

Taharoa Domain operations update for July 2020 to October 2020

Meeting: Taharoa Domain Governance Committee
Date of meeting: 10 November 2020
Reporting officer: Hamish Watson, Parks and Recreation Manager

Purpose/Ngā whāinga

To report the operational update for the Taharoa Domain (Kai Iwi Lakes) for the July 2020 to October 2020 period to keep the Committee well informed.

Executive summary/Whakarāpopototanga

Below is a summary of activities, operations and maintenance work carried out over the months of July 2020 to October 2020.

Recommendation/Ngā tūtohunga

That the Taharoa Domain Governance Committee:

- a) Notes the Taharoa Domain operations update report for July 2020 to October 2020.

Context/Horopaki

The Kai Iwi Lakes are among the best-known dune lakes in New Zealand. It is the intent of the Kai Iwi Lakes (Taharoa Domain) Reserve Management Plan (RMP) to enable the Lakes and its surrounds to be enjoyed by all visitors while simultaneously enhancing the area and reducing risks through knowledge and active management.

Operational activities include:

- The Kai Iwi Campground (KDC)
- Taharoa Domain (KDC)
- Northland Regional Council Activities
- DoC Activities

Discussion/Ngā kōrerorero

Health and Safety:

- Staff are having to deal with multiple issues including dogs and Boats, we are discussing with our in-house staff, NRC and Police about providing more patrols for support.

Operational Activities

- The Taharoa Domain Operational management Plan and Management Zones for pest plants and predator control has been completed. (Attachment 1 & 2)

Improvement Programme:

- Work is continuing with the Te Tai Tokerau Redeployment package which will conclude mid-December. This work includes pest plant eradication across the Domain and revegetation, Council have contracted Te Roroa and Turf Tamer to complete this work. This has employed up to 12 people at its peak all though those numbers have declined as workers have left or

found other employment. A part of this employment package has also involved training for new staff including Growsafe and First Aid training that was completed in August and October respectively. Budgeted spend is approximately \$500,000, spend to date is \$295,000.

- Bollards have been installed at Lake Waikare.
- An independent security report has been commissioned which is reported in a separate paper.

Northland Regional Council (NRC):

- NRC have completed Stage 1 of the wilding conifer control. This has been a successful project and the evidence of the work can be seen with nearly all trees browning off at this point. Assessment is to be done with KDC staff on other areas on where wilding conifers can be targeted round the reserve.



- Predator trapping is continuing, and trap catch data is stored in the TrapNZ database.
- A possum and rat control operation has been completed with bait going in bait stations on the 14th October and a top up completed on the 28th October. Bait will remain in bait stations for a month after the top-up then any remaining bait will be pulled in at the end of November. A pre and post wax tag monitor will be completed to assess possum numbers.

Kai Iwi Campground

- Staff are preparing for the Holiday season.
- Interviews for summer casuals have been completed and appointments are being made.

Next quarter activity:

- Ongoing general repairs and maintenance.
- Continuing with Te Tai Tokerau redeployment work, this will be ending as of 20th December.
- Water meter data recording system to be installed.
- Summer holiday season duties as required.
- Continue with campground options review.

Financial implications

The financial budgets are set within the Long-Term Plan and respective Annual Plan.

Risks and mitigations

The RMP was developed using a public process and reflects the views of the community and other stakeholders at the time of its development.

Significance and engagement/Hirahira me ngā whakapāpā

The decisions or matters of this report do not trigger the significance criteria outlined in Council's Significance and Engagement Policy, and the public will be informed via agenda on the website.

Next steps/E whaiake nei

Council staff will continue to implement the RMP and agreed forward works plan.

Attachments/Ngā tapiritanga

	Title
A	Taharoa Domain Operational Plan
B	Taharoa Domain Management Zones

Kai Iwi Lakes Operational Plan



A collaborative partnership between Kaipara District Council, Northland Regional Council, Te Roroa, Ngati Whatua and the Department of Conservation.

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1. INTRODUCTION

Kai Iwi is a unique place. The most outstanding characteristic of this place is its three lakes and the limited impact of invasive species on their biota, which is unparalleled elsewhere on mainland New Zealand. (Northland Regional Council, undated). Its dune lakes and associated wetlands represent a natural environment type that is one of the rarest and most threatened aquatic habitats in the world. It supports a diverse assemblage of native plants and animals including several rare and endangered species.

Some are unique to this location such as the dune lakes galaxias, a non-migratory freshwater fish, other species are nationally endangered such as *Trithuria* which is amongst the oldest and most primitive flowering plants on the planet and native bladderwort (*Utricularia australis*) a small carnivorous plant. Also present is a diverse range of aquatic bird species including the threatened, nationally critical Australian bittern (*Botaurus poiciloptilus*) or matuku hūrepo.



Figure 1: Dune lakes galaxias



Figure 2: Australasian bittern



Figure 3: *Trithuria*



Figure 4: Native bladderwort

The three lakes of Kai Iwi, Taharoa and Waikare are basin type dune lakes formed over 50,000 years ago in consolidated sand of late Pleistocene geological origin that are ranked as nationally important geological sites (Kenny & Hayward, 1996; as cited in Smale et al., 2009). Formed by the accumulation of rainwater in depressions of sand underlain by relatively impermeable ironstone pans, the Kai Iwi lakes are some of the most pristine lakes in New Zealand for their water quality.

Lake Taharoa is particularly unique as it is also one of the largest and deepest dune lakes of its type in the world and has the deepest growing submerged vegetation in the North Island, at 24m.

People are also a significant part of the landscape that is the Kai Iwi Lakes. Two Māori governance entities have rohe whenua Area of Interest around Lake Kai Iwi – the hapū Te Roroa and the iwi Ngāti Whātua. Kai Iwi Lakes are a specific Area of Interest for Te Roroa.

The hapū Te Kuihi, based at Tangiterōria marae have ahi kaa status at the lakes. The lakes provided a rich source of food and other resources. The Kai Iwi area was also a major gum digging area in the late 1800's, particularly around the eastern shores of Lake Taharoa which supported a general store at Pine Beach (now a campground).

From the 1920's onwards progressive purchase of land around the lakes resulted in 538 hectares of public scenic and recreation reserves with amenities to cater for increasing numbers of day and overnight visitors. Lake Taharoa is the focus of camping and much of the Kai Iwi lakes recreational activities. Lakes Kai Iwi and Waikare are less developed. However, management of the three lakes as one larger area effectively achieves integrated management of the natural environment and recreational activities.



Figure 5: Lake Taharoa

Collectively the lakes and their surrounding reserves are known as Taharoa Domain and are administered by Kaipara District Council (KDC). In recognition of the natural and heritage values of the area and the need for integrated management, the Council is supported in its management by mana whenua iwi, Northland Regional Council (NRC), and the Department of Conservation (DoC).

Strategic guidance to the custodianship and enhancement of the Taharoa Domain is by way of a KDC Reserve Management Plan (the Kai Iwi Lakes (Taharoa Domain) Reserve Management Plan 2016). It is supported by the NRC Kai Iwi Lakes Management Plan whose purpose is to implement the Northland Lakes Strategy.

This strategy seeks to facilitate actions with mana whenua iwi, landowners, and other stakeholders in the lake catchments to deliver priority work to protect water quality and mitigate current pressures (e.g. increasing recreational use, runoff from surrounding catchment, presence of animal and plant pests).

The above plans are strategic documents and it has been determined that the key work areas derived from these plans needs to be combined into one document to guide operational work on the ground. This is the purpose of this Operational Management Plan.

2. OPERATIONAL MANAGEMENT ZONES

The Kai Iwi Reserve/Taharoa Domain complex has been divided into five operational management zones. These were determined following a number of site visits, meetings with mana whenua and management agencies and a comprehensive review of various management plans and related documents written for the reserve complex.

The five zones also consider the type and intensity of active management required to protect natural and cultural heritage values as well as the popularity of the area for recreational and amenity use and the presence of animal and plant pests (both aquatic and terrestrial). Management priorities and guidelines seek to enhance heritage and recreational values in a proactive and sustainable manner to ensure that both can be undertaken in harmony with each other.

MANAGEMENT ZONE 1: LAKE BEDS

Lakes Kai iwi, Taharoa and Waikare are outstanding Northland dune lakes with significant values. The lakes have excellent water quality and outstanding ecological condition, providing habitat for a range of endangered plants and animals. Lakes Taharoa and Waikare are major attractions with exceptionally clear water and white sandy beaches. They are popular for boating, sailing, kayaking, swimming, water skiing, camping, walking and trout fishing. However due to the easy accessibility and high recreational use of the lakes there is a significant risk of aquatic pest introduction, which could have a significant impact on the values of the area. There are already significant threats to the lakes from terrestrial weeds and pest animals (McKenzie, 2014).



Figure 6: Lake Kai Iwi lake edge

The Lake Beds Zone covers all of the aquatic areas of the three lakes – Taharoa, Kai Iwi and Waikare.

Its inner edge is variable due to seasonal water levels but is generally defined by vegetation sequence edges between from those that require permanent inundation (e.g. macrophytes such as stoneworts, low growing turf species such as arrow grass) and those that do not.

The drier areas are often characterised by raupo, oioi, eleocharis, baumea and salt marsh ribbonwood. Lake beds and edges have not been revegetated in any way and are primarily native remnants or regenerating areas where key plant pests such as wattle and pine have been removed from.

MANAGEMENT ZONE 2: LAKE EDGES

Lake edges are generally where a lot of recreational activity is concentrated but it is also an area of diverse native vegetation communities with relatively few terrestrial and aquatic plant pests . Protection of vegetated lake edges is essential to deflect wave action, protect water quality and as habitat for native species both terrestrial and aquatic.



Figure 7: Typical lake edge -Lake Kai Iwi



Figure 8: Management Zone 2 with track as boundary

The inner edge of the Lake Edges Zone is defined by the outer edge of lake side walking tracks and or/grassed or other vegetation (native and non native). In areas of native vegetation it is often characterised by waewaekaka, manuka, coprosma species, koromiko and neinei. Any management undertaken in this zone has been focused on the removal of invasive plant pest species to encourage native regeneration. These areas are limited to walking access only by way of series of narrow walking tracks down to lake edges or viewing points.

MANAGEMENT ZONE 3: AMENITY AREAS

The Kai Iwi lakes have a long history as a popular recreational area with many return visitors who come to enjoy the stunning natural surroundings and appreciate the family friendly opportunity to be able to stay for extended periods at the campgrounds administered by Kaipara District Council. Basic facilities (toilets, water, powered sites for motorhomes) are provided with an on site manager.



Figure 9: Amenity Zone: Pine Beach campground Lake Taharoa

The Amenity Zone encompasses all of the areas specifically developed for visitor use and includes the two campgrounds at Pine Beach and Promenade Point at Lake Taharoa, all day use areas, walking tracks, access roads and all associated facilities (e.g. toilets, changing rooms, boat launching areas). These areas are generally defined as open mown grass areas (mostly adjacent to lake edges) or formed metalled tracks and sealed roads as well as sand tracks.

MANAGEMENT ZONE 4: REGENERATING/ REVEGETATION AREAS

Naturally regenerating areas along with areas that have been revegetated are vitally important areas that both buffer and protect the lakes from activities such as runoff and sedimentation in the surrounding catchment and expand habitat for native plants and animals.



Figure 10: Native regeneration area Lake Taharoa

The Regenerating/Revegetation Zone is largely all of the area on the inland side of lake edge walking tracks and behind amenity areas. It has a network of walking and management access tracks and contains diverse assemblages of regenerating native gumland species. Small pockets of naturally regenerating and revegetation areas are also contained within Management Zone 3.

MANAGEMENT ZONE 5: PINE FOREST/WATTLE/WILDING PINE AREAS

Plantation pine which is the source of significant wilding pines along with wattle trees are the most significant terrestrial plant pests at Kai Iwi Lakes. Both species are able to establish in low light conditions and can tolerate the harsh soil and climate conditions and outcompete native species. Effective long term recovery of native plant communities will only be achieved if pines and wildings are removed from within the Taharoa Domain. However even if this is achieved, the presence of pine plantations immediately adjacent the Domain boundaries will necessitate the removal of wilding pines as a permanent part of the Domain's plant pest management programme.



Figure 11: Wilding pine area



Figure 12: Regenerating wattle

The Pine Forest/Wattle/Wilding Pine Zone contains extensive areas behind all three lakes and is dominated either by dense wattle or wilding pine stands through which little native vegetation is evident. It also contains the remaining production pine plantation area on the northern side of Lake Taharoa and a wilding pine area on the southern side of Lake Kai Iwi which may also have harvest potential.

3. MANAGEMENT ZONE PRIORITIES

1. LAKE BEDS

Conservation and heritage (The Kai Iwi Lakes are a specific Area of Interest for Te Roroa. The hapū Te Kuihi, based at Tangiterōria marae have ahi kaa status at the lakes

- Prevention of Aquatic plant pests (e.g. oxygen weeds and bladderwort (*Utricularia gibba*) have caused extinction of *T. inconspicua* in other Northland lakes). The continuation of the NRC and NIWA monitoring programmes as part of the wider Northland Lakes Strategy is essential.
- Standard Surveillance for aquatic plant pests is conducted annually by NIWA. Seven main species have been identified to watch out which have a high risk of introduction (boats, drain machinery, eelers not birds or other natural vectors)
- Protection of Dwarf Lake Galaxiid (DLG) habitat and koura/kewai (these lakes are a last refuge for DLG and koura/kewai are morphologically different to any elsewhere) – management of Eleocharis beds on margins (providing shelter and higher water temps for gambusia (a threat to DLG) – no inshore areas for DLG to escape too)
- Protection of high-water quality and unique geology, particularly Lake Taharoa as the lake with deepest growing submerged vegetation in North Island. Maintain most outstanding dune lakes status in Northland. The best example of a clear-water lake in Northland, with the deepest recorded (27.5 m) submerged vegetation in the North Island in deepest (37m in Northland).
- Prevention of exotic fish introductions (gambusia & trout there now) but grass carp nearby in Midgeley
- Increased biosecurity campaign to avoid water weeds and pest fish entering the lakes. Check Clean Dry is a key message.
- Protection of taonga species and environments as guided by mana whenua
- Protection of habitat for rare native aquatic plants (27 species, 4 rare) e.g. Threatened Nationally Critical & Serious Decline rated *Trithura inconspicua* (previously *Hydatella inconspicua*) - recorded from all lakes. Listed as in serious decline in Northland PNA Report. Lake Kai Iwi supports possibly the largest Northland population, Kai Iwi's value significant charophyte (freshwater green algae) meadows. Nationally Critical Rated *Centipedia minima* sp. *minima* Sneezeweed has been recorded at Lake Taharoa
- Animal pest management – prevent spread of pest fish and introduction of new species, rat control (particularly Norway as known to dive and get mussels, fish etc.)
- etc. monitoring, establishment of indicator species (e.g. koura/kewai for water quality)

Amenity and recreation:

- Management of access points into the lake e.g. boat ramps
- Speed, wake, and other boat restrictions e.g. non-motorized use only in some lakes
- Maintain no vehicle, no boat ramp, no power boat access to Lake Kai Iwi – maintain as a 'wilderness lake'
- Management of trout fishery consistent with the long-term protection of DLG
- Segregation of recreational activities both in terms of public safety, congestion, and protection of natural qualities of lakes
- Advocacy around establishing a minimal impact code (e.g. continuing education about key threats such as aquatic plant pests brought in on boats, not boating at speed close to shore etc./no wake zones, limit access to lake edge to formed tracks, don't make new ones)
- Continue to support annual events and use to promote minimal impact code, source of volunteers
- Environmental Education programme with mana whenua & local schools' citizen science partnership with science (e.g. NIWA, Northtec, NRC, DOC) for an environmental health/wairua monitoring programme with key aquatic and terrestrial indicator species. Aquatic indicators include koura/kewai (water quality), Diptera midge & water boatmen (can only tolerate moderate water pollution), dabchick need depths of 2m clear water. Animal and plant pests are indicators of terrestrial health along with increases in key native species such as tui and kereru, North Island brown kiwi and wading birds. The programme should also include cultural monitoring, indicators, and concepts of environmental health (mauri) as well as the resourcing of kaitiaki to participate in monitoring
- Water from the lakes must not to be used for firefighting if other water sources are also being sourced to prevent the introduction of invasive aquatic species

2. LAKE EDGES

Conservation and heritage

- Aquatic and terrestrial plant pest management (e.g. Banksia, wattle, casuarina, pampas), Aquatic plant pests – vigilance for introduction of new species at boat ramps and lake edges where canoes can be slid in, vigilance for didymo etc.
- Prioritise plant pest control based on threats to lake edge communities e.g. Sydney Golden wattle (*Acacia longifolia*) is posing a threat to sections of the southern foreshore of Lake Taharoa and parts of the western and southern shores of Lake Kai Iwi. Many of these exotic species are a management problem, they are suppressing native regeneration, and some can fix nitrogen, possibly contributing to nutrient levels in the Lakes e.g. brush wattle, gorse
- Animal pest control - possum, rat, stoats, feral cats to protect native plants, insects, and nesting wetland birds (e.g. Australasian bittern, NZ dabchick, grey duck, grey teal, Australasian shoveler) and based around a system of trap and bait station-based systems close to tracks and access points for efficient servicing and all GPS'd (applies to all management zones)
- Protection of native plant communities (identification of where rare species are and focus plant pest control in these places – refer Attachment 1: Rare and Significant Plant Species Present)
 - encourage public support for management by identifying different native plant communities with plant name and cool facts information
 - encourage Dracophyllum and natural lake edge plant communities to extend buffer between walking tracks and lake edge
- Expanding lake edge communities where possible – where there are open grassy areas away from amenity areas
- Protection of lake edges as spawning and nesting areas – so important to have vegetated buffers from tracks etc. and lake edge vegetation to enable these natural processes to occur. Buffers also important to protect the Lakes from forestry and pastoral land uses in the catchment.
- Protection of taonga species and environments as guided by mana whenua and sites used for gum digging/camps etc. – mainly Lake Taharoa
- Any revegetation efforts around lake edges need to be minimised in favour of putting effort into sustained plant pest control to effect natural regeneration. Any revegetation needs to consider careful species selection - Some native plants are also capable of fixing nitrogen, such as kowhai, so care should be taken when choosing native species for planting.

Amenity and recreation:

- Maintain primary access into lake by public from amenity areas (including campground, boat ramps etc.)
- Outside of amenity areas limit to sign posted established access & vantage points, e.g. formed tracks to reduce impacts on native flora and fauna and chances of accidental introduction of didymo or aquatic pests & lake edge erosion
- Ongoing advocacy around hygiene with boats to prevent introductions of additional aquatic pests (water chemistry & wave action is such that growth of invasive plants may be restricted – strong reasons for maintaining natural states and buffers around lake edges, limited access points)

3. AMENITY AREAS (roads, tracks, campground, boat ramps etc.)

Conservation and heritage

- Protection of natural environments from key inputs – people (carrying capacity), stormwater, wastewater, and rubbish management e.g. track drains cleared regularly to avoid sediment running into lake, sumps in all drains, cross fall and manage surfaces of unsealed tracks and roads to avoid impacts to lakes
- Management of the integrity of natural areas primarily from plant pests and expansion of these areas where possible to expand and create additional continuous natural corridors from lake to hilltop & between lakes
- Reducing open grass areas where this will have minimal impact on recreational use/camping facilities e.g. areas that flood in winter, difficult to access or hard to mow/maintain, expanding vegetated lake edge buffers, connecting areas of revegetation or native vegetation – slight adaptations to revegetation systems so that there is a seamless transition from in revegetated areas to naturally regenerating areas (achieve by right mix of plants and spacings) & using plantings to direct people into particular areas – rooms and corridors approach – help to maintain policy of separating day users from campers
- In partnership with KDC identify what is practicable and what priorities are, contract rest out in manageable, auditable chunks, e.g. Dec-March period Domain Manager priority is campground and visitor management, plant pest management work best done outside these periods
- Removal of weed trees close to publicly accessible areas to always avoid any risk to public e.g. trees felled outside of busy season, never use any technique that kills trees standing unless these can be felled before they pose a risk or their fall zone is outside of that where public may access
- Ensure that road and track metal and any mulch etc. that comes in is weed free
- get plant pests out of amenity and existing plantings as a priority, use living mulch (grass seed etc. to suppress regrowth of plant pest seed and cover open ground until canopy coverage achieved and interplant in gaps) – This should be the priority over planting new areas if plant pest control cannot be effectively managed

- Animal pest management focused on rodent and possum control to protect vegetation, minimise human health hazards (e.g. rats and campground), repeat 2015 & 2017 delimitation surveys for exotic ants and agree any necessary management actions (4 species present of which 1 (Argentine) can negatively impact invertebrate communities, need to confirm species of black headed ant present as some are problematic and others not, delimitation needs to be mapped in a way to enable easy comparison with previous years data so can track patterns of spread etc.). Ongoing rabbit and hare management is also essential to reduce impact to plantings, grassed areas etc. Requires working in with neighbouring properties to achieve effective seasonal control.

Amenity and recreation:

- Management of all infrastructure related to campgrounds, roads, tracks, stormwater, wastewater, amenity areas, toilets, boat ramps, signage etc. as undertaken by KDC now and always considering carrying capacity of lakes and surrounding landscape
- Tracks and roads have a dual purpose – recreational and service (e.g. pest control, width, and surface/maintenance enough to suit quad/ATV access for work crews & mountain bikers/walkers to use safely at same time)
- construction based on minimal maintenance philosophy, e.g. cross-felled tracks with minimal to no side drains, minimal steps etc., hierarchy of use – easy, medium, difficult based on proximity to campground, roads etc.
- Many walking and service tracks exist around the domain – as resources allow these should be upgraded and connected to form a range of recreation tracks used for walking and bicycling around the lake. These tracks also enable more efficient access for animal and plant pest control crews. Most of the tracks need to be kept or constructed to suit quad bike access for work crews and to allow for cyclists to pass each other or walkers in relative safety
- Work with mana whenua to ensure tracks are away from any sensitive archaeological sites or features
- Limit boat access to Lake Taharoa to existing 3 boat ramps and limit waterskiing to this lake only as currently
- Support Bioengineering vs conventional engineering solutions if upgrading facilities such as roads (swales and permeable surfaces), tracks, infrastructure (e.g. toilets, waste, grey and stormwater management)
- Volunteer and campers' days to help on key aspects e.g. plant pest control, revegetation planting, track maintenance, seed collection – KDC have a small team, well planned volunteer work could expand this rate funded work
- Development of a small onsite nursery with some easy to grow species that could be largely managed by KDC Domain Manager but allows involvement from volunteers, locals, campers, build on considerable work done by KDC with revegetation and amenity plantings including more shade trees for picnicking and shelter.
- Work in with local nurseries, schools, and mana whenua

4. REGENERATING/REVEGETATION AREAS (includes gum land scrub)

Conservation and heritage

- Animal pest control (feral cats, stoats, possums, rodents in that order of priority), pigs when affecting plantings or other essential assets, public health, safe camping.
- Plant pest control concentrating on priority species (Refer Attachment 2) - staged and managed seasonally to maximise effectiveness, practical ability to complete work, reduced volumes of chemicals used, identify what and when KDC team can do work and rest is contracted out. Priority species are focused on the most highly invasive species that rapidly spread by wind and bird, outcompete natives, block by block management approach established for wattles requiring repeat visits
- Focus on maximising opportunities for natural regeneration, revegetation only where necessary – recovery of gumland vegetation sequences through sustained and targeted plant pest control need to be encouraged versus conventional revegetation as this can irreversibly prevent gum lands and their highly specialized plant communities from coming back, some of the rarer species such as *Centrolepis* need open sparsely vegetated ground to survive
- Removal of weed trees close to publicly accessible areas to always avoid any risk to public e.g. trees felled outside of busy season, never use any technique that kills trees standing, minimal dry material left around in summers months to reduce fire risk
- Build on work done by KDC and establish a targeted list of key revegetation species versus all native species that would have been there. Species would be that those that are easy to source local seed, are fast growing, seed and fruit quickly to attract seed dispersing and pollinating birds, achieve effective canopy coverage quickly, drought tolerant, consider flammability of species close to public areas, a revegetation programme that effectively re-establishes the natural microclimate at the lakes that has been altered with land clearance and other factors such as increasing protection from prevailing winds. (Refer Attachment 4 for Species List).
- Guidelines for revegetation and amenity planting to maximise survival, minimise losses and maintenance, bring back lost species e.g. kauri
- Protection of and access to archaeological sites as guided by mana whenua and any measures in management plans to protect sites and values

Amenity and recreation:

- Linked in with volunteer programmes opportunities for operational work such as plant pest control and revegetation

- Many walking and service tracks exist around the domain – as resources allow these should be upgraded and connected to form a range of recreation tracks used for walking and bicycling around the lake. These tracks also enable more efficient access for animal and plant pest control crews. Most of the tracks need to be kept or constructed to suit quad bike access for work crews and to allow for cyclists to pass each other or walkers in relative safety
- Citizen science initiatives and working with iwi to develop an all-embracing community awareness and understanding programme around responsible and sustainable use of the lakes so that they continue to be enjoyed in as natural a state as possible by many generations to come
- Iwi – their aspirations and how best to support and implement them – what would they like to see beyond employment, protecting heritage, co-decision making
- Integrated agency, iwi, community management – KDC, DOC, NRC

5. PINE FOREST/WATTLE /WILDING PINE AREAS

Conservation and heritage

Support and establish a Catchment Landcare Group (CLG)– sustainable catchment management led by NRC. Work areas include animal and plant pest control, working with landowners to buffer lakes against nutrient loading, management of ephemeral farm drains – support and encourage sustainable farming practices – controls around drains and inlets into Lake Kai Iwi,

- Utilise NRC Farm Water Quality Improvement Plans and the Environment Fund assistance with fencing and planting to ensure no stock access to lakes or drains/overland flow paths which flow to lakes, also to increase buffers between farmland and lakes - As the lakes are basically closed systems (i.e., have no significant inflows or outflows) they are extremely sensitive to inputs from surrounding land use.
- discourage more intensive activities such as subdivision to a minimum larger lot size, no dairy farming, deer, goats
- Utilize NRC Freshwater Improvement Fund to support efforts of CLG:
 - Catchment nutrient assessment of all three lakes including recommendations for any further remedial actions
 - Remedy of the farm drain entering Lake Waikare and Taharoa
 - Assessment of the channel between Kai Iwi and Taharoa and closure if necessary
- Future management of pine forest areas still planned for logging – proactive plan for removal and rehabilitation centered around pest control and revegetation where required, focus on maximising natural revegetation
- Plant pest control based on management of wildings and reducing seed source concentrated around lift off seed points – e.g. ridges and hill tops, direction of prevailing winds, where seed trees are (priorities influenced by NRC Wilding management Plan/Strategy, implementation of first stage of wilding pine tree control planned for mid-2020 by NRC)
- Animal pest control heavy focus on possum as more possum habitat in pine and farmland areas – fur recovery opportunity
- Reach agreement on future of remaining pine plantations and site rehabilitation post logging (ideally not back in pines) – management systems to ensure high standard of sediment controls during logging and after until ground has rehabilitated to a stage where there is at least 95% vegetation cover on exposed ground. Note that canopy closure generally takes about 6 years post a harvest event
 - To protect the natural integrity of the lakes, management must consider natural and geological characteristics of area
 - Removal and management of standing pine forest – should not be replaced once logged –a plan is needed that shows ages and time to logging, establishes strict environmental safeguards to prevent sedimentation during and after logging such as buffer areas/setbacks between logging and lake , time of year logging done, revegetation planting versus natural regeneration , a plant pest management plan until canopy coverage is achieved. The plan should also build on experience from previous logging operations at the lake
 - Manuka plantings for honey and oil, carbon farming opportunities in partnership with mana whenua

Amenity and recreation:

- Expand recreational opportunities beyond what is now currently available ensuring no conflict with wilding pine removal, e.g. more challenging mountain bike and walking trails, vantage points and picnic spots – any additional development to be linked to clear demand, ability of KDC to resource – construction based on minimal maintenance philosophy, e.g. cross felled tracks with minimal to no side drains, minimal steps etc.
- Many walking and service tracks exist around the domain – as resources allow these should be upgraded and connected to form a range of recreation tracks used for walking and bicycling around the lake. These tracks also enable more efficient access for animal and plant pest control crews. Most of the tracks need to be kept or constructed to suit quad bike access for work crews and to allow for cyclists to pass each other or walkers in relative safety

4. KEY WORK AREAS

4.1 PLANT PESTS

Pest plants are one of the most significant issues affecting the ecological integrity of the Taharoa Domain. They also impact heritage sites as well as recreational and amenity values.

4.1.1 MANAGEMENT STRATEGY FOR TERRESTRIAL PLANT PESTS

Terrestrial plant pests such as wilding pines, Sydney golden wattle (*Acacia longifolia*), black wattle (*Acacia* spp.) and brush wattle, (*Racosperma* spp.) are widespread. Both are species that are well adapted to the naturally low fertility soils of the Taharoa Domain. They are ecologically damaging because they can outcompete native species and form dense stands through which little light penetrates reducing the ability for any native seed in the ground to successfully establish. Wattle species as legumes are also nitrogen fixers and anecdotally have the potential to change water quality. An increased level of nitrogen in the lakes, can lead to excessive growth of freshwater plants and algae. These plants will also increase the fertility of the soils, which may lead to additional plant pest issues in future.

Other plant pest species are also present. Although they are not as widespread as wildings pines and wattles, they are species that can inhibit native regeneration. They include pampas, swamp cypress, blue-eyed iris, sheoak, banksia, loquat, hakea, Spanish heath, banana passionfruit and grape

A considerable amount of effort has been put into plant pest control to date, but it has had limited success because the work has largely been reactive and not able to be sustained. Funding and a systematic plan that recognises that challenges of doing the work on the ground and matches that with appropriate control methodologies is required. The following plan builds on the knowledge gained from work done to date, utilises proven control methodologies and includes monitoring of plant pest control attempts to help understand the potential effects on water quality. Control methods must ensure that plant pest control is both effective and does not pose a risk to water quality.

Attachment 2 identifies priority plant pest species to control as well as recommended techniques. The priority scale is based on levels of invasiveness and prevalence:

- Level 1: Highest level of invasiveness and prevalence. Pose greatest threat to natural & amenity values and inhibit natural regeneration & revegetation
- Level 2: Medium level of invasiveness and prevalence but can still form pure communities and outcompete native species, reduce amenity values, inhibit natural regeneration & revegetation
- Level 3: Lower level of invasiveness and prevalence, if allowed to expand could in time outcompete native species and affect amenity values.

Control techniques consider the challenging environments at Taharoa Domain. Access into many areas particularly those that are regenerating is often difficult due to tight dense and/or low growing vegetation which makes carrying heavy backpacks of herbicide physically demanding. In areas where pine forest has been removed, decomposing slash which includes whole logs and branches make working in the areas hazardous because these obstacles are often obscured by regrowth.

To achieve the most cost effective and environmentally sustainable control that minimises impacts on lake water quality and surrounding native vegetation, four key factors have been considered when determining control techniques for each species:

1. Must have no impact on lake water quality or surrounding native plant communities
2. Must effectively control target species at right time of the year before flower and seed set with minimal repeat applications
3. Where herbicide use is required, always use the most selective herbicide method and always on target to avoid impacts to surrounding natives
4. Techniques must be safe to use for applicators and around publicly accessible areas (where this applies, e.g. along walking tracks, roads, campground no techniques such as drill n fill where trees die standing are to be used)

Non-herbicide methods should be used where this is known to be effective e.g. hand pulling small seedlings. It is acknowledged that some species are most effectively controlled (i.e. the need to return to control multiple times is reduced) with herbicides. Responsible use of herbicides is about only using them when necessary and to Safety Data Sheet specifications. Herbicide control will only be undertaken when the plant is actively growing and will maximise the translocation of herbicide and therefore both reduce the amount of herbicide as well as the number of repeat applications required.

Proactive management of new plant pests while in the establishment phase and/or where there are isolated infestations is also essential. Monkey apple, banksia, swamp cypress, loquat, banana passionfruit and grape vines fall into this category.

Control Priorities

Determination of priority areas for control are based on maximising opportunities for native regeneration and sustaining the gains from plant pest control work that has been done in these areas and in revegetation areas. Consideration has also been given to minimising the impacts of plant pests and their control measures on water quality as well as heritage and recreational/amenity values.

Priority 1: (Refer Attachment 4) - Removal and sustained control within areas of existing native vegetation around Lake Edges (Management Zone 2). Return visits should ideally be undertaken 1-2x per annum to manage any regrowth and deal with missed plants.

Lake Kai Iwi between track and lake edge

- Much of the eastern and southern side has minimal pest plant infestations and are often only present as single or small groupings- identified as red line on Attachment 4 map:
 - wattle and wilding pines – most of which are saplings can be easily cut n stump treated along with a small number of larger trees that require chainsawing. These larger trees should be sectioned into small pieces to enable more rapid breakdown.
 - pampas – mainly small to medium plants, large plants are in small clumps around previously felled mature pines
 - hakea – all shrub height
 - occasional spanish heath, small gorse, watsonia and aristeia

Lake Taharoa (Map 2B):

Area 1: Promenade Campground starting at campground point and working around from lake edge using access tracks to break areas into management units:

- Targeting wattle, a few banksias, silver dollar, pine, pampas, gorse, hakea, and the only patch of cotoneaster known at Taharoa domain. Spanish heath more widespread and to be targeted if resources allow.
- Larger trees and same species in 3 sub areas south of the campground including flame trees, small eucalypts. These are away from walking track so could be drilled standing

Area 3: Monkey apple area

- The only area of monkey apple known – small trees can be removed with pruning saws. Will likely need a return visit as seed will be in ground and seedlings will come up. Relatively easy to access and trees all in one small spot

Area 4: Wetland to left of main entrance

- Wattles, hakea mainly, an area of approximately 1.8ha

Lake Waikere:

- As for Lake Taharoa removal of pest plant species from Lake Edge management zone extending eastwards from the Ski Club building round to the road entrance on the western side (Map 2C). The remaining western side of the lake is predominantly mown grass with minimal plant pests.

Priority Two: Control to protect balance of existing native vegetation around Lake Edges (Management Zone 2)Lake Kai Iwi:Remaining section lake edge on the northern side (Blue line on Map 2A)

- Large wattle are the main species – these would need to be felled and sectioned up on site and left to rot down. Care would need to be taken to ensure that no material fell into the lake and was above flood levels.

Lake Taharoa:Area 2: north of campground regenerating area from lake edge to edge of hill slope

- Pampas, hakea, a few wattles, odd small pine in a great regenerating area - almost 6ha depending on how far the extent is uphill

Area 5: Roadside to lake edge

- Building on work progressively being undertaken by Kaipara District Council. This area is mainly wattle but could be cut down and chipped as close to road. Would make a plant pest free lake edge from entrance to campground

Area 6: Pine Beach campground and amenity areas

- Capitalises on work being done by Kaipara District Council removing plant pests from within amenity plantings

Priority Three: Regenerating and revegetation areas (Management Zone 4)Lake Kai Iwi:

- Area of regenerating wattle (orange area Map 2a) between road edge and lake edge track but will require sufficient resource for ongoing plant pest control and revegetation of this area

Lake Taharoa:

- Revegetation area behind Pine Beach campground and then progressively through regenerating areas around remainder of lake

Lake Waikere:

- Progressively move through all regenerating areas located on eastern and southern sides of lake

Priority Four: Removal of pure stands of wattle, wilding and production pines (Management Zone 5)

The removal of pure stands of the above species has been accorded the lowest priority for four reasons:

- the amount of work that is required to complete and sustain priority 1-3 areas
- the cost and commitment required to remove these species from Zone 5
- the planning required to harvest the remaining pine plantations and re-establish these in natives
- the need to work with adjoining landowners to establish a sustainable catchment management plan that reduces reinvasion risks of key plant pest species into the Taharoa Domain.

Any removal work in this area must be well planned and resourced for an extended period to enable appropriate management to be undertaken to ensure that what is removed does not re-establish. Large scale removal of exotic vegetation cover also needs to ensure that there is no adverse impact to lake water quality. Removal techniques need to be refined to reduce this risk and must be immediately followed by a revegetation programme of suitably ecosourced species that are able to cover the ground quickly and speed up natural regeneration processes. Preference should be given to species that fruit and flower early on to attract pollinating and seed dispersing insects, reptiles and birds.

A start has been made on the wilding pine issue in this Zone as a result of funding being made available to Northland Regional Council in 2020 from the Ministry of Primary Industries.

Additionally innovative solutions in areas of accessible young wattles have recently been trialled by Kaipara District Council using a tracked mulcher. These trials need to be expanded upon and agreement reached on next steps e.g. grassing and revegetation to maximise these initiatives.

MONITORING - ideally each piece of control should see 100% removal or control of target species - performance based contracts with a retainer are essential.

4.1.2 MANAGEMENT STRATEGY FOR AQUATIC PLANT PESTS

Aquatic plant pests once established are significantly more challenging and costly to remove than their terrestrial relatives. All three Kai Iwi lakes are native plant dominated with no significant pest plants present. Bulbous rush and bladderwort, two non-native plants are present, but neither are invasive and have had a significant enough impact in the lakes to be considered a serious invasive species (Northland Regional Council, undated).

The chances of establishment in the Kai Iwi lakes is low. In Lake Taharoa exposed wave cut platforms prevent plant establishment to around 6 metres. In both Taharoa and Waikere, unusual water chemistry limits the development of large vascular plants. The threat is greater at Lake Kai Iwi but locked gates and bollards at Lake Kai Iwi prevent access for trailer boats.

The key plant pest species with a high chance of introduction are hornwort, egeria, lagarosiphon and elodea. The only pathway for introduction of these species is via human activities transferring contaminated equipment (e.g. boat, kayak, drain clearing digger, eel fisher) from an infested water body.

Maintaining limitations on motorised boat access and continuing advocacy, along with annual surveillance for plant pest incursions is essential to minimising the risk of invasive aquatic plants establishing. The combination of advocacy to educate users and early detection of incursions increases the chances of containment and eradication as well as decreasing the costs and impacts if such an event were to occur.



Figure 13: Hornwort



Figure 14: Egeria



Figure 15: Lagarosiphon



Figure 16: Elodea

The following management actions are suggested to maintain this status:

- A refresh of the existing websites (<http://www.kai-iwi-lakes.co.nz/> and <https://kaiiwicamp.nz/>) to include information on the ecological significance of the lakes and in particular their water quality that encourages people to check – clean – dry (CCD) before they come to the lakes particularly if they are boating (motorised and non-motorised). Information should include key potential aquatic plant pests, how they are spread and the impact they can have. Links to the Ministry of Primary Industries CCD campaign website and particularly the ‘Protect your Patch’ and CCD Pocket Guide also need to be included.

- Maintain onsite advocacy programmes based on the CCD campaign with clear informative signage, advocacy programmes during busy times of the year and community days with animal and plant pest workshops and guided snorkelling trips
- A survey of immediate neighbouring farm ponds and waterways to assess risk and raise awareness with immediate neighbours

Monitoring

- Annual or biannual aquatic and wetland edge plant pest surveys as undertaken by NRC and NIWA as part of the Northland Lakes programme to provide early warning of incursions.

4.2 ANIMAL PESTS

Animal pests both aquatic and terrestrial are the next most significant risk to the Taharoa Domain after plant pests.

4.2.1 MANAGEMENT STRATEGY FOR TERRESTRIAL ANIMAL PESTS

There are several rare plant species within the Taharoa Domain which are at risk from browsing animal pests. Native forest regeneration is likely impacted due to the high number of ground dwelling introduced pests. Rabbits are having ongoing impacts on revegetation and amenity plantings.

Rare and endangered native birds, lizards and insects are also at a high risk of predation from introduced mammalian predators. Possums, stoats, rats, feral pigs, and wild cats are present around the margins of the lake along and on adjoining farmland. The impact of these predators on wetland birds and other native flora and fauna is likely to be significant.

Ground dwelling native species which include many wetland bird species, along with insects and reptiles (the ecosystem engineers) are particularly vulnerable. Rats have severe impacts on terrestrial as well as aquatic species (including kawai/Koura and crabs).

Stage 1: Maximise the effectiveness of the existing programme

Possum, rodent, mustelid and feral cat and pig control is undertaken by Northland Regional Council using a combination of traps, bait stations, hand laid toxin and hunting and local contractors. However the programme has been hampered by a lack of ongoing funding and variable standards and checking regimes by contractors.

Contractors have reported that several lines that devices have been laid on have not been maintained and consequently have been overgrown or are difficult to access. This has been compounded when areas of wattles or pines have been felled and devices have not been moved or replaced.

A modified programme which utilises existing devices on the ground and continues the practice of integrated pest management needs to be embedded as follows:

- If resources to undertake the work continue to be limited then where the work is undertaken, what techniques are used and when species are targeted needs to be prioritised. Additionally any contracts let need to ensure that contractors work to set standards and are regularly monitored to ensure these are consistently maintained.
- Priority sites are management zones 1-3 as the sites where ecological values are greatest and potential impacts on recreational and amenity values (e.g. rats attracted to campgrounds) are greatest are the immediate priority
- Management zones 4 and 5 are the next priority
- Techniques used need to minimise labour and other input (e.g. bait, traps, bait stations) resources required e.g. bait bags on trees versus bait stations, the addition of self resetting traps and ensuring that devices on the ground are on well marked and easily accessible lines off main walking tracks.
- Rabbit control also needs to become part of the programme as they are having a significant impact on revegetation plantings.
- All records to be kept on Trap NZ or similar electronic based system

Northland Regional Council has identified that the animal pest programme needs to be supported by a biodiversity monitoring programme (refer section 4.3 of this Operational Plan) to build knowledge on native species present and enable population trend monitoring over time so as to determine the effectiveness of the animal pest control programme.

Rats and possums

Pre – operational monitoring:

- Chew cards or wax tags to determine rodent and possum numbers
- Possum browse in revegetation plantings of key palatable species (e.g. pohutukawa, kowhai)

Control methods:

- Utilising existing trap and bait station network (refer Attachment 5)
- Double Tap (diphacinone/cholecalciferol) in bait stations
- Supplement with a cyanide run (Feratox bait bags) each winter outside of periods of high visitor use

Timing of control:

- Spring to early summer prior to bird breeding season and prior to busy summer recreation season
- Winter when natural food supplies are low and rats and possums are hungry

Post operational monitoring:

- Annual possum wax tag and rat chew cards/wax tags monitoring will be carried out in November-December according to the standard wax tag protocol. The wax tag index should be below <10% annually.

Mustelids (stoats, ferrets and weasels)Control method:

- DOC 200 and 250 traps (200's for stoats and weasels, 250's for ferrets) utilising existing network (refer Attachment 5).
- Occasional microhabitat adjustments with traps are useful - Mustelids use linear lines on the landscape where there is always cover such as fencelines, possum, rabbit and rat trails, bush/pasture/ wetland margins and waterway edges. The best sites are where there are converging features like a stream crossing a track at the edge of bush. A change in features is also a good site – e.g. pasture: bush interface, sites beneath a tree canopy cover are ideal.
- Take care with placement and ensure traps are well away from places where ground birds (particularly wetland birds may be present) to minimise non target catches
- Traps are only useful if they are well maintained. Entrances, along with baits and lures must always be visible, traps must be regularly tested and calibrated to ensure that they will be set off by a mustelid
- Baited with salted or log life rabbit and egg (there is little point using fresh rabbit if checks are monthly as bait will not last and could deter mustelids)
- DOC traps have the added benefit of also being attractive to hedgehogs and rats

Timing of control:

- Monthly throughout the year, if possible, check fortnightly during breeding season from December to February and use fresh rabbit

Monitoring:

- Annual audit by KDC Domain Manager to ensure trap management standards are being maintained

Feral catsControl method:

- Steve Allen cat traps at 1 trap every 20 hectares inside Taharoa Domain and 1 every 15ha on boundary.
- Locate traps along roads, tracks and sites where other traps are located as well as any sites where droppings are found
- As with mustelids traps need to be well maintained and well set so that they do not create trap shyness

Timing of control:

- Because fresh bait is the most attractive to cats and keeping fresh bait in traps requires more frequent checks, pulsed runs of cat traps should be undertaken in mid winter when natural food sources are low and early spring prior to bird breeding season – fresh rabbit should be used and traps should be checked fortnightly and ideally weekly for at least a month during each pulse.

Monitoring:

- Quarterly audits by KDC Domain Manager to ensure trap management standards are being maintained

Rabbits and haresControl methods:

- Rabbits: Night shooting and poisoning using Pindone. Poisoning can be carried out simultaneously when the domain is closed during the possum control operation. Shooting should only be carried out with extreme caution or when the domain is closed as mentioned above.
- Hares: Shooting is the only effective method as toxins are ineffective.

Timing of control:

- Prior to planting season to minimise damage to plantings and during planting season where sign is seen

Monitoring:

- KDC Domain Manager spotlight counts and pellet counts, signs of damage to plantings, grass areas

PigsControl method:

- Periodic live trapping and hunting when sign is obvious e.g. rooting or droppings or animals are seen

Monitoring:

- Kaipara District Council staff monitoring in catchment

Stage 2: Expand the above programme on surrounding land to create an effective buffer for the Taharoa Domain

Several landowners supported by Northland Regional Council are undertaking varying levels of animal pest control. Effective management of an expanded programme is best undertaken with the establishment of a catchment management group, ideally a local Landcare group which can harness the support of the NZ Landcare Trust.

4.2.2 MANAGEMENT STRATEGY FOR AQUATIC ANIMAL PESTS

The lakes are also the only known habitat of dune lakes galaxias. The presence of *Gambusia affinis* (formerly known as mosquito fish) has been recognised by NIWA as having a major impact on galaxiid species in the lakes and have directly contributed to dune lakes galaxias becoming extinct in Lake Kai Iwi.

It is likely also that the proliferation of rushes around this lake also protected the gambusia from predators allowing the development of a high density population (NIWA, 2014). *Gambusia* are an aggressive and rapidly breeding species that are known to frequently attack native fish nipping at their eyes and fins - endangered galaxiids and mudfish are especially vulnerable. Gambusia also compete with native fish for food and have been known to eat native fish eggs.

Rainbow trout are also present in Lakes Taharoa and Kai Iwi. The removal of aquatic animal pests from large and deep water bodies is extremely challenging and expensive and often poses risks to native species. Aquatic animal pests management needs to be focussed on improving knowledge on the actual effects of these species on native flora and fauna and lake water quality. There is an urgent need to complete work started by a working group of the Taharoa Domain Board to assess the interaction between dune lakes galaxias, *Gambusia* and rainbow trout. This should be extended to include the effects of rudd generally. This work needs to be accorded priority as a proactive management plan is required to prevent the extinction of dune lakes galaxias.

Advocacy and education needs to be ongoing to prevent the further establishment of new aquatic animal pests, the reduction of rudd numbers by catch and kill fishing (consideration should be given to targeted community/visitor fishing days) and surveys of lakes and ponds in the surrounding catchments to confirm whether other aquatic pests are present is all that can be done.

4.3 NATIVE PLANTS AND ANIMALS

Native plant and animal communities are challenged by many threats. At Taharoa Domain these are primarily the presence of animal and plant pests, along with land uses in the surrounding catchment (e.g. forest harvesting, nutrient runoff) that if not managed carefully risk water quality and the overall integrity of the dune lake system. Previous sections of this operational plan and the revegetation/natural regeneration section address the above challenges.

It is essential that key management actions such as animal and plant pest control programmes and visitor advocacy around preventing the introduction of invasive aquatic plant pests into the lakes have secure longterm funding so that real gains can be made. These programmes need to be supported by a biodiversity monitoring programme to ensure that work such as animal and plant pest control is benefitting native species at Taharoa.

The following biodiversity monitoring programme builds on one developed by Northland Regional Council. It is acknowledged that resources are limited. However biodiversity monitoring is a task that is attractive to volunteers, community groups and NGO's such as the Ornithological Society and Fish and Game.

Partnerships with individuals and groups with an interest in this work would both spread the load for management agencies at Lake Taharoa and provide a really valuable opportunity for longterm active community involvement.

Outcomes of the biodiversity monitoring programme can then be used to inform adjustments to other management programmes such as animal and plant pest management.

4.3.1 WETLAND AND TERRESTRIAL BIRD MONITORING

Wetland and terrestrial birds (particularly those that nest on the ground) are susceptible to predation by introduced predators such as mustelids, feral cats, possums, and rodents. Sustained and targeted predator control can increase and enhance wetland bird populations.

Monitoring systems

- Annual monitoring programme around each lake using automatic acoustic recorders
- Wetland bird call count monitoring is proposed to be carried out every 1-2 years using standard call count monitoring protocols

Automatic acoustic recorders can be installed at selected sites to establish a baseline of what species are currently present around the lake. The advantage of these devices is that they can be set up and left in situ remotely. They can be obtained from the Department of Conservation and Northland Regional Council. DOC AR4 recorders come with a simple instruction guide.

Recorders are left out for 4-5 consecutive days/nights of fine weather, to avoid contamination of data caused by other natural sounds such as wind and rain and maximise the likelihood of detecting as many of the target species as possible. One challenge with these devices is the volume of sounds they can collect. However resources such as the web based AviaNZ (<http://www.avianz.net/>) can be used to both interpret calls and establish reliable estimates of abundance. These resources have the added advantage of enabling remote analysis that could be undertaken by volunteers.

4.3.2 KIWI CALL COUNT MONITORING

Historically, kiwi were in relatively high abundance around the Kai Iwi Lakes. The introduction of introduced predators and habitat modification has led to decreasing kiwi populations throughout Northland. Ongoing predator control and dog advocacy can halt the decline of kiwi and slowly increase populations around the Kai Iwi catchment.

An annual Kiwi call count monitoring programme will be established using electronic listening devices around the Kai Iwi Lakes. Kiwi call counts are used to monitor kiwi population trends over time and establish the presence and absence of kiwi.

Monitoring will be carried out when kiwi call rates are generally at their highest (May-June). Electronic Listening devices will be placed in roughly the same locations annually and at least 4 nights listening data will be analysed to get an average call per hour. Call count monitoring training and analysis of results can be provided by DOC and NRC staff and by Kiwis for Kiwi.

4.3.3 NATIVE PLANT MANAGEMENT AND MONITORING

The most effective operational management to protect and enhance native plant communities (aquatic and terrestrial), at Taharoa Domain are:

- Mapping of sites where rare and endangered species are (Attachment 1) to easily enable site management staff and contractors to identify these locations in the field and building knowledge of key threats and implementing management practices to expand these communities, e.g. removal of aristeas from track edges to reduce competition for forked sundew (*Drosera binata*), pampas and hakea removal to expand gumland grass tree (*Dracophyllum sinclairii*) communities

- Sustained and proactive plant pest control that includes as a priority dealing with small infestations before they expand more e.g. casuarina, acmena, swamp cypress, gorse and silver dollar in areas such as Promenade Point where they are just establishing
- Ensuring appropriately sourced native species for any amenity or revegetation planting.

The identification and mapping of rare and endangered terrestrial and aquatic species would provide a basis for an annual survey of these areas as the primary biodiversity monitoring technique. The annual survey would consider a range of factors including plant community health, whether it was expanding or contracting and observe any adverse impacts e.g. browse by animal pests.

4.4 REVEGETATION OR NATURAL REGENERATION

Natural regeneration is the most cost effective means of expanding native vegetation communities at Taharoa Domain. It does however requires reasonable investment in animal and particularly plant pest control until full ground/canopy cover has been achieved and the most invasive plant pests removed.

Revegetation also has its place at Taharoa Domain but it is essential that any revegetation planting largely contain the same species/species that will eventually establish in regeneration areas so there is a seamless transition between naturally regenerating and revegetation areas. This creates cohesion in the landscape and will along with the planting of sourced species maximise survival rates and optimal habitat for native species.

Natural regeneration is also the best strategy because the plants that establish are from parent stock that are well adapted to local environmental conditions. Additionally, removal of the most invasive plant pests over time allows soil conditions to recover and any dormant seed or remnant seedlings of native species less able to compete with invasive plants to recover. The plant pest management actions in this operational plan are designed to maximise natural regeneration at Taharoa Domain.

Revegetation has also been successfully undertaken at Taharoa Domain. This is most evident on the hillside directly behind the main campground at Pine Beach after the harvesting of pines in the area. Native plantings are also undertaken in amenity areas to expand natural areas and reduce mowing and maintenance commitments.

However a number of the more recent plantings are dominated by flax and manuka and stand out from the surrounding regenerating areas – diversity and cohesion is essential to maximise survival rates and blend in with surroundings. The only exception should be in amenity areas where shelter for visitors or safety around facilities is an issue. In these areas shade trees may be planted such as pohutukawa, or pure stands of flax or other species as hedging or separating day use or overnight areas.

In 2010, Kaipara District Council commissioned a very experienced Northland Nursery – Alternatives to produce a Native Revegetation Plan for Taharoa Domain. This plan supports the plant

pest control to encourage native regeneration as discussed above. Although some of the costings will be outdated this plan establishes a sound and pragmatic basis for revegetation and amenity planting. It is recommended that this plan be followed. It is also a useful template for revegetation planting if and when resources are available to remove large areas of pure wattle and wilding pines that dominate Management Zone 4. Relevant sections of the revegetation plan are included as Attachment 3. It would be useful to have large scale versions of the maps on a wall in the Domain Managers workshop at Taharoa Domain.

4.5 MANAGEMENT OF HERITAGE SITES

A number of maori and gumdigger sites are present at Lake Taharoa. The Kaipara District Council 2016 Kai Iwi Lakes (Taharoa Domain) Reserve Management Plan identifies that all archaeological and wāhi tapu sites are protected. Kaipara District Council is committed to working in partnership with mana whenua to protect these sites. This includes the establishment of any interpretation signage or other facilities such as tracks in and around these sites.

The proximity of heritage sites also needs to be considered when undertaking planting, harvesting pines or plant pest control or any other activities that may impact these sites. Mana whenua can assist with advice in regards to how impacts on sites may be mitigated and advice can also be obtained from Heritage New Zealand Pouhere Taonga. It is suggested that a large scale map of the location of heritage sites is kept on a wall in the managers workshop at Taharoa Domain to aid with site proximity when any works are being undertaken.

4.6 AMENITY AND RECREATION

Kaipara District Council acknowledges the need to balance the protection of natural and heritage values with visitor use at Taharoa Domain with the vision statement in its 2016 Reserve Management Plan.

Kia tiaki kia whakareia enei tanoga tuku iho ara ko nga roto o Taharoa, hei taonga hiranga o te ao.

To protect and enhance Taharoa Domain as taonga (treasures) of global significance for the benefit of present and future generations

KDC has a challenging role with increasing visitor numbers in a fragile and unique natural setting. Its current management system of basic campgrounds and facilities and network of roads and access tracks (walking and management access) enables the use of the reserve to have minimal impact on natural and heritage values. The pressure to expand facilities is likely to increase particularly with the COVID-19 pandemic and its associated travel restrictions which will likely see more pressure on local visitor attractions in preference to travelling overseas. However it is essential that ongoing management and any development does not impact on lake water quality.

The current management of amenity and recreation concentrates efforts around the two campgrounds at Pine Beach and Promenade Point and several smaller satellite day visitor areas at Lake Waikere and Lake Taharoa. Day visitor areas are separated from camping areas.

Tracks are generally well maintained with a higher standard of formed and graded tracks around the main visitation areas and the around the lake tracks. Ensuring that drainage and runoff from tracks is managed proactively is essentially to avoiding sediment flowing into the lakes. The presence of generally wide areas of established native vegetation between the round the lake tracks and lake edges also assists with minimising this risk. Informal tracks down to the lake edge need to be minimised and any new casual tracks/desire lines formed need to be closed off as soon as they are discovered.

It is suggested that a 3 tier management system be established for access tracks:

Level 3 Routes - require a reasonably good level of fitness and agility. They can be steep, have uneven ground, may be just grass or dirt, narrow and are those that require the minimal amount of maintenance. They could include mountain bike trails and would generally be in Management Zones 4-5.

Generally, they should be crossfalled as opposed to having drains that need cleaning out. They will not have boardwalks or any major structures. They are often the ones furthest away from Zone 1 e.g. the track that sidles around on the eastern side below the sculpture, track down from northern cell tower to pond.

Level 2 Tracks - Moderate level of fitness and ability, may have steps, a better more even grade than tracks, more regular maintenance, be a bit wider, have metal surface etc, e.g. tracks leading from Level 1 to Level 3. They may also include mountain bike tracks and would be located in Management Zones 2-3.

Level 1 - Walks/paths - low level of fitness, mainly located in Management Zone 1, provide access between key points, e.g. lake edge to campground and include the round the lake access tracks. They are generally accessible for people with limited mobility and families with children in strollers.

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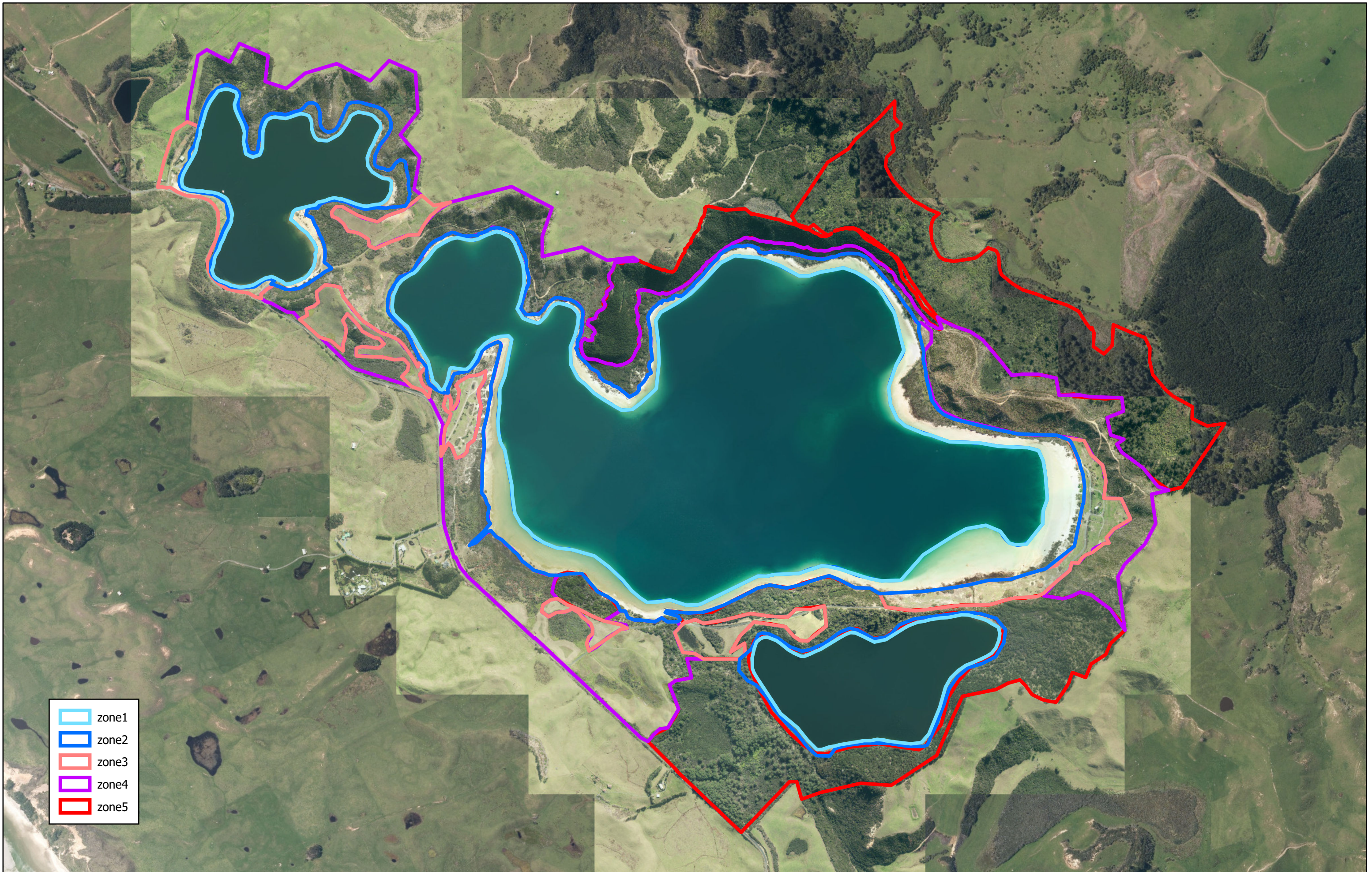
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- zone1
- zone2
- zone3
- zone4
- zone5