Aquatic Pest Survey 2012

Prepared by Adam Brown and Tracey Bates (Summer Students)

Bay of Plenty Regional Council
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Cover Photo:
Invasive weeds washed up on the shore of Lake Tarawera
Photographer: Tracey Bates

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Executive Summary

The Rotorua Lakes are a significant asset to the Bay of Plenty Region and New Zealand. Their health and biosecurity is therefore worth protecting. The number, popularity and proximity of the lakes make them extremely susceptible to invasive species.

Hornwort, egeria, lagarosiphon and elodea have been identified as the main invasive weed species that have established in the lakes and contribute to water degradation. Human recreational activities are the principal means through which weed fragments spread between lakes, with vessels, trailers and equipment identified as the main vectors. Pest fish eggs 'hitchhike' on weed fragments and are a concern as is the invasive freshwater alga didymo. First identified in a South Island river catchment in 2004 it has now spread to over 150 rivers though is not yet known to be present in the North Island.

Aquatic Pest Summer Awareness Programmes aim to identify levels of public awareness and educate recreational users of the threats pest weeds, fish and didymo present, and how to prevent their spread. This was conducted via surveys at boat ramps and on the region's rivers during which a promotional pack containing merchandise and educational information were offered for free. Awareness and decontamination stations at sporting events and the distribution of educational material to retail outlets, information centres and tourist accommodation complemented the surveys.

A total of 794 individuals were surveyed on lake boat ramps and rivers throughout the Bay of Plenty Region during the 2011/12 programme. Of those at lakes, 45% checked and cleaned vessels between waterways, a 19% decrease from the previous year, however 1% were still seen to have weed fragments attached to vessels, trailers or equipment. This poses a significant risk to many of the lakes, specifically the ones that are currently hornwort free. A greater proportion of river users (65%) checked and cleaned their vessels/equipment between waterways however. Most lake users were from Rotorua (27%) or Tauranga (23%) whereas most river users were from Rotorua (25%) or overseas (25%). The majority of lake users (63%) used vessels with outboard motors with the most popular recreational activity being fishing (31%). However, on rivers, kayaks (71%) were the most heavily used due to the popularity of the Wairoa and Kaituna Rivers. In addition, 4% of river users were from the South Island which poses a threat due to didymo's dominant presence in that part of the country. In total, 64% of vessels at lakes had last been used on the Bay of Plenty Region's waterways, a 24% increase from last year, in comparison to 55% of vessels or equipment used on rivers.

It was perceived that a high proportion (84%) of those surveyed at the lakes had a good level of interest in aquatic pest issues compared to only 59% last year, with 80% of river users perceived to have a good level of interest. These results are encouraging, though highly subjective due to difference in surveyors' perceptions of knowledge and interest. However, in terms of awareness of aquatic pest issues on the lakes, 58% were perceived to have a medium level of awareness. With regards to didymo awareness, 49% were perceived to have a good awareness amongst those surveyed on lake ramps. This is a 37% drop on the previous year which is of concern. Didymo awareness on rivers were perceived to be good (42%) or excellent (39%) thus 81% of river users are well educated with regards to didymo.

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Part 1: Introduction

1.1 Background on Bay of Plenty lakes and rivers

The Rotorua/ Te Arawa Lakes are considered by many to be the jewels of the Central North Island. They provide a large source of economic, recreational and cultural benefits to the country and are a significant asset to the Bay of Plenty region. In total there are twenty lakes within 32 km of Rotorua, fifteen of which are of suitable size and depth for recreational activities (RotoruaNZ).

In addition to the lakes there are a number of rivers in the Bay of Plenty region which are famous for their white water kayaking and rafting appeal. The Wairoa River and Kaituna River are known worldwide for their amazing kayaking experience. Both the rivers and lakes contribute to the appeal of the region as a summer destination both domestically and internationally.

The Rotorua Lakes were formed through volcanic activity over 140,000 years ago. The geothermal nature of the region means the lakes were created in close proximity to each other and although many have no surface outlets, they are thought to be interconnected via groundwater and subsurface flows.

The number, popularity and closeness of the lakes make them extremely susceptible to invasion by invasive species, the biggest medium through which weeds invade the lakes being human activities such as fishing, water tourism and recreational activities. In many of the lakes, high nutrient levels from sources such as runoff and sewage output have also contributed to greater abundance of aquatic weeds, particularly in Rotorua, Rotoiti, and Rotoehu.

Regional tourism for 2010, including domestic and international tourists, contributed $491 million to the Rotorua economy (Ministry of Economic Development, 2010). The lakes are therefore a vital asset to the region's growth and stability and their health and biosecurity is worth protecting.

Figure 1- Lake Tarawera

1.2 Invasive weed species

In many countries the introduction of foreign species has contributed to the local and regional economy through aquaculture, the aquarium industry and pharmaceuticals. In a lot of situations however, the effects of these species on the native environment can be catastrophic. Of all anthropogenic impacts that affect global biodiversity, the impact of invasive species is considered second only to habitat destruction in terms of loss of biodiversity (Groves, Panetta, & Virtue, 2001).

In the Rotorua region, there are four main invasive weed species established in the lakes that contribute to degradation of water quality and loss of native biodiversity. These weeds include: hornwort *(Ceratophyllum demersum),* Canadian pondweed (*Elodea canadensis*)*,* lagarosiphon *(Lagarosiphon major),* and egeria *(Egeria densa).*

Invasive weed species possess a similar set of characteristics that enable them to spread rapidly and survive in New Zealand's aquatic environments. These include the ability to grow rapidly, often by asexual means such as fragmentation. In most cases only one sex of the species has been introduced, meaning they are constrained by lack of natural dispersal methods. Human activities are therefore the most common means for dispersal from one water body to another, and the close proximity of all our lakes place them at risk of incursion from these invasive weeds. Impacts of foreign aquatic weeds include clogging of water bodies, and displacement of native and desirable species such as trout (Champion & Clayton, 2000).

An Aquatic Weed Risk Assessment Model (AWRAM) is a useful tool developed to compare the success of one aquatic species with another. Attributes of the ecology, biology, weediness and management of each species is assessed based on their behaviour in new habitats. Each trait is ranked on a scale of 0-10 and combined to give a total score.

Table 1 Submerged aquatic plant species present in Rotorua Lakes ranked according to weed risk. Higher score reflects greater impact (Champion & Clayton, 2000)

Common Name	Scientific Name	AWRAM Score
Hornwort	*Ceratophyllum demersum*	67
Egeria	*Egeria densa*	64
Lagarosiphon	*Lagarosiphon major*	60
Canadian pondweed	*Elodea canadensis*	46

1.2.1 Hornwort

Figure 2 Hornwort on the anchor of a vessel. Lake Tarawera

Hornwort is a species that is mainly submerged, and found within littoral zones of still and flowing fresh water. It can either free-floating, or anchor itself in sediments via modified leaves and forms dense beds than can often reach up to seven metres in height (Matheson, Wells, & Vopel, 2005)

The appearance of the plant is feathery with bright green, finely divided leaves that have minute teeth, making it feel rough to the touch. New plants can form easily via vegetative growth of broken stems. As stems are easily snapped and dislodged, hornwort is a particularly rapid invader in water of varying clarity, temperature, light and nutrient levels. Its tendency to break off and form free-floating mats means it often blocks light penetration to native species and causes blockages of hydro dams (Biosecurity New Zealand, 2009).

Hornwort was first found in the region in Rotoiti, and has since established in Rotorua, Tarawera, Rotoehu, Rotomahana and more recently, Ōkataina.

1.2.2 Lagarosiphon

Lagarosiphon has been present in New Zealand since the 1950s when it was first discovered blocking hydro dams, and has spread throughout the world via the aquarium trade. Lagarosiphon has since established in many waterways throughout the country, and is present in all the Rotorua Lakes apart from Rotomahana, Ōkaro and Rotokakahi.

It differs in appearance to other aquatic weeds in that the leaves are arranged in an alternate spiral rather than in a whorl and have tapered tips curving downwards along the stem.

This invasive oxygen weed prospers in clear, shallow water of depths up to 6.5m in temperate latitudes. It can form dense monospecific stands that block light penetration, eliminating growth of native plants and smothering benthic invertebrate populations. In addition to this, lagarosiphon can restrict the passage of boats and limit recreational activities such as swimming and fishing (ISSG, 2006c).

1.2.3 Egeria

This species thrives in turbid, slow-flowing waters, forming dense monospecific beds that clog water bodies and cause fluctuations in water quality. Its dense growth also smothers benthic communities and restricts light to surrounding native plants.

Egeria is bright green, with short internodes which give the plant a leafy appearance and stems that can grow up to several metres in length. Individual leaves are minutely serrated, linear and arranged in whorls of up to 3-8 (ISSG, 2006a)

Egeria was first found in Lake Rotorua in 1977, and since then has established in Rotoiti, Ōkāreka, Tarawera, Rotomahana and Rerewhakaaitu.

1.2.4 Elodea

Canadian pondweed is a submerged aquatic plant that has the ability to grow and multiply rapidly in a diverse range of environments and conditions in water up to 10m deep. This species forms dense mats over substrate that can often reach heights of up to 5m. It is a major threat to waterways through habitat modification and its competitive ability against other plant species for light and space (ISSG, 2006b).

Elodea is similar in appearance to the other oxygen weeds, egeria and lagarosiphon, however, it can be identified as having three leaves arranged in whorls around the stem. This species also has flowers which are carried to the surface by long, slender stalks for pollination via the wind and water (ISSG, 2006b).

Elodea is thought to have established in New Zealand over a century ago and is currently found in all but one of the Rotorua Lakes.

The transferral of invasive weeds can also heighten the risk of unknowingly introducing other invasive specimens to the Rotorua Lakes. A recent discovery of *Pomacea diffusa* (Apple snails) on hornwort taken from Lake Tarawera confirms the spread of this aquarium species from the Waikato River to the Bay of Plenty Region. The impacts of this species are not yet well documented. However, in countries where it has become established *Pomacea* spp. has become a pest by consuming all aquatic plants and increasing nutrient and phytoplankton mass in wetlands. It may also indirectly alter biodiversity through predation on eggs or competition for food with other detritivores. This case only heightens the importance of the need for increased awareness and understanding of the biosecurity risks surrounding our freshwater systems (Collier *et al*., 2011).

1.3 Pest fish species

A further threat to the quality and health of the Rotorua Lakes is the introduction of invasive pest fish species. Currently the lakes are inhabited by mosquito fish (*Gambusia affinis*), a highly predatory fish that preys on the eggs of economically desirable fish, native fish and native invertebrate species (ISSG, 2010b).

High numbers of invasive pest fish in neighbouring regions increase the risk of their transfer into local waterways. In the Waikato freshwater ways there are currently two such species which, if found in our lakes, would seriously reduce the water quality and habitat for native fauna and fauna. These species include koi carp (*Cyprinus carpio*) and catfish (*Ameiurus nebulosus*). The importance of checking

trailers and equipment for aquatic weed fragments is especially important in the case of pest fish, as fertile eggs can be attached and therefore introduced to new water bodies (Clements, 2005).

Koi carp are similar in appearance to goldfish and are often irregular in colour, with blotching of red, black, gold or white. They are distinguishable from other fish by the presence of two pairs of barbels at the base of their mouth and can grow up to 600 mm in length. Koi carp pose a serious threat as they reduce the health of the lakes as a result of their opportunistic feeding habits. As they grub through bottom sediments they increase water turbidity, impacting on plant habitat, insects and water fowl through competition for food and reduced water quality (Clements, 2005)

Catfish are scale-less, dark brown fish with pale sides and belly. They are a distinctive species due to their large, flat mouth surrounded by eight barbels and the presence of a sharp toxic spine on the leading edge of their dorsal fin. Native to North America, catfish are extremely hardy and can invade a wide range of habitats as well as survive long periods of time out of water. They can rapidly build up to large numbers and out-compete trout and native species by stirring up sediment and preying on eggs and juveniles (Clements, 2005).

Other pest fish include tench (*Tinca tinca)* and rudd (*Scardinius erythrophthalmus*), which are found in both islands of New Zealand but are commonly found in the northern half of the North Island. Both pose a threat to indigenous species and it is considered an offence to be in possession of any of these pest species.

1.4 The threat posed by didymo (*Didymosphenia geminata)* to New Zealand

Figure 3 Didymo cleaning station at Murray Redpath's farm.

A further biosecurity threat to the Bay of Plenty's freshwater ecosystems is didymo, *Didymosphenia geminata,* or 'Rock Snot' as it is known colloquially due to its unpleasant manifestation. Didymo are freshwater diatoms, single celled algal micro-organisms that can be spread in a single drop of water (Bowden, 2010). Despite being microscopic, they can accumulate in dense colonies referred to as algal blooms that can form impenetrable mats covering rocks and suffocating plants on the substratum of rivers, streams and lake edges (BNZ, 2011). It is brown, beige or white in colour but never green, and though it looks to be slimy it actually feels like wet cotton wool (ISSG, 2010a).

Didymo has a native distribution which includes cold forest and alpine environs across northern latitudes of North America, Europe and Asia. It is typically located in cool, oligotrophic waters and grows through vegetative cell division

(ISSG, 2010a). Didymo prefers stable flows and substrates as well as high light conditions (Kilroy, 2004).

In October 2004, New Zealand was confirmed as the first Southern Hemisphere country to have didymo. Employees of Southland Fish and Game and the National Institute for Water and Atmospheric Research (NIWA) noticed a strange algal growth covering the substrate of the lower Waiau River (Kilroy, 2004). Despite early attempts at containment via public education, the alga has spread to over 150 rivers in the South Island but to date has not been identified in New Zealand's North Island (BNZ, 2011). The South Island has been made a controlled area in its entirety and under the Biosecurity Act (1993) didymo has been classified as an unwanted organism (BNZ, 2011).

Over a comparatively brief period of time, didymo has grown profusely and become widespread. Kilroy *et al* (2006) highlight characteristics facilitating invasiveness in didymo: large amounts of didymo cells can suspend in flowing water which acts as a vector; cells flourish in a wide range of water velocities; it has a wide tolerance compared to specific limits of native algae and with a relatively stable substrate it can grow anywhere along a river course.

Freshwater ecosystems, aquatic species, recreational activities and the aesthetic appeal of waterways have been adversely affected thus impacting upon government finances, social and commercial interests and the spiritual and cultural values of Maori (Deloitte, 2011). Branson (2006), remarks that didymo blooms can negatively affect fisheries, tourism, hydro-electric power and irrigation schemes. The adverse impacts of didymo for 2006-2011 have been estimated to have cost New Zealand $127.8 million, with an increased projection estimated at between $210.6 and $854.8 million for the period 2011-2020 (Deloitte, 2011).

Invisible cells can be spread inadvertently and this is a major concern should didymo enter the North Island. Many rivers appropriate for recreational activities such as fishing or kayaking are often those most apt for didymo growth, hence these activities have been identified as the most likely cause of didymo proliferation within and between different rivers and watersheds. It is acknowledged that eradication of a microscopic organism that has established in a natural freshwater environment is practically impossible and therefore not a viable option (BNZ, 2010). Thus, a 'Check, Clean, Dry' campaign developed by Biosecurity New Zealand is a proactive attempt at slowing the spread and containing didymo. Preventing its spread to the North Island is of paramount importance. This awareness campaign is directed towards the public and educates as to the best methods of cleaning vessels, clothing and equipment if moving between bodies of freshwater (Bowden, 2010).

1.5 Awareness programme and survey background

The lakes and rivers within the Bay of Plenty Region are utilised by people living locally and both domestic and international travellers undertaking a wide variety of recreational activities. Equipment, clothing, vessels and trailers associated with these activities have been identified as vectors capable of transferring invasive pest weed and fish species, as well as live didymo cells, between waterways. Invasive pest weed species spread via vegetative fragmentation and weed fragments can harbour the eggs of pest fish. Didymo cells are microscopic, can survive in moist conditions and may therefore be spread unwittingly. Invasive pest weeds can form dense mats which out-compete native freshwater plants such as charophytes and

milfoils, degrade water quality, encourage stagnation and adversely affect irrigation and hydroelectric schemes.

The Aquatic Pest Technical Advisory Group (APTAG) was established in August 2004. This multi-agency initiative comprised of representatives from the Bay of Plenty Regional Council (formerly EBOP), the Department of Conservation (DOC), the Te Arawa Lakes Trust, Eastern Fish and Game, Rotorua District Council (RDC), and Land Information New Zealand (LINZ). These organisations work in partnership to ascertain and improve public awareness relating to aquatic pest plant dispersal between waterways.

The Bay of Plenty Regional Council has employed two students each summer since 2004 to assist with their Aquatic Pest Advocacy Programme. This programme has since evolved into a more direct programme in terms of its education and awareness strategies. Included in this programme is a survey created by APTAG (Appendix 2) directed at users of lake boat ramps and the region's rivers. Packs containing merchandise and educational material provided by Biosecurity New Zealand (BNZ) and Bay of Plenty Regional Council are distributed free of charge to participants of these surveys.

1.6 Aims and objectives

The main aim of the annual Aquatic Pest Advocacy Programme is to both determine awareness of aquatic pests and educate recreational users of the lakes and rivers in the region about how pest fish, weeds and didymo are dispersed between waterways. In addition it educates water users on how to best minimise the risk of this happening. The distribution of educational material to retail outlets, iSITES and tourist accommodations provides an additional approach to promoting awareness. This method also ensures the target audience can access information throughout the year, not just during the three months of the programme. This report initially highlights the methodologies used to disseminate information and the locations at which surveys were undertaken. Analysis and discussion of results from surveys follows. Finally, conclusions and recommendations will be documented to facilitate those conducting subsequent awareness programmes.

Part 2: Methods

In order to reach as many people as possible during the Aquatic Pest Advocacy Programme, boat ramps, rivers, local businesses and tourism outlets were visited to ensure that the "Check, Clean, Dry" message was widely heard. Beginning on the 3rd December and ending on the 6th February 2012, 794 individuals were spoken to and surveyed. In addition any retail outlets selling fishing gear, accommodation sites, information sites and water events were contacted and provided with merchandise to ensure a wide audience was met and educated.

2.1 Boat ramp surveys

During the busy summer period boat ramps were visited and water users surveyed in a number of locations in the Bay of Plenty Region. These surveys were conducted by Tracey Bates and Adam Brown from the Bay of Plenty Regional Council. In addition, Department of Conservation employees Amy Greaves and Valerie Raethel also worked in the Waikato Region to educate individuals about aquatic biosecurity risks.

The survey form (Appendix 2) used was similar to previous years, in which information was gathered on the origin of vessel and owner, whether the vessel was checked/cleaned, vessel type, recreational purpose and perceived awareness on aquatic issues. In addition to previous years, a question was asked as to whether individuals had ever seen pest fish in the Bay of Plenty waterways. This was asked to gain an idea of whether people were aware of pest fish issues and what they needed to do if they saw them, as well as gain information about potential sightings.

Normal hours of work were generally weekends and three week days from 8:00 am to 4:30 pm. On the weekends and during the Christmas period however, later starts were often required to catch individuals who returned from fishing or stayed at the lake until early evening.

At the site, the vehicle was parked out of the way of turning trailers and vehicles but close enough to the ramp to see vessels launching and retrieving. On quieter ramps it was possible to speak to people while they were on the ramp as they were in no immediate rush and no one was waiting to access the water. On busier ramps however, it was often better to speak to individuals as they were waiting to use the ramp, fixing their vessel up to leave, or if there was someone waiting for the skipper on the jetty. This ensured that no congestion occurred on the ramp as a result of our surveying.

To determine if weather conditions influenced the numbers of people surveyed over the busy summer period, the conditions were recorded at each ramp. Most people were observed for a while to see if they checked their vessels, however as there is no way of knowing whether they cleaned it at home or not, the topic was generally bought up during the talk, to which a lot of people admitted whether they had or hadn't cleaned their gear. When approached water users were given the promotional pack containing information and giveaways (information, prop flag, sticker, key ring, sunblock, lollipop and/or a sun hat/ drink bottle/ or t-shirt) (Appendix 3), and answers relating to the survey were gathered through conversation with lake users. All users were educated on the importance of checking and cleaning their boats, and the risks associated with aquatic weeds, didymo and pest fish. In the case of didymo, more information was given if they

were perceived to be a greater risk to the region, i.e. kayakers, fishermen, and foreigners.

A useful prop to show the effect that invasive weeds can have on the lakes was a photo of Rotoehu in 2009, in which hornwort is covering the entire surface of the lake (Figure 4). This photo achieved a powerful effect with many people, as they could understand the impact it would have on their recreational activities if it spread to cleaner lakes. Another useful prop was a model of a koi carp and catfish, as it allowed people to see what they looked like and if possible, identify them if they were found in the Rotorua Lakes.

In previous surveys sea biscuiting, wakeboarding and skiing have all been placed together in the collective category of "skiing." However, as sea biscuit material can stay damp for an extended period of time, we considered them to be at higher risk of transferring pests than skis and wakeboards so placed them in a separate category. Kayaking is also a high risk activity as many kayakers move from north to south and use both rivers and lakes. As such, these were not place in the "other" category as has previously been done. Recreational purposes of lake users were instead broken down into clearer and more specific categories, allowing for the assessment of the risk of incursion from weeds, pest fish or didymo.

Once all the relevant information had been gathered, survey sheets were filled in away from the ramp in the vehicle. This decreased any bias achieved by surveying people directly, in which dishonest answers might be given in regards to whether they check and clean their gear.

The following lists all the boat ramps visited over the summer period and can be found in Appendix 7 and 8:

- **Lake Rotorua**
  - Hannah's Bay
  - Ngongotahā Mouth
  - Hamurana
  - Hamurana Springs Mouth
  - Sulphur Point
  - Lake Front

- **Lake Rotoehu**
  - Kennedy Bay
  - Ōtautū Bay
- **Lake Ōkāreka**
  - Boyes Beach
  - Acacia Road Reserve
  - DOC campground
- **Lake Tarawera**
  - The Landing
  - Boatshed Bay
  - Stoney Point Reserve
  - Bay View Road Ramp
  - Tarawera outlet mouth
- **Lake Rotoma**
  - Merge Lodge
  - Matahī Spit
- **Lake Ōkataina**
- **Lake Rotoiti**
  - Otaramarae
  - Delta Ramp
  - Gisborne Point
  - Hinehopu
- **Lake Tikitapu (Blue Lake)**
- **Lake Rerewhakaaitu**
- **Lake Rotokakahi (Green Lake)**
- **Lake Aniwhenua**
  - Camp ground and ramp
- **Lake Matahina**

Of this list of boat ramps, all but four were visited on a weekly basis. Lakes Rerewhakaaitu, Aniwhenua and Matahina are further out than the other lakes, and therefore require more driving and time. Aniwhenua and Matahina were visited twice over the summer during the Christmas/ New Year period and Anniversary weekend as a lot of people camp at Aniwhenua with boats and kayaks. Guy Roe Reserve at Rerewhakaaitu

Figure 5 Guy Roe Reserve, Lake Rerewhakaaitu

is another popular camping spot, with a lot of people mooring boats along the lake edge. Lake Rotokakahi was checked every time we drove past the ramp to Lake Tarawera, but as it is privately owned with no public access we never encountered any boats or trailers.

At the completion of the survey period the origins of water users were combined into regional categories to allow for comparisons to be drawn between results. The origins of lake users were as follows:

- **Rotorua Region**
  - Rotorua
  - Tarawera
  - Ōkāreka
  - Ngongotahā
  - Rotomā
  - Tarawera
  - Rerewhakaaitu
  - Rotoehu
  - Awahou
  - Kaharoa
  - Hamurana
  - Rotoiti
- **Whakatāne Region**
  - Whakatāne
  - Awakeri
  - Kawerau
  - Te Teko
  - Matatā
  - Paengaroa
  - Galatea
  - Rūātoki
  - Edgecumbe
  - Murupara
- **Tauranga Region**
  - Tauranga
  - Te Puke
  - Pāpāmoa
  - Pukehina
  - Maketu
  - Katikati
- **Waikato Region**
  - Tokoroa
  - Hamilton
  - Cambridge
  - Te Aroha
  - Te Awamutu
  - Reporoa
  - Waimangu
  - Morrinsville

  - Putaruru
  - Matamata
  - Huntly
- **Coromandel Region**
  - Waihī
  - Whangamata
  - Thames
- **Wellington Region**
  - Wellington
  - Waikanae
  - Upper Hutt
- **Hawke's Bay Region**
  - Hastings
  - Havelock North
  - Napier
- **Northland**
- **Gisborne**
- **Taranaki**
- **Auckland**
- **Horizons Region**
  - Palmerston North
  - Whanganui
  - Foxton
  - Dannevirke
- **South Island**
  - Christchurch
  - Dunedin
  - Timaru
- **Overseas**
  - (Canada, Germany, Slovakia, Switzerland, Australia, Norway, Scotland, USA)

2.2 River user surveys

By surveying the recreational users of rivers within the Bay of Plenty Region, in addition to boat ramp users, a more comprehensive demographic of the population were addressed. Rivers within the Rotorua District were usually visited on at least two occasions each week whereas rivers within the Whakatāne and Ōpōtiki Districts were visited only once over the entire duration of the programme. This was primarily due to recommendations made by previous students of the awareness programme, stating that in comparison few people use these rivers. Time constraints due to long distances required for travel also restricted our opportunities to visit these locations. However, the Wairoa River in the Western Bay of Plenty District was visited on three occasions over the survey period. This river gets utilised heavily on Sundays over the summer by kayakers and rafters taking advantage of the Wairoa release

carried out for hydro-electric power generation. McLaren Falls, the Ruahihi Power Station take out and the Canoe Club put in and play wave all proved popular with kayakers and provide a good opportunity for educating and surveying different users.

- **Rotorua District (Appendix 7**)
  - Ngongotahā River access points
  - Awahou River mouth
  - Kaituna River
  - Waitetī River mouth
- **Whakatāne District (Appendix 8)**
  - Rangitāiki River
  - Tarawera River
  - Waimana River
  - Whakatāne River
- **Western Bay of Plenty District (Appendix 9)**
  - Wairoa River
- **Ōpōtiki District (Appendix 10)**
  - Waioeka River

Figure 6- White water kayakers at McLaren's Falls put-in

Popular fishing sites were visited in an attempt to find river users. Blue and white angler access point signs were located at known fishing spots by Fish and Game. These were useful indications of where anglers may be found, as were vehicles parked adjacent to these signs. Access points were especially useful on the Waioeka River, on which good fishing spots would otherwise be very hard to access without prior knowledge. Ngongotahā and Waioeka River access points are shown respectively as N1, N2 etc (Appendix 7) and W1, W2, etc (Appendix 9).

The same survey sheets were used as those at lake boat ramps. The only difference being that fishing equipment was recorded as opposed to type of vessel. Fishermen were approached and informed that we were working for the Bay of Plenty Regional Council. Conversation was initiated and answers to questions in the survey ascertained. Packs were handed out to those surveyed and survey forms filled in back at the vehicle. Many fishermen were surveyed during early evenings at fishing spots close to Rotorua. However, this was not possible at the more remote rivers visited on day trips further out of the region.

2.3 Retail and tourism awareness

During the period of 8th December to 19 January 2012 a number of retail outlets and local businesses in the Bay of Plenty Region were visited to distribute material and provide information about the invasive pest species that threaten the lakes. The organisations targeted were those that frequently used the waterways as part of their businesses; had people staying who would be using the waterways; or who had customers who may lack understanding of the biosecurity issues in and around our waterways. In particular businesses such as rafting companies, boat and kayak shops, and retail outlets that sold fishing and tramping gear were targeted. As well as this, motels, hotels and backpackers were provided with information that foreigners and people new to the region might not be aware of when using the water. Backpackers have not been focussed on as much in previous summer awareness programmes. However, as many travellers go from the South Island to the North Island with little knowledge of biosecurity risks, they were considered a high risk vector through which didymo could be transported. Retail outlets targeted (for a full list see Appendix 1):

- Tourist accommodation (Motels and backpackers)
- Retail outlets that sold boating and fishing gear
- Retail outlets that sold fishing licences
- Local businesses that frequently used water i.e. white water rafting, Tarawera Water Taxi.
- Information centres and libraries
- Stores and petrol stations that were frequently used by lake users i.e. Rotomā Trading Post
- Fish and Game

With each business the owners were educated about the risks associated with water users and why it was so important that their customers were aware of these. The threat of didymo to our waterways, especially when people from the South Island were travelling to the North Island was emphasised and the means of how to stop its spread outlined. In cases where owners were uninterested or unresponsive, we reiterated the damage these invasive species would cause to the local economy and in turn, their own businesses.

Biosecurity New Zealand and Bay of Plenty Regional Council merchandise supplied included A4 and A3 posters, brochures (foreign language and “Protect our waterways”), stickers and z-booklets. For businesses that were more actively using the water, we provided key rings and occasionally Simple Green.

2.4 Event awareness and decontamination stations

Attendance at sporting events on Bay of Plenty waterways during the summer was viewed as an opportunity to increase awareness of aquatic pest issues to a wider cross section of society. These events catered to groups with a diverse range of interests, many of which may not otherwise have spent much time on the region’s waterways. In addition, events provide a chance to disseminate information to organisers, friends and family of competitors and other spectators.

Events can bring large captive audiences to a single location. Therefore, being granted permission to speak to a relaxed crowd offers opportunity to spread awareness that would otherwise have taken a considerable amount of time and effort. During November 2011 the events were researched, with information provided by organisers passed through a matrix to determine their risk to lake health. Correspondence with organisers helped determine whether it was possible to speak at briefings, whether decontamination stations would be necessary and what merchandise would be most appropriate for distribution. The following events were attended during the programme.

Figure 7 NZ canoe slalom in Kawerau 2012

- Annual International Trout Fishing Tournament
- Blue Lake Sprint Regatta
- Blue Lake Hospice Half and Quarter Ironman
- Fish and Game Boat Fishing Seminar
- Water Ski Racing on Lake Rotomā. N.Z Water Ski Racing Association
- North Island PWC Summer Tour. Hawkes's Bay Jet Sport Club Inc
- Dewar Shield Blue Lakes Regatta
- NZ Slalom Kayaking Event- Kawerau
- Eves Blue Lake Multi Sport Festival 2012
- Kiwanis Club of Whakatāne- Rotomā Waitangi Day Open Water Swim

Speaking to organisers and at briefings offered the chance to not only raise awareness of aquatic pest risks to lake health but also to provide information on decontaminating vessels and equipment. Decontamination stations manned by Regional Council summer students were set up at the hospice half ironman event and the Blue Lake Multi Sport Festival as a requirement of race entry. A 5% 'Sunlight' or 'Simple Green' detergent solution were used at stations to reduce the risk of spreading aquatic pests like didymo. Stations were also located at the Waitangi Day event for voluntary decontamination of wetsuits and at the Dewar Shield Rowing Regatta for any boats not correctly cleaned prior.

In addition to providing cleaning material, event organisers were provided with a Biosecurity New Zealand "Check, Clean, Dry" ring binder containing information for regional partners on decontamination processes; a "Stop the Spread" DVD; and merchandise to use for either spot prizes or for event officials.

Part 3: Results

3.1 Boat ramp surveys

uary at a

From 3 December to 6 February 2012, 794 surveys were undertaken and analysed around the Bay of Plenty Region. At the beginning of the summer/ New Year period the region experienced a 50-year-high rainfall record, causing many of the lakes to reach levels not experienced since the seventies (Martin, 2011).

Figure 10 shows the weather experienced over the summer period in which surveys were conducted. Despite the stormy weather there was none of the weed loading experienced by students in previous summers. In only two situations were there ramps with considerable amounts of weed loading in spite of the often windy and choppy conditions.

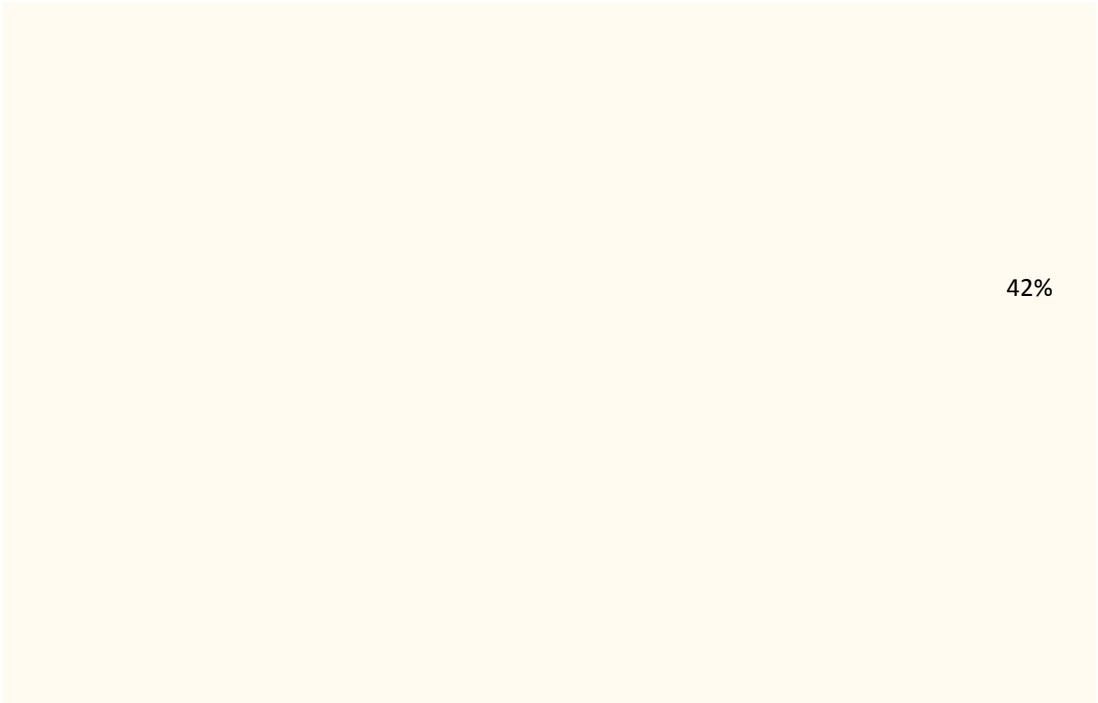

Figure 10 Weather conditions experienced over percentage of the summer period 2011-2012

3.1.1 **Was the vessel checked/cleaned before launching?**

Of the users surveyed it was found that 45% did check and clean their vessels before moving onto another lake, a 19% decrease from last year (Figure 11). Of the surveys, 6.5% of people told us directly that they had not cleaned their boat before moving on to another lake. Almost 50% of vessels were already in the Water (AIW).

Figure 11 Percentages of vessels checked for weed prior to launching

During the summer 1% of vessels were found to have weed fragments on their vessel or trailer. Of the nine instances weed was found on equipment, all species were hornwort except for one situation in which *Lagarosiphon major* was found on the trailer of a boat.

t Ōtautū

3.1.2 Types of vessels/ equipment and recreational purpose

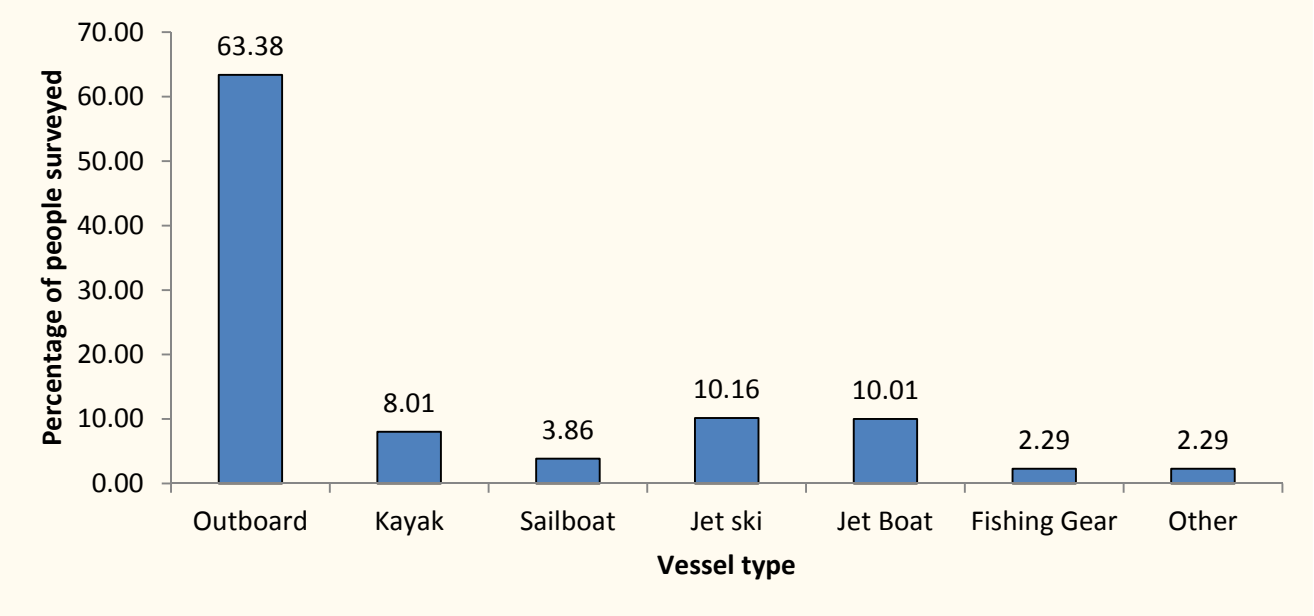

Figure 13 Vessel types surveyed at boat ramps

Figure 13 shows that the majority of lake users were on outboard vessels, with a result of 63%. Jet skis and Jet boats also contributed a large portion of vessels, with over 20% of users.

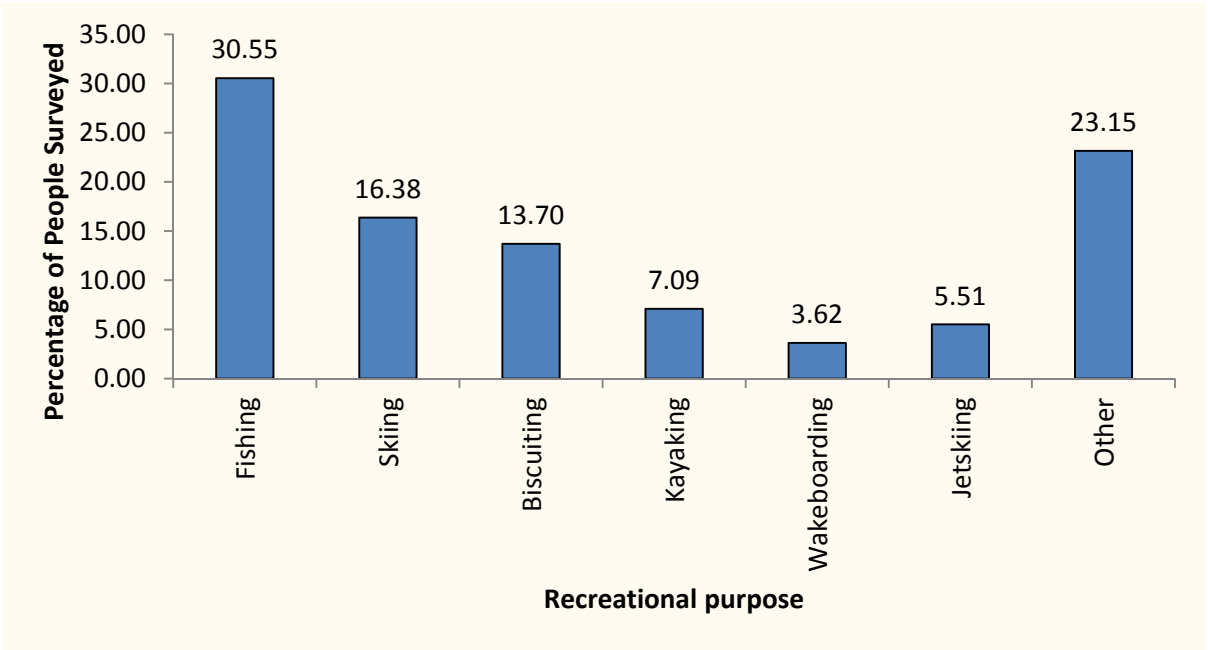

Figure 14 Recreational purposes of lake users

In Figure 14, fishing represented the greatest percentage of recreational purpose among users, followed by "other," in which we placed camping, general boating and sailing. Skiing was our second largest specific category at 16%, followed by sea biscuiting and kayaking at 13% and 7% respectively.

3.1.3 Origin of owner and vessel

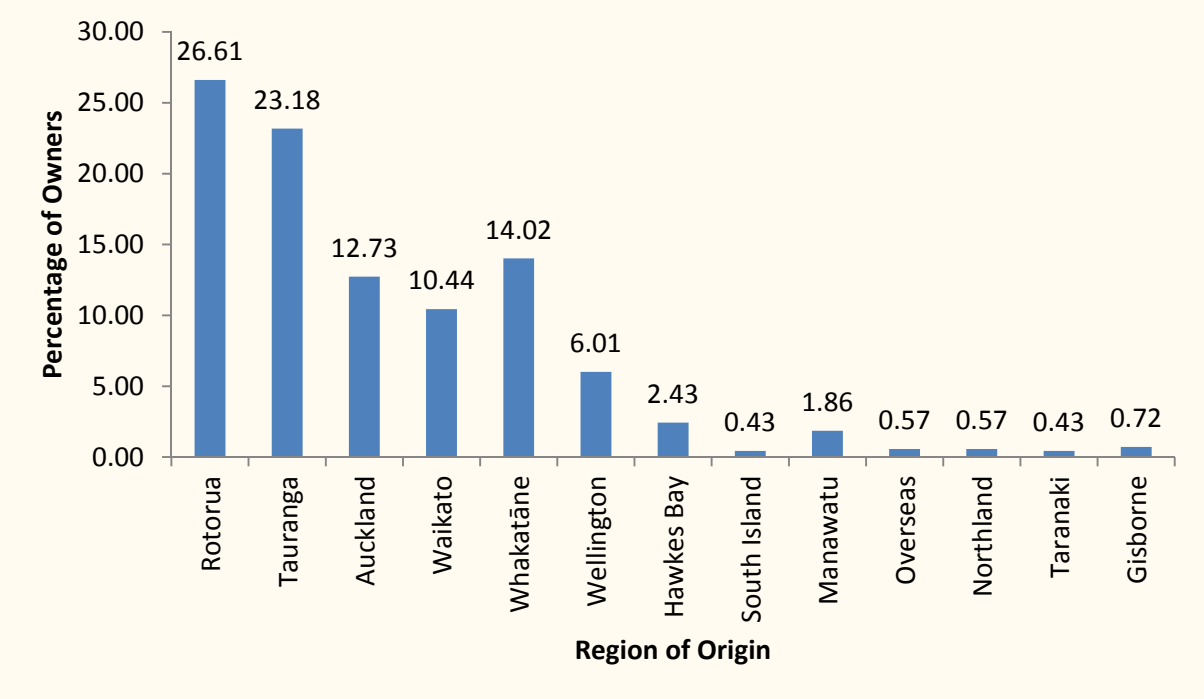

Figure 15 Percentage of boat owners surveyed from each region

Figure 15 shows the area with the highest number of boat users was the Rotorua District with 26%. The second highest category was Tauranga at 23%. Whakatāne users also represented a significant percentage at 14%.

Of the 794 vessels surveyed, 64% originated from Bay of Plenty freshwater ways (Figure 16). Vessels originating from the ocean and Waikato waterways represented the next largest categories at 25% and 8% respectively.

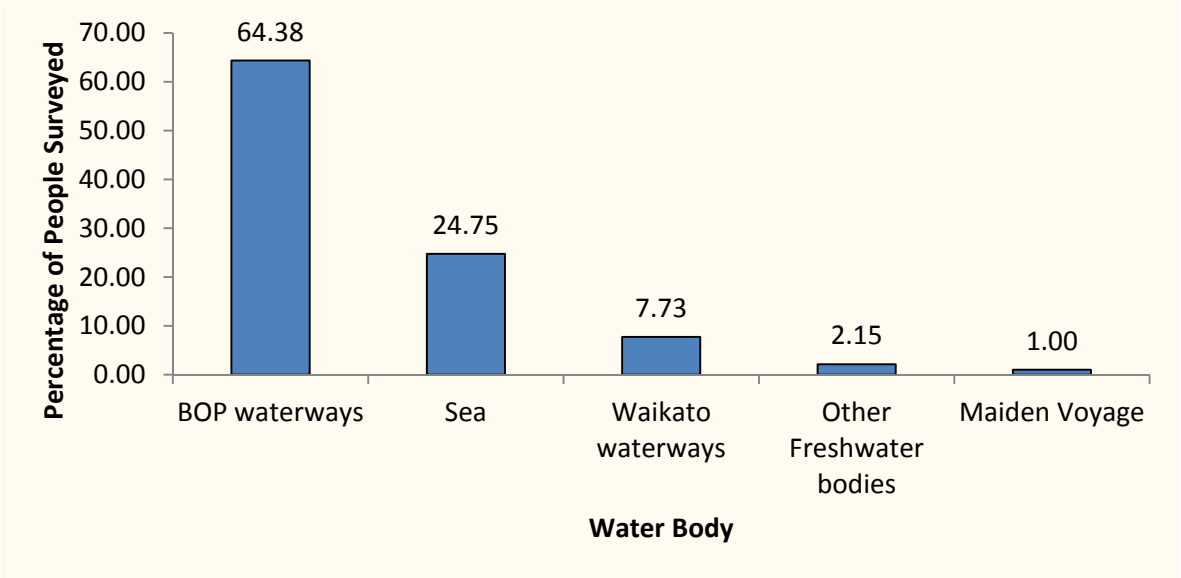

Figure 16 Region of water body the vessel last visited

3.1.4 Perceived levels of interest and awareness in aquatic pest and didymo issues

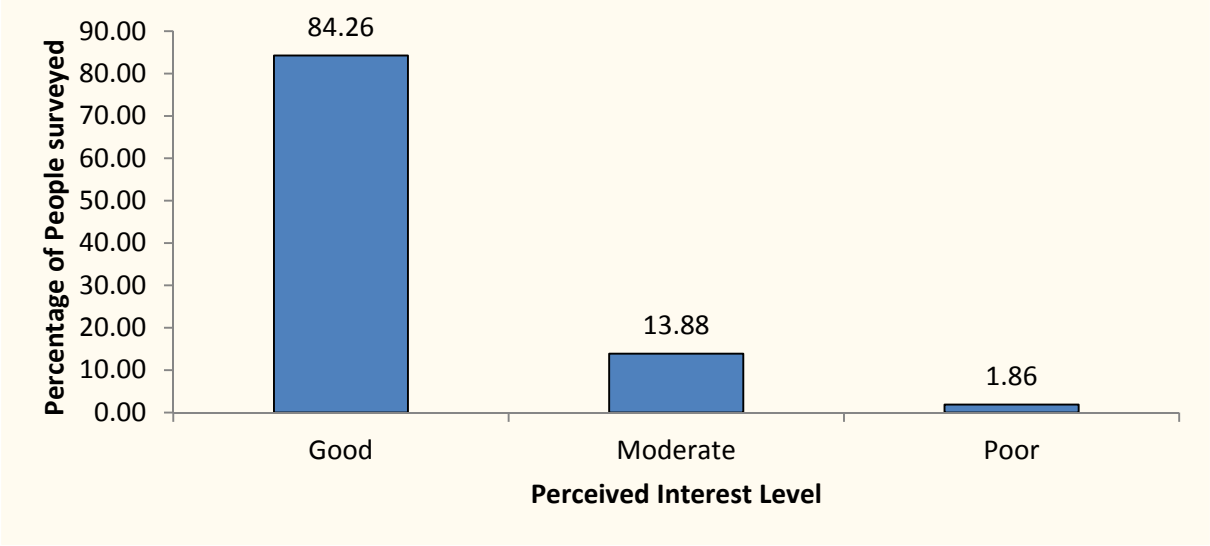

Figure 17 Perceived levels of interest in aquatic pest issues among lake users

Perceived levels of interest were high, with 84% of people having a "good" and only 2% receiving "low" interest (Figure 17).

This summer 7% of individuals were found to have low knowledge of the biosecurity risks surrounding the lakes (Figure 18). A lot of these people were either foreigners or users new to boating. The most dominant category was those with a medium awareness at 57%, followed by excellent awareness at 35%.

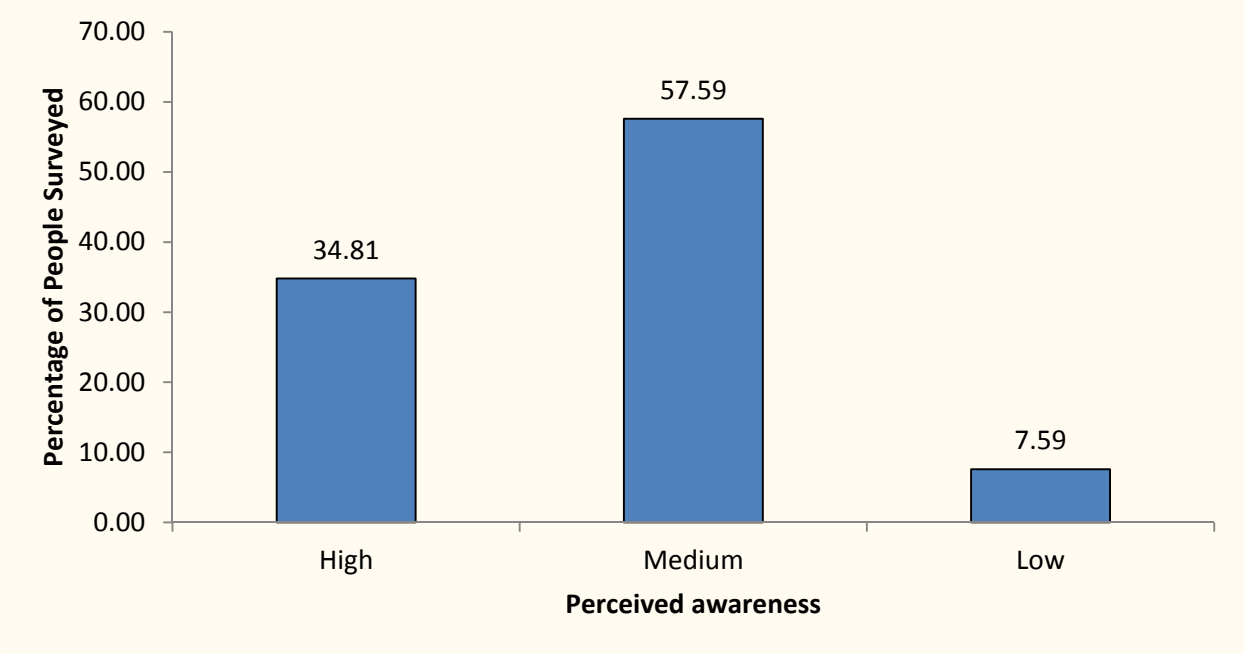

Figure 18 Perceived level of awareness of aquatic pest issues

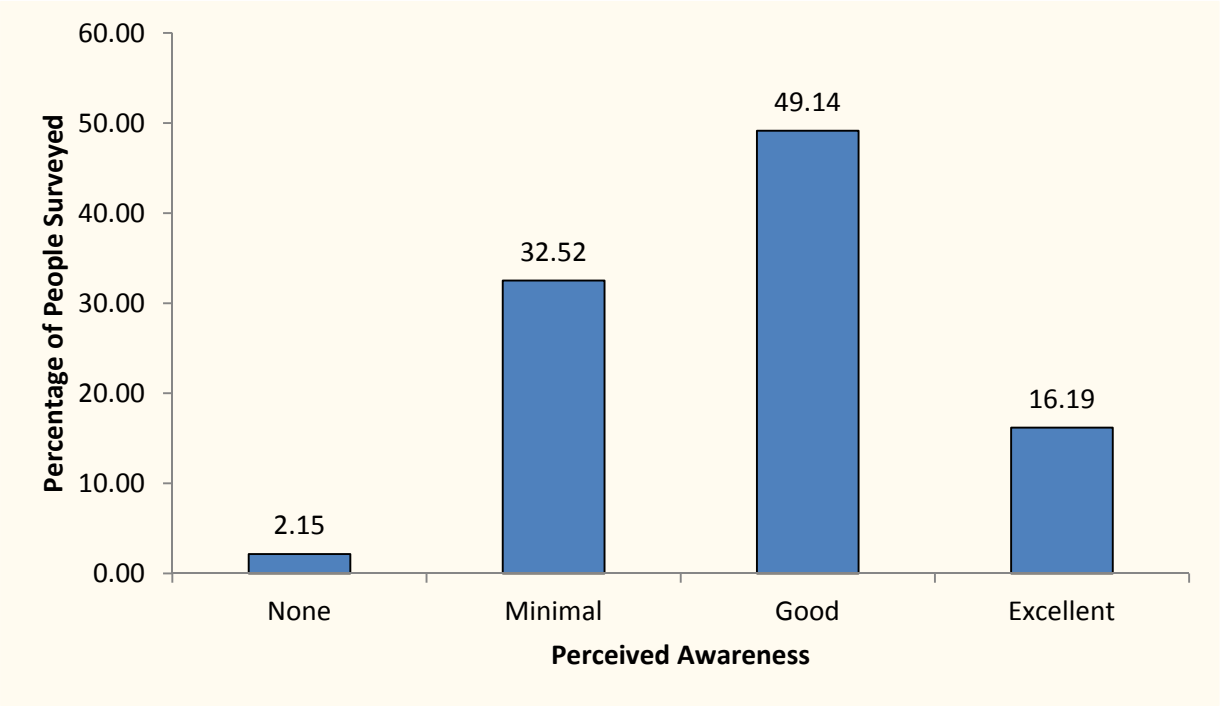

Figure 19 Perceived level of awareness of didymo

In the case of didymo it was found that the most dominant category was those with a good knowledge of the alga and its threat to the North Island. Forty nine percent were in this category, followed by 32% in the minimal category (Figure 19). Fifteen people were encountered who had never heard of didymo.

Over the summer only two individuals claimed to have seen pest fish in the lakes. One of these sightings was reported to the DOC hotline by a Regional Council employee, however the other sighting was some time ago so was not followed up.

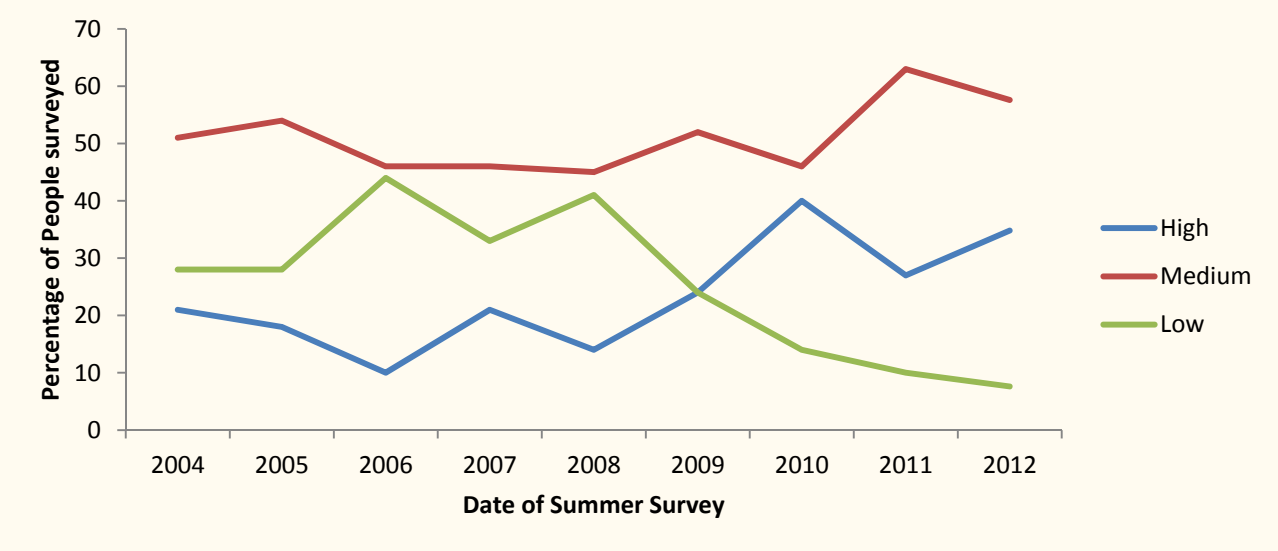

Figure 20 Differences in the perceived levels of awareness of aquatic pest issues between surveys summer 2003/20074 and summer 2011/2012

Figure 20 shows the differences in levels of awareness between summer surveys. Although the sampling method is subjective between surveyors, general trends can be observed in most cases. For the first few years of surveying awareness levels remained relatively stable, fluctuating around the same percentage of users. From 2008 an increase in users with a high awareness can be observed, rising from 15% to 34%. The percentage of users with a low awareness has shown a steady decline from the same year, dropping from 42% to 7.5%. Medium awareness has shown the least distinctive change however has risen slightly from 45-50% to 58%.

3.1.5 Distribution of surveys conducted at boat ramps

The distribution of surveys conducted at all the boat ramps was analysed to show where the majority of users were surveyed (Figure 21). Last year the students reported Otaramarae (Lake Rotoiti) and Boatshed Bay (Lake Tarawera) to be the most popular and therefore most worthwhile ramps to visit.

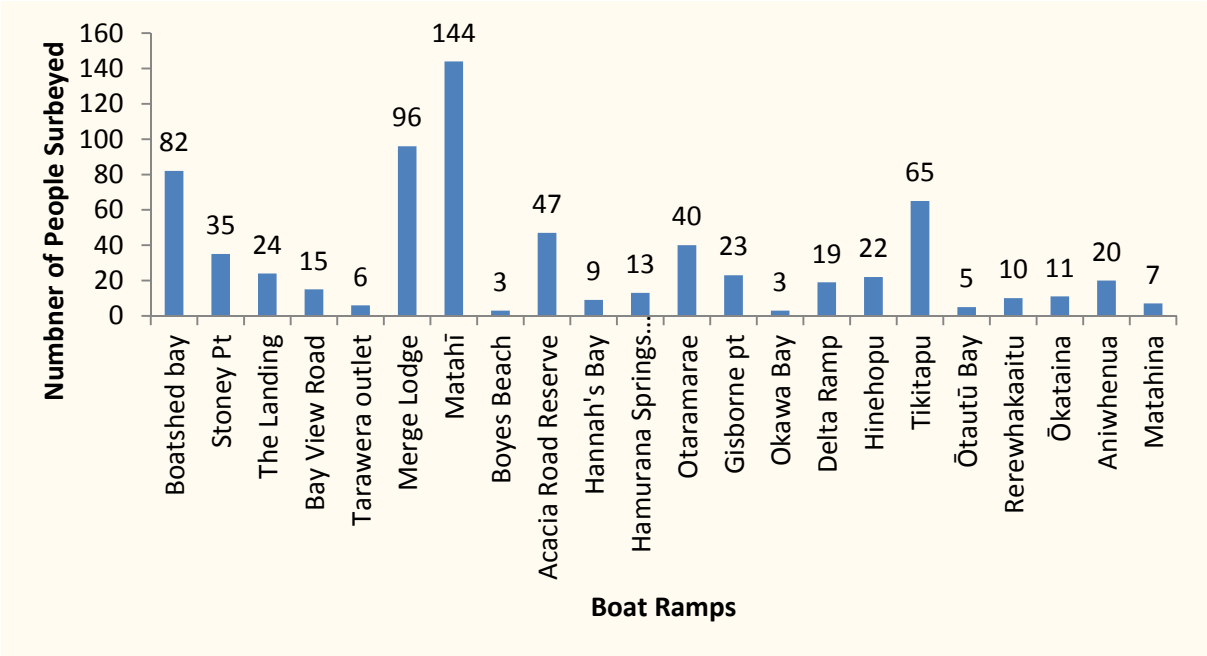

Figure 21 Number of users surveyed at each boat ramp during summer 2011-2012

3.2 River surveys

Over the summer period 95 people were surveyed at the Bay of Plenty rivers. As this was enough people to do analyses on, results were not amalgamated with boat ramp surveys, as has been done in previous years.

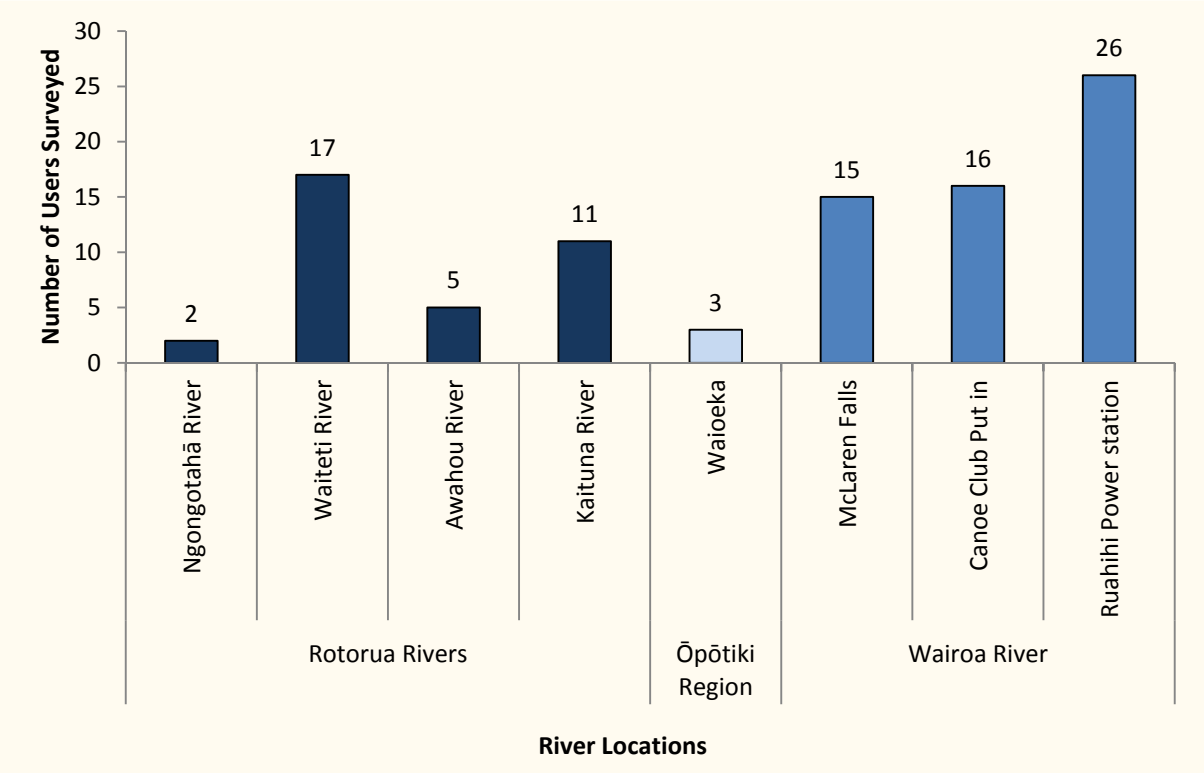

Figure 22 Number of surveys gathered at different river locations in the Bay of Plenty Region

3.2.1 Distribution of river surveys

The majority of surveys were gathered at the Wairoa River where a lot of kayakers go to take advantage of the higher water levels during the release. Many were very relaxed and easy to talk to in all locations on the river. The Waitetī River is also another popular spot, although after consecutive visits surveyors frequently find the same people.

3.2.2 **Was the equipment checked/cleaned before launching?**

Figure 23 Percentage of users who checked/cleaned gear before using in a river

In the river surveys 65% of individuals spoken to at the rivers had checked or cleaned their gear. Many people were aware of the kind of work we were doing and told us without prompting that they cleaned their gear (Figure 23).

3.2.3 **Type of equipment and recreational purpose**

Figure 24 Type of equipment used by people surveyed at river sites

The majority of users surveyed at river sites were kayakers due to the popularity of the Wairoa release every Sunday. They contributed 70% to the overall types of equipment seen and correspondingly, the recreational purposes of the people spoken to (Figure 24). Fishing equipment was the next largest category at 27% due to the high popularity of the Rotorua rivers among fishermen. All people spoken to at the river sites were generally either kayaking or fishing thus the recreational purposes corresponded to percentages shown in figure 24. The two individuals spoken to in the "other" category were paddle boarders.

3.2.4 **Origin of owners and equipment**

Figure 25 Region of origin of river users surveyed

A high percentage of users of the Bay of Plenty rivers were from overseas, representing the same amount as users from Rotorua at 25% (Figure 25). Waikato also represented a large group of users with 17% coming from this region. Four percent of users were from the South Island; however none of their equipment had previously been used down there as can be seen in figure 26.

Of the river users, 86% had been either on other waterways within the Bay of Plenty Region or on the Wairoa River (Figure 26).

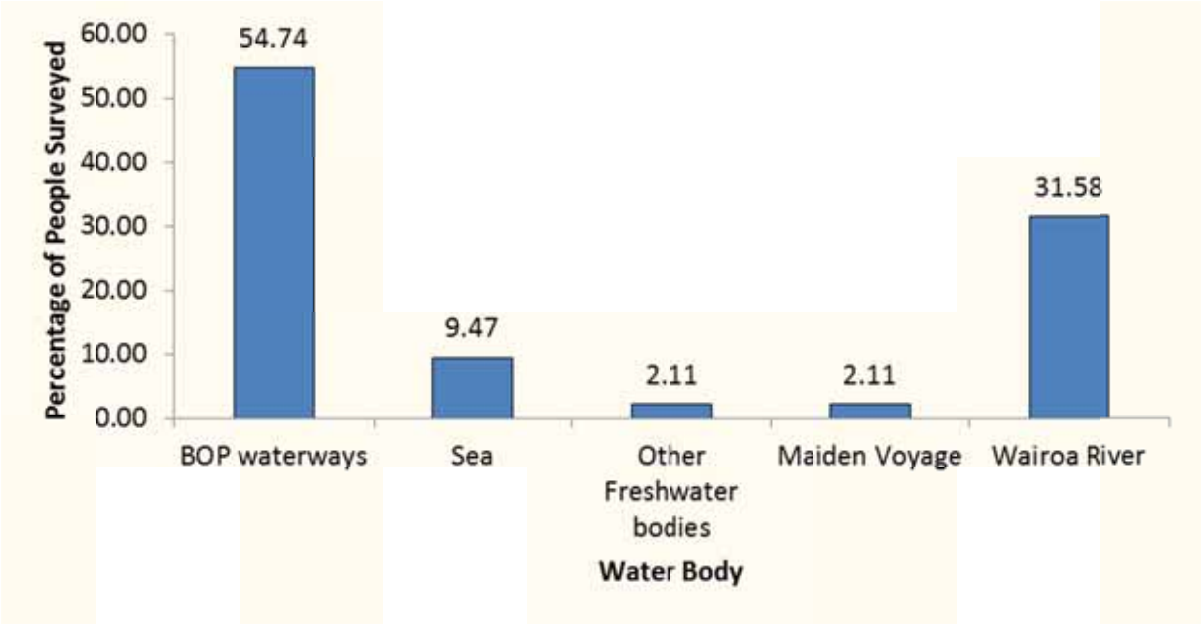

Figure 26 Last water body equipment was used in.

3.2.5 Perceived level of interest and awareness of didymo

Figure 27 Perceived level of interest in aquatic pest issues among river users.

In general most people spoken to at rivers were pleasant to talk to, with 80% of individuals falling into the “good” category of interest levels (Figure 27). Users with a “low” interest only made up 5% of the survey population.

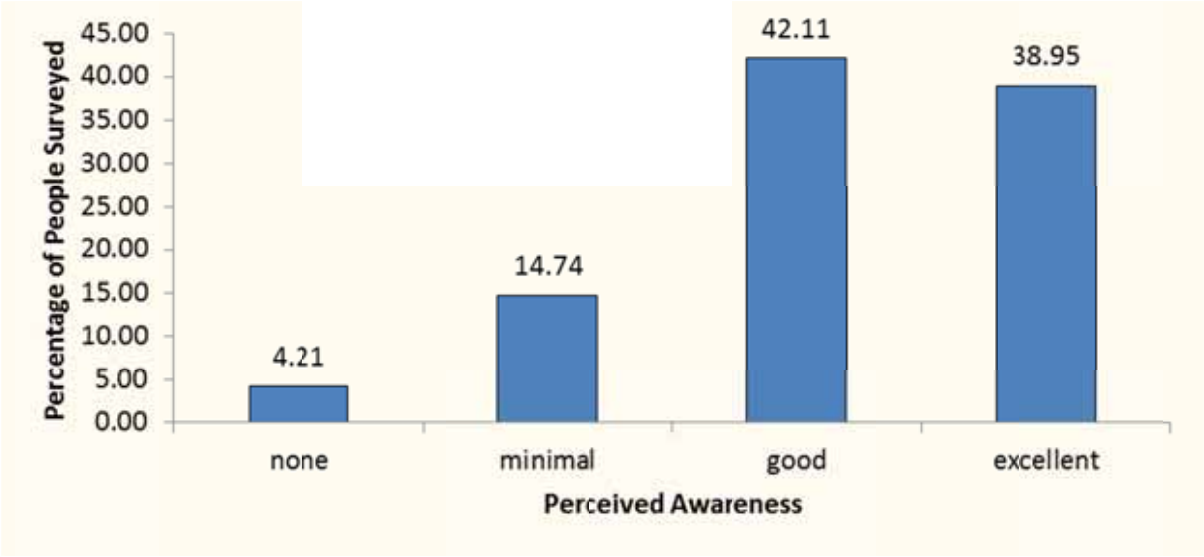

Figure 28 Perceived level of awareness of didymo among river users

For the river surveys it was decided that as didymo is the main threat to their ecology, weed awareness would not be presented. It is worth noting, however, that the majority of river users had a medium awareness of aquatic pests at 58%. River users exhibited didymo awareness much higher than lake users, with 38% having an excellent understanding as opposed to 16% among lake users (Figure 28). Despite this, the amount of people who had never heard of didymo was slightly higher with 4% having no awareness.

Part 4: Discussion

4.1 Boat ramp users' survey

4.1.1 Weather conditions

Figure 29 January water levels at Lake Rotomā

For the holiday period beginning 3 December and ending 9 January, high rainfall occurred for most of the time. As almost 800 individuals were surveyed however, it appeared that submerged jetties and beaches did not deter holiday lake users. It was found that on days where heavy rain was experienced, fewer people were encountered at boat ramps. As a result of this wet and windy weather conditions were not recorded as frequently on days where less people were encountered which altered results found in figure 10.

4.1.2 Was the vessel checked/cleaned before launching?

Although the majority of people surveyed did clean their vessel, the 19% (Figure 11) decrease in those that had washed their boat between waterways raises concern over the level of knowledge among users. There may have been a trend of complacency among lake users due to the clear waters in many of the lakes from high rainfall, or due to there being high numbers from outside the region who may not be as aware as locals of the risks associated with not cleaning their vessel. Many people said they cleaned their boat by alternating their recreational activities between the sea and the lake in order to kill anything which may be harbouring in their vessel. However, as many people were already in the water when we turned up this formed a large section of our results so it was unclear whether they checked their boat before launching. A lot people asked if there were wash down stations at ramps and said that it would make them more likely to clean their boat should they go to another lake the same day.

It was commented by some of those surveyed that they always cleaned their boats but had never really thought about cleaning equipment such as sea-biscuits. Others thought that taking weed fragments off boats was understandable but that there was no need to wash boats down against didymo as it is not yet in the North Island. Explaining that didymo cells are microscopic and could easily spread inadvertently should they get transferred to the North Island made people realise the risk. The "Check, Clean, Dry" message relating to didymo is a proactive measure used to contain and slow the spread of didymo. It is a far better alternative to just being reactive to the problem when it arrives. Most people had heard of the name "didymo" and knew that it was bad for our water but many had minimal understanding of it after that. Lake users who also utilised the region's rivers often knew more about didymo than those who only used the lakes.

4.1.3 **Weed loading on ramps and equipment**

Figure 30 Weed loading at Hannah's Bay, Lake Rotorua

The amount of weed found on trailers and ramps has not been as noticeable as other years. Although a rake was carried in the vehicle for clearing weed loading and debris at ramps, it appears that it was a problem of much less significance than in previous years when weed loading at Lake Rotoehu accounted for a high percentage of weed being found on trailers. On only two occasions, at Lake Tarawera and Lake Rotorua, did we witness weed loading. This may be attributed to the very high water levels in lakes resulting from higher than usual amounts of precipitation this summer, lower sunlight hours and a greater number of cloudy and cold days. The higher water levels in conjunction with the weed cordon at Ōtautū Bay, weed harvesting and herbicide spraying around ramps and bays may also have contributed to Lake Rotoehu looking in better condition than in previous years. On several occasions during surveys, members of the public gave positive feedback about how the lake was improving. Other lake ramps being relatively weed free can be explained by the spraying of Diquat in November/December to control the abundance of weed. As a consequence of this, very few boats or trailers at boat ramps were seen to have any invasive weed species attached. In one situation, hornwort was found on the trailer of a Waikato user just before they launched into Lake Rotomā. When pointed out the owner was genuinely concerned that they may be transferring fragments and was informed of the damage such an invasive species would do to a pristine lake. Most people spoken to with weed on their equipment were concerned about the risks associated once they were educated about the damage they could cause. One Wellington couple found with hornwort on their anchor said they were going back to Wellington the same day and would use their vessel in the sea upon their return. Despite information boards at ramps we still had people approaching and asking about the purpose of the cordons. The trial results and the importance of weed cordons in preventing weed incursions were then explained.

4.1.4 Types of vessels/equipment and recreational purposes

The number of outboard vessels recorded reflects similar results to previous years (Figure 13); however, numbers of kayakers have decreased by 12% since 2010/2011. This is probably due to the separation of river and lake user surveys in our report. The previous students amalgamated their surveys which led to kayakers at the Wairoa and Kaituna Rivers being included in the lake section of results. The high percentage of kayakers in our rivers section reinforces this.

Figure 31 Lake user at Rotomā

The fact that the number of jet skis and jet boats are up 5% and 7% (Figure 13) respectively is a reason for concern as these vessels are at a higher risk of incursion than others due to silt traps and jet intakes. In general it was also found that although owners take good care of their vessels, they are unaware of the risk associated with the jet intake and the fact that if a specimen was left in there it would likely survive an extended period of time in the damp conditions.

Previously, the question relating to recreational purposes had only three categories comprising “skiing,” “fishing” and “other” but it was decided that these were deemed too general to assess the risk of incursion from pest species. As sea biscuits are composed of an entirely different material to water skis and wakeboards, the likelihood that they would be harbouring weeds or didymo if it were to be in the North Island is significantly higher.

4.1.5 Origin of owners/ vessels

The number of users from Rotorua is similar to results found in previous years, in which it contributes the highest percentage of people. The value of 26%, however, is 14% lower that of what was found last year, with the number of Auckland and Waikato users increasing by 3% and 4% from last year (Figure 15). The number of users coming from Whakatāne is also well up from last year with a 7% increase.

Despite the changes in vessels and recreational purposes, there were no strong notable differences in where vessels were last being used other than a 24% increase in those coming from BOP waterways. These included the Rotorua Lakes and the greater region’s hydro dam lakes. This increase may simply be users who had fallen into the “unknown” category in past years. The fact that there are no changes in the number originating in the sea, the second largest category, solidifies this theory (Figure 16). This year the wording of the “origin of vessel” question was put to people in such a way that did not seem invasive or interrogative. Many people told us of their own accord where they were the day or week before. One interesting finding of our results was there was 4% rise in the number of vessels originating in the Waikato waterways. This rise is concerning due to the high risk the Waikato waterways pose from the presence of invasive pest fish species. The lakes and rivers in this region also contain high numbers of invasive weeds that are not present in some of our cleaner lakes such as Rotomā. Many people whose vessels

originated from the sea were aware of the fact that saltwater kills aquatic pests and said they used the sea to eliminate the risk of carrying hitchhikers.

The increase in users from Auckland and the Waikato from last year may be due to the deteriorating quality of the rivers and lakes there. Most people spoken to revealed they go to the Rotorua lakes because of their pristine water quality and less invaded environment. Others commented “I only use my boat in Lake Taupō and the Rotorua Lakes” with a presumption that their boat would therefore not need cleaning. It was noted that although many users from these regions were aware of the pest fish, like catfish and koi carp, due to their presence in that region, they did not know that their eggs could spread via weed fragments. Some surveyed did not realise the Rotorua Lakes were free of these species. When told this however, most individuals said they definitely would not like to see them introduced into the Bay of Plenty Region and reported that due to the poor quality of their waterways, they always washed their vessel after use. Additionally, several of the people surveyed this year did not realise that the invasive weed species we discussed were not in fact native species. Others incorrectly assumed that all the lakes had the same composition of weed communities in them. The number of Tauranga users remained similar to previous years, although many did mention the reason they were coming to the lakes was due to the risk of colliding with debris from the Rena.

4.1.6 Perceived levels of interest and awareness

Perceived levels of awareness were well up from previous years with an increase of 29% in the amount of people having a “good interest” (Figure 17). In general, we did notice that most people were genuinely interested in what we had to say, many lake users asked questions and could later be seen looking at the information material we had given them. In a number of situations we were approached by people asking about biosecurity related issues or to ask what the weed cordon was. Some people were also prepared to have lengthy conversations about how happy they were with the state of the lakes and the way they felt about keeping them clean for the next generations. In some cases we had people who claimed to know everything we were talking about or who were simply uninterested or non-supportive of what we were saying. These people made up the “poor” category which only amounted to 2%.

It was mentioned that repeating the same information each year provided a timely reminder and was having the desired effect. This year significant numbers of ‘stop the spread’ t-shirts and caps have also been distributed to event organisers, advocates of the programme and even in some packs for people who seemed to be genuinely interested in the awareness programme. These products have already been seen to be worn around ramps and thus the slogan has been seen by others. Regular users of the lakes tended to be better informed as they had received packs in previous years and had the message repeated to them on several occasions. It became apparent that the awareness campaign is working as we often heard comments like “we only use this lake”, “we only normally go to the sea”, “we’ve checked our boats and trailers for weeds” and “we always wash our boat between waterways”. People residing at properties in close proximity to the lakes were also often well informed as it is in their benefit to keep the lakes in good condition both for using and aesthetically. Naturally, these residents would also be more likely to make complaints regarding events held on the lakes or communicate problems that they would like addressed.

Awareness of aquatic pest issues shows a shifting trend towards higher levels of understanding. The percentage of individuals receiving a “low” awareness has decreased and the percentage achieving an “excellent” awareness has increased by 8% compared to last year (Figure 18). Levels of awareness in aquatic pest issues were gauged according to how many questions they asked or by the knowledge they portrayed when talking to the surveyor. In general, people who knew about cleaning with salt water, detergent or hot water, and demonstrated knowledge of how weeds and fish were spread were given a high awareness. People who knew some information but asked what the weed cordon was, and didn’t know why aquatic pests were considered a threat in the lakes were given a medium awareness. Individuals who demonstrated no knowledge of aquatic pest issues and what we were doing were given a low awareness.

In the case of didymo we found a 37% decrease in the amount of people with a “good” awareness at only 49% (Figure 19). However our surveys reported an 8% increase in the “excellent” category and an increase of 26% of people with “minimal” knowledge. We also met 15 individuals who had never heard of didymo. In general those who had never heard of didymo were foreigners or younger individuals. People with a minimal awareness were judged according to whether they asked if “didymo was in this lake,” described it incorrectly, mispronounced its name or talked about it being in the North Island. Those who knew what it was and about its distribution had a “good awareness.” The few people we met who talked in length about its biology and ecology were given an “excellent” awareness.

For the first time this year vessel owners were asked if they had seen any pest fish whilst using the Rotorua Lakes. Of this question, only two people thought they had seen koi carp or catfish in the lakes. One lady said her son saw a large goldfish about 40cm in the bay at Otaramarae in Rotoiti. All details of the sighting were gathered and put through to the DOC hotline the following day. Another man said that he saw a person with a catfish they claimed to have caught in Ōkāreka, however he said this sighting was some months ago. Many people also said they had seen goldfish while on the lakes.

The perceived levels of awareness question is always going to be prone to bias and subjectivity between surveyors. This is due to the difference in the levels of knowledge between surveyors at the start of the summer, or different ideas on what shows an “excellent” knowledge. In 2010 the students designed a “revised” survey with a number of questions people had to answer to allow surveyors to see how broad an understanding they had of issues. This was not used this year as it was thought that a list of questions would put people off from talking to us and the number of users getting the “Check, Clean, Dry” message would decline.

4.1.7 Distribution of surveys conducted at boat ramps

At the start of the summer 2011 Otaramarae was visited a few times and did not appear very busy until later in the season, hence the lower numbers than last year. Ramps which yielded smaller numbers of surveys should not be visited less frequently however, as there is potential to meet people there who may avoid busier ramps for a reason. Often individuals go to quieter ramps because they know they can avoid officials or harbour masters and are the ones who need targeting when it comes to biosecurity risks. Other ramps like Aniwhenua and Matahina have smaller numbers because they are quite far away but do get busy during long weekends so are worth visiting at least twice over summer

4.2 River users' survey

Figure 32 White water kayaking at Kawerau slalom course

Over the summer period the Rotorua rivers were visited about twice weekly when the region had not experienced heavy rain. When they were visited after a lot of rainfall it was found that the rivers were quite discoloured and no one was fishing. On fine days, however, many proved to be popular spots, with many fishermen congregating at the Waitetī Stream and the Awahou River mouth. On three Sundays over summer the Wairoa River was visited for the release of water at 10 am. This was an extremely popular spot for kayakers and a number could be targeted before and after they entered the river. A popular spot is the Canoe Club play wave just up from the Ruahihi Power Station, where a lot of beginners gather to kayak together on the rapids. The Waioeka, Waimana and Whakatāne River were visited only once over the summer period due to their remote location and the high number of slips on the road after the New Year. On this trip only three people were encountered but it allowed a visit to Murray Redpath, a resident at Wairata who is a great custodian of the river in that area.

4.2.1 Was the equipment checked/cleaned before launching?

Kayakers are high risk vectors for the spreading of didymo as they regularly move between several different rivers in the space of one day. For example, on a Sunday many visit the Wairoa River for the release and then head to Ōkere Falls for a kayak on the Kaituna River. Unlike boats, kayaks and fishing gear don't have as many areas where visible clumps of weed can accumulate, but as the main risk to rivers is didymo, we took people's response saying they wash their equipment with detergent or seawater as honest answers. In some situations we spoke to fishermen when they were already fishing, contributing to the 25% of the AIW section (Figure 23). The 9% of people who hadn't washed their gear usually told us they thought it wasn't practical or necessary to wash their equipment. Some claimed that the cleaning methods suggested were impractical and bad for their equipment. A small number of individuals encountered received our information in a very negative way and are unfortunately the kind of people who spread invasive species from one place to another.

4.2.2 Origin of owners and equipment

The majority of river users were from overseas or the Bay of Plenty Region (Figure 25). A significant risk to the didymo-free status of the North Island is the number of South Islanders using the Bay of Plenty rivers. Most of the South Islanders, however, were well informed about didymo and knew all the procedures they needed to go through to prevent its spread. Some of the kayakers said that they went to play in the surf in Tauranga if they ever moved from the Wairoa River to the Kaituna River. In addition, a lot of top level kayakers were well informed about cleaning procedures as when they travel overseas their kayaks are taken and fumigated if not properly cleaned.

The high number of kayakers on rivers from overseas poses a risk as they are the most likely to have no understanding or awareness of aquatic pests. This heightens the importance of targeting backpackers and tourism outlets with information and merchandise. Many of the foreigners spoken to had been told of didymo by their kiwi friends, however some were unaware that it was present in the country and spread by moving from one river to another. This factor may have contributed to the slightly higher percentage of river users having no awareness of didymo.

Although a lot of users were from out of the region, the results show that most equipment had previously been used in the region (Figure 26). Some kayakers said they moved between the Wairoa and the Kaituna River in a space of a few days but these people seemed aware of cleaning their vessels. A lot of the fishermen surveyed were seen repeatedly in the same locations and said that as they were local they rarely used other waterways.

4.2.3 Perceived level of interest and awareness

Eighty percent of river users showed a good level of interest, and many were very receptive and enthusiastic about our awareness programme (Figure 28). Although one man said he didn't think didymo was an issue and the cleaning procedures were impractical, people with low interest made up only 5% of the population. This is a positive finding in comparison to the 'blasé attitude' exhibited by many competitive kayakers during the 2008 awareness programme. Hopefully, this new found enthusiasm translates to the cleaning of kayaks between waterways. A lot of kayakers also stated that there were wash down stations in the South Island for cleaning their gear, and as many travelled and camped at kayaking locations, the practicality of having enough water to clean gear was very low.

Like kayakers, fishermen are potentially a high risk vector of didymo. They move between rivers, catchments, New Zealand's main two islands and travel abroad on fishing trips. Damp fishing equipment has been identified as a possible vector of the didymo incursion into New Zealand. Many fishermen have heard this before and become slightly defensive during conversations, asking surveyors whether migrating birds could have been responsible for transferring it from North America. It is then explained that we don't know for sure how didymo arrived but that current research suggests it was unlikely to have been birds. Nevertheless, many fishermen are great custodians of New Zealand's rivers and realise that if didymo enters the North Island it will affect their recreational interests more than most. Some we spoke to freeze their equipment after use in the South Island whereas others that regularly fish in both islands have a different set of gear to use in each as it prevents hassle at ferry terminals. Other fishermen have favourite fishing spots that they rarely deviate from. People who had seen didymo for themselves in the South Island river catchments were generally a lot more passionate in making sure it does not reach the North Island. We regularly found that the Waitetī Mouth was frequented by the same people. Several people surveyed stated that they restrict their fishing to a single waterway so they are unlikely to spread didymo to other watersheds.

The initial date that we had planned to visit the Ōpōtiki district and Waioeka River had to be cancelled due to heavy rainfall causing flooding and road closures. Tim Senior (BOPRC Biosecurity Officer, Ōpōtiki) also advised us that the river was not being used much as a result of the adverse weather conditions that were symptomatic of the summer in the region. When we finally visited, the river was extremely quiet and we were only able to conduct a few surveys.

4.3 Retail and tourism awareness

The retail and tourism sector in the Bay of Plenty Region service a wide variety of people with a diverse range of freshwater recreational interests. In total 97 backpackers, motels, hotels and campgrounds were visited, along with 32 retail and tourism outlets. During the Dewar Shield event, surveyors were also able to speak to and inform eleven school groups. The awareness programme was well received in the majority of outdoor retail outlets, motels, hotels, backpackers, camping grounds and tourist/information centres.

Most retail outlets were happy to promote our message and were generally very supportive. In some situations we found that large outdoor chain stores have a policy where they cannot take material unless it can be sold or if it is actively promoting the company. In another situation retail assistants were willing to take merchandise, however when we spoke to the owner he said they had plenty left over from last year although none could be seen.

The vast majority of hotels and motels took brochures from us however a few commented that they rarely get fishermen or boat owners staying, although most still took brochures. Some motels still had a rack filled with brochures in the reception from the previous year. Owners sometimes mentioned that they were seldom looked at but this is understandable when a motel displays almost 100 different brochures for tourists to peruse. Very rarely were the larger (A3) sized posters taken by motels but the smaller (A4) ones were very popular and were taken to place in laundries, games rooms, kitchens or the office window. If any negativity was portrayed the potential impact upon the tourist industry was highlighted.

Camping grounds were also happy to take brochures and posters for communal areas. Backpackers travel widely and often visit remote but stunningly beautiful areas of wilderness with pristine waterways. They therefore have the potential to transfer didymo cells between catchments.

4.4 Event awareness and decontamination stations

Most event organisers were willing to promote didymo and aquatic pest awareness and cooperated well with any decontamination required from competitors. By speaking at the briefing, a large target audience that may not otherwise use the Rotorua Lakes was able to be reached.

Some organisers of events such as the Annual Trout Fishing Tournament and Fish and Game Seminar were open to having Regional Council workers attend and speak. An allocated time period was given for a short talk on the lakes and the biosecurity risks associated. Many people attending these events were fishermen; therefore they were keen on keeping the lakes in a healthy state and were very supportive.

Figure 33 Jet Ski racing at Lake Rotomā

At some of the events such as Blue Lake Sprint Regatta and Kawerau Canoe Slalom, decontamination had already been organised as part of the event. In these situations the events were attended on the day and a Biosecurity New Zealand ring-binder, packs containing merchandise, and a “Stop the Spread” DVD was given to event organisers. In some cases competitors were spoken to in-between their events, but in most cases it was found that a lot were busy or preoccupied. Parents, friends and supporters proved to be an easy audience to speak to during the day and provided a medium through which information would be passed on to competitors.

At events such as the Hospice half ironman, Blue Lake Multisport Festival, Kiwanis Lake Rotomā swim and Dewar Shield Canoe Regatta, decontamination was carried out on wetsuits and boats used in the events. At the half-ironman decontamination was carried out the night before by Adam Brown, Tracey Bates and DOC employee Valerie Raethel. This involved competitors dipping their wetsuits in a 5% Simple Green solution and then being given a key-ring tag, lollipop and z-booklet. The tag was taken up to reception, where the number of competitors was recorded to evaluate how many people were cooperating with this procedure. It was found that a lot of people don’t like putting on damp wetsuits, so often used excuses like “it’s a brand new wetsuit;” “I last wore it in the sea,” and “It’s only been in this lake.” In these situations most people had the suit dipped anyway as it was known that some individuals used these excuses simply to get out of having damp gear. In the case of the Blue Lake Multisport Festival, event organisers were very proactive in organising decontamination and said they would do it themselves the night before. In this case the Regional Council supplied the RATS club with Simple Green and a bin in which to do their decontamination.

The Dewar Shield event put decontamination of vessels as a requirement in their race briefing but requested cleaning gear on the day in case competitors had not done this. In this situation a sponge and Simple Green was used to clean the outside of rowing boats being raced.

Biosecurity New Zealand and the Regional Council are trying to encourage event organisers to be more proactive about biosecurity and make decontamination compulsory. For this reason organisers of the PWC Jet-ski racing and water-ski racing on Rotomā were contacted a few weeks prior to the event and asked to put a requirement for decontamination in their race information. These events were then attended on the day and competitors spoken to in the briefing. During the event individuals were also spoken to and packs handed out to enforce the message we were trying to get across. In most cases competitors were friendly and supportive of what we were doing. Many had been doing these events in Rotorua for years and were passionate about keeping the lakes clean. As a lot of the gear and vessels were high performance machinery, they were kept in immaculate condition and many wives assured us they were well cleaned every time they were used.

Part 5: Conclusions and Recommendations

5.1 Conclusion

The Rotorua Lakes are a significant asset to New Zealand and the Bay of Plenty Region. Their health and biosecurity is therefore worth protecting. The number, popularity and proximity of the lakes make them extremely susceptible to invasion by invasive species.

Hornwort, egeria, lagarosiphon and elodea have been identified as the main invasive weed species that have established in the lakes and contribute to water degradation. Invasive weeds grow and spread within a waterway via vegetative fragmentation. Human recreational activities are the principal medium through which weeds spread between lakes, with vessels, trailers and equipment identified as the main vectors. The eggs of pest fish such as koi carp and catfish are also known to be able to 'hitchhike' on these weed fragments. Furthermore, an invasive freshwater alga called didymo was identified in a South Island river in 2004 and is now present in over 150 rivers. This has negative impacts upon river ecology, aesthetics as well as recreational and commercial interests. It is not currently known to be in the North Island.

The 2011/12 Aquatic Pest Summer Awareness Programme aimed to identify levels of public awareness and educate recreational users about pest weeds and fish as well as didymo. A total of 794 individuals were surveyed on lake boat ramps and rivers throughout the Bay of Plenty Region.

The findings from the summer show that among lake users there is a shifting trend towards higher levels of awareness of aquatic pests. These results are encouraging though highly subjective due to differences in surveyors' perceptions. Although a lot of users were from the Waikato and Auckland Region, this increased awareness and additional pressure from the Regional Council to prevent the spread of weeds and pest fish, may create a mind-set among boat owners to check and clean their vessels. Despite shifting levels of awareness, a number of vessels were still found to have weed on them, with hornwort being the dominant species present. This poses a risk as some people are unaware of the risks hornwort poses to cleaner lakes such as Rotomā and Tikitapu. Didymo awareness among lake users has reduced although this may be due to surveying methods. Although it seems many people do clean their boats, the lakes continue to be at high risk of incursions due to the large amount of users with outboards, and the increasing number of jet skis and jet boats. Kayakers continue to make up a large percentage of users, but are mostly found on the Kaituna and Wairoa Rivers. Kayakers are a high risk vector for didymo, visiting many different rivers in one day and often have little or no awareness of the biosecurity risks as they are commonly from overseas. Levels of didymo awareness among river users, however, are higher than lake users, with the majority exhibiting either "good" or "excellent" levels of knowledge. The increased targeting of backpackers will hopefully reach those making up the "none" and "minimal" categories of didymo awareness. As backpackers frequently travel from the South Island to the North Island they are at high risk of introducing it to new parts of the country.

It seems to be that the Aquatic Pest Awareness Programme is reaching those most at risk of causing incursions of invasive species to the Bay of Plenty Region. Lake and river users appreciate the presence of the Regional Council around the waterways and comment frequently on the work being done. With continued summer awareness programmes, it is hoped the understanding and passion to keep the waterways in as pristine as possible state will reach all areas of the population. A mind-set among recreational users to “Check, Clean, Dry” will prevent didymo incursions to the North Island, which will be in New Zealand’s interest ecologically, economically and aesthetically.

5.2 General recommendations

- Large amounts of merchandise are required for survey packs, event organisers, retail outlets, tourist accommodation and other contacts. Conduct regular stock counts to ensure enough is on hand. This is especially vital leading up to Christmas and New Year which is the busiest survey period. Biosecurity New Zealand employees are off work so good planning and early ordering is required.
- Contact Sherryn Owen (Water Administration Officer at Rotorua office) when looking for events to attend. She is responsible for lake closures and has event information and contact details.
- Contact event organisers one month prior to events taking place. This gives organisers plenty of notice and sufficient time to contact competitors if necessary.
- Give a didymo information file, a ‘Stop the spread’ DVD and some free merchandise (T-shirts, caps, keyrings etc) to event organisers.
- Arrange with organisers the opportunity to speak about aquatic pests and cleaning vessels at event briefings and encourage them to be more proactive about doing decontamination themselves. Ask about putting aquatic pest information and didymo brochures in event packs.
- If event registration is the day prior to the event itself, ask that a decontamination station be set up (e.g. if it involves wetsuits). Decontamination could be a prerequisite for participation in the event. This also provides enough time for wetsuits to dry out.
- Most motel owners are happy to display a pile of brochures in the front office. However, if they show interest encourage them to direct guests known to use waterways towards the brochures. Better still, if a guest is known to be a fisherman or boat owner etc., to place a brochure in their room prior to arrival.
- Backpackers often tramp in the South Island and then the North Island with the possibility of having contact with a large number of waterways in a short period of time. They are therefore a potential high risk vector for didymo. Ask backpacker hostel owners for permission to put posters on noticeboards and to take a pile of the didymo brochures directed at those that tramp.
- Distribute brochures to retail outlets and tourist accommodation early in the programme. This ensures they are stocked prior to the busiest time of year.
- Encourage motel owners to put posters in communal areas e.g. laundry/games room.
- Ask owners of fishing outlets or boat showrooms to hand out a brochure with every fishing licence/ fishing rod/ boat sold.

- Likewise, encourage sport shops/camping stores to put posters in changing rooms.
- Occasionally members of the public do not wish to be spoken to and may become negative or argumentative. You will not be criticized for simply thanking them for their time and walking away rather than getting enticed into an argument.
- When conducting river surveys do not attend the Wairoa River on too many occasions as you will find repeat users. One visit at the beginning, once in the middle and again towards the end of the survey period would be ideal.
- Choose busy periods such as public holidays to visit more remote rivers (e.g. Waioeka) and lakes (e.g. Aniwhenua and Matahina). This will increase the chance of meeting people rather than travelling long distances for a few surveys.
- Wairoa release kayakers at the McLaren Falls put-in are often in more of a rush than when they get out of the river. Although some surveys can be conducted there, it is recommended that more time is spent at the Ruahihi Power Station take-out area or at the play wave. Kayakers' park cars by the roadside and are usually more relaxed.
- Murray Redpath has a farm (Appendix 10) that the Waioeka River runs through. He is very proactive in didymo awareness for users of the river and has a decontamination station set up for fishermen (Figure 4). We would recommend you visiting him, providing him with 'Simple Green' and offering some free merchandise.
- Contact rental car companies and provide them with brochures and information to hand to customers. A lot of foreigners camp in rental vans and cars while they travel the country kayaking. Their general lack of awareness puts them at high risk of transferring invasive species.

5.3 Awareness programme recommendations

- Those living in properties with private boat ramps are often not surveyed so a significant number of people are not spoken to about aquatic pest awareness. Future summer students could communicate with the Regional Council's consents officers to get addresses of these properties. The three information sheets used in survey packs could then be sent to these addresses with a covering letter explaining the awareness programme.
- Encourage organisers to be more proactive with regards to invasive pest awareness at events. The aim is for organisers to contact us about wetsuit decontamination and for them to run the stations, as the Blue Lake Multi Sport organisers did this year. We can supply the equipment for this purpose. Some organisers have already included decontamination as a condition for entering their event which is promising.
- In addition to the events we attended, the Cruise n Watch Wooden Boat Regatta should be attended if possible.
- The perceived level of awareness question is subjective and a more definite measure of awareness is required. This has been alluded to in previous reports. A suggestion for future years would be that before surveying begins, the students decide on a set of criteria lake users meet to determine their level of awareness. This could be set out in a table form with lists of facts about didymo and aquatic pests in rows. For everything a user mentions or

knows they are assigned one mark back at the vehicle when filling out survey forms. Different scores would place users in the different categories of awareness i.e. low, medium, high. This sampling method may not be as efficient as previous years as only one set of results could be remembered at a time, but would give a more accurate assessment of knowledge which could then be used for comparisons in the future.

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Appendices

Appendix 1 – Sites visited to promote aquatic pests and didymo awareness

Rotorua sites	Name	Products distributed
Hotels/Motels		
	Aaryn court	Brochures, posters, stickers
	Acacia/Sequoia Lodge Motel	Brochures
	Acapulco Motel	Brochures
	Accolade Lodge	Brochures, poster
	Ace Motor Lodge	Brochures
	Alpin Motel	Brochures
	Arista/Cedar lodge	Brochures
	Ascot on Fenton	Brochures, poster
	Ashleigh Court	Brochures
	B&K's Rotorua Motor Lodge	Brochures
	Baden Lodge	Brochures
	Bel Aire Motel	Brochures, posters
	Birchwood Spa Motel	Brochures
	Boulevard	Brochures, posters
	Brylin Motel	Brochures, poster
	Capri Court	Brochures
	Cedar Lodge Motel	Brochures
	Coachman Comfort Inn	Brochures
	Collingwood Gables	Brochures, poster
	Emerald Spa Resort	Brochures
	Executive On Fenton	Brochures
	Fenton Court Motel	Brochures
	Gateway Motel	Brochures
	Geneva Motor Lodge	Brochures
	Golden Glow Motel	Brochures
	Gwendoline Court	Brochures
	Heywoods	Brochures
	Kerry's Motel	Brochures, poster
	La Mirage	Brochures
	Malfroy Motor Lodge	Brochures
	Malones Motel	Brochures
	Marama Resort	Brochures
	Midway Motel	Brochures
	Palm Court Motor Inn	Brochures, poster
	Paradise Valley Lodge	Brochures, 20 key rings
	Pineland	Brochures, posters
	Pohutu Lodge	Brochures
	Quality Hotel	Brochures
	Quest serviced apartments	Brochures
	Regal Palms	Brochures, poster
	Rob Roy	Brochures
	Rose Court	Brochures
	Rotorua Mini Suites	Brochures

	Rotorua Motor Lodge	Brochures
	Rydges	Brochures
	Silver Fern Motor Inn	Brochures
	Silver Oaks	Brochures
	Six on union	Brochures, poster
	studio motel	Brochures, poster
	Te Puia	Brochures, poster
	Tuscany Villas	Brochures
	Union Victoria Motel Limited	Brochures, poster
	Ventura Inn and Suites	Brochures
	Victoria Lodge	Brochures, stickers
	Wylie Court	Brochures
Camping grounds		
	All Seasons Holiday Park	Brochures, poster
	Blue Lake Top 10 Holiday Park	Brochures, poster
	Cosy Cottage Holiday Park	Brochures, poster
	Holdens Bay Top 10 Holiday Park	Brochures, poster
	Lake Rotoiti Holiday Park	Brochures, poster
	Redwood Holiday Park	Brochures, poster
	Rotorua Family Holiday Park	Brochures, poster
	Rotorua Thermal Holiday Park	Brochures, poster
	Waiteti Trout Stream Holiday Park	Brochures, poster, key rings
	Willow Haven	Brochures, poster
Backpackers	Blaney Stone Backpackers	Brochures, poster, stickers
	Cactus Jacks Backpackers	Brochures
	Crank Backpackers	Brochures, poster
	Crash Palace	Brochures
	Funky Green Voyager	Brochures
	Oasis hostel	Brochures
	Planet nomad Backpackers	Brochures
	Regent Flashpackers	Brochures
	Rotorua Central Backpackers	Brochures
	Spa Lodge Backpackers	Brochures
	X-Base Backpackers	Brochures
	YHA Rotorua	Brochures
Retail outlets		
	Bill Davies Outdoor Sports World	Brochures, poster, stickers, key rings, spray bottles
	Hamill's	Brochures, poster, stickers
	Hunting and Fishing	Already had merchandise
	Kathmandu	Brochures
	Mountain Designs	Brochures, poster, stickers
	Raft-About	
	River Rats	40L Simple Green, caps, key rings, sun cream.
	Stirling Sports	Brochures

	O'Keefe's	Posters, brochures
	Outdoorsman Headquarters	Poster, brochure, key rings
	The Happy Angler	Brochures
	Rotoma Trading Post	Brochures
	Telfer marine	Brochures, key rings
	Dive HQ	Brochures, key rings
	Redwoods info centre	Brochures
	Lake Tarawera Water Taxi	T shirts, brochures, stickers
	Kaitiaki	20L Simple Green

Tauranga sites

Backpackers	Harbourside backpackers	Trampers brochures, stickers, poster
	Tauranga Central Backpackers	Trampers brochures, stickers, poster
	Loft 109	Brochures
	YHA	Brochures and posters
	Mount Backpackers	Both brochures, stickers, 2x posters
	Pacific Coast Lodge Backpackers	Tramping brochures, poster
Tourism	Tauranga library	Trampers brochures
	Mount Maunganui i-site	Both brochures, stickers
	iSITE Tauranga	Both brochures stickers
	Te Puke iSITE	Both brochures, stickers
	Te Puke library	Both brochures, stickers
Retail	Camping and Outdoors	Trampers brochures, stickers, poster
	Te Puke Backpackers	Trampers brochures, stickers, poster
	Sportsworld Te Puke	Both brochures, 2x posters, 7x key rings
	Stirling sports	Trampers brochures, stickers, poster
	Mountain Designs	Posters, brochures
	Bivouac Outdoors	Brochures, stickers, posters
	Wrights sports	Tramping brochures, key rings
	Broncos sports	Trampers brochures, poster

Whakatāne sites

Hotels/motels	Tuscany Villas	Brochures, poster
	Windsor Lodge Backpackers	Brochures, poster
	Whakatāne Hotel	
Retail outlets	Stirling Sports	Brochures

	Sportsworld	Brochures, Z booklets
	Whakatāne Great Outdoors	Brochures
	Iceman	Brochures, poster
	Hunting and Fishing	Brochures
Tourism centres	Whakatāne Library	Brochures, poster, Z booklets, stickers
	iSITE Whakatāne	Brochures, poster, Z booklets, stickers
	Citizens Advice Bureau	Brochures, poster, Z booklets, stickers
	White Island Tours	Brochures, poster
	Whale and Dolphin Watching	Brochures

Ōpōtiki sites

Retail outlets	Ōpōtiki Bait & Tackle	Brochures, poster
	Hickeys Sports	Brochures, poster
Tourism centres	Department of Conservation	Brochures, poster
	iSITE Ōpōtiki	Brochures, poster

Appendix 2 – Boat ramp survey form

Lake/River:..... **Boat:**.....

Ramp:..... **Date:**..... **Surveyor:**.....

Weather conditions:..... **Weed loading:**.....

Checked/cleaned prior to launching today?	☐ Yes	☐ No ? (already in water)
Weed on boat/equipment?	☐ Yes	☐ No

If yes-species and where on boat (anchor/trailer???)

Vessel/equipment type? e.g. boat (separate jet boats), jet ski, waders etc.

Origin of vessel/equipment (last water body 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)
Have you seen any pest fish?	☐ Yes	☐ No		

Comments (on anything: e.g. didymo, signs, banners etc): .....
.....
.....
.....

Weather conditions:..... **Weed loading:**.....

Checked/cleaned prior to launching today?	☐ Yes	☐ No ? (already in water)
Weed on boat/equipment?	☐ Yes	☐ No

If yes-species and where on boat (anchor/trailer???)

Vessel/equipment type? e.g. boat (separate jet boats), jet ski, waders etc.

Origin of vessel/equipment (last water body 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)
Have you seen any pest fish?	☐ Yes	☐ No		

Comments (on anything: e.g. didymo, signs, banners etc): .....
.....
.....

Weather conditions:..... **Weed loading:** .....

Checked/cleaned prior to launching today?	☐ Yes	☐ No ? (already in water)
Weed on boat/equipment?	☐ Yes	☐ No
If yes-species and where on boat (anchor/trailer???)		
Vessel/equipment type? e.g. boat (separate jet boats), jet ski, waders etc.		
Origin of vessel/equipment (last water body 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)
Have you seen any pest fish?	☐ Yes	☐ No		

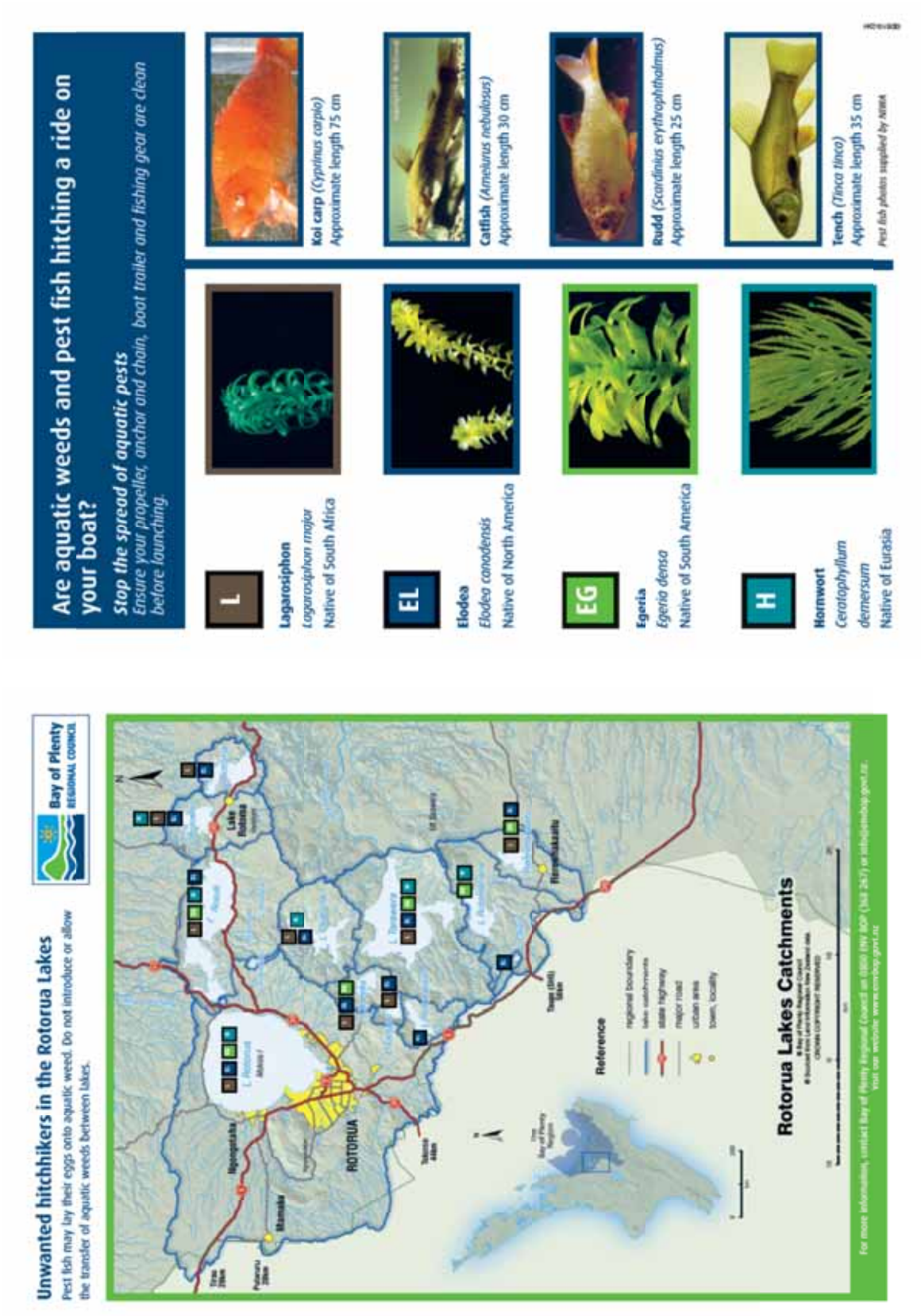
Comments (on anything: e.g. didymo, signs, banners etc): .....
.....
.....
.....

Appendix 3 – List of Biosecurity New Zealand and Bay of Plenty Regional Council products distributed

- Fluorescent “Stop the Spread” propeller flag
- “Stop the Spread” floating key rings
- Lollipops
- Boater spray bottles
- Trekkers 20ml sachets of detergent
- “Stop the Spread” t-shirts
- “Stop the Spread” caps
- “Stop the Spread” sunblock
- Z-booklets (pocket brochures)
- Posters
- Pens
- Didymo “Check, Clean, Dry” stickers
- Lakes information sheets showing aquatic plant pests and fish species
- Boat information sheets showing where to check for aquatic hitchhikers
- Department of Conservation “Wanted” pest fish sheets
- Trout bags with “Check, Clean, Dry” message
- “Stop the Spread” drink bottles
- Trekkers and boaters brochures
- Simple Green

Appendix 4 – "Wanted" pest fish flyers

Appendix 5 – Unwanted hitchhikers' flyer



Appendix 6 – Keeping lakes pest free flyer

Keep our lakes pest free this season

The Rotorua Lakes are popular for many forms of recreation and are treasured natural assets of great beauty. We need to look after them so that they remain as beautiful and enjoyable for generations to come.

You can help to stop the spread of pests

When entering the Rotorua Lakes (especially from the Waikato River system including Lake Taupo and the hydro-lakes) and when moving between the Rotorua Lakes, it is important that you:

- Inspect trailers, engine wells, anchors, propellers, fishing gear and other wet equipment such as waders to ensure they are not carrying either weed fragments or pest fish species BEFORE you leave one waterway.
- Ensure you thoroughly clean your boat and all equipment that has been in contact with water before using again.

Threats to our lakes

Threats to the lakes include aquatic weeds, algae, and pest fish.

Aquatic weeds and algae can invade and seriously degrade our lakes, displace native aquatic plants, and reduce suitable habitat for aquatic organisms.

Pest fish can cause many problems, such as causing extensive damage to native plant, fish and waterfowl habitats. They also eat and compete with native fish. Once pest fish haave become established in a lake it is practically impossible to eradicate them.

It is your responsibility as a lake user to ensure that you are not contributing to the introduction or spread of aquatic pests.

Bay of Plenty REGIONAL COUNCIL

New rules around pest management

The Bay of Plenty Regional Council 2011-2016 Pest Management Plan has rules regarding spreading pests including Section D(6):

No Person shall move or allow to be moved any machinery, vessel, organism, risk good, or other goods that is contaminated with any containment pest plant.

Under these new rules it is an offence to move or allow to be moved, any machinery, vessel, organism, risk good or others goods contaminated with any contaminant pest plant.

STOP THE SPREAD

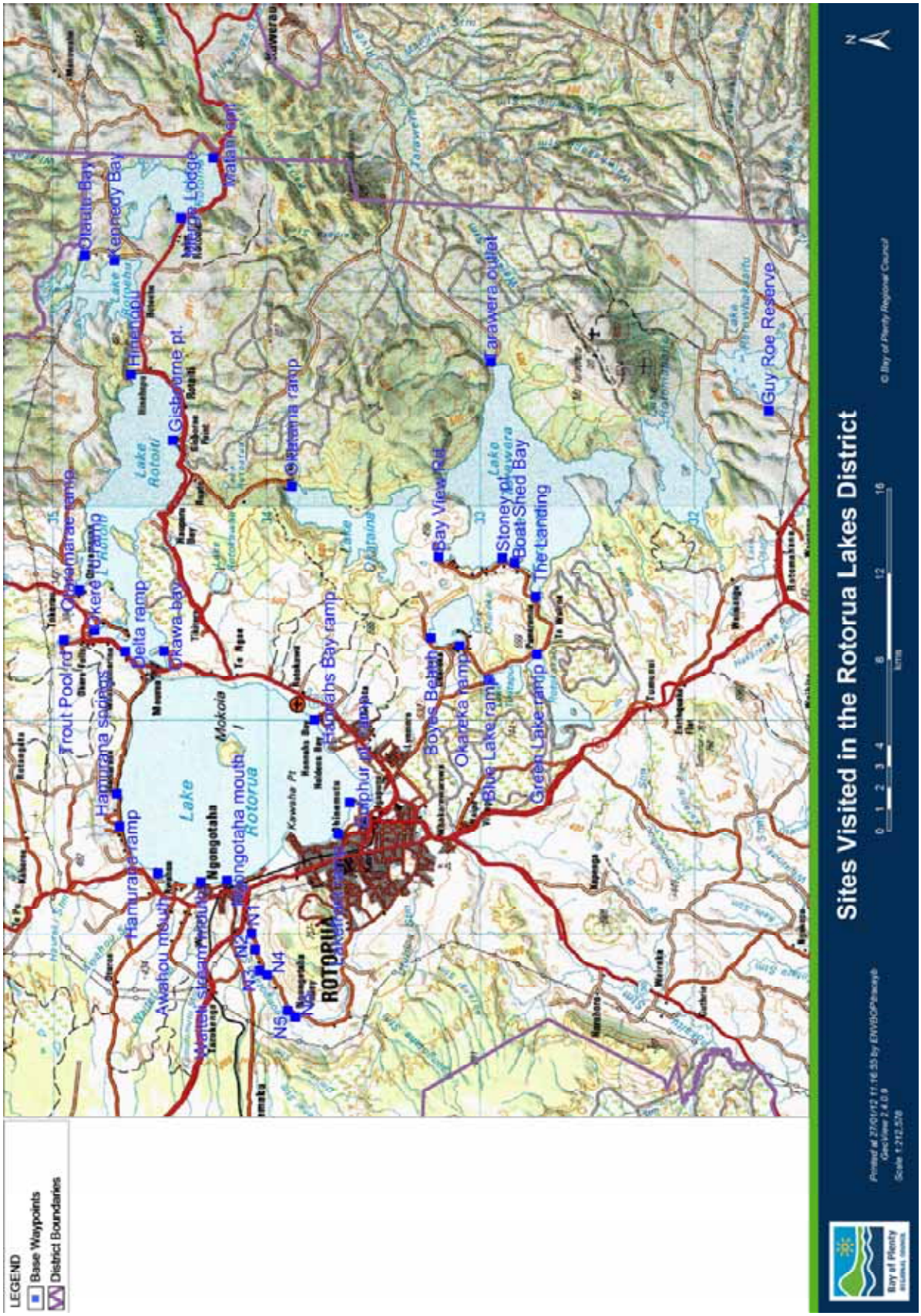
Protect our waters from aquatic hitchhikers
Check, clean and dry all boats and recreational equipment between waterways

Inspect trailers, engine wells, anchors, propellers, fishing gear and other wet equipment such as waders to ensure they are not carrying either weed fragments or pest fish species BEFORE you leave one waterway.

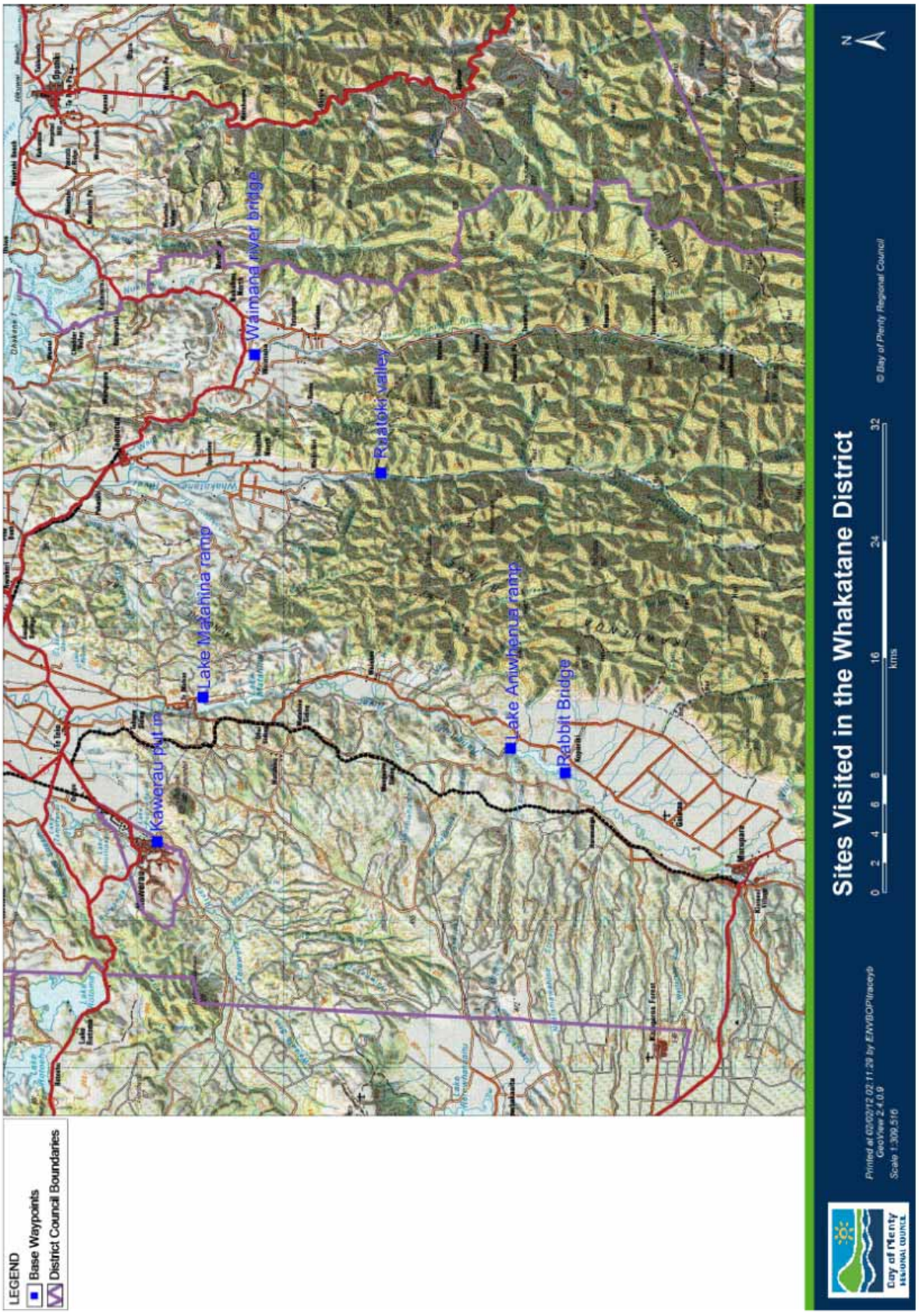
For more information contact a Biosecurity officer at Bay of Plenty Regional Council
0800 884 880 or visit www.boprc.govt.nz

Bay of Plenty REGIONAL COUNCIL

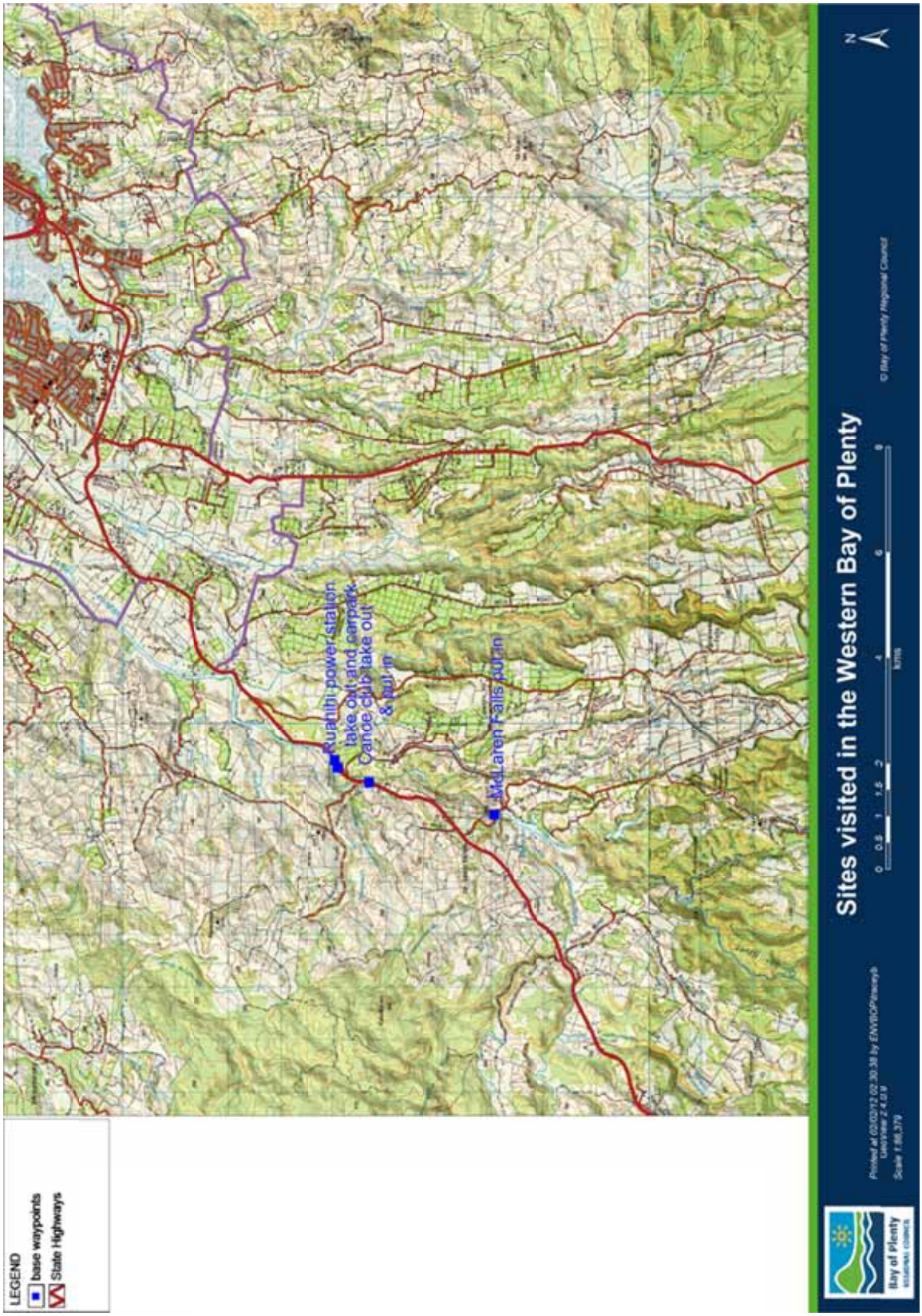
Appendix 7 – Sites visited in the Rotorua District



Appendix 8 – Sites visited in Whakatāne District



Appendix 9 – Sites visited in the Western Bay of Plenty District



Appendix 10 – Sites visited in the Ōpōtiki District