Aquatic Pest Report 2019-2020

Bay of Plenty Regional Council
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Executive summary

Pest species are a major driver of biodiversity loss within freshwaters, globally (Simberloff et al., 2013). A qualitative assessment by Gluckman (2017) shows a decline in the current trend of native birds and fish, wetlands and some recreational and cultural values, as a result of the invasive freshwater pests that are currently established in New Zealand.

The Bay of Plenty region encompasses many of New Zealand’s well-known lakes and rivers, which attract significant numbers of visitors annually. The close proximity of these Bay of Plenty lakes and rivers, along with their popularity makes them extremely susceptible to invasive pest species. Therefore, the preservation and protection of these waterbodies is vital to the continued attraction of not only domestic but also international tourists to these waterbodies.

There are four main pest weeds that have been identified as the most invasive and high risk species to have established in the Bay of Plenty waterbodies, these species are; *Elodea canadensis* (Canadian Pondweed), *Egeria densa* (Egeria), *Lagarosiphon major* (Lagarosiphon or oxygen weed) and *Ceratophyllum demersum* (Hornwort). Water degradation in the region has largely been due to these species, they also continue to have adverse effects on recreational activities. Unfortunately, it is these recreational activities which typically cause weed fragments to spread between water bodies in New Zealand. Weed fragments can also contain hidden pest fish eggs, meaning there is a risk of pest fish spreading as well as invasive weeds. There are two pest fish which are of most concern in the Bay of Plenty Region, these are *Cyprinus carpo* (Koi Carp) and *Ameiurus nebulosus* (Brown Bullhead Catfish). Similar to pest weed species, pest fish have the ability to degrade water quality, affect recreational activities and threaten native species. Invasive algae species are also of concern, particularly *Didymoshpenia geminata* (Didymo) and *Lindavia intermedia* (Lake snow).

The Aquatic Pest Awareness Programme (APAP) aims to determine public levels of awareness whilst educating users about pests. This programme educates waterbody users and guides them on how they can prevent the spread of aquatic pest species, what these species look like and why they are considered a pest. Surveys were conducted at lakes and rivers across the Bay of Plenty region to improve the engagement within the awareness programme. With the completion of each survey, the APAP advocate gave the individual the option of receiving a pack which included ‘Check, Clean, Dry’, and ‘Not in Our Lakes’ merchandise, along with educational material. These were distributed at boat ramps, events, a number of retail outlets and accommodation. During the summer, the Bay of Plenty’s portable boat wash station was also used at busy boat ramps to decontaminate vessels entering or leaving the waterbody.

During the 2019/2020 summer programme, a total of 1,160 surveys were completed on fresh waterbody users in the Bay of Plenty region, 1,036 of these being under the Ministry for Primary Industries (MPI) Freshwater User Survey and the other 124 being under the Boat Wash Survey. A total of 97% of users were surveyed at lakes in the Bay of Plenty, with the remaining 3% being surveyed at rivers.

Of the users surveyed, 8% did not use a cleaning technique to prevent the spread of pests; however, 75% of users did clean gear which had been in contact with water. Similarly 90% of waterbody users indicated some level of awareness in regard to freshwater pest plants present in New Zealand. Of those surveyed 69% were from the Bay of Plenty region, followed by individuals from Auckland (11%).
Five rivers were visited over the 2019/2020 summer period, with a total of 29 surveys being completed. Most river users had previously visited another waterbody within two weeks (75%). 45% of users were from overseas, while 31% of river users were from Rotorua.

The boat wash station surveyed a total of 124 vessel owners and of those, no vessels/trailers were found to have freshwater pests attached. The majority of people who were surveyed at the boat wash station were from the Bay of Plenty Region (Rotorua 49%, Tauranga 17% and Whakatāne 1%). Of the users surveyed, 73% had previously visited another waterbody, as opposed to the ocean.
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Part 1: Introduction

1.1 Background of Bay of Plenty waterbodies

The Rotorua District has been home to the people of Te Arawa since the 14th century. In the 1880’s, Rotorua was made into a town to provide for visitors to the ‘hot lakes’ (New Zealand History, 2019). Today, Rotorua generates 3.3M visitors each year, including one third of all international visitors to New Zealand (Rotorua New Zealand, 2018). Some of New Zealand’s most popular lakes and rivers are found in the Bay of Plenty region. The Rotorua Lakes District comprises of 16 lakes and three major rivers and is well-known for its geothermal activity.

The Rotorua lakes are of volcanic origin, which were formed over 140,000 years ago when the Rotorua Caldera was formed (McLintock, 1966). Various types of land surround the lakes, consisting of both undeveloped and highly developed forest and pastoral land. The water quality of each lake is known to be influenced by the surface flows in the surrounding catchment, however, groundwater springs within the catchment have been known to connect the lakes together as well (McBride, et al., 2015).

These lakes are tāonga to the people of Te Arawa, due to their cultural and historical significance, along with their natural beauty and life-sustaining properties. The responsibility of the Bay of Plenty Regional Council (BOPRC) is to protect Te Mana o te Wai (the intrinsic value of water). The lakes also hold recreational and economic value, with tourism in Rotorua contributing $820 million per annum (Rotorua New Zealand, 2018).

In addition to the lakes, there are number of rivers in the Bay of Plenty region which are known for their recreational value. The Kaituna, Rangitāiki, Tarawera and Wairoa rivers are held in high regard both domestically and internationally for their white-water rafting and kayaking, making them a regular destination for events such as races and fishing competitions.

![Figure 1 Boat Shed Bay, the most popular boat ramp on Lake Tarawera. Photo Credit: Caitlin Wildman.](image-url)
1.2 Invasive weed and algal species

Within the Bay of Plenty region, lakes, rivers, and streams are highly susceptible to invasion from exotic, non-native pest species. Like most other pest species, these have the ability to outcompete the native flora and fauna found in New Zealand, while continuously altering New Zealand’s ecosystems (Kelly & Hawes, 2005). The transfer of pest species, particularly algae, can be accidental or intentional and have caused substantial economic, recreational and biological impacts on New Zealand’s freshwater systems (Champion & Clayton, 2000). Economically, the cost of managing these pests, particularly by the hydro-electricity industry is large and ongoing, therefore, identifying the methods of spread and dispersal of these pest species is vital for the management of their impacts (de Winton et al., 2009).

There are 16 lakes in the Rotorua Lakes District, which are all of varying sizes and depths. Fifteen of these lakes in the Rotorua District are currently under protective management for four invasive macrophytes. These are; *Ceratophyllum demersum* (Hornwort), *Elodea canadensis* (Canadian Pondweed), *Lagarosiphon major* (Oxygen Weed), and *Egeria densa* (Egeria) (Clayton, 1996). The distribution of these weeds across the 16 lakes varies (see Appendix 1) as shown on the Aquatic Pest Coordination Group (APCG), there is biosecurity signage posted at each of the lakes (see Appendix 2). Due to the close proximity of the lakes and the large volume of lake users visiting them, the lakes can become particularly vulnerable to human assisted weed transfer.

Invasive weed species possess characteristics, which make them problematic to control and difficult to eliminate when they become well established (Fountain, 2015). They are known to outcompete native species as they spread rapidly and form dense aggregations in New Zealand’s waterbodies. Due to the absence of natural predators of these invasive weed species, they are able to outcompete the native species in New Zealand (Francis, 2012). The invasive weeds can be quickly distributed to waterbodies that are used recreationally through weed fragmentation, which allows them to reproduce asexually. All four weed species are dioecious (sexes on different plants) and have only one sex of each plant that was introduced to New Zealand, meaning natural dispersal is not possible. The dispersal of these weeds is via fragmentation only and relies on external influences such as strong currents, wind and human activities (Champion & Clayton, 2000).

The Aquatic Weed Risk Assessment Model (AWRAM) is a useful tool that predicts the weed potential of a new species, by comparing the success of one aquatic species with another. The ecology, biology, invasiveness and management of the species (based on their behaviour in new habitats) are all compared. Each trait is ranked on a scale of 0–100 and combined to give a total score (Table 1).

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1.2.1 **Hornwort**

*Ceratophyllum demersum*, which is commonly referred to as Hornwort, is a submerged freshwater macrophyte that occupies both shallow and deep littoral habitats (Pelechaty et al., 2014). Hornwort can inhabit low light environments along with eutrophic and turbid habitats, which makes it a very unique macrophyte (Pelechaty et al., 2014; Keskinkan et al., 2004). Hornwort is easily classified by its filiform leaves which are found in whorls of 6-12 and are dichotomously branched with minute teeth, causing the plant to feel rough to the touch (Wilmot-Dear, 1985). Hornwort has no root structure (Les, 1991) instead, it has modified leaves which anchor the plant into the sediment (Keskinkan et al., 2004). The base of its stem is buried in sandy or silty substrates, however, it is often found floating in stagnant, slow moving water (Syed et al., 2018). In clear lakes hornwort can be found in depths of up to 16 m, and in dense beds which can reach up to 10 m in height, inhibiting light penetration to native species (Wells et al., 1997; Champion et al., 2002).

Hornwort was first observed in the Bay of Plenty in 1975, in Lake Rotorua (Burton & Clayton, 2015) and has further established into Lakes, Rotoehu, Ōkataina, Rotoiti, Tarawera, Ōkāreka and Rotomahana. Lakes Ōkataina and Ōkāreka are under active control for Hornwort. Hornwort in Lake Ōkāreka is being controlled via an eradication program, which since August 2015 has yielded positive results, whereas Lake Ōkataina is being controlled by a weed cordon at the boat ramp, where Hornwort is present in low numbers. Although hornwort is well established in the North Island, it has been eradicated from the South Island of New Zealand. Due to the widespread establishment of Hornwort across the North Island it has caused detrimental effects on the environmental and recreational values within freshwater systems (Wells et al., 1997; Champion et al., 2002). Due to Hornwort’s ability to float in slow moving water it often causes blockages on hydro-electric systems, costing the hydro-electric power industry millions of dollars in maintenance which is undertaken to prevent Hornwort blocking turbines (Coffey & Clayton, 1988).
Hornwort has the ability to reproduce sexually and asexually, although the environmental requirements for sexual reproduction often limit seed production in many areas (Syed et al., 2018). Due to the rate and ease in which Hornwort can form a new plant via vegetative fragmentation it is considered a highly invasive weed species (Les, 1991; Champion et al., 2002). Each fragment moving with the stem is capable of forming a new colony and are often dislodged from the parent plant as a result of wave action, currents, animals or propeller-driven boats (Coffey & Clayton, 1988; Syed et al., 2018). As a result it is easily transported around the lake and can thrive in water of varying clarity, temperature, light and nutrient levels (Coffey & Clayton, 1988).

The AWRAM scale gives Hornwort a score of 67, meaning it is a very high risk aquatic species. Under the Bay of Plenty Regional Pest Management Plan, it is a containment pest that must not be moved or interfered with (Bay of Plenty Regional Council, 2016). Hornwort is also an unwanted organism under the Biosecurity Act 1993 and is banned from sale, propagation and distribution under the National Plant Pest Accord (Ministry for Primary Industries, 2016). As the Rotorua Lakes are highly vulnerable and Hornwort has a high potential to thrive in a number of varying habitats, it possesses a high risk to aquatic biosecurity in the Bay of Plenty.

Figure 3  A boat trailer heavily infested with Hornwort after exiting Lake Tarawera following a heavy storm.
1.2.2 Lagarosiphon

*Lagarosiphon major,* (commonly known as oxygen weed), is a wholly submerged, vigorous freshwater perennial plant. It is found to be present in all of Rotorua's lakes except lakes Rotomahana, Rotokakahi and Ōkaro, it is characterised by leaves that are strongly curved downward along the stem and arranged spirally (Coffey & Clayton, 1988). Native to South Africa, the invasive weed has been present in New Zealand since the 1950s, presumably imported for use in the aquarium trade. It is now widely naturalised in the North Island, as well as the northern and eastern South Island.

Lagarosiphon is known to inhabit clear, shallow water bodies with slow to moderately fast flow of water. They prosper in up to 6.5 m depth but may grow to 1 m in murky water as well. As Lagarosiphon is a dioecious plant (separate male and female plants), fortunately only the female plant resides in New Zealand. However, fragmentation is still a way in which Lagarosiphon can spread, and relies on human activity to do so (Coffey & Clayton, 1988).

Once widespread, Lagarosiphon can become extremely difficult to control. It has the ability to form vast meadows, which shade out native species and prevent their seedlings from establishing. This can result in rotting vegetation, causing stagnant water and killing plants and animals. It also has an impact on recreational activities, as large clumps may become dislodged, blocking waterbodies and hydro-electric systems, causing flooding (Weedbusters, 2018). As a containment pest plant in the Bay of Plenty Regional Council Pest Management Plan, Lagarosiphon follows the same guidelines as Hornwort (Bay of Plenty Regional Council, 2016).

1.2.3 Egeria

*Egeria densa*, commonly referred to as Egeria, is a freshwater perennial plant, native to South America. It is identified by short internodes and leaves which are approximately 10 mm-30 mm long, and 2 mm-5 mm wide (Champion & Hofstra, 2013). Egeria forms dense monospecific strands, restricting water movement in stream environments, trapping sediment and causing water quality fluctuations (Champion & Tanner, 2000). Egeria thrives in turbid, slow-flowing waters (de Winton et al., 2009), where its stems can grow to 5 m or until the plant reaches the water's surface. It then forms monospecific strands, reducing light penetration to other organisms (Invasive Species Specialist Group (ISSG), 2006).

Egeria was introduced to New Zealand’s waterbodies via the aquarium trade (de Winton et al., 2009) and was first found in Lake Rotorua in 1977. It has since established in lakes Ōkāreka, Rotoiti, Tarawera, Rerewhakaaitu and Rotomahana (Wells & Clayton, 1991). It is widely distributed across most of the North Island and is present in a small number of waterbodies in the South Island.

Egeria is difficult to manage as its dense growth creates anoxic conditions which smother benthic communities. Due to Egeria’s dense growth it can cause major impacts on hydroelectric dams, and has the ability to impede irrigation flows and drainage within a catchment (Chapman, 1970). Listed as a containment pest plant under the Bay of Plenty Regional Council Pest Management Plan, the Council would like to minimise its effects and prevent its further spread (Bay of Plenty Regional Council, 2016).

1.2.4 Elodea

*Elodea Canadensis,* commonly referred to as Canadian Pondweed, is a submerged, bottom rooted, freshwater aquatic plant. Native to North America, it has the ability to grow and multiply rapidly in a diverse range of environments and conditions (Min et al., 2013). Elodea can be identified by its three leaves which are arranged in whorls around the stem,
similar in appearance to other oxygen weeds (i.e. Lagarosiphon, Egeria). Elodea also flowers, in New Zealand this occurs in November through to January (Popay et al., 2010). The flowers are carried to the surface by long, slender stalks and are pollinated via the wind and water (Hulme et al., 2010). Elodea forms dense mats over substrate, often reaching heights of up to 6 m (Popay et al., 2010), and thrives in moderately fast-flowing to still waterbodies.

Elodea was the first invasive weed introduced to New Zealand in 1868 (Champion et al., 2002), presumably with the intention of oxygenating waters to support future introduced species of fish (Champion et al., 2002). It is currently present in all of the Rotorua lakes except for Lake Rotomahana. Dispersal and reproduction of Elodea occurs by vegetative fragmentation, where the stem breaks away from the parent plant and floats away. It then roots itself into the substrate and begins growing a new plant (Hulme et al., 2010). Fragments of Elodea have a high survival rate, allowing for wide-spread dispersal, further increasing its invasion capabilities (Barrat-Segretain, 2004). Human recreation activities are believed to be one of the main dispersal methods for moving fragments and assist in the dispersal of Elodea (Barrat-Segretain, 2004).

Large growths of Elodea are responsible for many adverse economic and ecological effects (Zehnsdorf et al., 2015). Economically, similar to Hornwort it has the capability to block hydroelectric dams and restrict boat traffic (Zehnsdorf et al., 2015). Classed as a restricted pest plant under the Bay of Plenty Regional Council Pest Plan, the Council would like to reduce the further spread of Elodea and support the community in doing so (Bay of Plenty Regional Council, 2016). Ecologically it poses a major threat to waterbodies due to its ability to modify the habitat it is present in, and the competitive ability for light and space against other plant species (Champion et al., 2002).

![Invasive weed species from left: Elodea canadensis, Ceratophyllum demersum, Lagarosiphon major and Egeria densa. Taken at Lake Aniwhenua.](image)

### 1.2.5 Didymo

Didymo (*Didymosphenia geminata*) is a major threat to rivers both within New Zealand and worldwide. Didymo is a microscopic, single celled diatom which only has a noticeable presence when it blooms. It is an aggressive, invasive freshwater algae that is spread by humans, using as little as a single drop of water, and has the ability to stay alive when kept moist for months at a time.

It is unusual for freshwater algae to dominate lotic water systems, even more so to grow in nutrient-poor environments, as algae blooms are typically associated with high concentrations of nutrients. Didymo, however, appears to prefer water that is low in
phosphorus. A distinct characteristic of waterbodies low in nutrients is the appearance of pristine, clean water. Therefore, Didymo is a major threat to New Zealand’s most beautiful waterbodies.

Didymo is able to form large mats when blooming, which consist of stalks that are strong and decay resistant (Kilroy et al., 2009). These are used to attach to substrate such as rocks, forming thick colonies across large areas. The thick brown layer smothers habitat for native plants and animals and is distinctly recognized by its spongey texture, which appears slimy but is actually somewhat gritty like cotton wool.

Didymo was first discovered in the South Island of New Zealand in 2004, in the Waiau River, Southland. It is believed that the algae had already been present there for 2-3 years, and was likely spread to New Zealand via human-related activities. Prior to this, Didymo was widely distributed but uncommon across the Northern Hemisphere, but appeared to have more blooms in New Zealand, indicating that at some point the algae transformed into a more common, aggressive species (National Institute of Water and Atmospheric Research, 2014).

Although Didymo is yet to be detected in North Island waterbodies, it is highly likely that it has been spread at some stage and not established successfully. Now present in 150 rivers in the South Island, it is one of the biggest threats of invasion to the Bay of Plenty region. The lack of Didymo in the North Island may be a result of higher phosphorous levels, however, Didymo has been shown to grow successfully in North Island waters using lab-based trials.

Classified under the regional pest management plan as a pest of national significance, Didymo is an unwanted organism under the Biosecurity Act (1993). In order to prevent the spread of Didymo, it is essential that any gear used between waterbodies is cleaned and dried, especially as its presence is not visible to the naked eye. The ‘Check, Clean, Dry’ programme by Biosecurity New Zealand fundamentally targets the spread of Didymo, however, the guideline applies to all freshwater pests.

![Figure 5](image.png)

1.2.6 *Lindavia intermedia*

*Lindavia intermedia* is a free-floating diatom and is currently understood to have arrived in New Zealand from North America, due to observations made in New Zealand and American lakes (Novis et al., 2017). Recent reports have recommended that no
immediate action is to be taken to contain or eradicate Lindavia, and therefore it is highly likely that Lindavia will establish as an invasive organism in New Zealand’s lakes (Novis et al., 2017).

Lindavia poses no known human health risk, however, it can pose a serious threat to lake ecology and needs attention (Novis et al., 2017; Otago Regional Council, 2018). Commonly referred to as lake snow, colonies of Lindavia can produce a sticky biological material, for reasons unknown (Otago Regional Council, 2018). Further impacts of Lindavia on higher trophic levels of the food chain are unknown and therefore options for management and public awareness will need to be determined.

Lindavia is currently found in a number of Canterbury, Otago and North Island lakes, such as Wakatipu, Wanaka, Hawea, Hayes, Taupō, Waikeremoiana and Rotoaira (Horizons Regional Council, 2019). Water testing has shown Lindavia is yet to establish in the Rotorua Lakes. More comprehensive testing is required, as it is similar to Didymo and is able to spread via a single drop of water. Once Lindavia forms lake snow it has been shown to require upgrades to urban water infrastructure, and has proven to be disruptive to recreational fishing on lakes (Williams, 2017).

1.3 Pest fish

Freshwater pest fish species are less common in the Bay of Plenty region but pose a serious threat to recreational waterbodies. Brown bullhead catfish, gambusia and the common goldfish are currently present in the Rotorua lakes, whereas koi carp, rudd, tench and perch have some presence in other areas of the Bay of Plenty or surrounding North Island regions (Bay of Plenty Regional Council, 2019).

Pest fish were originally introduced to New Zealand for a variety of reasons, including; biological controls, recreational fishing and ornamental purposes (Collier, 2015). These invasive fish establish quickly and out-compete native species for habitat and food. They are known to eat native fish and invertebrates, as well as destroy habitat by disturbing the sediment, damaging river banks and reducing water quality.

The presence of catfish in lakes Rotoiti and Rotorua is the most concerning invasion of pest fish in the Rotorua Lakes District. Catfish and many other invasive fish species are only spread to these areas via human activity. This may be accidental, such as catfish swimming into boat trailers that are left in the water, or purposefully, such as koi carp introduced to waterbodies as a food source.

Figure 6 Heavily pregnant catfish netted at Te Weta Bay, Lake Rotoiti by the Te Arawa Catfish Killas. Photo Credit: Caitlin Wildman.
1.3.1 **Catfish**

Brown Bullhead Catfish (*Ameiurus nebulosus*) have become an exceedingly significant threat to the Rotorua lakes and waterbodies. Generally found in slow or still waterbodies and on the edge of lakes, they are highly adaptable to a variety of environments including poor water quality, low oxygen levels and high temperatures (Barnes & Hicks, 2003; Lakes Water Quality Society, 2017). Alongside this, they have been known to survive out of the water for up to 48 hours. They are recognized by four distinct pairs of barbels around their mouth, their dark brown to olive-green colour and their thick, flattened body (Barnes & Hicks, 2003).

Originally from North America, catfish were brought to New Zealand in 1877 as a food source and have since become abundant in various parts of the country, including the Waikato River system and Lake Taupō (Grayling, 2016). Alongside their ability to tolerate a variety of environments, catfish are one of the few freshwater fish that exhibit parental care, by defending juveniles in nests (Eycleshymer, 1901). This significantly increases their chances of survival, facilitating their spread once introduced to a waterbody. Catfish are generally spread between waterbodies through recreational activities, as they are known to hide inside boat trailers that are idle in the water for a period of time, eggs can also become caught in the carpet on trailers.

Once established, catfish cause detriment to natural lake environments in many ways. They decrease water quality through sedimentation, by stirring up substrate when feeding. Adults are omnivorous, feeding on fish, fish eggs, crustaceans, molluscs, invertebrate larvae, detritus and more. This has led adult catfish to feed on koura (native freshwater crayfish) and compete with them for habitat (Barnes & Hicks, 2003). They are also likely to compete with native eels, disrupt macro invertebrate communities and alter ecosystem processes in our lakes (Lakes Water Quality Society, 2017).

Thought to have been introduced to the Bay of Plenty region from Lake Taupō or other Waikato waterbodies, catfish were initially found in 2016 at Lake Rotoiti, then in Lake Rotorua in late 2018. As a result of this, significant measures have been taken to prevent their spread to the remaining Rotorua lakes. Although the majority of caught catfish have been found in Te Weta Bay in Rotoiti (78%), populations have spread to many areas around the lake, including Okere Inlet, Northern Shore and the Ōhau Channel (Grayling, 2016). The extent to which populations have spread in Lake Rotorua is yet to be determined. Classified as an exclusion or eradication pest in the Bay of Plenty Regional Pest Management Plan, the known spread or sale of catfish is prohibited under the Biosecurity Act (1993) and Freshwater Fisheries Regulations (1983).
1.3.2 Koi carp

Koi carp (*Cyprinus carpio*) are the most common pest fish in New Zealand (Lakes Water Quality Society, 2017). Identified by their orange colour, they are often mistaken with feral goldfish that can grow to similar sizes. Koi carp can grow to lengths of 750 mm and can weight up to 10kg. They are distinctly different to goldfish, as they have two pairs of barbels on the side of the mouth. They also exhibit blotching of different colours, including orange, red, black, gold and white (Bay of Plenty Regional Council, 2019).

Introduced to New Zealand in the 1960's, it is not known whether koi carp arrived deliberately or by accident, but are thought to have been liberated from a pond to a waterbody in Te Awamutu. Now they are widespread and common throughout the southern Waikato region and various ponds in the North Island. Like catfish, koi carp generally prefer slow-moving or still freshwater environments and are spread deliberately to waterbodies or private ponds, and can otherwise spread through flooding events and via water channels.

Koi carp are omnivores and eat a variety of food including plants, invertebrates, fish, larvae and detritus. They feed by vacuuming up benthic material and discarding unwanted sediment, causing an increase of sedimentation into the waterbody, resulting in murky water and damaged riverbeds. In shallow lakes, they have the ability to increase turbidity as they are constantly disturbing the substrate. This causes unattractive waterbodies with poor water quality, and a reduction in native aquatic plants (National Institute of Water and Atmospheric Research, 2018.). Koi carp are listed as an exclusion and eradication pest, indicating that the Council is currently aimed at excluding them or eradicating them from the region (Bay of Plenty Regional Council, 2016).
1.3.3  **Rudd**  

*Scardinius erythrophthalmus*, commonly known as Rudd belong to the cyprinid family (Hicks, 2003) and are native to Europe and Central Asia. Rudd typically prefer slow flowing water habitats and are able to tolerate a wide range of temperatures (Hicks, 2003). They prey on a variety of invertebrates and vegetation, due to their feeding habits they have the potential to alternate macrophyte communities, aiding in the invasion of aquatic pest weeds (Lake et al., 2002; Hicks 2003).

Rudd was illegally introduced into New Zealand in 1967, where a private consignment of juvenile Rudd were reared to adulthood and encouraged to breed (Department of Conservation, 2017). Once strategically released to a number of ponds in the Waikato Region, they have since spread to the Northland, Manawatu, Canterbury and Nelson regions (Department of Conservation, 2017). Rudd are listed as a containment pest under the Bay of Plenty Regional Council Pest Management Plan. This specifies that the Council would like to minimise the effects of and prevent their further spread. Landowners are required to destroy all Rudd in any pond or waterbody, excluding Lake McLaren (Bay of Plenty Regional Council, 2016).

1.3.4  **Tench**

*Tinca tinca* commonly known as Tench belong to the cyprinid family (Rowe, 2004) and are native to the United Kingdom. Tench are limited to slow-moving shallow water habitats, however, they are able to tolerate a wide variety of conditions. They have a fleshy, downturned mouth with small barbels either side (National Institute of Water and Atmospheric Research, 2018) which they use to prey on zooplankton and benthic invertebrates, and have been responsible for a reduction in benthic invertebrates overseas (Rowe, 2004). Typically they have bright red eyes and have an olive-green colour profile.

Tench were accidentally introduced into New Zealand in 1868. In addition to this accidental introduction, they are also spread illegally to new bodies of water by coarse fish angling enthusiasts (Carter, 2009). Tench are often illegally spread to large bodies of water which lack large predators, as the large size that Tench can then grow to attract anglers from overseas. Tench are currently found in Christchurch, Nelson, Oamaru, Northland and Tauranga (Dean, 2010), there have been unconfirmed sightings in Lake McLaren (Bay of Plenty Regional Council, 2016).

There is strong evidence that Tench, when in large numbers, are responsible for reducing lake clarity. They achieve this by disturbing the bottom sediments, and increasing nutrient recycling in shallow lakes (Bay of Plenty Regional Council, 2016). This can also cause indirect negative effects on native fish species via reduced food supply, reduction in water quality and reduced macrophyte cover. Like Rudd, Tench are listed as a containment pest under the Bay of Plenty Regional Council Pest Management Plan (Bay of Plenty Regional Council, 2016).

1.3.5  **Gambusia**

*Gambusia affinis*, formally known as the mosquito fish, were supposedly introduced into New Zealand’s waterbodies as a means to control mosquitos (Ling, 2004). Gambusia are found most abundantly in shallow water, where they are protected from larger fish (Kuntz, 1913). They are also well adapted to living in hostile environments, are resilient to low oxygen concentrations and are able to survive in temperatures up to 42°C for short periods (Global Invasive Species Database, 2018). Gambusia are aggressive and often attack native fish species by nipping at their fins and eyes, they also compete with native fish for food and have been found to eat native fish eggs.
Gambusia were first released in the Auckland Botanical Gardens pond in the 1930’s (Department of Conservation, 2017). Further transfers into Northland, Taranaki and Wellington in the late 1930’s are also documented (Department of Conservation, 2017). Since the 1930’s, Gambusia have spread dramatically into the North Island’s waterbodies due to natural spread, and by further illegal introductions. Following successful eradication operations, there are no known populations of Gambuisa in the South Island (National Institute of Water and Atmospheric Research, 2018).

1.3.6 Pest management in the Bay of Plenty

The Bay of Plenty Regional Pest Management Plan (2011-2016) outlines what we, as a Council, are trying to achieve through our efforts to manage and prevent pest plants and animals. The plan also provides an outline of the statutory obligations surrounding various pests depending on their classification (Bay of Plenty Regional Council, 2016).

There are four classifications of pests in the Bay of Plenty, (Table 2). Each classification has its own specific objectives, rules and statutory obligations for the management of the pests. All freshwater pests, regardless, are protected under sections 52 and 53 of the Biosecurity Act, 1993. This states that no person shall willingly sell, release or otherwise facilitate the spread of such species.

The rules surrounding both containment pests and exclusion and eradication pests, also specify that, “No person shall move or allow to be moved, any machinery, vessel, organism, risk goods or other goods that is contaminated with any pest animal” (Bay of Plenty Regional Council, 2016). This is especially important due to the nature of these aquatic weed and fish pest species to be facilitated by the use of boats, boat trailers and other recreational equipment.

Table 2 Definitions and examples of pest classifications as stated in the Bay of Plenty Regional Pest Management Plan (2016).

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agency Pests</td>
<td>Pests of national significance that are managed by or subject to programmes co-ordinated by the Crown.</td>
<td>Didymo</td>
</tr>
<tr>
<td>Exclusion and Eradication Pests</td>
<td>Pests we want to prevent from entering the region, or eradicate from the region.</td>
<td>Brown bullhead catfish, Koi carp</td>
</tr>
<tr>
<td>Containment Pests</td>
<td>Pests that we want to minimise the effects of and prevent their further spread.</td>
<td>Hornwort, Lagarosiphon, Egeria, Rudd, Tench</td>
</tr>
<tr>
<td>Restricted Pests</td>
<td>Pests we want to reduce the further spread of and will support community and occupier efforts to control, in places where they are a problem.</td>
<td>Elodea, Gambusia</td>
</tr>
</tbody>
</table>

1.4 Awareness programme and survey background

The Bay of Plenty region’s lakes and waterbodies are used by many residents, as well as domestic and international visitors. The waterbodies are used for a variety of recreational activities with a range of different equipment such as wetsuits, vessels and trailers entering the water. This equipment has been identified as the primary vectors capable of transferring invasive weed, fish and algae between waterbodies around New Zealand.

Since the introduction of Didymo to the South Island, several groups have been established to manage at-risk waterbodies and improve public awareness of freshwater pests. The Aquatic Pest Coordination Group (APCG) was established in 2004 and is made up of the Department of Conservation (DOC), Eastern Fish and Game,
Bay of Plenty Regional Council (BOPRC), Te Arawa Lakes Trust, Land Information New Zealand (LINZ) and the Rotorua Lakes Council (RLC). The objectives of the APCG are to increase biosecurity awareness among waters in the Bay of Plenty and to prevent introductions and further spread of invasive species.

In July 2007, the Didymo Long-Term Management Plan (LTM) was implemented across New Zealand, consisting of partnerships between MPI (Formerly MAF: the Ministry of Agriculture and Forestry), DOC, Fish and Game New Zealand, regional councils, impacted industry and Iwi. The LTM outlined objectives, roles and responsibilities for Didymo management. The Rotorua Te Arawa Lakes Programme was also established in 2015, and is comprised of the Te Arawa Lakes Trust, RLC and the BOPRC. The purpose of this programme is to ‘work together to protect and restore water quality in 12 Rotorua lakes’ (Te Arawa Lakes Programme, 2019).

More recently in 2016, MPI established the Freshwater Biosecurity Partnership Programme (FBPP). Formally the LTM programme, the FBPP is a long term strategy extending through to 2021. It brings together the partners as listed above, as well as the addition of local Iwi, Genesis Energy and Meridian Energy. The programme recognises the extension by the LTM to include all freshwater pests in 2011 and provides support and coordination for the APCG group.

Since the forming of the APCG in 2004, the Bay of Plenty Regional Council, with support from MPI, has employed two tertiary students over the busy summer period each year. The primary role for the students is to assist with the Aquatic Pest Advocacy Programme (APAP), a BOPRC initiative. Over previous years, a survey created for the APCG was conducted, in order to determine pest awareness among the general public. Since 2017, a new MPI survey designed as a part of the National Science Challenge is being conducted nationwide (Appendix 4).

1.5 Aims and objectives

The aim of the Aquatic Pest Advocacy Programme is to raise awareness within the community and educate the public about preventing the spread of freshwater pests. This programme is specifically targeted at recreational users of Rotorua’s waterbodies, both local and visiting. Emphasis is placed on ways in which the public can help minimise the spread of aquatic weed and fish species both within the Bay of Plenty region and beyond.

Data collected over the 2019/2020 summer period via electronic surveys will be used to determine the level of freshwater biosecurity knowledge by water users, as well as what they are currently doing to help prevent pests. This is important as it will allow for us to target future awareness programmes towards the types of users who appear to need it most. Various education material and merchandise supplied by the Ministry for Primary Industries and the Bay of Plenty Regional Council is also used to help capture public interest and spread knowledge throughout the community. This report will summarise the findings of the electronic survey, the efforts made through public interactions and what recommendations can be made as a result.
Part 2: Methods

Between 27 November 2019 and 25 January 2020, a total of 1,160 Surveys were conducted on fresh waterbodies throughout the Bay of Plenty Region, predominantly around the Rotorua lakes. Out of the total number of surveys, 1,036 of those were under the MPI Freshwater User Survey and the other 124 being under the Boat Wash Survey. Surveys were undertaken most weekends and for three days during the week, survey days lasted for eight hours with varying start times based on the target audience and weather conditions.

Over the course of the summer, the Bay of Plenty Regional Council also had a portable boat wash station operational for four days during public holidays and weekends. The aim was to clean vessels as they were entering or leaving the lake, and to engaging with vessel owners regarding the need to wash vessels between waterbodies. The boat wash provides a high pressured wash which removes loose weed fragments from boats and trailers.

In addition to carrying out surveys, information sites, relevant retail outlets, tourist accommodation and tourism activities were visited during the programmes dates and were provided with educational material and merchandise. This ensured that information relating to aquatic pest issues is available year round. Organisers of aquatic events contacted and provided with information, merchandise and decontamination gear if required.

2.1 Boat ramp surveys

Boat ramps on the Bay of Plenty lakes were visited multiple times during the summer period. The lakes were broken down into three smaller regions (northern, central and southern) and visited on alternating days, however, if the user population was low, multiple regions were visited a day.

Once at the ramp, the surveyor’s vehicle was parked out of the way of turning trailers and other vehicles but close enough to see vessels being launched/retrieved. Users were observed and only approached while waiting for the ramp or preparing their vessel to leave.

Once engaged, ramp users were asked a series of questions in accordance with the MPI Freshwater User Survey (Appendix 4). Information gathered included:

- Waterbody name.
- Location where the survey took place.
- User type.
- Country, region of residence and nearest town.
- Frequency of waterbody visits.
- Freshwater pest plant and/or algae knowledge.
- Whether freshwater pests had impacted waterbody enjoyment.
- How often the individual followed check, clean, dry procedures.
- Waterbodies visited in the last two weeks (prior to survey).
- Option to provide contact details.
Knowledge of freshwater pests was gauged by asking users to list any freshwater pests they knew were a problem in New Zealand. The aquatic pest plants in the survey included; Didymo, Hornwort, Egeria, Lagarosiphon, Lake snow and Hydrilla.

Based on the information collected, users were then informed of current aquatic pest issues and educated on ways to help stop the spread of freshwater pests. Education was tailored to the specific user type, boat/jet ski owners were talked to in regard to weed transfer via trailer and fishermen were educated about pest fish species. Once the survey was completed and the user had been educated, a promotional pack containing further information and merchandise was provided to the individual for further reference.

Surveys were conducted via iPad and all information gathered was uploaded to a central server (ArcGIS) which was later collated and analysed.

The following list comprises all the boat ramps visited over the summer period, see Appendix 7 for map locations of these sites.

Table 3  Survey locations for the 2019/2020 summer period:

<table>
<thead>
<tr>
<th>Northern Sites</th>
<th>Central Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Rotorua</td>
<td>Lake Ōkāreka</td>
</tr>
<tr>
<td>• Hannah’ Bay</td>
<td>• Acacia Point Reserve</td>
</tr>
<tr>
<td>• Ngongotahā Mouth</td>
<td>• Boyes Beach</td>
</tr>
<tr>
<td>• Hamurana</td>
<td></td>
</tr>
<tr>
<td>• Sulpher Point</td>
<td>Lake Tarawera</td>
</tr>
<tr>
<td>• Lakefront</td>
<td>• The Landing</td>
</tr>
<tr>
<td></td>
<td>• Boat Shed Bay</td>
</tr>
<tr>
<td></td>
<td>• Stoney Point Reserve</td>
</tr>
<tr>
<td>Lake Rotoiti</td>
<td>• Bay View Road</td>
</tr>
<tr>
<td>• Otaramarae</td>
<td></td>
</tr>
<tr>
<td>• Delta Ramp</td>
<td></td>
</tr>
<tr>
<td>• Okawa Bay</td>
<td></td>
</tr>
<tr>
<td>• Gisborne Point</td>
<td></td>
</tr>
<tr>
<td>• Hinehopu</td>
<td></td>
</tr>
<tr>
<td>Lake Rotowhau</td>
<td></td>
</tr>
<tr>
<td>• Kennedy Bay</td>
<td></td>
</tr>
<tr>
<td>• Ōtautū Bay</td>
<td></td>
</tr>
<tr>
<td>Lake Rotomā</td>
<td></td>
</tr>
<tr>
<td>• Merge Lodge</td>
<td></td>
</tr>
<tr>
<td>• Matahī Spit</td>
<td></td>
</tr>
<tr>
<td>Lake Ōkataina</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Southern Sites

Lake Ōkaro

Lake Rerewhakaaitu
• Guy Roe Reserve
• Domain
• Brett Road DOC Campsite
• Ash Pitt Road DOC Campsite
2.2 **River site surveys**

River sites were visited less frequently over the summer period as there was a greater focus on the Rotorua lakes aquatic weeds rather than Didymo. Additionally, the greater user numbers at boat ramps meant time was better utilised at boat ramps.

The Wairoa River in the Western Bay of Plenty District was visited on one occasion over the survey period. This river gets heavily utilised on Sundays by kayakers and rafters taking advantage of the Wairoa release, which is carried out to generate hydro-electric power. Rotorua river sites were visited for a short period of time. If present, river users were approached and educated. At these sites more time was spent educating users about Didymo as this has a more direct impact on river users. River users were asked the same questions in accordance to the MPI Freshwater User Survey (Appendix 4). Once the survey was completed users were provided with a promotional pack containing further information and merchandise.

The following list comprises all of the river sites visited during the summer period:

**Western Bay of Plenty**
- Wairoa River

**Rotorua District**
- Kaituna River
- Hamurana River
- Ngongotahā Stream
- Waitetī Stream

2.3 **Boat wash surveys**

The Bay of Plenty Regional Council provided a portable boat wash station that was set up at two popular boat ramps during the 2019/2020 summer period. The wash uses water from the lake to spray vessels from the sides and underneath, while they are driven over a ramp. The purpose of this is to ensure weed is removed from vessels and their trailers before they are taken to another waterbody.

Boat wash users, were asked to participate in a survey about freshwater pests. The survey included information about the vessel type, owner residence and previous water source, as well as the following yes/no questions:

- Do you know about freshwater pests/fish?
- Do you clean your vessel prior to changing water sources?
- Aquatic weeds found on vessel?
The boat wash was set up at Boat Shed Bay (Lake Tarawera) and Acacia Bay Reserve (Lake Ōkāreka). These sites were chosen due to spatial constraints, as the boat wash station was able to be set up without impeding on lake users accessibility. Weather was also a determining factor.

![Figure 8](image-url) The boat wash in use at Lake Tikitapu for the 2018 FLOCHELLA event.

### 2.4 Retail and tourism awareness

Prior to the busy Christmas holiday period, a number of retail outlets, campgrounds and local businesses were visited to distribute merchandise and provide updated information about the invasive species that threaten the lakes and rivers within New Zealand. Businesses targeted included ones that frequently used fresh waterbodies or had customers that would often use the waterbodies. In particular; rafting companies, boat shops and retail outlets selling fishing and tramping gear were targeted. Educational material was also distributed to campgrounds as they had previously been identified as a popular area for people with recreational boats and fishermen. Information centres and popular stores/cafes frequented by water users were also targeted. Retail outlets and campgrounds visited are listed in Appendix 6.

Promotional material was supplied to retail and tourism outlets depending on their target customers. Fishing and outdoor stores were supplied with Check, Clean, Dry brochures, key rings, bumper stickers, spray bottles and detergent. Holiday parks, motor inns and campgrounds were given Check, Clean, Dry and catfish brochures and posters, while popular cafes among waterbody users were supplied with catfish coffee cups. Where possible, managers and supervisors were spoken to as this ensured that the correct message was being spread to customers. The majority of businesses visited were interested in the campaign and willing to take an active role.

Merchandise was supplied by both the Ministry for Primary Industries and the Bay of Plenty Regional Council. The messages included were in relation to the ‘Check, Clean, Dry’ (CCD) campaign and ‘Stop the Spread’ of both aquatic weeds and catfish (Appendix 5). The CCD campaign messages focused on reducing the further spread of aquatic weeds as well as preventing Didymo from entering the North Island. The catfish messages focused on ‘Make our Lakes Great’ and included steps on how to prevent the spread of catfish.
2.5 **Event awareness**

Water based events in the Bay of Plenty Region provided advocates with the opportunity to talk to a wider audience and increase aquatic pest awareness. These events catered to groups with a diverse range of interests from all over New Zealand, some of which had not spent much time in the Bay of Plenty region’s waterbodies. Additionally, events provided an opportunity for advocates to distribute information to organisers and spectators and collect surveys from the event participants.

During November 2019, relevant events were identified and information provided by organisers was assessed to determine the risk to the lake/river. Correspondence with the event organisers helped establish whether it was necessary to speak to competitors at briefings and what merchandise would be most appropriate for distribution.

As with previous years, the focus was on event organisers to take the initiative and control of the decontamination process. As part of the lake closure consents for events, organisers and participants must read and abide by the Biosecurity protocol (Appendix 8), in order to take part in the Bay of Plenty’s waterbody events.

Listed below are the events which were attended or were a part of during the programme:

- Telfer Marine Demo day
- Blue Lake Kayak Regatta
- Half Iron Man, Lake Tikitapu
- New Zealand Water Ski Racing, Lake Rotoma
- Dewar Shield Blue Lake Regatta
- Blue Lake Multisport Festival

Event organisers were provided with the information necessary to keep their event pest free, and merchandise and information packs were provided to give away as sport prizes or for event officials.

*Figure 9*  Lake Tikitapu, where majority of the freshwater events were held. Photo Credit: Hannah Heasman.
Part 3: Results

3.1 Boat ramp surveys

3.1.1 Distribution of surveys conducted at lakes

Over the summer a total of 1,036 surveys were conducted at boat ramps at nine lakes in the Bay of Plenty region. The majority of users were surveyed at Lakes Tarawera (41.7%), Rotoiti (19.5%) and Rotomā (18.6%). 93 users were surveyed at Lake Tikitapu, 50 surveys were completed at both Lake Ōkataina and Lake Ōkāreka. The remaining lakes had less than 10 surveys conducted there; Rerewhakaaitu (5), Rotorua (5) and Ōkaro (1) (Figure 10).

Figure 10  Distribution of surveys conducted at boat ramps in the Bay of Plenty region.
3.1.2 **Distribution of surveys conducted at boat ramps**

Of the lakes surveyed, Lakes Tarawera, Rotoiti, Rotomā, Rerewhakaaitu and Rotorua had multiple survey sites (Figure 11). Boatshed Bay had the highest amount of surveys conducted (347) followed by Otaramarae (171) and Merge Lodge (157). Half of the boat ramps visited had less than 10 surveys and are considered to be less popular among users (Figure 11).

![Figure 11](image-url)  
*Figure 11  Distribution of surveys conducted at boat ramps in the Bay of Plenty region.*
3.1.3 Waterbody user type

A total of 13 different user types were recorded over the 2019/2020 summer period (Figure 12). The most popular user type was Ski/Wake boat (28.5%), followed by Leisure boating (18.8%) then Boat Fishing (15.3%). Fisher, sailing and tramping made up only 2% of the total users surveyed. 10.7% of users were recorded having more than one user type.

Figure 12 Waterbody user types of those surveyed at lakes and rivers in the Bay of Plenty region.

3.1.4 Origin of users

69% of users originated from the Bay of Plenty region, with users from Rotorua and Tauranga making up over half of all users surveyed (Figure 13). Outside of the Bay of Plenty region, the majority of freshwater users were made up of individuals from Auckland (11%), Waikato (10%) and Wellington (3%). 97% of all users surveyed were from within the North Island (Figure 13).

Figure 13 District/Region of Origin of all freshwater users surveyed.
3.1.5 **Region/type of last waterbody used**

Of the 1,036 users surveyed, 690 had not used any waterbody in the previous two weeks. 10% of users had entered a marine waterbody, 209 users had been to a waterbody in the Bay of Plenty region and a further 81 had used a waterbody in the Waikato in the previous two weeks. Only two users surveyed had been in a waterbody in the South Island in the two weeks prior to the survey.

*Figure 14 Region/type of waterbodies used in the previous two weeks by those surveyed.*
3.1.6 Knowledge of freshwater pests

Knowledge of freshwater pests among freshwater users surveyed was high, 89.6% of people knew of any freshwater pests that were a problem in New Zealand (Figure 15). Didymo was the most well-known freshwater pest plant/algae, as 73% of all users surveyed had heard of it. 50% of users had heard of oxygen weed, and a smaller proportion (20%) about hornwort. Less than 5% of users surveyed had heard of Egeria, Hydrilla or Lindavia (Figure 16).

Figure 15  Freshwater users surveyed that knew of any freshwater pests that are a problem in New Zealand.

Figure 16  Knowledge of freshwater pest plants by users surveyed.
3.1.7 Pest plant impact on enjoyment

Regardless of freshwater pest knowledge, the majority of users reported that freshwater pests did not impact their enjoyment of waterbodies in New Zealand (Figure 17).

![Pie chart showing 13% 'Yes' and 87% 'No' for impact on enjoyment.]

*Figure 17* Percentage of freshwater users surveyed that claim freshwater pests have impacted on their enjoyment of lakes or rivers.

3.1.8 Users who Check, Clean, Dry vessels/equipment

Three quarters of freshwater users surveyed reported that they always followed Check, Clean, Dry procedures when moving between freshwater bodies (Figure 18). 110 users were potentially high risk of spreading aquatic pests as they had either never or couldn’t recall cleaning/drying their vessel/equipment when moving between water bodies.

![Bar chart showing frequency of CCD protocols.]

*Figure 18* How often freshwater users followed Check, Clean, Dry protocols when moving between waterbodies.
3.2 River site surveys

3.2.1 Distribution of surveys conducted at river sites

Wairoa dam release was attended on one occasion where the majority (69%) of the river surveys were completed. This summer, only a small amount of surveys (29) were conducted at rivers in the Bay of Plenty (Figure 19).

![Distribution of surveys conducted at river sites within the Bay of Plenty region.](image1)

3.2.2 Origin of owners

Overseas users made up almost half of the freshwater users surveyed, a further 13% of users originated from the South Island. The remaining users surveyed were all from the Bay of Plenty, Waikato or Auckland regions (Figure 20).

![District/region of origin of users surveyed.](image2)
3.2.3 **Recreational purpose**

Kayaking is a popular recreational activity in rivers around the Bay of Plenty region and this user type made up for the majority of users surveyed. The other user type that was common in the Bay of Plenty rivers was fishing, with 3% of users undertaking this activity (Figure 21).

![Recreational Purpose](image-url)

*Figure 21* Recreational purpose of users surveyed at different river sites.

3.2.4 **Last waterbody used**

Over 50% of users surveyed had used the Kaituna River in the previous two weeks, and 65% had previously used a river in the Bay of Plenty region. Only one person had visited a South Island river in the previous two weeks (Figure 22).

![Last waterbody used](image-url)

*Figure 22* Region of last fresh waterbody used by users surveyed.
3.3 **Boat wash survey**

3.3.1 **Distribution of surveys conducted at lake sites**

Boat Shed Bay at Lake Tarawera is a large boat ramp and was where most of the boat wash surveys were conducted (Figure 23). Lake Tarawera (Boat Shed Bay) was surveyed on more than one occasion, while Lake Ōkāreaka (Acacia Reserve) was only surveyed once (Figure 23).

![Distribution of surveys conducted at Lake Tarawera (Boat Shed Bay), Lake Ōkāreaka (Acacia Reserve).](image)

3.3.2 **Origin of owners**

The majority of vessel owners surveyed at the boat wash were originally from the Bay of Plenty Region. Rotorua and Tauranga users were particularly common, followed by Auckland and Waikato (Figure 24).

![District/region of origin of users surveyed.](image)
3.3.3 Vessel type

There were three vessel types surveyed at the boat wash over the 2019/2020 summer period. 79% of all users surveyed had a boat, however, almost a quarter of users had a jet ski and a small proportion had a kayak (Figure 25).

Figure 25 Percentage of different vessel types that were surveyed.

3.3.4 Last waterbody used

Previous waterbodies used were all in the Bay of Plenty or Waikato regions (Figure 19). The majority of users had last entered Tarawera or the ocean (Figure 26).

Figure 26 Most recent water source used by those surveyed.
3.3.5 **Use of boat wash**

Of the users surveyed at the boat wash, only 24% of people entering or leaving the water participated in using the boat wash to clean their vessel (Figure 27).

![Figure 27](image1)

*Figure 27* Percentage of users surveyed who used the boat wash.

3.3.6 **Awareness of pest weeds/fish**

96% of all users surveyed at the boat wash had knowledge of freshwater pest plants or fish (Figure 28).

![Figure 28](image2)

*Figure 28* Percentage of users with knowledge of pest weeds and fish.
3.3.7  **Do you clean your vessel between waterbodies?**

Regardless of freshwater pest knowledge, 98% of all users surveyed at the boat wash clean their vessel between waterbodies (Figure 29).

![Pie chart showing 98% Yes and 2% No](image)

*Figure 29  Percentage of users who clean their vessels when moving between waterbodies.*
Part 4: Discussion

4.1 Boat ramp surveys

4.1.1 Distribution of surveys

During the survey period of the 2019/2020 Aquatic Pest Awareness Programme, lakes and rivers with a greater recreational use were visited more often, as this ensured a larger population of waterbody users were engaged with. Previous years’ recommendations and current knowledge of aquatic pest issues allowed advocates to determine which lakes needed to have a greater amount of time spent at them. Waterbodies, which were less popular, were therefore visited less frequently due to a smaller user population. It is important to note that the number of surveys conducted at each lake does not reflect the actual number of lake users visiting the lakes, as it is only indicative of the amount of time spent at each lake.

Lake Rotomā is widely considered the most pristine lake in the Rotorua Lakes District, due to its water quality and the absence of many freshwater pests. It is also highly regarded for recreational activities and events, especially during the summer period. This high level of popularity and its close proximity to lakes Rotoiti and Rotoehu (both of which harbour a number of freshwater pests), led to Rotomā being a high priority site for collecting survey data and educating users.

Lake Rotoiti is the third largest lake in the Rotorua Lakes District at a surface area of 38.6 km² and is popular with users from Rotorua and Tauranga (McLintock, 1996). The Otaramarae boat ramp was visited frequently as it was one of the most popular with vessel users. At the Rotoiti boat ramps, an emphasis on checking trailers for catfish and catfish eggs was made, as well as educating users on the importance of cleaning their gear before using other lakes in the region to prevent the spread of catfish. In previous years it has been noted that Okawa Bay and the Hinehopu Ramp have a large amount of weed in and around the loading area. During the summer months of 2019/2020, these boat ramps were visited on most occasions when surveying at Lake Rotoiti, however, there were still very few vessels that were seen being loaded into or taken out of the lake here.

Lake Tarawera is one of the most popular lakes in the Bay of Plenty for a number of recreational activities, and is well known for its geothermal hot springs on its southern shore. Due to high user numbers there is a greater risk of weed incursions and higher probability of users spreading weeds to other lakes within the area. Due to parking restrictions at other boat ramps, Boat Shed Bay and Stony Point are two boat ramps that receive a large volume of boat traffic. For this reason a large portion of time was spent surveying users at these boat ramps. Boat Shed Bay in particular has two boat ramps and a large turning circle which make it a preferred ramp for lake users.

Lakes Tikitapu and Ōkāreka were visited frequently over the summer period, due to the close proximity to Lake Tarawera. Lake Ōkāreka is under active management for hormwort while Lake Tikitapu is currently free of it. For this reason, time was spent at both of these lakes discussing the need to clean boats and trailers that have come from, or were previously out on Lake Tarawera. Additionally, advocates attended multiple events at Lake Tikitapu to conduct surveys and educate lake users.

Lakes Rerewhakāaitu and Ōkaro, were only visited on two occasions due to their remoteness and smaller user population, therefore, fewer surveys were conducted at
these locations. However, of the individuals surveyed, the majority of them were locals or annual visitors. Due to fewer users at these lakes the advocates could spend more time educating the individual of the risks of spreading freshwater pests. Likewise, lakes Aniwenua and Matahina were visited on one occasion at the start of summer due to their remoteness, which meant there were unfortunately no surveys gathered at these two locations. In previous years it has been noted that many of the users at these lakes only use the one lake and do not travel to other fresh water locations, however, even if this is the case the users still need to be educated and aware of the risks and provided with the correct equipment to follow the Check, Clean, Dry procedure.

Figure 30 Lake Ōkāreka weed cordon at Acacia Bay boat ramp. Photo Credit: Caitlin Wildman.

4.1.2 Recreational purpose

As with previous years, boats with an outboard motor made up the majority of users surveyed. Boats, jet skis and trailers pose the greatest risk of transportation of freshwater pests as they have many areas weed can be transported including, but not limited to; carpet, anchor wells and outboards/engines. Over 75% of users surveyed were using one or more of these vectors of transportation. Therefore, the surveyor ensured that time was spent educating these users and making sure they knew how to check for weed and properly clean their vessels.

Jet skis in particular, have a faster tie down times than boats and as a result of this, the window in which these users could be talked to was considerably smaller than that of a boat owner, however, this year saw the percentage of Jet Ski users’ surveyed increase by 6.2%. Ski/wake boats were the most common user type surveyed followed by leisure boating. The leisure category included users who were not undertaking a particular activity and were instead pleasure boating.

The number of users surveyed who had kayaks decreased to 5.5% from last summers 13%. Kayakers have the ability to move between waterbodies at ease and can launch their kayaks anywhere along the shoreline, making it considerably harder for these users to be surveyed, for these reasons alone they have been identified as a high risk user. Fewer kayakers were targeted this summer a result of more time spent surveying at boat
ramps. It is advised to target this particular user group more, particularly in regard to the spread of Didymo between waterbodies.

4.1.3 Origin of users and last waterbody used

The Rotorua lakes are easily accessible from a variety of locations due to the areas in which they are located. As with previous years, the summer of 2019/2020 saw the majority of waterbody users come from the Bay of Plenty region (69%), users from the Rotorua District accounted for 35% of total surveys, followed by Tauranga (28%) and Whakatāne (6%). Freshwater users surveyed from the Bay of Plenty region increased by 10% compared to the 2018/2019 results.

The Auckland and Waikato regions are two of the regions deemed high risk for pest transfer and make up 11% and 10% of users surveyed, respectively. While the number of users from the Waikato region remain consistent with the 2018/2019 findings, the percentage of users from the Auckland region dropped by 6%. A large part of the reason these two regions are classified as high risk, is that the waterbodies in the Auckland and Waikato region contain high numbers of invasive weeds and pest fish that are not present in the Rotorua lakes.

Only 1% of the Rotorua lakes users were visitors from the South Island. Due to the presence of Didymo in a large number of waterbodies in the South Island, visitors from here to the North Island are classified as high risk, however, these particular users were often better informed about freshwater pests as many had witnessed first-hand, the devastating effects Didymo had on their pristine rivers.

Similarly, overseas users are also classified as high risk due to their lack of awareness around New Zealand biosecurity and how frequently they travel between different waterbodies. This summer freshwater users from overseas made up 2% of users surveyed, a 1% decrease from the 2018/2019 summer period. Overseas users were provided with as much information as possible to reduce the risk of them transferring freshwater pests.

62% of people surveyed stated that they had not visited another waterbody in the two weeks prior to the survey being conducted. This was a large increase from the previous years’ findings which identified only 25% of users having not visited another waterbody in the previous two weeks, however, similar to the 2017/2018 findings in which 74% of waterbody users stated that they had not visited another waterbody in the previous two weeks.

Majority of those that had used another fresh waterbody in the past two weeks were in the Bay of Plenty region (19%), a 14% decrease from the 2018/2019 survey period in which 33% of users had used different waterbody in the Bay of Plenty region within the previous two weeks. The Rotorua lakes are made up of different combinations of freshwater pests, where some are hornwort free and others are not. A number of lake users were not aware that the distribution of freshwater pests varied from lake to lake and so their risk of weed transferal increased.

Users who had previously had their vessels in the ocean (10%) were aware that saltwater is able to kill any freshwater pests that may have attached themselves to the vessel. These particular users often stated that they used salt water between freshwater visits as a way to eliminate the risk of spreading aquatic pests.

4.1.4 Levels of freshwater pest awareness

To determine the levels of freshwater pest awareness, waterbody users were asked two questions, they were first asked whether or not they had any knowledge of freshwater
pests that were a problem in New Zealand. If users answered yes, they were then asked to identify or name any of the freshwater pests they had seen or heard of. Of the freshwater users surveyed, 89.6% were able to identify at least one freshwater pest that is a problem in New Zealand, an increase from the previous year which identified 50.1% of users having knowledge of freshwater pests. The most common pest plant or algae users had heard of was Didymo, with 73% of users having some knowledge on it, a 38% increase from the 2018/2019 results. Similarly, the percentage of users that had heard of hornwort increased to 20% in the 2019/2020 summer period. The least known pest plant species were found to be; Egeria (3%), Hydrilla (1%) and Lindavia (1%).

Users were also asked whether or not freshwater pests impact on their enjoyment of fresh waterbodies (Appendix 4). Only 13% of users indicated that freshwater pests had impacted their enjoyment and when ask to explain how, the most common reasons included ‘it is not enjoyable to swim through’ and ‘it gets stuck on the anchor or prop and is a hassle to clean’. It was also mentioned by multiple people travelling from the Waikato region, that they had not been affected by any freshwater pests in the Rotorua lakes, however, in the Waikato region freshwater pests had impacted on their enjoyment. The 13% of users indicating that freshwater pests impacted their enjoyment of the lakes was a decrease from the 2018/2019 summer period which found 28% of users said freshwater pests impacted their enjoyment.

Questions regarding pest fish were not included in this year’s survey, so levels of awareness and interest were unable to be quantified. However, due to the catfish incursions in lakes Rotoiti and Rotorua most waterbody users had some awareness of the issue due to the signage on and around the boat ramps. Many users that the advocates spoke to were concerned with the presence of catfish in the Bay of Plenty; feedback consistent with previous survey results.

![Image](image.jpg)

*Figure 31 Stop the Spread Catfish signs at Lake Ōkataina boat ramp. Photo Credit: Caitlin Wildman.*

### 4.1.5 Users who Check, Clean, Dry

It was really positive to see numerous users taking action to prevent the spread of freshwater pests this summer. Nearly 800 of the users surveyed always followed the Check, Clean, Dry procedures when moving between waterbodies, and a further 86 users mostly followed CCD procedures between waterbodies. ‘I’m not clear on what I’m supposed to do’ and ‘I just forget’ were the most common reasons why people were not always following the Check, Clean, Dry procedure when moving vessels/equipment between waterbodies. However, many people were still aware of the need to check and clean their gear, and generally took action to stop the spread of freshwater pests even though they may have been unfamiliar with some of the pests found in the Rotorua lakes.
Of the 1,036 users surveyed 83 people reported that they never followed CCD procedures, however, of this group 83% of users made up a group that only ever used their boat on one lake or only moved between the sea and one lake, therefore, presented no risk of spreading freshwater pests. Due to these findings, the survey could benefit from having a N/A category to prevent over representation of the users who never follow CCD procedures. Users that stayed on one waterbody were still educated on the correct procedures, should they ever choose to use a different waterbody in the future.

Educational material was given to users after they had completed the survey, allowing them to teach themselves and others. In addition to this, cleaning equipment (spray bottles, detergent) was also given out to those who didn’t realise they needed to clean their vessels or those that had become complacent. A strong emphasis was also put on the ease by which freshwater pests can be transferred, this was done by educating waterbody users how they could potentially spread freshwater pests by not checking or cleaning gear. With the recent incursion of catfish, now present in both Lakes Rotoiti and Rotorua, it was highlighted that weed fragments could also potentially be carrying pest fish eggs and to ensure lake users were checking for this.

During the 2019/2020 summer period there were four separate occasions where lake users had weed on their vessels/equipment, this was an increase from the 2018/2019 summer period. Three of these occasions were at Boatshed Bay on Lake Tarawera, these users had hornwort on their vessels. The other occurrence was at Lake Tikitapu, where hornwort was found on the boat trailer. This user was more concerning as Lake Tikitapu is free of hornwort and the boat owner had recently visited both Lake Tarawera and Lake Ōkāreka. This highlights the need for users to be educated about the risks associated with using multiple freshwater bodies in the same or consecutive days.

4.2 River site surveys

Rivers in the Bay of Plenty region were visited less frequently, as the main focus was on the Rotorua lakes due to the particularly busy summer period at the boat ramps. The Wairoa River was visited on one occasion to conincide with the dam release, this is
particularly popular spot for kayakers and rafters, attracting not only locals and other users from New Zealand but also many overseas users. The Kaituna River was also visited, this took place on two separate occasions during the survey period. Kayakers surveyed were all very knowledgable and well educated on the freshwater pests within New Zealand and were familiar with the Check, Clean, Dry procedure when cleaning their gear. It is important to note that results may be skewed as river survey numbers were so small (29 surveys).

River users were asked how often they followed Check, Clean, Dry procedures when moving between waterbodies. Of those surveyed, all followed the Check, Clean, and Dry procedure to decontaminate their vessel/equipment before moving to other fresh waterbodies. The knowledge of freshwater pests amongst river users was high with 86% of users knowing some sort of freshwater pest. Users who had previously travelled around the South Island were particularly well educated on Didymo and had a great appreciation for the Didymo-free North Island rivers.

Kayakers were the main user type surveyed at the rivers and made up 97% of the users surveyed, while the other 3% of users were fishers. Kayaks and fishing equipment are generally easier to clean than boats and trailers as they have less areas where freshwater pests can get caught. However, as they are used in river systems, they contribute greatly to the risk of transporting Didymo to the North Island rivers from the South Island.

45% of river users surveyed during the 2019/2020 period, originated from overseas. It is assumed that overseas users would increase the risk of freshwater pests spreading due to their limited knowledge on New Zealand freshwater pests, however, we found that in actual fact there was an extremely high level of awareness surrounding freshwater pests in the rivers with overseas users, particularly in Didymo awareness.

Our results show that 25% of river users surveyed had not used another waterbody in the last two weeks, while only 3% used a South Island waterbody and the other 72% had used various waterbodies in the North Island. All users who had used previous waterbodies, increase the risk of freshwater pests spreading, of greater concern are the users travelling up from the South Island as the further spread of Didymo is trying to be prevented. However, it was extremely encouraging that all river users surveyed followed the Check, Clean, Dry procedure and reduced the risk of the spread of freshwater pests.

Figure 33 Post dam release at Wairoa River, Western Bay of Plenty. Photo Credit: Caitlin Wildman.
4.3 Boat wash surveys

The main purpose of the boat wash was to assist members of the public in cleaning their vessels by providing an opportunity to do so. The setup of the boat wash also served to educate the public and raise awareness of aquatic pest issues, along with ensuring that vessels bearing weed were washed off prior to entering the lake. Vessels were not required to go through the boat wash stations, and were surveyed regardless of whether they did or not. Although users who were not intending to use the boat wash were encouraged to go through it, only 24% of surveyed users went over the boat wash this was most likely due to the vessels not being required to go through the boat wash stations (Figure 27).

During the 2019/2020 summer period, the boat wash was used at two sites and surveyed a total of 124 users (Figure 23). This was less than what was surveyed in the 2018/2019 period, which surveyed five sites and 197 people. The decrease in users surveyed and sites visited may be due some bad weather, as there were some weekends with high winds, which meant there were fewer people out at the boat ramps. Of the two sites, Lake Tarawera (98) had the highest numbers of surveys completed (Figure 23). This is generally one of the most popular boat ramps in the area as it boasts a lot of room for loading and parking, compared to Lake Ōkāreka. Whereas in the 2018/2019 period, Lake Tarawera 81 surveys completed there, while Ōkāreka had 33 surveys completed there (Figure 23).

Origin of users posed mostly similar results to last year. The majority of owners lived in the Bay of Plenty (Rotorua and Tauranga), followed by Auckland and Waikato (Figure 24). There was a large decrease in users from Whakatāne this year, with 1% as opposed to 11% during the previous season. As no surveys were being conducted at Lake Rotomā, this may be the cause of the decrease in Whakatāne users surveyed. Lake Rotomā attracts many users from Whakatāne as it is the closest to their town. This may also explain why the second most popular ‘previous waterbody’ is the ocean, as many Tauranga and Whakatāne users visit the sea before or after entering a waterbody (Figure 26).

Awareness of pest weeds/fish has increased since 2019/2020, with 96% of users saying yes compared to 85% previously (Figure 28). However, the number of people claiming to clean their vessel between waterbodies has increased from 91% to 98% over the same period (Figure 29). This appears to indicate that regardless of aquatic pest knowledge, users are getting the message to clean gear between waterbodies.
Feedback from the public in regards to the boat wash was generally very positive. Multiple people stated that they would prefer to use the boat wash if it were available permanently at popular ramps. In spite of this, it seemed that many users chose not to use the boat wash when it was available to them, as they were in a hurry to load/unload their vessel. There were no vessels recorded as having weed present on their trailers either when launching or retrieving from Lake Tarawera and Lake Ōkāreka, whereas during the 2018/2019 period they had a total of four vessels recorded as having weed present on their trailers from Lake Tarawera. All four instances had hornwort present and occurred on the same day during that year, due to a strong south-westerly blowing weed onto the boat ramp.

![Hornwort and Oxygen Weed washed up at Hinehopu boat ramp in Lake Rotoiti.](image)

**Figure 34** Hornwort and Oxygen Weed washed up at Hinehopu boat ramp in Lake Rotoiti. Photo Credit: Caitlin Wildman.

### 4.4 Pest fish awareness

Educating waterbody users on the various pest fish species that threaten the Bay of Plenty was a priority over the summer period. Although this region has few invasive pest fish, it was important to ensure users were aware of the risks if those species were to enter our lakes and rivers. With catfish now present in both Lake Rotoiti and Lake Rotorua, it was highly important that users of these lakes were correctly following the Check, Clean, Dry procedure on their boats, trailers and equipment before moving to other lakes.

In order to ensure that waterbody users were educated about pest fish, a large range of catfish collateral was provided to give to members of the public during surveys and at events (Appendix 5). Although the survey questions involved pest plants rather than fish, we ensured merchandise with catfish information was handed out among Check, Clean, Dry material, and that users were educated on the correct procedures if they were to see a pest fish (Appendix 9).

During the 2019/2020 summer period many conversations were had with freshwater users surrounding catfish and the damage caused by these fish. Many members of the public were aware that catfish were a problem in the area, due to large signs present at every boat ramp in the Rotorua lakes area. Many people had concerns such as how to stop them from spreading and what to do if they caught one.

Fewer conversations were had surrounding other pest fish such as koi carp, tench and rudd. This may be as a result of lack of awareness, as mentioned in previous summer
reports. Although they are not a major threat to the Bay of Plenty at this stage, it is still crucial that the public are actively working to prevent the spread of them.

![Sign](image)

Figure 35  Catfish Not in Our Lakes signs on route to Lake Tikitapu boat ramp. Photo Credit: Caitlin Wildman.

4.5 Retail and tourism awareness

Due to the popularity of the Bay of Plenty with both domestic and international tourists, the regions retail and tourism sector services a wide variety of people, many of these holidaymakers and tourists have a diverse range of freshwater recreational interests. Retail and tourist outlets are visited to gain information about the large range of freshwater activities within the region, therefore, it has been found successful to provide information about freshwater pests to these sectors, as it gives year round access to aquatic pest information. During the 2019/2020 awareness programme, 30 retail, tourism and accommodation sites were visited throughout the Rotorua District, prior to the busy holiday period. Similar to previous years, retail and tourism awareness is focused on holiday parks, outdoor retail stores, high risk tourism operators and cafes popular with lake users (Appendix 5).

Holiday parks and outdoor retail chains were very receptive to the information being given out and a vast majority of them are proactive in carrying out aquatic pest education with their guests. A number of holiday parks have boat wash stations which are made available to their guests. Boating and fishing stores were provided with CCD packs to distribute to their customers.

Several cafes were visited across the Rotorua Lakes District to distribute compostable catfish coffee cups, these opened a point of discussion between advocates, café owners and customers, many of which were not aware of catfish being a problem. Cafes targeted were those that were popular with freshwater users such as Ōkere Falls store and Rotomā Old Trout café. Every café visited agreed to give out takeaway cups to customers, allowing locals and tourists to read the information on the cup and see what they can do to help prevent the spread.
As with previous years, high risk tourism operators such as rafting companies were visited. They were reminded of the importance of cleaning gear and vessels between waterbodies and were updated with new information. Brochures and posters were provided for their operating premises and they were encouraged to talk about freshwater pests with clients. The Rotorua Duck Tours venture was also very interested in educating customers on aquatic pest issues and were provided with merchandise to help raise awareness.

The overall response gathered from retail and tourism ventures in the Bay of Plenty was very positive and indicated a high level of awareness. This is likely a result of the work undertaken by previous advocates to visit these locations each and every summer. This reinforces the importance of advocacy work between the Council and local businesses, both in building positive relationships and ensuring that efforts to educate the public are regular and up-to-date.

4.6 Event awareness

Speaking to event organisers and competitors at briefings, offered the chance to not only raise awareness of aquatic pest risk to lake health, but also allows a means of providing information about decontaminating vessels and equipment. All of the event organisers that were talked to this summer, were more than willing to promote aquatic pest awareness and a number of them made it a condition in the competitor’s entry forms that they must undertake decontamination steps in order to be allowed on the lake. Event organisers were also provided with brochures and merchandise to give to participants or use spot prizes to help raise awareness surrounding aquatic pest issues.

Events can bring large captive audiences to a single location which makes them ideal to talk to, as there are a large number of users in a relaxed location. Many of the competitors taking part in these events may not usually use the Rotorua lakes and for this reason may arrive with very little knowledge of our specific freshwater biosecurity issues and requirements. This poses a significant risk to waterbodies in the Bay of Plenty as users may enter a lake or river during a single event.

As with the previous years, the majority of the event’s organisers spoken to were receptive to the messages provided by the summer advocates, to help eliminate the risk of spreading pests. Emphasis was placed on the responsibility of event organisers to ensure biosecurity rules are adhered to. The response received this year indicates that this has been successful. It was the event organisers’ responsibility for setting up and manning decontamination stations and all of the event organisers knew the procedures they must follow in order to reduce the risks or any incursions. Although many event participants were not regular users of the Bay of Plenty waterbodies, they are able to follow the same procedures in waterbodies across the country to achieve the same result.

Organisers of the Half Iron Man and Blue Lake Canoe Regatta were very receptive of the messages being delivered by the Bay of Plenty Regional Council. The decontamination station for the Blue Lake Canoe Regatta was manned by event organisers and was made a condition of race entry. Prior to the Half Iron Man event, event organisers actively reminded competitors of the biosecurity risks via email and Facebook posts. A wetsuit dipping service was provided to competitors on the race morning, however, the decontamination station was not manned so it was unclear how many people used it.

At the Blue Lake Rowing Regatta, organisers made it compulsory for competitors to check and clean all boats before they are allowed to enter the competition. This event also provided a great opportunity to engage with lake users, as organisers allowed for us to set up a station where advocates were able to conduct surveys and raise awareness with participants and their families. The majority of users surveyed were well aware of the Check, Clean, Dry procedure and having a stall set up at the regatta attracted the
attention of many participants, coaches, spectators and other lake users there on the day. Many conversations were initiated by the public approaching advocates, proving to be a successful set-up in capturing the public’s attention and raising awareness. Additionally, the Rotorua Rowing Club were happy to use both CCD and catfish collateral to give away to competitors.

Events such as Water Ski Racing Rotomā were well aware of the correct procedures and the overall understanding of Check, Clean, Dry from competitors and state of boats entering the water was very high, which was excellent to see considering that the event took place in Lake Rotomā. Advocates were able to speak to the participants during the racing briefing and also conducted surveys with competitors and family members throughout the day. Likewise, organisers of the Blue Lake Multisport event were aware of the correct procedures and provided a decontamination station. Check, Clean, Dry brochures were available to participants at registration, this year advocates oversaw the dipping station, this was a good opportunity to educate competitors, many of which had travelled from outside the Bay of Plenty.

The majority of event organisers and competitors were friendly and supportive of what the Aquatic Pest Awareness Programme was doing. A number of the people spoken to had competed in events for many years and are passionate about keeping water quality and lake health high.

![Multisport event setup and decontamination station at Lake Tikitapu. Photo Credit: Caitlin Wildman.](image-url)
4.7 **Other issues for discussion**

Most waterbody users had been spoken to before in previous years and were appreciative of being approached again. A number of these users had positive responses to the continued aquatic pest awareness and education, particularly aimed at those who were not aware of the risks of transferring weeds and pest fish to other waterbodies. Generally users from the Bay of Plenty, especially Rotorua, were more knowledgeable on freshwater pests, most users were grateful for the efforts in place to prevent the spread of freshwater pests, such as signage for both pest plants and catfish, weed cordons and the active trapping of the catfish in lakes Rotorua and Rotoiti.

A large number of boat owners had their own equipment for cleaning boats, however, still approached advocates over the course of the summer and expressed the difficulty of thoroughly cleaning their boats between waterbodies. The boat wash station is a highly effective for reducing the spread of freshwater pests in the region. Some boat owners expressed the need for a permanent boat wash facility at the most popular boat ramps or for the boat wash to be out more frequently. Vessel owners were then told that cleaning the boat with a spray bottle and detergent were also extremely effective ways of cleaning their boats.
Part 5: Recommendations

5.1 Biosecurity recommendations

1. Carpeted trailers increase the risk of spreading pests as they provide an easy means for transfer. It would be beneficial to explore this further and perhaps raise more awareness about these trailers having an increased risk of spreading pests. Raising awareness could mean these trailers are more thoroughly checked before moving to different waterbodies.

2. A decontamination station with some spray bottles and detergent at the Kaituna River drop-in at Ōkere Falls would aid the prevention of pest plants as Kayakers tend to frequently visit different waterbodies.

3. After a number of prevented weed incursions due to the boat wash facility, it may be beneficial to look into public wash down facilities at the busiest boat ramps.

4. More signage on aquatic weeds like those of the catfish would be beneficial to have in place. Many waterbody users do not know what the aquatic weeds look like or do not know that they are in fact a pest.

5.2 General recommendations

Survey and behaviours

1. Ordering collateral from the Ministry of Primary Industries should be done in the first few weeks of the programme, ensuring to order enough stock to last the summer period.

2. Very few waterbody users do not wish to be spoken to, and may begin to become argumentative or berate the organisation. In these events it is simply best to thank them for their time and walk away.

3. It is beneficial to engage with users that have been surveyed in previous years to update them regarding biosecurity issues in the region. In some cases these people have had poor awareness or have forgotten information from previous years despite having the merchandise.

4. When surveying at ramps with weed cordons, regular checks should be made on the cordon. This ensures the cordon is effective at preventing the weed from spreading. It should also be noted that whilst surveying at any ramp the advocates should check parked trailers for signs of pests.

5. As kayakers are capable of launching almost anywhere, more efforts are necessary around reaching these users.

6. Carry laminated photos of the aquatic pests in New Zealand to show waterbody users what they should be looking out for if they are unaware or unsure how to identify the pests. MPI also supplies brochures with photos of key aquatic pests, these a good to give to freshwater users so they can refer to them in the future.

7. It would be beneficial to add a catfish option in the pest knowledge section in the survey, as many waterbody users knew catfish were a pest but there was no option of that in the survey.
Retail and tourism

1 Start delivering educational material to accommodation and related retail businesses early in the summer. This ensures they are sufficiently stocked with information prior to the summer period.
2 Campgrounds and holiday parks are especially important as they often accommodate waterbody users and are ideal places to distribute merchandise, gather surveys and educate waterbody users.
3 Encourage fishing and boat shops to distribute educational material when selling a boat/licence/rod.

Events

1 Summer students should view the lakes closure website when looking for events to attend. This provides a list of all lake closures for events, and has the event information and contact details.
2 Make contact with event organisers as early as possible. This ensure they have plenty of notice and sufficient time to contact participants if necessary.
3 Arrange with event organisers the opportunity to speak about aquatic pests and cleaning vessels at briefings. Ask about putting Check, Clean, Dry brochures in event packs.
4 The Blue Lake Rowing Regatta is an ideal time to collect surveys as there are many different regions in attendance. Parents and rowers alike are interested and happy to be educated on the risks of transferring aquatic pests and often share this information with their peers.
5 Attending the Wairoa Dam release multiple weekends in a row will see repeat users, therefore, it is better to space out attendances.

Additional

1 Justify travelling to remote waterbodies, such as lakes Rerewhakaaitu and Ōkaro by going at busy periods, such as public holidays, allowing a sizeable number of surveys to be collected.
2 The Wairoa River has a dam release every Sunday of the month over summer. Kayakers are in abundance and are happy to participate in the survey. Typically river sites require fewer visits due to the same users being frequent visitors.
3 On days with bad/rough weather, weed fragments tend to gather on the shores of the heavily pest infested lakes, such as Lake Rotoiti. It is advisable to attend these lakes to ensure any users are checking and cleaning their trailers, it is also a good time to educate users as you can show what the pest plants looks like.
4 Signage could be put up at areas where vessel users spend time. The signage at boat ramps is mostly ignored due to users rushing to get on or off the water. Signage at locations such as Hot Water Beach on Lake Tarawera would give vessel users time to read them thoroughly.
Part 6: Conclusions

The Rotorua lakes are a significant asset to both the Bay of Plenty region and the country. For this reason the health of the lakes, their water quality and biodiversity are worth protecting for the enjoyment today and future generations. Due to the number, proximity and closeness of the lakes, they are extremely susceptible to the invasion of freshwater pests by lake users.

The main aquatic pest weeds within the Rotorua lakes region have been identified as Hornwort, Egeria, Elodea and Lagarosiphon. These four weeds contribute to water degradation and affect native community systems, which can lead to a loss of native species. Several recreational activities have been identified to be the main means in which these weeds spread between lakes. These activities include, but are not limited to fishing, kayaking and boating. Pest weeds can spread between water bodies by becoming caught on trailers, vessels or equipment associated with those activities. Pest fish eggs from the likes of koi carp and catfish are able to ‘hitch-hike’ and can remain viable on damp weed fragments. It is essential that efforts are maintained to inform lake users of their potential to spread weeds. This is especially important for lakes in close proximity of each other, where one lake has less weed species present than the other. Although pest fish are uncommon in the Bay of Plenty, the introduction of catfish into two of the Rotorua lakes poses a significant risk to the remaining Bay of Plenty waterbodies.

In 2004, a freshwater algae called Didymo was discovered in the South Island and had since spread through numerous freshwater rivers within the South Island. Although it is not currently present in the North Island, Didymo has the capability to spread via microscopic cells that are undetected by the human eye. Didymo has negative impacts on rivers ecology and aesthetics; it also negatively impacts the interests of a number of commercial endeavours and recreational users.

The 2019/2020 Aquatic Pest Awareness Programme aimed to educate lake users and raise awareness of the risks involved in the spread of aquatic weed, pest fish and Didymo. The overall feedback from waterbody users was very positive. A total of 1,160 freshwater users were surveyed at boat ramps, river access points and events this summer, 1,036 of these being under the MPI Freshwater User Survey and the other 124 being under the Boat Wash Survey. The majority of freshwater users originated from the Bay of Plenty region, with many members of the public, particularly those local to Rotorua, already aware of the Check, Clean, Dry, process when spoken to.

The Aquatic Pest Awareness Programme is reaching many of those most at risk of causing incursions of invasive species in the Bay of Plenty region. Freshwater users appreciate the work conducted by BOPRC around the Rotorua lakes and rivers and users frequently make positive remarks about the work being undertaken. A positive mind-set among recreational users to ‘Check, Clean, Dry’ all vessels and equipment will help prevent Didymo incursions within the North Island. Similarly, ‘Stop the Spread’ reminds users of the procedures that must be undertaken when moving between waterbodies.
Part 7: References


Appendices
Appendix 1

The current known distribution of four pest weed species between eleven of the Rotorua lakes
Appendix 2

Biosecurity signage
DON'T LET PESTS SPOIL YOUR LAKES

Stop the spread of pests
Boats and trailers
Remove all plants from your boat, trailer, canoe and kayaks. 
Check for invasive aquatic plants and animals.

Fishing gear and other water-sports equipment
CHECK
CLEAN
DRY

Keep watch, call it in

Unwanted hitchhikers in the Rotorua lakes

See www.biosecurity.govt.nz/cleaning for more information.
Appendix 3

Ministry for Primary Industries protect our waterbodies flyer

FOLLOW THESE STEPS FOR EVERYTHING THAT’S BEEN WET, WHEN YOU MOVE BETWEEN ANY WATERRWAYS IN NEW ZEALAND:

CHECK

Remove any plant matter. Check anything that’s been in contact with the water, especially things like the head of your shoe.

CLEAN

Seek or scrub your equipment in water with detergent for at least a minute. Make sure the item is fully wet — without any pockets or bits the water can’t get to.

DRY

Wait till the equipment is dry to touch, and leave it dry for at least 40 hours to make sure any inviable pests are completely dead.

HORSETAIL

Hornwort (Callitrichais demersam) is a submerged freshwater weed found in still and flowing waters. Leaves are finely divided, with minute teeth which make the plant feel rough to the touch. It lacks roots, but has modified leaves that anchor the plant in bottom sediments.

New plants can form from each piece of the easily broken stems. Hornwort rapidly invades water of varying clarity, temperature, light and nutrient levels, and its dense growth habit crowds out native species.

Hornwort is currently widely established in the North Island. In the South Island, it has been found in the Matata Stream and some private ponds in Motueka and has been eradicated. In February 2020, a small population was discovered in Centennial Park Lake in Timaru and this too is thought to have been eradicated.

The Ministry for Primary Industries declared hornwort to have been eradicated from the South Island in 2018, therefore achieving the objective of the National Invasive Pest Response Programme for hornwort.

DIDYMUS

Didymo (Didymosphenia geminata) — known as “rock snot” — is a freshwater diatom (a type of alga). It is a native of northern Europe and North America and was first reported in New Zealand in 2004. Didymo is currently found in a number of South Island rivers. The Ministry for Primary Industries in 2016 declared the entire South Island a Controlled Area for Didymo. This means waterways remain open to angling and other recreational activities. You must clean your gear when going from one waterway to another in the South Island and before you enter a North Island waterway also.

Thealgons can form massive blooms on the bottom of streams, rivers and lakes. It attaches itself to the stream bed by stalks, and can form a thick brown layer that smothers rocks, submerged plants and other materials. It forms floating “ratt tails” that can turn while at their ends and look similar to tissue paper. As the “tails” of the algae get longer they become white in colour.

This microscopic pest can be spread by a single drop of water. Even if you can’t see it, you could be spreading it.

REPORT ALL SIGHTINGS IN THE SOUTH ISLAND TO 0800 80 99 66.

TO REPORT A SUSPECTED FIND OF DIDYMUS, CONTACT 0800 80 99 66.

LAGAROSIPHUN

Lake weed (Lagarosiphon major) is a fast-growing aquatic plant originally brought into New Zealand from South Africa as an aquarium or ornamental pond plant. It has since become established in many lakes and rivers throughout the country.

In the South Island it is found in some lakes and rivers. Lagarosiphon is a perennial plant with stems that can grow upright to 4 metres. Leaves are dark green and curl downwards back towards the stem and are arranged spirally around the stem. Optimum establishment, growth and spread of Lagarosiphon occur in 2 to 4 metres water depth.

Tiny fragments as small as 4cm can easily break off and establish in new areas, helped by water currents, wave action and boating activities. Its vigorous growth displaces more desirable native plants and disrupts recreational activities by choking and blocking waterways. If left uncontrolled, large beds can form, create obstructions and leave unsightly spots on the shore.

TO REPORT A SUSPECTED FIND OF LAGAROSIPHUN, CONTACT YOUR LOCAL REGIONAL COUNCIL.
Appendix 4

Ministry for Primary Industries Freshwater User Survey 2019/2020

<table>
<thead>
<tr>
<th>Date: *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region: *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waterway: *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location: *</th>
</tr>
</thead>
<tbody>
<tr>
<td>38°11'5 176°20'E</td>
</tr>
<tr>
<td>Location Notes:</td>
</tr>
<tr>
<td>If there is no cellphone coverage in the current area, notes about the current location can be entered here. The survey can then be saved and the location can be placed on the map when back in mobile coverage.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Event Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>If required</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location where interview took place: *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boat Ramp</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>User Type (Main Activity): *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boat fishing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional User Types (Optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
</tr>
</tbody>
</table>
**Questionnaire:**

What is your current country of residence *

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than once a year</td>
</tr>
<tr>
<td>1-5 times a year</td>
</tr>
<tr>
<td>6-10 times per year</td>
</tr>
<tr>
<td>More than 10 times</td>
</tr>
</tbody>
</table>

How often do you visit this lake/river? At least... *

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

Do you know of any freshwater pests that are problems in New Zealand? *

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

Have freshwater pests impacted on your enjoyment of any lakes and rivers? *

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

To prevent the spread of freshwater pests, the following actions are recommended: before you move between different lakes and rivers, ensure your gear and equipment has been checked (visible pests removed) and then either:

- dried for more than 48 hours
- cleaned thoroughly with a detergent or disinfectant solution for at least a minute

How often do you follow the Check, Clean, Dry procedures (or take other effective approaches i.e. freeze gear or use different sets of equipment)?

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always</td>
</tr>
<tr>
<td>Mostly</td>
</tr>
<tr>
<td>Sometimes</td>
</tr>
<tr>
<td>Never</td>
</tr>
<tr>
<td>Can’t recall</td>
</tr>
</tbody>
</table>

Please indicate why you do not ‘Always’ check, clean or dry.

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

I just forget

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

I don’t have the right equipment (no buckets, detergent, facilities, etc)

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

I don’t see a sign the prompts me

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

I assume there are no pests in the waterway I’m moving from

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

Other Reason:

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

In the last 2 weeks, have you visited the sea, or any other lakes or rivers? *

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

**Contact details**

Would you like to provide contact details to hear about the results of the survey or other matters related to CCD?

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>
Appendix 5

Ministry for Primary Industries and Bay of Plenty Regional Council material distributed

From Ministry for Primary Industries

- CCD “Protect your Patch” Pamphlets
- CCD 1 L Spray bottles
- CCD 20 mL Biodegradable Detergent Sachets
- CCD 250 mL Spray Bottle
- CCD Bumper Stickers
- CCD Pens
- CCD Posters
- CCD Temporary Tattoos
- CCD Z-booklets “How to: Check, Clean, Dry”

From Bay of Plenty Regional Council

- Keep Our Lakes Great Biodegradable Coffee Cups
- Keep Our Lakes Great Bumper Sticker
- Keep Our Lakes Great Coasters
- Keep Our Lakes Great Cooler Bags
- Keep Our Lakes Great Fridge Magnets
- Keep Our Lakes Great Larger Sticker
- Keep Our Lakes Great Pamphlets
- Keep Our Lakes Great Reusable Coffee Cups
- Pest Patrol and Clean your Boat Tie Down
- Pest Patrol and Clean your Boat Trailer and Propeller Fluorescent Flag
- Pest Patrol and Stop the Spread Drawstring Bags
- Pest Patrol and Stop the Spread Trout Bags
- Pest Patrol Lanyards
- Stop the Spread Floating Key Rings
- Stop the Spread T-shirts
# Appendix 6

## Retail and tourism outlets visited

<table>
<thead>
<tr>
<th>Rotorua sites</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail outlets</td>
<td>Hamills</td>
</tr>
<tr>
<td></td>
<td>Hunting and Fishing</td>
</tr>
<tr>
<td></td>
<td>Kathmandu</td>
</tr>
<tr>
<td></td>
<td>Macpac</td>
</tr>
<tr>
<td></td>
<td>O'Keefes</td>
</tr>
<tr>
<td></td>
<td>Ōkere Falls Store</td>
</tr>
<tr>
<td></td>
<td>Old Trout Café</td>
</tr>
<tr>
<td></td>
<td>Outdoorsman Headquarters</td>
</tr>
<tr>
<td></td>
<td>Rotomā Trading Post</td>
</tr>
<tr>
<td></td>
<td>Telfer Marine</td>
</tr>
<tr>
<td></td>
<td>The Landing Café</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tourism outlets</th>
<th>i-Site Rotorua</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kaitiaki Rafting</td>
</tr>
<tr>
<td></td>
<td>Kaituna Cascades</td>
</tr>
<tr>
<td></td>
<td>Lake Tarawera Water Taxi</td>
</tr>
<tr>
<td></td>
<td>Redwoods Information Centre</td>
</tr>
<tr>
<td></td>
<td>River Rats</td>
</tr>
<tr>
<td></td>
<td>Rotorua Duck Tours</td>
</tr>
<tr>
<td></td>
<td>Rotorua Rafting</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Camping grounds/Accommodation</th>
<th>All Seasons Holiday Park</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Blue Lake Top 10 Holiday Park</td>
</tr>
<tr>
<td></td>
<td>Cosy Cottage Holiday Park</td>
</tr>
<tr>
<td></td>
<td>Holdens Bay Holiday Park</td>
</tr>
<tr>
<td></td>
<td>Ōkataina Lodge</td>
</tr>
<tr>
<td></td>
<td>Rotorua Family Holiday Park</td>
</tr>
<tr>
<td></td>
<td>Rotorua Thermal Holiday Park</td>
</tr>
<tr>
<td></td>
<td>Rotorua Top 10 Holiday Park</td>
</tr>
<tr>
<td></td>
<td>VR Rotorua Lake Resort</td>
</tr>
<tr>
<td></td>
<td>Waitetū Trout Stream Holiday Park</td>
</tr>
<tr>
<td></td>
<td>Willow Haven</td>
</tr>
</tbody>
</table>
Appendix 7
Sites visited in the Bay of Plenty region
Appendix 8

Biosecurity protocol letter for events

22/09/2015

Bay of Plenty Regional Council’s biosecurity protocol for prevention of aquatic pest species incursions during events

Read and abide by this protocol in order to partake in events in Bay of Plenty waterbodies. Failing to properly clean and decontaminate vessels and equipment before entering any Bay of Plenty waterbody is a significant risk. It is an offence under Section 52 of the Biosecurity Act to knowingly communicate a pest or unwanted organism e.g. transport it from one waterbody to another. The penalty upon conviction, for an individual person, is imprisonment for a term not exceeding five years and/or a fine not exceeding $100,000.

Introduction

Bay of Plenty Regional Council (BOPRC) is responsible for managing pests named in the Regional Pest Management Plan for the Bay of Plenty region 2011-2016 (RPMP). Council use powers under the Biosecurity Act 1993 to ensure compliance with the RPMP and to protect the region’s natural environment from pests.

The Bay of Plenty region contains a number of lakes and rivers which are popular places for people to recreate and provide habitat for native plant and animal species. Pests can degrade the quality of our waterbodies and impact on native species and people’s enjoyment.

High risk activities and species

The Bay of Plenty is free of a number of pest species, and while some exist within the region, many lakes and rivers remain free of these problematic species. A number of pests are present in New Zealand, the goal of the RPMP is to prevent further pest establishment in the Bay of Plenty.

Particular attention needs to be given to those users who enter Bay of Plenty waterbodies soon after using Lake Taupō, the Waikato River and all its hydro lakes and many water bodies in the Auckland region where a number of freshwater pests reside.

Vessel cleaning and decontamination before entering Bay of Plenty waterbodies

All vessels and equipment used as part of any event in the Bay of Plenty region must:

1. Be thoroughly cleaned before entering and/or moving between water bodies, remove visible live and dead animal and plant material from trailers, anchor wells, nets, waders, fishing equipment or any other spaces or items potentially housing a pest species.
2 Decontaminate all equipment before entering any Bay of Plenty waterbody, instructions for the correct decontamination procedure can be found at: http://www.biosecurity.govt.nz/files/pests/Didymo/2010-freshwater-pests-leaflet.pdf or by contacting a member of BOPRC’s Biosecurity Team.

3 Ensure all jet skis or jet boats have had their jet unit flushed prior to entering the lake. Jet units are particularly risky in terms of pest spread.

4 Ensure all boat trailers are clean, all cavities drained and free of any living or dead plant or animal material. Pest species, particularly pest fish can use these spaces and can be easily transported, particularly if trailers are left submerged in water bodies for extended periods.

Bay of Plenty Regional Council’s RPMP rules regarding the transfer of freshwater pests

Rules apply in regard to freshwater pests within the Bay of Plenty region, BOPRC are authorised under the Biosecurity Act 1993 (the Act) to ensure compliance with these rules. Failing to properly clean and decontaminate your vessels and equipment prior to the event could amount to knowingly communicating a pest, a breach of RPMP rules. Those responsible will be prosecuted under the Act.

Offences

1 A breach of any RPMP rule is an offence under Section 154 of the Biosecurity Act 1993 with individuals liable on conviction of a fine up to $5,000.

Regional Pest Management Plan rules, statutory obligations regarding pest species

Rules specific to aquatic pest species are dependent on their classification. Below is a list of aquatic pest species managed under the RPMP and for whom the rules and statutory obligations apply.

<table>
<thead>
<tr>
<th>RPMP classification</th>
<th>Aquatic pest species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agency Pests</td>
<td>Didymo, Hydrilla, Salvinia, Water hyacinth</td>
</tr>
<tr>
<td>Exclusion/Eradication Pests</td>
<td>Alligator weed, Marshwort, Senegal tea, Spartina, Water poppy, Brown bullhead catfish, Koi carp, Perch</td>
</tr>
<tr>
<td>Containment Pests</td>
<td>Egeria densa (Brazilian waterweed), Hornwort, Lagarosiphon major (oxygen weed), Yellow flag iris, Rudd, Tench</td>
</tr>
<tr>
<td>Restricted Pests</td>
<td>Elodea canadensis (Canadian pondweed), Mexican water lily, Parrots feather, Gambusia</td>
</tr>
</tbody>
</table>

The intentional spread of any of the species listed above is an offence. Below is a summary of the plan rules and statutory obligations related to the RPMP.

<table>
<thead>
<tr>
<th>RPMP Rules</th>
<th>Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>No person shall move or interfere with any article or substance left in place by an authorised person for the purpose of monitoring, controlling or eradicating any pest plant or pest animal.</td>
<td>Section A(1), B(1), C(1), D(1), E(1) F(1), G(1)</td>
</tr>
<tr>
<td>No person shall move, or allow to be moved, any machinery, vessel, organism, risk goods or other goods that are contaminated with any pest.</td>
<td>Section B(2), C(3), D(6), E(3)</td>
</tr>
<tr>
<td>Statutory obligations</td>
<td>No person shall knowingly communicate, cause to be communicated, release, or cause to be released, or otherwise spread any Exclusion and Eradication pest plant or animal</td>
</tr>
</tbody>
</table>

For more information on Freshwater pests visit [http://www.boprc.govt.nz/environment/water/aquatic-pests/](http://www.boprc.govt.nz/environment/water/aquatic-pests/) or contact a Regional Council Biosecurity Officer on 0800 884 880.
Appendix 9

Department of Conservation pest fish sighting signage

STOP THE SPREAD...
and keep Rotorua lakes free of pest fish

Report any sightings of KOI CARP or CATFISH

YOU can help by
• PHOTOGRAPHING any specimens caught and forwarding to your local DOC office
• Following Check Clean Dry protocols

Why are invasive species a problem?
• Reduce water quality
• Can compete with native species and trout

Other fish of particular concern are rudd and gambusia.

For further information, or to report suspicious fish, contact your local DOC office or phone 0800 DOC HOTline

© DOC 2019/20

Aquatic Pest Report 2019-2020
Appendix 10

Boat wash survey

Date: .............................................. Location: ..................................................

Weather: ........................................... Vessel: Boat / Jet ski / Kayak

Place of residence: .................................................................................

Purpose of voyage: Fishing / Water sports / Other

Water source previously come from: Lake / Sea / River

Location: ......................................................................................

Do you know about aquatic weeds / fish: Yes / No

Do you clean your vessel prior to changing water sources: Yes / No

Aquatic weed found on vessel: Yes / No

Type: ............................................................................................