Papamoa	Brochures only
	Stirling Sports	Brochures only
<b>Tourism centres</b>	iSite Tauranga	Brochures only
<b>Whakatane sites</b>		
<b>Hotels/Motels</b>		
	Tuscany Villas	Brochures only
<b>Retail Outlets</b>		
	Stirling Sports	Brochures only
	Sportsworld	Brochures only
	Whakatane Great Outdoors	Brochures only

	Camping and Fishing	Brochures only
<b>Tourism Centres</b>	Whakatane Library	Brochures only
	iSite Whakatane	Brochures only
	Citizens Advice Bureau	Brochures only
	White Island Tours	Brochures only
	Whale and Dolphin Watching	Brochures only
<b>Opotiki sites</b>		
<b>Retail Outlets</b>	Opotiki Bait and Tackle	Brochures only
	Hickeys Sports	Brochures only
<b>Tourism Centres</b>	Department of Conservation	Brochures only
	iSite Opotiki	Brochures only



## Appendix II – Boat ramp survey form

Lake/River _____	Boat Ramp _____	Date _____	Surveyor _____
Cleaned/checked boat prior to launching today?	Yes	No	?(already in water) Only use this if
Weed on boat/equipment?	Yes	No	
If Yes–Species & where on boat (anchor, trailer,??)			
Vessel/Equipment type? eg boat (separate jet boats), jetski, waders etc			
Origin of Vessel/equipment? (last waterbody where used)			
Origin of Owners? (where vessel users are from/live)			
Recreational purpose?	Fishing	Skiing	Other _____
Level of Interest in aquatic pest issues?	Good	Moderate	Poor
Level of Awareness of aquatic pest issues?	High	Medium	Low
Level of Awareness of Didymo?	1(none)	2(minimal)	3 (good) 4(excellent)
Comments(on anything: e.g.didymo, signs, banners etc):			
Cleaned/checked boat prior to launching today?	Yes	No	?(already in water) Only use this if
Weed on boat/equipment?	Yes	No	
If Yes–Species & where on boat (anchor, trailer,??)			
Vessel/Equipment type? eg boat (separate jet boats), jetski, waders etc			
Origin of Vessel/equipment? (last waterbody where used)			
Origin of Owners? (where vessel users are from/live)			
Recreational purpose?	Fishing	Skiing	Other _____
Level of Interest in aquatic pest issues?	Good	Moderate	Poor
Level of Awareness of aquatic pest issues?	High	Medium	Low
Level of Awareness of Didymo?	1(none)	2(minimal)	3 (good) 4(excellent)
Comments(on anything: e.g.didymo, signs, banners etc):			
Cleaned/checked boat prior to launching today?	Yes	No	?(already in water) Only use this if
Weed on boat/equipment?	Yes	No	
If Yes–Species & where on boat (anchor, trailer,??)			
Vessel/Equipment type? eg boat (separate jet boats), jetski, waders etc			
Origin of Vessel/equipment? (last waterbody where used)			
Origin of Owners? (where vessel users are from/live)			
Recreational purpose?	Fishing	Skiing	Other _____
Level of Interest in aquatic pest issues?	Good	Moderate	Poor
Level of Awareness of aquatic pest issues?	High	Medium	Low
Level of Awareness of Didymo?	1(none)	2(minimal)	3 (good) 4(excellent)
Comments(on anything: e.g.didymo, signs, banners etc):			

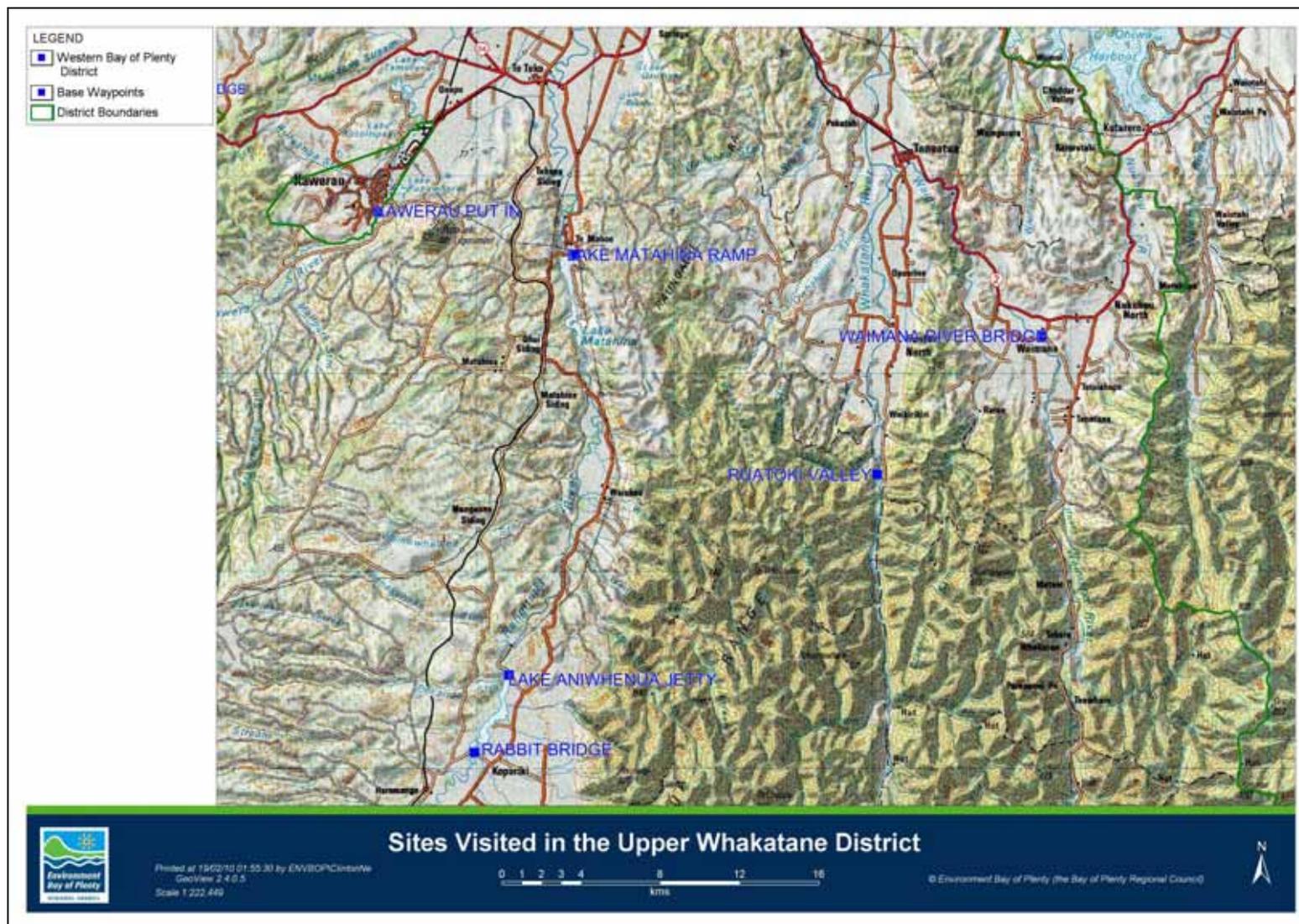


## Appendix III – Sites visited in the Rotorua district



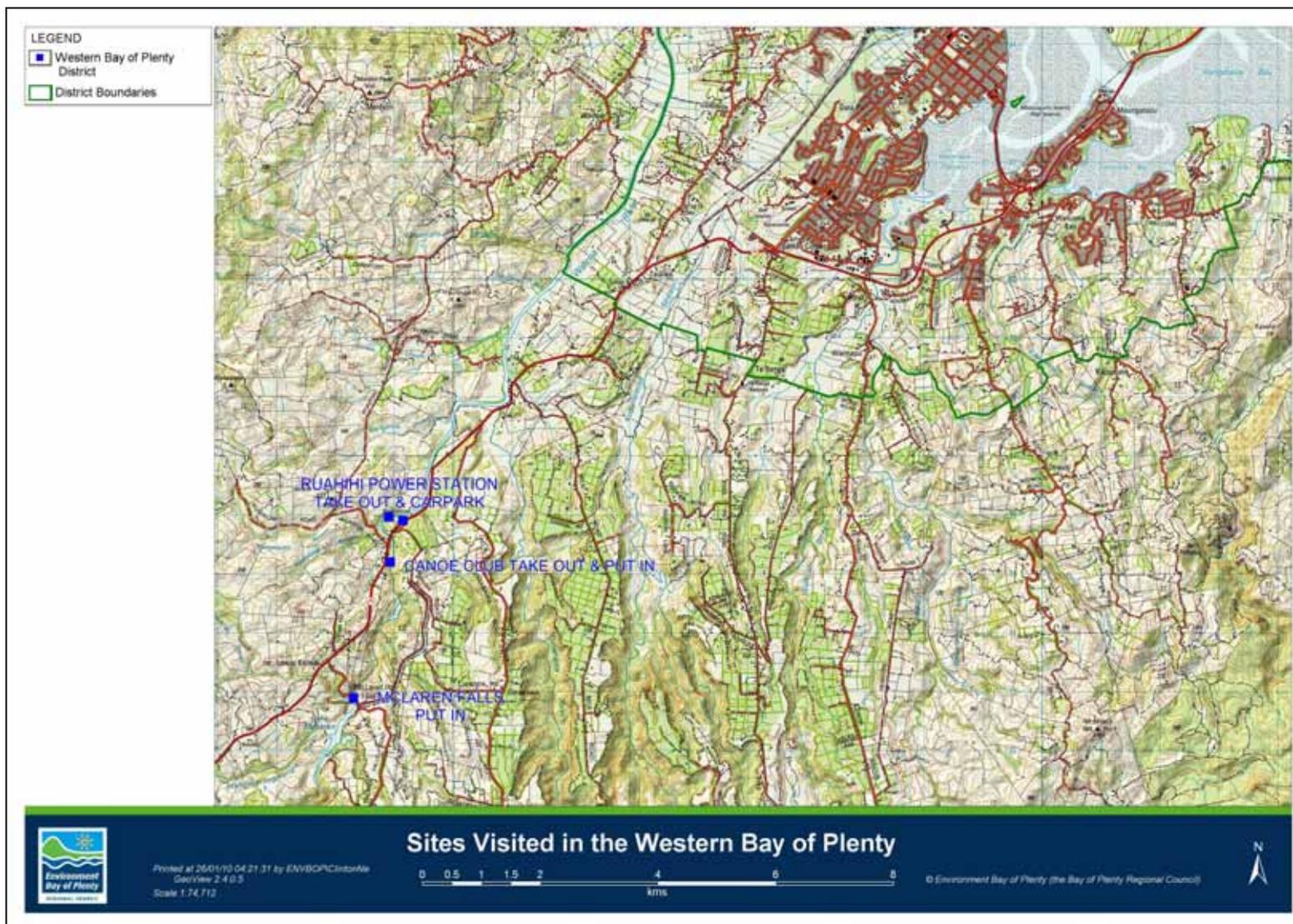


## Appendix IV – Sites visited in Whakatane district



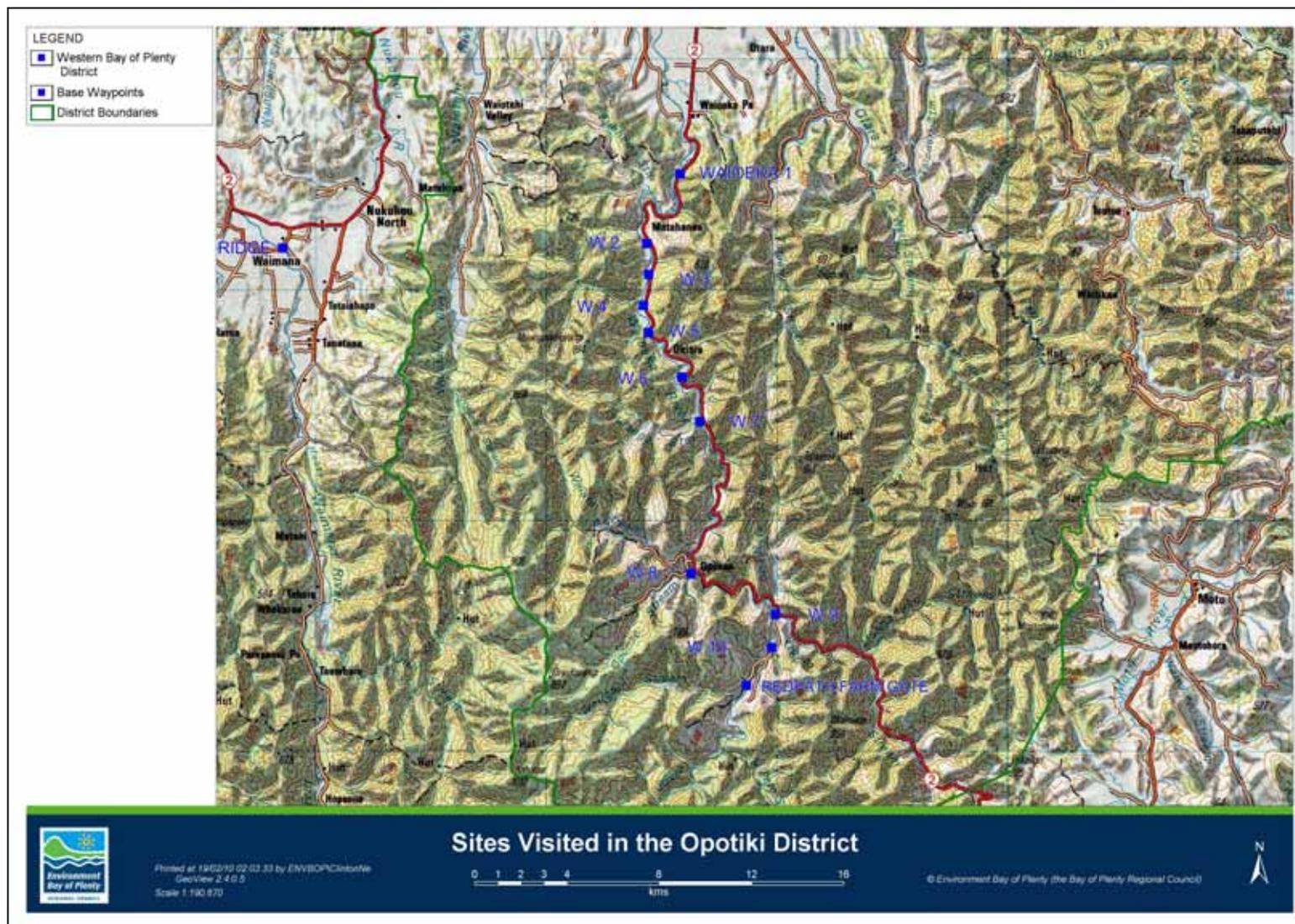


## Appendix V – Sites visited in the Western Bay of Plenty district





## Appendix VI – Sites visited in the Opotiki district





## **Appendix VII – List of biosecurity paraphernalia and products distributed**

---

- Lollipops.
- Didymo spray bottles filled with 5% (50 ml) of Simple Green.
- Pens.
- Fluorescent propeller flags with the 'Stop the Spread' message and logo on it (Environment Bay of Plenty).
- Pocket sized information brochures (fold up).
- Didymo information sheets with sticker and pen.
- Posters (bungee jumper, girl swimming, hand and rock).
- Floating key rings.
- Didymo Check, Clean, Dry stickers/posters/brochures.
- Wooden Check, Clean, Dry signage.
- Lakes information sheet showing aquatic pest plants and pest fish species.