

## 7.2.1 Te noho wātea o te kararehe orotā / Exclusion pest animals

These exclusion pest animals are potential pests which are not known to be established in the **Aotea / Great Barrier island group**. These pest animals all have the potential to establish on Aotea / Great Barrier island group and are capable of causing adverse effects to the island's environmental, economic, human health, social or cultural values. Early intervention to manage pathways and respond in the event of incursions is a cost effective approach to prevent or minimise future costs of these pests within the high ecological value island group.

### 7.2.1.3 Brown bullhead catfish (*Ameiurus nebulosus* syn. *Ictalurus nebulosus*)

Brown bullhead catfish are scaleless dark brown to olive green fish which are most easily distinguished by eight whiskery barbels around the mouth. Adults can grow up to 250-500mm long. They are opportunistic generalist feeders, which have been documented eating common bullies as well as a wide range of invertebrates including kōura. Their presence in wai māori / freshwater bodies can contribute to poor water clarity by extensive consumption of zooplankton, thereby exacerbating algal blooms. Bottom feeding can also cause the re-suspension of sediment and up-rooting of submerged aquatic plants. These impacts can contribute to lakes 'flipping' to an alternative stable state devoid of vegetation, with turbid water dominated by phytoplankton.



Stephen Moore

**Objective:** over the duration of the plan Auckland Council will exclude brown bullhead catfish (*Ameiurus nebulosus*) from establishing on the Aotea / Great Barrier island group to prevent adverse effects on economic well-being, the environment, human health, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** "exclusion" which means to prevent the establishment of brown bullhead catfish on the Aotea / Great Barrier island group.

### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Service delivery (control)  | Enter any property within the specified geographic area of the programme and carry out control work on this species.   |
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest animal.  |
| Education and advice        | Provide information and advice on responsible fishing as well as identification, impacts and control of the pest animal.                                       |

#### 7.2.1.8 *Gambusia* (*Gambusia affinis*)

*Gambusia* are small (3.5-6cm), silver fish which occupy shallow margins of still or slow moving water bodies including lakes, wetlands, ponds and streams. *Gambusia* prey on zooplankton, eggs and larvae of fish, and a diverse range of aquatic and terrestrial macroinvertebrates. This can induce avoidance behaviours such as changes in habitat use in a range of native fish and crustaceans. Their presence in wai māori / freshwater bodies can contribute to poor water clarity by altering patterns of nutrient cycling via the consumption of zooplankton, subsequently exacerbating algal blooms.



Stephen Moore

**Objective:** over the duration of the plan Auckland Council will exclude *Gambusia* (*Gambusia affinis*) from establishing on the Aotea / Great Barrier island group to prevent adverse effects on economic well-being, the environment, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “exclusion” which means to prevent the establishment of *Gambusia* on the Aotea / Great Barrier island group.

### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Service delivery (control)  | Enter any property within the specified geographic area of the programme and carry out control work on this species.   |
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest animal.  |
| Education and advice        | Provide information and advice on responsible fishing as well as identification, impacts and control of the pest animal.                                       |

#### 7.2.1.9 Pest goldfish (*Carassius auratus*)

Pest goldfish are small-medium sized (100-400g) fish which may vary in colour, from red-gold, bronze-black through to olive-green. Pest goldfish are generalist feeders consuming aquatic plants, algae, insects, crustaceans, small fish and fish eggs; potentially competing with native fish for resources. The predation of zooplankton, uprooting of aquatic plants and re-suspension of nutrients and sediments into the water column may contribute to reduced water clarity and algal blooms in invaded wai māori / freshwater ecosystems.



**Objective:** over the duration of the plan Auckland Council will exclude pest goldfish<sup>1</sup> (*Carassius auratus*) from establishing on the Aotea / Great Barrier island group to prevent adverse effects on economic well-being, the environment, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “exclusion” which means to prevent the establishment of goldfish on the Aotea / Great Barrier island group.

<sup>1</sup> A pest goldfish means any goldfish that is not:

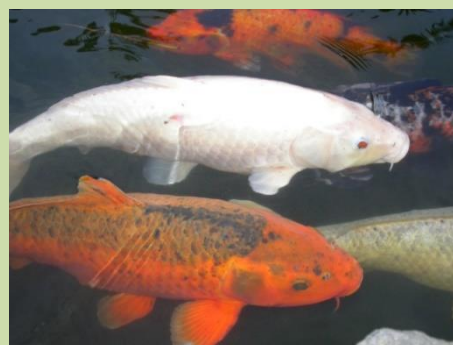
- held in effective containment on private land; or
- otherwise constrained in an enclosed water body on private land.

### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Service delivery (control)  | Enter any property within the specified geographic area of the programme and carry out control work on this species.   |
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, distribution, breeding and release of the pest animal outside of containment.  |
| Education and advice        | Provide information and advice on responsible pet ownership as well as identification and impacts of the pest animal.  |
| Requirement to act          | Pet owners required to effectively contain goldfish.   |

#### 7.2.1.11 Koi carp (*Cyprinus carpio*)

Koi carp are an ornamental strain of common carp measuring up to 700mm long, variable in colour but can be distinguished by the presence of a pair of barbels. Koi carp can negatively impact submerged aquatic plant communities via plant uprooting and reduced light penetration, and alter invertebrate communities via predation and habitat modification. Waterfowl, native fish and kōura are also at risk from increased water turbidity, due to koi carp stirring sediment when feeding, and resource competition. Invasion may contribute to lakes 'flipping' to an alternative stable state devoid of vegetation, with turbid water dominated by phytoplankton.



Stephen Moore

**Objective:** over the duration of the plan Auckland Council will exclude koi carp (*Cyprinus carpio*) from establishing on the Aotea / Great Barrier island group to prevent adverse effects on economic well-being, the environment, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** "exclusion" which means to prevent the establishment of koi carp on the Aotea / Great Barrier island group.

### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Service delivery (control)  | Enter any property within the specified geographic area of the programme and carry out control work on this species.   |
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest animal.  |
| Education and advice        | Provide information and advice on responsible fishing as well as identification, impacts and control of the pest animal.                                       |

#### 7.2.1.13 Perch (*Perca fluviatilis*)

Perch are olive green-grey fish (< 1kg) with six or more dark vertical bands across their sides. They can contribute to poor water clarity via the consumption of zooplankton, thereby exacerbating algal blooms. Feeding habits can also cause the re-suspension of sediment and up-rooting of submerged aquatic plants. Combined effects of zooplankton feeding and bottom feeding habits can contribute to lakes 'flipping' to an alternative stable state devoid of vegetation, with turbid water dominated by phytoplankton. Perch presence has been associated with reduced abundance of common bullies, and impacts are likely on other native fish such as tuna (eels), Īnanga, galaxiids and paraki/smelt through predation, aggressive attacks and competition for prey.



**Objective:** over the duration of the plan Auckland Council will exclude perch (*Perca fluviatilis*) from establishing on the Aotea / Great Barrier island group to prevent adverse effects on economic well-being, the environment, human health, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** "exclusion" which means to prevent the establishment of perch on the Aotea / Great Barrier island group.

### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Service delivery (control)  | Enter any property within the specified geographic area of the programme and carry out control work on this species.   |
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest animal.  |
| Education and advice        | Provide information and advice on responsible fishing as well as identification, impacts and control of the pest animal.                                       |

#### 7.2.1.15 Red-eared slider (*Trachemys scripta elegans*, *T. scripta scripta*, *T. scripta troostii*)

Red-eared sliders are turtles with olive to brown carapaces patterned with yellow spots or stripes, and a distinctive red stripe behind each eye. They inhabit a wide variety of still or slow-moving water bodies including ponds, lakes, wetlands, rivers and drainage ditches. As opportunistic omnivores, potential impacts are likely via herbivory and the predation of zooplankton, molluscs, fish, frogs, crustaceans, insects, gastropods, birds and small reptiles. There are further risks to native reptiles and amphibians via disease transmission. Wetland bird reproductive success may be impacted through the displacement of parent birds from nests to use as basking sites. Feeding habits and associated activities are likely to result in food-web and ecosystem process impacts, and reduced water quality in invaded habitats.



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**Objective:** over the duration of the plan Auckland Council will exclude red-eared sliders and related sub-species (*Trachemys scripta elegans*, *T. scripta scripta*, *T. scripta troostii*) from establishing on the Aotea / Great Barrier island group to prevent adverse effects on economic well-being, the environment, human health, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “exclusion” which means to prevent the establishment of red-eared slider turtles on the Aotea / Great Barrier island group.

**Rules:**

7.2.1.15.1 No person shall move or allow to be moved any red-eared slider to Great Barrier island group.

7.2.1.15.2 No person shall breed red-eared slider on Great Barrier island group.

7.2.1.15.3 No person shall distribute or release (or cause to be released or distributed), any red-eared slider on Great Barrier island group.

The purpose of rules 7.2.1.15.1 and 7.2.1.15.3 is to specify the circumstances in which the pest may be communicated, released, or otherwise spread.

The purpose of rule 7.2.1.15.2 is to regulate activities that may affect measures taken to implement the plan.

A breach of these rules is an offence under s154N(19) of the Biosecurity Act.

**Principal measures of achievement:**

|                             |  |
|-----------------------------|--|
| Service delivery (control)  | Enter any property within the specified geographic area of the programme and carry out control work on this species.   |
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest animal.  |
| Education and advice        | Provide information and advice on responsible pet ownership as well as identification and impacts of the pest animal.  |
| Requirement to act          | Pet owners to ensure secure containment and prevent breeding.  |

### 7.2.1.16 Rudd (*Scardinius erythrophthalmus*)

Rudd are fish with bright red fins, usually 200-250mm as adults, but can be larger. Extensive herbivory can negatively affect aquatic plant growth, survival and community composition, sometimes leading to aquatic plant collapse in lakes. Some high impact aquatic weeds, including hornwort, are selectively avoided by rudd and may thus be further competitively advantaged. They may compete with native fish such as paraki/smelt and common bullies for invertebrate prey. Facilitation of nutrient and sediment suspension in the water column and predation of zooplankton by rudd can contribute to regime shifting of lakes from clear to turbid states.



Stephen Moore

**Objective:** over the duration of the plan Auckland Council will exclude rudd (*Scardinius erythrophthalmus*) from establishing on the Aotea / Great Barrier island group to prevent adverse effects on economic well-being, the environment, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “exclusion” which means to prevent the establishment of rudd on the Aotea / Great Barrier island group.

#### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Service delivery (control)  | Enter any property within the specified geographic area of the programme and carry out control work on this species.   |
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest animal.  |
| Education and advice        | Provide information and advice on responsible fishing as well as identification, impacts and control of the pest animal.                                       |



### 7.2.1.17 Snake-neck turtle (*Chelodina longicollis*)

Snake-neck turtles are medium-sized turtles with characteristically long necks (approximately 60% of the shell length). They are likely to prey on a range of zooplankton, aquatic and terrestrial invertebrates, amphibians, carrion, fish and crustaceans. Snake-neck turtles can dig nesting burrows in the ground which may disturb gardens, golf courses, gravel roads and other recreational land. They are carriers of *Salmonella* and risk transmitting the disease to native reptiles and humans.



**Objective:** over the duration of the plan Auckland Council will exclude snake-neck turtles (*Chelodina longicollis*) from establishing on the Aotea / Great Barrier island group to prevent adverse effects on economic well-being, the environment, human health, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “exclusion” which means to prevent the establishment of snake-neck turtles on the Aotea / Great Barrier island group.

**Rules:**

7.2.1.17.1 No person shall move or allow to be moved any snake-neck turtle to Great Barrier island group.

7.2.1.17.2 No person shall breed snake-neck turtles on Great Barrier island group.

7.2.1.17.3 No person shall distribute or release (or cause to be released or distributed), any snake-neck turtle on Great Barrier island group.

The purpose of rules 7.2.1.17.1 and 7.2.1.17.3 is to specify the circumstances in which the pest may be communicated, released, or otherwise spread.

The purpose of rule 7.2.1.17.2 is to regulate activities that may affect measures taken to implement the plan.

A breach of these rules is an offence under s154N(19) of the Biosecurity Act.

### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Service delivery (control)  | Enter any property within the specified geographic area of the programme and carry out control work on this species.   |
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest animal.  |
| Education and advice        | Provide information and advice on responsible pet ownership as well as identification and impacts of the pest animal.  |
| Requirement to act          | Pet owners to ensure secure containment and prevent breeding.  |

#### 7.2.1.19 Tench (*Tinca tinca*)

Tench are olive green-bronze fish (30-70cm), distinguished by red eyes, two barbels, large soft-rayed fins and copious mucous. They can contribute to poor water clarity via the consumption of zooplankton, thereby exacerbating algal blooms. Bottom feeding also causes the re-suspension of sediment and up-rooting of submerged macrophytes. These combined effects can contribute to lakes 'flipping' to an alternative stable state devoid of vegetation, with turbid water dominated by phytoplankton. Indirect effects to native fish species diversity via transmission of parasites, reduced water clarity, and/or competition for invertebrate prey are also likely.



**Objective:** over the duration of the plan Auckland Council will exclude tench (*Tinca tinca*) from establishing on the Aotea / Great Barrier island group to prevent adverse effects on economic well-being, the environment, human health, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “exclusion” which means to prevent the establishment of tench on the Aotea / Great Barrier island group.

**Principal measures of achievement:**

|                             |  |
|-----------------------------|--|
| Service delivery (control)  | Enter any property within the specified geographic area of the programme and carry out control work on this species.   |
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest animal.  |
| Education and advice        | Provide information and advice on responsible fishing as well as identification, impacts and control of the pest animal.                                       |

## 7.2.2 Te noho wātea o te tupu orotā / Exclusion pest plants

These exclusion pest plants are potential pests which are not known to be established in the Aotea / Great Barrier island group. These pest plants all have the potential to establish on the Aotea / Great Barrier island group and are capable of causing adverse effects to the island's environmental, economic, human health, social or cultural values. Early intervention to manage pathways and respond in the event of incursions is a cost effective approach to prevent or minimise future costs of these pests within the high ecological value island group. Council will undertake active surveillance across the Aotea / Great Barrier island group to detect new pest plant incursions. Council may, at its discretion, undertake incursion responses to species other than those listed in the following section.

**Objective:** over the duration of the plan Auckland Council will exclude the pest plants specified below from establishing on the Aotea / Great Barrier island group to prevent adverse effects on economic well-being, the environment, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “exclusion” which means to prevent the establishment of the pest plants specified below on the Aotea / Great Barrier island group.

### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Service delivery (control)  | Enter any property within the specified geographic area of the programme and carry out control work on this species.   |
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest plant.   |
| Education and advice        | Provide information and advice on identification and impacts of the pest plant, and how to avoid spreading aquatic pest plants.                                |

### Eel grass (*Vallisneria australis*)

Eel grass is a bottom-rooted freshwater aquatic plant with strap-like leaves up to 5.5m long. Male flowers consist of large pollen-filled sacs produced at the base of mature plants. Female flowers are small and green and produced on the end of a very long, spirally coiled stalk that can extend to the water's surface. It is capable of forming dense stands which may displace other submerged plant species in suitable wai māori / freshwater habitats. These stands have the potential to impede drainage, exacerbating flooding, and impede recreational water uses. Entanglement in the pest plant can lead to drowning.



### Elodea (*Elodea canadensis*)

Elodea is a submerged, bottom-rooting freshwater aquatic plant up to 5m tall, with small white and purple flowers borne at the surface of the water from November to January. It can reduce flow velocity and impede gas exchange in wai māori / freshwater ecosystems resulting in lowered dissolved oxygen levels and increased sedimentation. It may also impede water flow in drains, exacerbating flooding.



### Hornwort (*Ceratophyllum demersum*)

Hornwort is a perennial submerged aquatic plant up to 7m tall which can be anchored to sediment by stems, or forms free-floating mats. Leaves are 10-40mm long, narrow, branched and whorled forming complex architecture. Hornwort forms dense monospecific stands which can displace all native submerged vegetation down to 15m depth. The dense stands alter water flow, increase flooding risk and impede recreational access of waterbodies. Because it can grow to greater depths than other aquatic pest plants, it is the species likely to have greatest impacts on deep-water charophyte meadows. Kōura are also likely to be especially impacted due to requirement for open habitat.



Rohan Wells, NIWA

### Lagarosiphon/ oxygen weed (*Lagarosiphon major*)

Oxygen weed is a bottom-rooted submerged perennial aquatic herb with downward curving leaves, arranged in spirals on the stem. It is capable of forming dense stands; displacing native aquatic herb species, altering habitat availability for fish and invertebrates, and affecting dissolved oxygen levels by reducing gas exchange. The stands also can impede recreational water access to water bodies.



Rohan Wells, NIWA

### Parrot's feather (*Myriophyllum aquaticum*)

Parrot's feather is a submerged, bottom-rooted perennial aquatic herb of which the top 10cm of foliage can be emergent. Sprawling foliage is pale grey-green and leaves are finely divided, feathery and arranged in whorls of 4 to 6. It is ranked as one of Aotearoa / New Zealand's worst aquatic pest plants, and is especially problematic in shallow, sheltered, nutrient rich lakes and wetlands. It can displace other plant species through rapid growth, shading and the release of biochemicals, thereby decreasing native plant species' richness. An increase in cover of parrot's feather is also associated with a decrease in invertebrate abundance and diversity in invaded water-bodies.



### 7.2.3 Te murunga o te tupu orotā / Eradication pest plants

These eradication pest plants are present in low numbers or have a limited distribution within the Aotea / Great Barrier island group, and eradicating them appears to be feasible and cost-effective. These pests all have the potential to establish widely on Aotea / Great Barrier island group, and are capable of causing adverse effects to the islands' environmental, economic, human health, social or cultural values. Early intervention to prevent their extensive establishment is a cost effective approach to protecting the island from these pests, many of which are highly damaging elsewhere in the region.

**Objective:** over the duration of the plan Auckland Council will eradicate the pest plants specified below from the Aotea / Great Barrier island group to prevent adverse effects on economic well-being, the environment, human health, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “eradication” which means to reduce the infestation level of the subject to zero levels in an area in the short to medium term.

#### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Service delivery (control)  | Enter any property within the specified geographic area of the programme and carry out control work on this species.   |
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, propagation, distribution and exhibition of the pest plant.  |
| Education and advice        | Provide information and advice on pest plant identification, impacts and control.  |

### Cape pond weed (*Aponogeton distachyos*)

Cape pond weed is a bottom-rooted perennial aquatic plant with surface-floating linear leaves and white flowers borne on spikes emergent above the water's surface. Impacts appear to be relatively minor compared to some other aquatic weed species however there is some potential for competition with native freshwater vegetation, therefore this species is not desirable on Aotea / Great Barrier island group. There is also minor potential for entanglement of recreational equipment on long reaching stems.



### Egeria (*Egeria densa*)

Egeria is a bottom-rooted submerged perennial aquatic herb with long stems (3m and over) and white flowers borne at the water's surface between November and January. It forms dense stands displacing native aquatic plants and altering the habitat structure of macroinvertebrates and fish. Resultant impacts can include lowered dissolved oxygen levels, increased sedimentation, changes to primary production and nutrient cycling capacity of the invaded water body.



### Water plantain (*Alisma plantago-aquatica*)

Water plantain is an emergent perennial herb up to 1m tall with oval leaves and multi-branched clusters of small pale lilac flowers produced in summer. It invades wetlands and other slow-moving water bodies impeding water flow, trapping debris causing silt to build up and potentially displacing native species where it occurs. It will also grow in damp pasture and has the potential to exacerbate flooding due to impeded drainage ditches.





## 7.6 Ngā roto aronga matua / Priority lakes Rototoa and Tomarata

Kua heke kē te pai o ngā wai māori o Tāmaki Makaurau, kua uru kē atu ētahi momo orotā. Ahakoa he orotā kei Tomarata me Rototoa, kei runga e mau tonu ana ki ōnā wai māori, ōna uara kanorau-koiora. Engari, e tūpono hinga ēnei pūnaha hauropi nā ngā āhua orotā me ētahi atu pēhitanga, e ngaro ai pea ētahi o ngā māra tupu whāngai ora ki te pūnaha hauropi o te wai, tae atu hoki ki te ngaro o te waikaka - he ika wai māori. Ko ngā wāhanga e whai ake nei e hāngai ana ki te aro, ki te whāinga i te wāhi motuhake e taea ai ngā tipu me ngā koiora orotā te aukati i ēnei roto matua e rua, hei tiaki me te whakaora ake anō i ēnei pūnaha hauropi.

Most wai māori / freshwater bodies in mainland Tāmaki Makaurau / Auckland are degraded, with some pest species already present. While Tomarata and Rototoa do have some pests present, they retain relatively high freshwater biodiversity values. However, these ecosystems are at imminent risk of collapse due to pests and other pressures, leading to the likely loss of charophyte meadow ecosystems from the region, and loss of important populations of at-risk native species such as waikaka / black mudfish. The following sections encompass a site-led approach to manage a suite of pest plants and animals at these two top priority lakes to protect and restore these ecosystems. Other pest species may also be managed at these sites if required over the lifetime of the plan. These programmes will take an adaptive management approach, informed by research and monitoring of progress towards outcomes (biodiversity and water quality) (see also 4.2.8).



An infestation of hornwort © Rohan Wells, NIWA

### 7.6.1 Wāhi whai tupu orotā / Site-led pest plants

**Objective:** over the duration of the plan Auckland Council will manage the pest plants specified below to protect values in place to prevent adverse effects on the sustainability and recreational enjoyment of natural ecosystems of priority lakes, and the ecological processes and biological diversity therein.

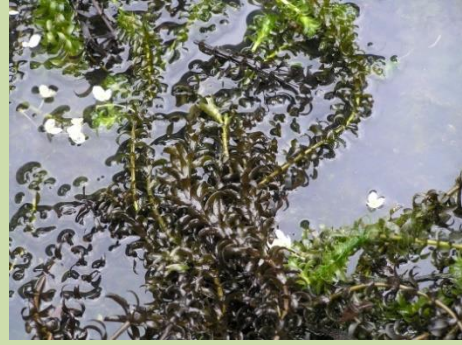
**Intermediate outcome:** “protecting values in places” which means that the subject, that is capable of causing damage to lakes Tomarata and Rototoa, is controlled within the lakes to an extent that protects the values of the lakes.

#### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Service delivery (control)  | Manage the pest plant in lakes Tomarata and Rototoa to levels that enhance ecosystem function and resilience, and protect the values of the lakes, as part of an integrated multi-species programme.   |
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations and status of existing or historical sites. Monitor progress towards outcomes sought at sites (biodiversity and water quality) to inform management approaches. |
| Education and advice        | Provide information and advice on pest plant identification, impacts and control.<br>Provide support and advice to community groups undertaking pest management in and around priority lakes.  |
| Research and development    | Collaborate with research agencies to improve tools and understanding of freshwater invasive species management.   |

### **Egeria (*Egeria densa*)**

Egeria is a bottom-rooted submerged perennial aquatic herb with long stems (3m and over) and white flowers borne at the water's surface between November and January. It forms dense stands displacing native aquatic plants and altering the habitat structure of macroinvertebrates and fish. Resultant impacts can include lowered dissolved oxygen levels, increased sedimentation, changes to primary production and nutrient cycling capacity of the invaded water body.



### **Hornwort (*Ceratophyllum demersum*)**

Hornwort is a perennial submerged aquatic plant up to 7m tall which can be anchored to sediment by stems, or form free-floating mats. Leaves are 10-40mm long, narrow, branched and whorled forming complex architecture. Hornwort forms dense monospecific stands which can displace all native submerged vegetation down to 15m depth. The dense stands alter water flow, increase flooding risk and impede recreational access of waterbodies. Because it can grow to greater depths than other aquatic weeds, it is the species likely to have greatest impacts on deep-water charophyte meadows. Kōura are also likely to be especially impacted due to requirement for open habitat.



Rohan Wells, NIWA

## 7.6.2 Wāhi whai kararehe orotā / Site-led pest animals

**Objective:** over the duration of the plan Auckland Council will manage the pest animals specified below to protect values in place to prevent adverse effects on the sustainability and recreational enjoyment of natural ecosystems of priority lakes, and the ecological processes and biological diversity therein.

**Intermediate outcome:** “protecting values in places” which means that the subject, that is capable of causing damage to lakes Tomarata and Rototoa, is controlled within the lakes to an extent that protects the values of the lakes.

### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Service delivery (control)  | Manage the pest animal in lakes Tomarata and Rototoa to levels that enhance ecosystem function and resilience, and protect the values of the lakes, as part of an integrated multi-species programme.  |
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations and status of existing or historical sites. Monitor progress towards outcomes sought at sites (biodiversity and water quality) to inform management approaches. |
| Education and advice        | Provide information and advice on pest animal identification, impacts and control.<br>Provide support and advice to community groups undertaking pest management in and around priority lakes.   |
| Research and development    | Collaborate with research agencies to improve tools and understanding of freshwater invasive species management.   |

**Brown bullhead catfish (*Ameiurus nebulosus*  
syn. *Ictalurus nebulosus*)**

Brown bullhead catfish are scale-less dark brown to olive green fish which are most easily distinguished by eight whiskery barbels around the mouth. Adults can grow up to 250-500mm long. They are opportunistic generalist feeders, which have been documented eating common bullies as well as a wide range of invertebrates including kōura. Their presence in freshwater bodies can contribute to poor water clarity by extensive consumption of zooplankton, thereby exacerbating algal blooms. Bottom-feeding can also cause the re-suspension of sediment and up-rooting of submerged aquatic plants. These impacts can contribute to lakes 'flipping' to an alternative stable state devoid of vegetation, with turbid water dominated by phytoplankton.



Stephen Moore

**Koi carp (*Cyprinus carpio*)**

Koi carp are an ornamental strain of common carp measuring up to 700mm long which are variable in colour but can be distinguished by the presence of a pair of barbels. Koi carp can negatively impact submerged aquatic plant communities via plant uprooting and reduced light penetration, and alter invertebrate communities via predation and habitat modification. Waterfowl, native fish and kōura are also at risk from increased water turbidity, due to koi carp stirring sediment when feeding, and resource competition. Invasion may contribute to lakes 'flipping' to an alternative stable state devoid of vegetation, with turbid water dominated by phytoplankton.



Stephen Moore

### Perch (*Perca fluviatilis*)

Perch are olive green-grey fish (< 1kg) with six or more dark vertical bands across their sides. They can contribute to poor water clarity via the consumption of zooplankton, thereby exacerbating algal blooms. Feeding habits can also cause the re-suspension of sediment and up-rooting of submerged aquatic plants. Combined effects of zooplankton feeding and bottom feeding habits can contribute to lakes 'flipping' to an alternative stable state devoid of vegetation, with turbid water dominated by phytoplankton. Perch presence has shown to reduce the abundance of common bullies, and impacts are likely on other native fish such as tuna (eels), īnanga, galaxiids and paraki/smelt through predation, aggressive attacks and competition for prey.



### Rudd (*Scardinius erythrophthalmus*)

Rudd are fish with bright red fins, usually 200-250mm as adults, but can be larger. Extensive herbivory can negatively affect aquatic plant growth, survival and community composition, sometimes leading to aquatic plant collapse in lakes. Some high impact aquatic weeds, including hornwort, are selectively avoided by rudd and may thus be further competitively advantaged. They may compete with native fish such as paraki/smelt and common bullies for invertebrate prey. Facilitation of nutrient and sediment suspension in the water column and predation of zooplankton by rudd can contribute to regime shifting of lakes from clear to turbid states.



Stephen Moore

### Tench (*Tinca tinca*)

Tench are olive green-bronze fish (30-70cm), distinguished by red eyes, two barbels, large soft-rayed fins and copious mucous. They can contribute to poor water clarity via the consumption of zooplankton, thereby exacerbating algal blooms. Bottom-feeding also causes the re-suspension of sediment and up-rooting of submerged macrophytes. These combined effects can contribute to lakes 'flipping' to an alternative stable state devoid of vegetation, with turbid water dominated by phytoplankton. Indirect effects to native fish species diversity via transmission of parasites, reduced water clarity, and/or competition for invertebrate prey are also likely.



### 7.7.3 Te mau tonu o te patu kararehe orotā / Sustained Control pest animals

The species in the following Sustained Control programmes vary greatly in their distribution across the region; some are currently present only in containment (e.g. as pets), while others are already well established in the wild and spreading. Nonetheless, all these species have the potential for economic and/or environmental impacts, and for all of these species there is value in reducing the risk of humans assisting the establishment or further spread of pest populations. The following programmes therefore manage these pest animals through rules and accompanying education and awareness programmes designed to reduce risk of pests being spread through activities such as recreational fishing, pet ownership, movement of risk goods, and recreational use of natural areas. In some instances, Council may also undertake direct control of pest animals as well, generally aligned with biodiversity focus areas.

#### 7.7.3.4 Brown bullhead catfish (*Ameiurus nebulosus*)

Brown bullhead catfish are scaleless dark brown to olive green fish which are most easily distinguished by eight whiskery barbels around the mouth. Adults can grow up to 250-500mm long. They are opportunistic generalist feeders, which have been documented eating common bullies as well as a wide range of invertebrates including kōura. Their presence in wai māori / freshwater bodies can contribute to poor water clarity by extensive consumption of zooplankton, thereby exacerbating algal blooms. Bottom-feeding can also cause the re-suspension of sediment and up-rooting of submerged aquatic plants. These impacts can contribute to lakes 'flipping' to an alternative stable state devoid of vegetation, with turbid water dominated by phytoplankton.



Stephen Moore

**Objective:** over the duration of the plan Auckland Council will sustainably control brown bullhead catfish (*Ameiurus nebulosus*) to prevent adverse effects on economic well-being, the environment, human health, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “sustained control” which means to provide for ongoing control of brown bullhead catfish, to reduce their impacts and spread to other properties.



## Rules:

7.7.3.4.1 No person shall distribute or release (or cause to be released or distributed) any brown bullhead catfish in any part of the Auckland region.

7.7.3.4.2 No person may fish for brown bullhead catfish in High Conservation Value water bodies or their catchments (see Appendix 3), or anywhere in the Hauraki Gulf Controlled Area.

A breach of this rule is an offence under s154N(19) of the Biosecurity Act.

The purpose of rule 7.7.3.4.1 is to specify the circumstances in which the pest may be communicated, released, or otherwise spread.

The purpose of rule 7.7.3.4.2 is to regulate activities that may affect measures taken to implement the plan.

## Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of pet shops, markets and online pet trade.<br>Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new incursions and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest, its release from containment, and fishing in High Conservation Value water bodies.  |
| Education and advice        | Provide information and advice on responsible fishing.<br>Provide information and advice on identification, impacts and control of the pest animal.  |

See also section 1 for Aotea / Great Barrier Exclusion programme and section 7.6.2 for priority lakes site-led programme.

### 7.7.3.11 **Gambusia (*Gambusia affinis*)**

Gambusia are small (3.5-6cm), silver fish which occupy shallow margins of still or slow moving water bodies including lakes, wetlands, ponds and streams. Gambusia prey on zooplankton, eggs and larvae of fish, and a diverse range of aquatic and terrestrial macroinvertebrates. This can induce avoidance behaviours such as changes in habitat use in a range of native fish and crustaceans. Their presence in wai māori / freshwater bodies can contribute to poor water clarity by altering patterns of nutrient cycling via the consumption of zooplankton, subsequently exacerbating algal blooms.



Stephen Moore

**Objective:** over the duration of the plan Auckland Council will sustainably control gambusia (*Gambusia affinis*) to prevent adverse effects on economic well-being, the environment, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “sustained control” which means to provide for ongoing control of gambusia, to reduce their impacts and spread to other properties.

#### **Rules:**

7.7.3.11.1 No person shall distribute or release (or cause to be released or distributed) any gambusia in any part of the Auckland region.

7.7.3.11.2 No person may fish for gambusia in High Conservation Value water bodies or their catchments (see Appendix 3), or anywhere in the Hauraki Gulf Controlled Area.

A breach of these rules is an offence under s154N(19) of the Biosecurity Act.

The purpose of rule 7.7.3.11.1 is to specify the circumstances in which the pest may be communicated, released, or otherwise spread.

The purpose of rule 7.7.3.11.2 is to regulate activities that may affect measures taken to implement the plan.

### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of pet shops, markets and online pet trade.<br>Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new incursions and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest, its release from containment, and fishing.  |
| Education and advice        | Provide information and advice on responsible fishing.<br>Provide information and advice on identification, impacts and control of the pest animal.  |

See also section 1 for Aotea / Great Barrier Exclusion programme and section 7.6.2 for priority lakes site-led programme.

### 7.7.3.12 Pest goldfish (*Carassius auratus*)

Pest goldfish are small-medium sized (100-400g) fish which may vary in colour, from red-gold, bronze-black through to olive-green. Pest goldfish are generalist feeders consuming aquatic plants, algae, insects, crustaceans, small fish and fish eggs; potentially competing with native fish for resources. The predation of zooplankton, uprooting of aquatic plants and re-suspension of nutrients and sediments into the water column may contribute to reduced water clarity and algal blooms in invaded freshwater ecosystems.



**Objective:** over the duration of the plan Auckland Council will sustainably control pest goldfish<sup>2</sup> (*Carassius auratus*) to prevent adverse effects on economic well-being, the environment, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “sustained control” which means to provide for ongoing control of goldfish, to reduce their impacts and spread to other properties.

**Rules:**

7.7.3.12.1 No person shall release from containment (or cause to be released) any goldfish within the Auckland region.

A breach of this rule is an offence under s154N(19) of the Biosecurity Act.

The purpose of rule 7.7.3.12.1 is to specify the circumstances in which the pest may be communicated, released, or otherwise spread.

**Principal measures of achievement:**

|                      |  |
|----------------------|--|
| Education and advice | Provide information and advice on responsible pet ownership as well as identification, impacts and control of the pest animal. |
| Enforcement          | Enforce prohibition of release from secure containment.  |

See also section 1 for Aotea / Great Barrier Exclusion programme.

<sup>2</sup> A pest goldfish means any goldfish that is not:

- a) held in effective containment on private land; or
- b) otherwise constrained in an enclosed water body on private land.

### 7.7.3.15 Koi carp (*Cyprinus carpio*)

Koi carp are an ornamental strain of common carp measuring up to 700mm long which are variable in colour but can be distinguished by the presence of a pair of barbels. Koi carp can negatively impact submerged aquatic plant communities via plant uprooting and reduced light penetration, and alter invertebrate communities via predation and habitat modification. Waterfowl, native fish and kōura are also at risk from increased water turbidity, due to koi carp stirring sediment when feeding, and resource competition. Invasion may contribute to lakes 'flipping' to an alternative stable state devoid of vegetation, with turbid water dominated by phytoplankton.



Stephen Moore

**Objective:** over the duration of the plan Auckland Council will sustainably control koi carp (*Cyprinus carpio*) to prevent adverse effects on economic well-being, the environment, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** "sustained control" which means to provide for ongoing control of koi carp, to reduce their impacts and spread to other properties.

**Rules:**

7.7.3.15.1 No person shall distribute or release (or cause to be released or distributed) any koi carp in any part of the Auckland region.

7.7.3.15.2 No person may fish koi carp in High Conservation Value water bodies or their catchments (see Appendix 3), or anywhere in the Hauraki Gulf Controlled Area.

A breach of these rules is an offence under s154N(19) of the Biosecurity Act.

The purpose of rule 7.7.3.15.1 is to specify the circumstances in which the pest may be communicated, released, or otherwise spread.

The purpose of rule 7.7.3.15.2 is to regulate activities that may affect measures taken to implement the plan.

### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of pet shops, markets and online pet trade.<br>Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new incursions and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest, its release from containment, and fishing in High Conservation Value water bodies.  |
| Education and advice        | Provide information and advice on responsible fishing.<br>Provide information and advice on identification, impacts and control of the pest animal.  |

See also section 1 for Aotea / Great Barrier Exclusion programme and section 7.6.2 for priority lakes site-led programme.

#### 7.7.3.21 Perch (*Perca fluviatilis*)

Perch are olive green-grey fish (< 1kg) with six or more dark vertical bands across their sides. They can contribute to poor water clarity via the consumption of zooplankton, thereby exacerbating algal blooms. Feeding habits can also cause the re-suspension of sediment and up-rooting of submerged aquatic plants. Combined effects of zooplankton feeding and bottom-feeding habits can contribute to lakes 'flipping' to an alternative stable state devoid of vegetation, with turbid water dominated by phytoplankton. Perch presence has shown to reduce the abundance of common bullies, and impacts are likely on other native fish such as tuna (eels), īnanga, galaxiids and paraki/smelt through predation, aggressive attacks and competition for prey.



**Objective:** over the duration of the plan Auckland Council will sustainably control perch (*Perca fluviatilis*) to prevent adverse effects on economic well-being, the environment, human health, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “sustained control” which means to provide for ongoing control of perch, to reduce their impacts and spread to other properties.

**Rules:**

7.7.3.21.1 No person shall distribute or release (or cause to be released or distributed) any perch in any part of the Auckland region.

7.7.3.21.2 No person may fish for perch in any High Conservation Value water body or their catchments (see Appendix 3) in the Auckland region.

A breach of these rules is an offence under s154N(19) of the Biosecurity Act.

The purpose of rule 7.7.3.21.1 is to specify the circumstances in which the pest may be communicated, released, or otherwise spread.

The purpose of rule 7.7.3.21.2 is to regulate activities that may affect measures taken to implement the plan.

**Principal measures of achievement:**

|                             |  |
|-----------------------------|--|
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of pet shops, markets and online pet trade.<br>Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new incursions and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest, its release from containment, and fishing in High Conservation Value water bodies.  |
| Education and advice        | Provide information and advice on responsible fishing.<br>Provide information and advice on identification, impacts and control of the pest animal.  |

See also section 1 for Aotea / Great Barrier Exclusion programme and section 7.6.2 for priority lakes site-led programme.

### 7.7.3.26 Red-eared slider (*Trachemys scripta elegans*, *T. scripta scripta*, *T. scripta troostii*)

Red-eared sliders are turtles with olive to brown carapaces patterned with yellow spots or stripes, and a distinctive red stripe behind each eye. They inhabit a wide variety of still or slow-moving water bodies including ponds, lakes, wetlands, rivers and drainage ditches. As opportunistic omnivores, potential impacts via herbivory and the predation of zooplankton, molluscs, fish, frogs, crustaceans, insects, gastropods, birds and small reptiles are likely. There are further risks to native reptiles and amphibians via disease transmission. Wetland bird reproductive success may be impacted through the displacement of parent birds from nests to use as basking sites. Feeding habits and associated activities are likely to result in food-web and ecosystem process impacts, and reduced water quality in invaded habitats.



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**Objective:** over the duration of the plan Auckland Council will sustainably control red-eared sliders and related sub-species (*Trachemys scripta elegans*, *T. scripta scripta*, *T. scripta troostii*) to prevent adverse effects on economic well-being, the environment, human health, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “sustained control” which means to provide for ongoing control of red-eared sliders, to reduce their impacts and spread to other properties.

#### **Rules:**

- 7.7.3.26.1 No person shall cause to breed any red-eared slider or other sub-species of *Trachemys scripta* within the Auckland region.
- 7.7.3.26.2 No person shall distribute or release (or cause to be released or distributed), any red-eared slider or other sub-species of *Trachemys scripta* within the Auckland region.
- 7.7.3.26.3 No person shall sell or offer for sale any red-eared slider or other sub-species of *Trachemys scripta* within the Auckland region.

A breach of these rules is an offence under s154N(19) of the Biosecurity Act.

The purpose of rule 7.7.3.26.1 is to regulate activities that may affect measures taken to implement the plan.



The purpose of rules 7.7.3.26.2 and 7.7.3.26.3 is to specify the circumstances in which the pest may be communicated, released, or otherwise spread.

Rules 7.7.3.26.1, 7.7.3.26.2 and 7.7.3.26.3 come into force on 1 April 2021.

**Principal measures of achievement:**

|                             |  |
|-----------------------------|--|
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of pet shops, markets and online pet trade. Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations outside of containment and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest.   |
| Education and advice        | Provide information and advice on responsible pet ownership as well as identification, impacts and control of the pest animal.   |

See also section 1 for Aotea / Great Barrier Exclusion programme.

### 7.7.3.27 **Rudd (*Scardinius erythrophthalmus*)**

Rudd are fish with bright red fins, usually 200-250mm as adults, but can be larger. Extensive herbivory can negatively affect aquatic plant growth, survival and community composition, sometimes leading to aquatic plant collapse in lakes. Some high impact aquatic weeds, including hornwort, are selectively avoided by rudd and may thus be further competitively advantaged. They may compete with native fish such as paraki/smelt and common bullies for invertebrate prey. Facilitation of nutrient and sediment suspension in the water column and predation of zooplankton by rudd can contribute to regime shifting of lakes from clear to turbid states.



Stephen Moore

**Objective:** over the duration of the plan Auckland Council will sustainably control rudd (*Scardinius erythrophthalmus*) to prevent adverse effects on economic well-being, the environment, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “sustained control” which means to provide for ongoing control of rudd, to reduce their impacts and spread to other properties.

**Rules:**

7.7.3.27.1 No person shall distribute or release (or cause to be released or distributed) any rudd in any part of the Auckland region.

7.7.3.27.2 No person may fish for rudd in any High Conservation Value water body or their catchments (see Appendix 3) in the Auckland region.

A breach of these rules is an offence under s154N(19) of the Biosecurity Act.

The purpose of rule 7.7.3.27.1 is to specify the circumstances in which the pest may be communicated, released, or otherwise spread.

The purpose of rule 7.7.3.27.2 is to regulate activities that may affect measures taken to implement the plan.

### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of pet shops, markets and online pet trade.<br>Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new incursions and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest, its release from containment, and fishing.  |
| Education and advice        | Provide information and advice on responsible fishing.<br>Provide information and advice on identification, impacts and control of the pest animal.  |

See also section 1 for Aotea / Great Barrier Exclusion programme and section 7.6.2 for priority lakes site-led programme.

#### 7.7.3.29 Snake-neck turtle (*Chelodina longicollis*)

Snake-neck turtles are medium-sized turtles with characteristically long necks (approximately 60% of the shell length). They are likely to predate on a range of zooplankton, aquatic and terrestrial invertebrates, amphibians, carrion, fish and crustaceans. Snake-neck turtles can dig nesting burrows in the ground which may disturb gardens, golf courses, gravel roads and other recreational land. They are carriers of *Salmonella* and risk transmitting the disease to native reptiles and humans.



**Objective:** over the duration of the plan Auckland Council will sustainably control snake-neck turtles (*Chelodina longicollis*) to prevent adverse effects on economic well-being, the environment, human health, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “sustained control” which means to provide for ongoing control of snake-neck turtles, to reduce their impacts and spread to other properties.

### Rules:

7.7.3.29.1 No person shall cause to breed any snake-neck turtle within the Auckland region.

7.7.3.29.2 No person shall distribute or release (or cause to be released or distributed), any snake-neck turtle within the Auckland region.

7.7.3.29.3 No person shall sell or offer for sale any snake-neck turtle within the Auckland region.

A breach of these rules is an offence under s154N(19) of the Biosecurity Act.

The purpose of rule 7.7.3.29.1 is to regulate activities that may affect measures taken to implement the plan.

The purpose of rules 7.7.3.29.2 and 7.7.3.29.3 is to specify the circumstances in which the pest may be communicated, released, or otherwise spread.

Rules 7.7.3.29.1, 7.7.3.29.2 and 7.7.3.29.3 come into force on 1 April 2021.

### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of pet shops, markets and online pet trade. Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new infestations outside of containment and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest.   |
| Education and advice        | Provide information and advice on responsible pet ownership as well as identification, impacts and control of the pest animal.   |

See also section 1 for Aotea / Great Barrier Exclusion programme.

### 7.7.3.30 Tench (*Tinca tinca*)

Tench are olive green-bronze fish (30-70cm), distinguished by red eyes, two barbels, large soft-rayed fins and copious mucous. They can contribute to poor water clarity via the consumption of zooplankton, thereby exacerbating algal blooms. Bottom-feeding also causes the re-suspension of sediment and up-rooting of submerged macrophytes. These combined effects can contribute to lakes 'flipping' to an alternative stable state devoid of vegetation, with turbid water dominated by phytoplankton. Indirect effects to native fish species diversity via transmission of parasites, reduced water clarity, and/or competition for invertebrate prey are also likely.



**Objective:** over the duration of the plan Auckland Council will sustainably control tench (*Tinca tinca*) to prevent adverse effects on economic well-being, the environment, human health, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** "sustained control" which means to provide for ongoing control of tench, to reduce their impacts and spread to other properties.

**Rules:**

7.7.3.30.1 No person shall distribute or release (or cause to be released or distributed) any tench in any part of the Auckland region.

7.7.3.30.2 No person may fish for tench in any High Conservation Value water body or their catchments (see Appendix 3) in the Auckland region.

A breach of these rules is an offence under s154N(19) of the Biosecurity Act.

The purpose of rule 7.7.3.30.1 is to specify the circumstances in which the pest may be communicated, released, or otherwise spread.

The purpose of rule 7.7.3.30.2 is to regulate activities that may affect measures taken to implement the plan.

### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Monitoring and surveillance | Undertake inspections, monitoring and surveillance of pet shops, markets and online pet trade.<br>Undertake inspections, monitoring and surveillance of key risk areas to determine the presence of new incursions and status of existing or historical sites. |
| Enforcement                 | Enforce restrictions on the sale, breeding, distribution and exhibition of the pest, its release from containment, and fishing.  |
| Education and advice        | Provide information and advice on responsible fishing.<br>Provide information and advice on identification, impacts and control of the pest animal.  |

See also section 1 for Aotea / Great Barrier Exclusion programme and section 7.6.2 for priority lakes site-led programme.

### 7.7.10 Te mau tonu o te patu tupu orotā / Sustained Control pest plants

The species in the following Sustained Control programmes vary greatly in their distribution across the region; some are not currently known to be established in the region, while others are already widespread pest plants. Nonetheless, all these species have the potential for economic and/or environmental impacts, and for all of these species there is value in reducing the risk of humans assisting the establishment or further spread of pest populations. The following programmes therefore manage these pest plants through rules and accompanying education and awareness programmes designed to reduce risk of pests being spread through gardening and other activities, and also to encourage land occupiers to undertake pest management on their own properties.

**Objective:** over the duration of the plan Auckland Council will sustainably control the pest plants specified below to prevent adverse effects on economic well-being, the environment, enjoyment of the natural environment and the relationship between Māori, their culture, their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.

**Intermediate outcome:** “sustained control” which means to provide for ongoing control of the pest plants specified below, to reduce their impacts and spread to other properties.

#### Rules:

- 7.7.10.1.1 No person shall cause to breed any Sustained Control Pest Plant within the Auckland region.
- 7.7.10.1.2 No person shall distribute or release (or cause to be released or distributed), any Sustained Control Pest Plant within the Auckland region.
- 7.7.10.1.3 No person shall sell or offer for sale any Sustained Control Pest Plant within the Auckland region.
- 7.7.10.1.4 No person may plant or allow to be planted any Sustained Control Pest Plant (specified below) on or in any land within the Auckland region.
- 7.7.10.1.5 Despite rule 7.7.10.1.4, a person may transfer or allow to be transferred an existing Sustained Control Pest Plant planted on their land from one location to another location within the boundaries of the same property. This exception does not apply to the following freshwater pest plants: alligator weed, bladderwort, Chilean rhubarb, eel grass, egeria, hornwort, giant reed, lagarosiphon, parrot’s feather, reed sweet grass, water primrose.

7.7.10.1.6 All occupiers of land in the Auckland region must destroy any Sustained Control Pest Plant that has been planted on their land in breach of the RPMP, if directed to do so by an authorised person.

The purpose of rules 7.7.10.1.1, 7.7.10.1.2, 7.7.10.1.3, 7.7.10.1.4 and 7.7.10.1.5 is to specify the circumstances in which the pest may be communicated, released, or otherwise spread.

The purpose of rule 7.7.10.1.6 is to require the occupier of a place to take specified actions to eradicate or manage the pest or a specified pest agent on the place.

A breach of these rules is an offence under s154N(19) of the Biosecurity Act.

Rules 7.7.10.1.1 to 7.7.10.1.6 come into force on 1 April 2020 for the following species: bamboo species, berry heath, black wattle, Brazilian rattlebox, Californian thistle, *Carex scoparia*, century plant, Chinese holly grape, dally pine, divided sedge, giant rhubarb, guava, hakea, holly-leaved senecio, *Hydrocotyle umbellata*, loquat, marram grass, Mexican devil, prickly-leaved wattle, red dragon, red valerian, salt water paspalum, *Selaginella* spp., sharp rush, Spanish broom, Sydney golden wattle, tree lupin.

Rules 7.7.10.1.1 to 7.7.10.1.6 come into force on 1 April 2021 for the following species: alder, bangalow palm, Canary Island ivy, Chinese fan palm, creeping fig, fatsia, furcraea, Japanese cherry, Morton Bay fig, Queensland umbrella tree, soap aloe, yellow guava.

### Principal measures of achievement:

|                             |  |
|-----------------------------|--|
| Service delivery            | Facilitate the development and release of biocontrol for targeted species, which may include (but not limited to) African club moss, alligator weed, blue morning glory, boneseed, boxthorn, Californian thistle, climbing asparagus, giant reed, gorse, grey willow, hornwort, Japanese honeysuckle, jasmine, moth plant, Mexican daisy, pampas grass, privet (tree and Chinese), ragwort, rhamnus, royal fern, salt water paspalum, tradescantia, tutsan, wild ginger and woolly nightshade. |
| Monitoring and surveillance | <p>Undertake inspections, monitoring and surveillance of nurseries, markets and online plant trade.</p> <p>Undertake monitoring and surveillance of biocontrol agent dispersal and impacts.</p> <p>Undertake surveillance to understand emerging trends in pest plant naturalisations and impacts.</p>   |



|                          |   |
|--------------------------|---|
| Enforcement              | Enforce restrictions on the sale, propagation, distribution and exhibition of the pest plant.   |
| Education and advice     | <p>Provide information and advice on pest plant identification, impacts and control.</p> <p>Provide information and advice on responsible gardening practices including safe disposal of organic refuse, and alternative planting choices.</p> <p>Support nursery industry initiatives, including breeding of low fertility forms, aimed at reducing biosecurity risk of nursery stock.</p> <p>Provide advice and support to community groups undertaking pest plant control, with priority given firstly to activity in or around biodiversity focus areas and secondly to work in or around SEAs. Facilitate community biocontrol activity for moth plant, tradescantia and other ecologically damaging pest plants of high priority to the community. Facilitate coordination within the region and inter-regionally to improve pest management outcomes through aligned action, including data sharing.</p> |
| Research and development | Facilitate research on pest plant impacts and management tools, including but not limited to biocontrol and emerging technology such as drones that may improve ability to deliver effective pest plant control in remote or difficult to access areas.   |
| Requirement to act       | Land occupiers to destroy plants when instructed.   |

### Eel grass (*Vallisneria australis*)

Eel grass is a bottom-rooted freshwater aquatic plant with strap-like leaves up to 5.5m long. Male flowers consist of large pollen-filled sacs produced at the base of mature plants. Female flowers are small and green and produced on the end of a very long, spirally coiled stalk that can extend to the water's surface. It is capable of forming dense stands which may displace other submerged plant species in suitable wai māori / freshwater habitats. These stands have the potential to impede drainage, exacerbating flooding, and impede recreational water uses. Entanglement in the weed can lead to drowning.



### **Egeria (*Egeria densa*)**

Egeria is a bottom-rooted submerged perennial aquatic herb with long stems (3m and over) and white flowers borne at the water's surface between November and January. It forms dense stands displacing native aquatic plants and altering the habitat structure of macroinvertebrates and fish. Resultant impacts can include lowered dissolved oxygen levels, increased sedimentation, changes to primary production and nutrient cycling capacity of the invaded water body.



### **Hornwort (*Ceratophyllum demersum*)**

Hornwort is a perennial submerged aquatic plant up to 7m tall which can be anchored to sediment by stems, or forms free-floating mats. Leaves are 10-40mm long, narrow, branched and whorled forming complex architecture. Hornwort forms dense monospecific stands which can displace all native submerged vegetation down to 15m depth. The dense stands alter water flow, increase flooding risk and impede recreational access of waterbodies. Because it can grow to greater depths than other aquatic weeds, it is the species likely to have greatest impacts on deep-water charophyte meadows. Kōura are also likely to be especially impacted due to requirement for open habitat.



Rohan Wells, NIWA

### **Lagarosiphon/oxygen weed (*Lagarosiphon major*)**

Oxygen weed is a bottom-rooted submerged perennial aquatic herb with downward curving leaves, arranged in spirals on the stem. It is capable of forming dense stands; displacing native aquatic herb species, altering habitat availability for fish and invertebrates, and affecting dissolved oxygen levels by reducing gas exchange. The stands can also impede recreational water access to water bodies.



Rohan Wells, NIWA

### Mexican water lily (*Nymphaea mexicana*)

Mexican water lily is a perennial bottom-rooted aquatic herb with floating heart-shaped leaves and yellow flowers borne above the water surface from October to December. It forms dense mats which can reduce dissolved oxygen levels in the water column by preventing gas exchange between water and air, and may suppress submerged aquatic plants by shading. Impacts on fish, zooplankton and other species resulting from low dissolved oxygen are probable.



Rohan Wells, NIWA

### Parrot's feather (*Myriophyllum aquaticum*)

Parrot's feather is a submerged, bottom-rooted perennial aquatic herb of which the top 10cm of foliage can be emergent. Sprawling foliage is pale grey-green and leaves are finely divided, feathery and arranged in whorls of 4 to 6. It is ranked as one of Aotearoa / New Zealand's worst aquatic pest plants, and is especially problematic in shallow, sheltered, nutrient rich lakes and wetlands. It can displace other plant species through rapid growth, shading and the release of biochemicals, thereby decreasing native plant species richness. An increase in cover of parrot's feather is also associated with a decrease in invertebrate abundance and diversity in invaded water-bodies.



### Yellow water lily (*Nuphar lutea*)

Also known as: brandy bottle

Yellow water lily is a perennial aquatic plant with both floating oval leaves and submerged very thin leaves. Flowers are yellow and held above the water surface in spring-summer. Dense mats may suppress submerged aquatic plants by shading and can have indirect impacts on plankton by providing refuges from fish predation. Invasion can alter patterns of nutrient storage in sediment and may reduce dissolved oxygen levels in the water column.



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