Annual Report 2022-23

Takahē Recovery Programme

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Department of Conservation
Te Papa Atawhai

Cover photo: Minister of Conservation, Hon. Willow-Jean Prime, and Fulton Hogan representative, Kiwi Johnson, release takahē into the Greenstone Valley.

Contents

LONG-TERM RECOVERY GOAL

Takahē exist in growing numbers in large areas of their former natural range as a functioning element of natural ecosystems and are treasured as a national icon.

MANAGEMENT PLAN-PERIOD 2021-2025 OVERARCHING GOAL

The takahē population exceeds 500 mature individuals by the end of the plan period, with more than half free ranging in locations within their historic range.

1. Summary of Progression

No.	***PAGE***	***OBJECTIVE***	***PROGRESSION***
1.1		Monitor updates and innovations in landscape-scale pest monitoring methodology and collaborate with others to ensure a shared understanding the potential impacts these tools may have on takahē populations and their management.	Progressed
2.1		Investigate and/or monitor pest animal abundance at takahē locations.	Progressed
2.2		Monitor takahē population dynamics at Recovery Sites where pest animal abundance is known.	Progressed
2.3		Undertake density impact function analyses to quantify effect of pest densities on takahe mortality.	Progressed
3.1		Maintain a sample of radio-tagged takahē at each Recovery Site to monitor survival (via aerial methods), and, wherever possible, determine cause of death. An appropriate sample size and regime will be determined for each location, dependent on management needs.	Achieved
3.2		Maintain a sample of radio-tagged adult takahē at new or recently established Recovery Sites to monitor productivity rates. An appropriate sample size and regime will be determined for each location, dependent on management needs.	Achieved
3.3		Develop models to predict population trends and assess alternative management actions.	Next due 2025
3.4		Regularly critique innovations and new technology in monitoring methods for suitability of deployment within takahē populations.	Progressed
3.5		Use mixed-effects models to assess environmental, predator and management factors that affect takahē recruitment and survival.	Progressed
3.6		Regularly update mixed-effects models with new environmental and population data and input results into demographic models, to refine and target population management where needed and to gauge habitat suitability via the birds' observed response to the environment.	Progressed
4.1		Advocate for takahē to be considered during the development of landscape-scale pest management tools	Achieved
4.2		Test susceptibility of takahē to new toxins and their application methods for stoat, rodent, cat, and ferret control.	Progressed
4.3		Test available mitigation methods used in aerial toxin applications (e.g., repellents, palatability, exclusion zones).	Progressed
4.4		Estimate risk/benefit to takahē for toxins considered for application to takahe habitat to produce a net gain to the takahē population size.	Progressed

5.1		Identify and monitor the main drivers of individual population performance, e.g., habitat, climate, native predator impacts, interspecific competition.	Progressed
5.2		Develop management methods to improve recruitment and survival rates at locations where one or more of the environmental factors discussed in Action 5.1 pose a risk to takahē populations.	Progressed
5.3		Use the information derived from 5.1 and 5.2 to classify and rank suitable habitat areas for takahē across New Zealand, including existing locales.	Achieved
6.1		Manipulate Burwood Takahē Centre pairings to produce a minimum of 20 takahē per year.	Achieved
7.1		Develop a timeline that identifies targets for maintaining capacity.	Next due 2025
7.2		Increase the capacity of Retirement Sites as required, to support optimal bird management at Sanctuary Sites.	Achieved
8.1		Work proactively with Ngāi Tahu and owners/managers of potential new locations to identify suitable and sufficient large South Island sites for takahē, with capacity to hold at least 30 pairs each, and a combined 100 pairs across Recovery sites.	Achieved
8.2		Initial population establishment with a minimum of 25 birds at the new Recovery Sites (in 8.1).	Achieved
8.3		Support appropriate levels of pest ungulate control in the Recovery Sites to optimise vegetation condition, and the monitoring of outcome of control on important takahē resources.	Progressed
8.4		Understand the density thresholds for critical mammalian predators of takahē required to allow population security.	Progressed
8.5		Apply sufficient levels of suppression to achieve thresholds set in 8.4.	Progressed
8.6		Supplement takahē populations at Recovery Sites with new birds as required, to enable an adequate test of habitat suitability and to ensure populations persist.	Achieved
9.1		High level strategic and operational decision making is collaborative through Kaitiaki rōpū committee and Taonga species representative; identifying opportunities for ensuring principles of mātauranga Māori are embedded.	Achieved
9.2		Ensure other parties understand the primary partnership between the Department and Ngāi Tahu; and that other partnerships are compatible with this relationship.	Achieved
9.3		Working with tangata whenua, provide a range of opportunities to cultivate their involvement, education, research objectives, governance in takahē recovery – such as cadetships, or student programmes.	Progressed
10.1		Ensure all takahē populations have an approved task assignment (DOC sites), or Memorandum of Understanding and Wildlife Permit (external sites) before takahē are released. Monitor adherence to these documents - as well as the Takahē Management Plans.	Achieved
10.2		Work with Iwi katoa to ensure appropriate tikanga take place when receiving manu/kaitiakitanga from Ngāi Tahu.	Achieved
11.1		Establish and cultivate collaborations (for example, with tertiary institutions and zoos) to achieve the research and management needs of the Takahē Recovery Programme.	Achieved
11.2		Present results of the conservation management and research programmes for takahē to the scientific community, including Papers for peer-reviewed journals.	Achieved

12.1		Define the annual financial requirements of the programme to fulfil this management plan. Where these are not met by Department funding, obtain through external means.	Achieved
12.2		Maintain external financial partnerships for mutual benefit, fulfilling requirements of relevant agreements.	Achieved

Table 1 Progress made Takahe Species Management Plan - 2021

2. Abstract

As of 31 September 2023, the end of the 2022 'takahē year', the takahē population was estimated at 493 birds (141 breeding aged pairs), consisting of 208 Sanctuary, and 285 Recovery site (243 Murchison Mountains, 24 Kahurangi, and 18 Whakatipu) individuals. The population growth rate was a healthy 3.7% but continues to decline as the proportion of birds in Recovery Sites increases. Good performance across both Recovery and Sanctuary Sites was contributed to the overall growth.

YEAR	POPULATION	BREEDING PAIRS	EST. MORTALITIES (Subs and adults)	EST. RECRUITMENT	GROWTH	SECURE SITE + ADVOCACY	RECOVERY SITE	OVERALL RATE (%)
2000	221	50			0	85	136	0
2001	248	57			27	98	150	12.2
2002	246	57			-2	97	149	-0.8
2003	262	60			16	108	154	6.5
2004	287	72			25	115	172	9.5
2005	295	75			8	127	168	2.8
2006	295	76	36	36	0	123	172	0.0
2007	222	50	93	20	-73	127	95	-24.7
2008	228	55	20	26	6	122	106	2.7
2009	230	55	20	22	2	121	109	0.9
2010	252	60	13	35	22	142	110	9.6
2011	262	65	15	25	10	165	107	7.9
2012	257	66	24	24	-5	171	86	-5.5
2013	275	81	26	30	18	192	83	7.0
2014	279	87	29	43	4	202	77	1.5
2015	306	91	20	47	27	194	112	9.7
2016	347	106	20	61	41	209	138	13.4
2017	376	112	34	63	29	210	166	8.4
2018	416	130	37	65	33	218	191	8.8
2019	445	141	33	69	36	226	219	8.8
2020	444	143	66	65	-1	208	236	-0.2
2021	475	150	44	75	31	235	240	7.0
2022	500	165	51	76	25	208	292	5.4

Table. 2 Summary population figures 2022-23

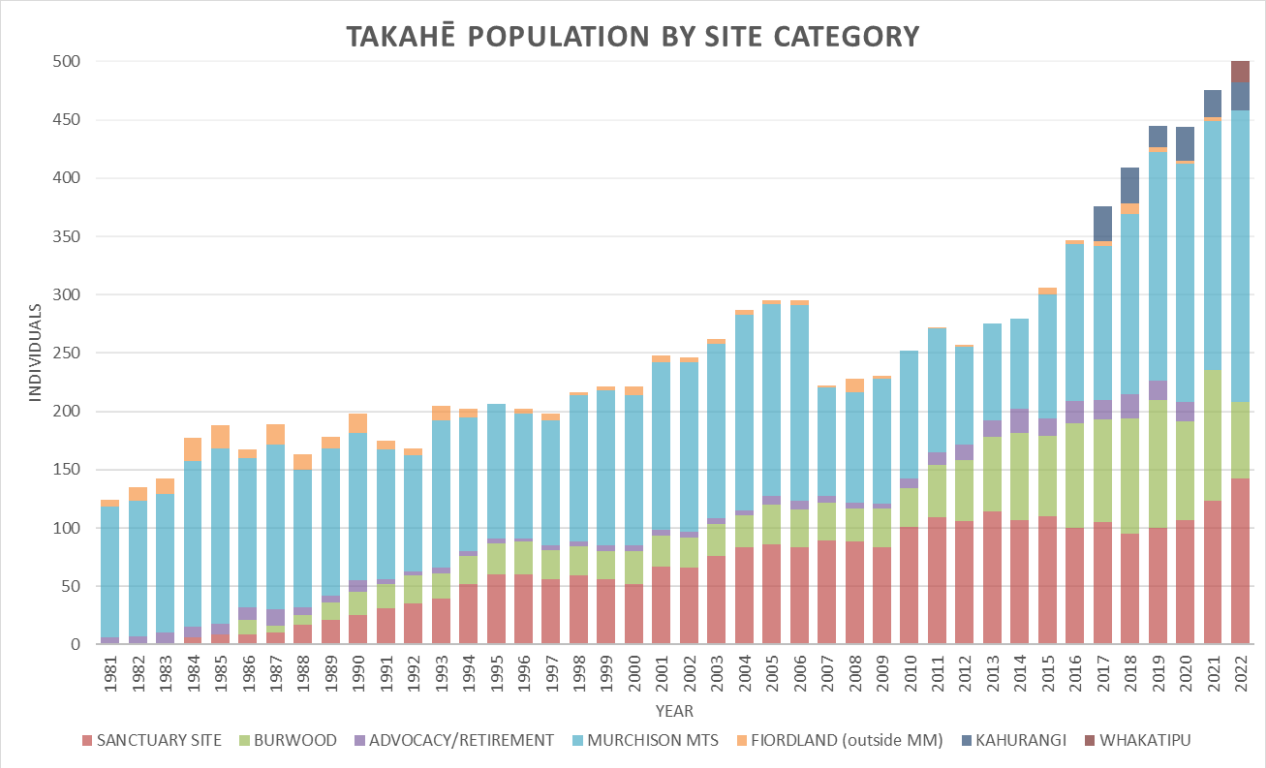


Figure.1 Takahē population by site category

It is important to note that, from this year, we will no longer estimate the number of takahē outside of the core recovery site populations, previously based on creditable sightings and feeding sign. As the dispersal increases through sites reaching capacity. We have also found these sightings to be relatively unreliable.

The Murchison Mountains Recovery Site population was likely to have been relatively stable this year, increasing by an estimated 29 individuals thanks to supplementation. Forty-one takahē were released across December 2022 and January 2023, so this year-end population represents a natural decline of 6%, and supplementation-inclusive growth of 14%.

This growth rate, modelled using long term recruitment and known survivorship rate from a monitored sample of the population, is reflective of a year absent of events that cause significant periodic decline (e.g. stoat plague, extreme weather event, extreme seasonal climatic conditions). A full ground survey is planned for November 2024 which will be used to further refine this modelling.

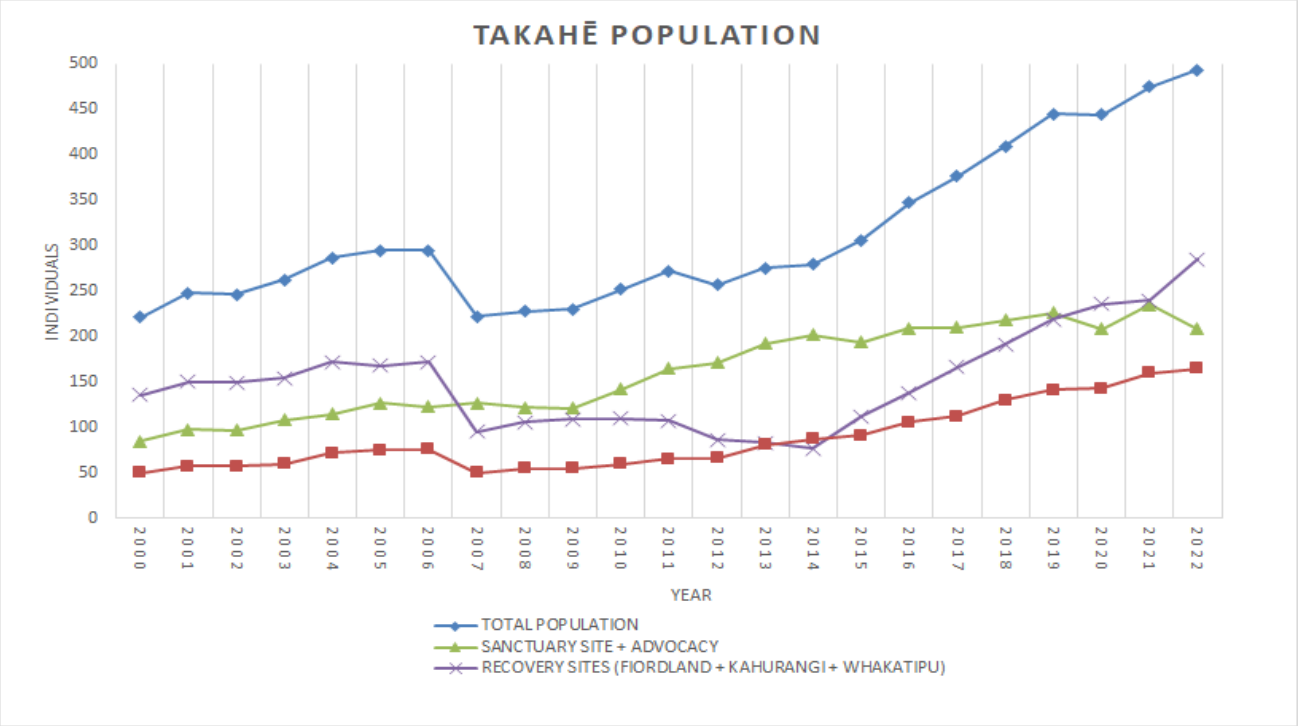


Figure. 2 Takahē population trends

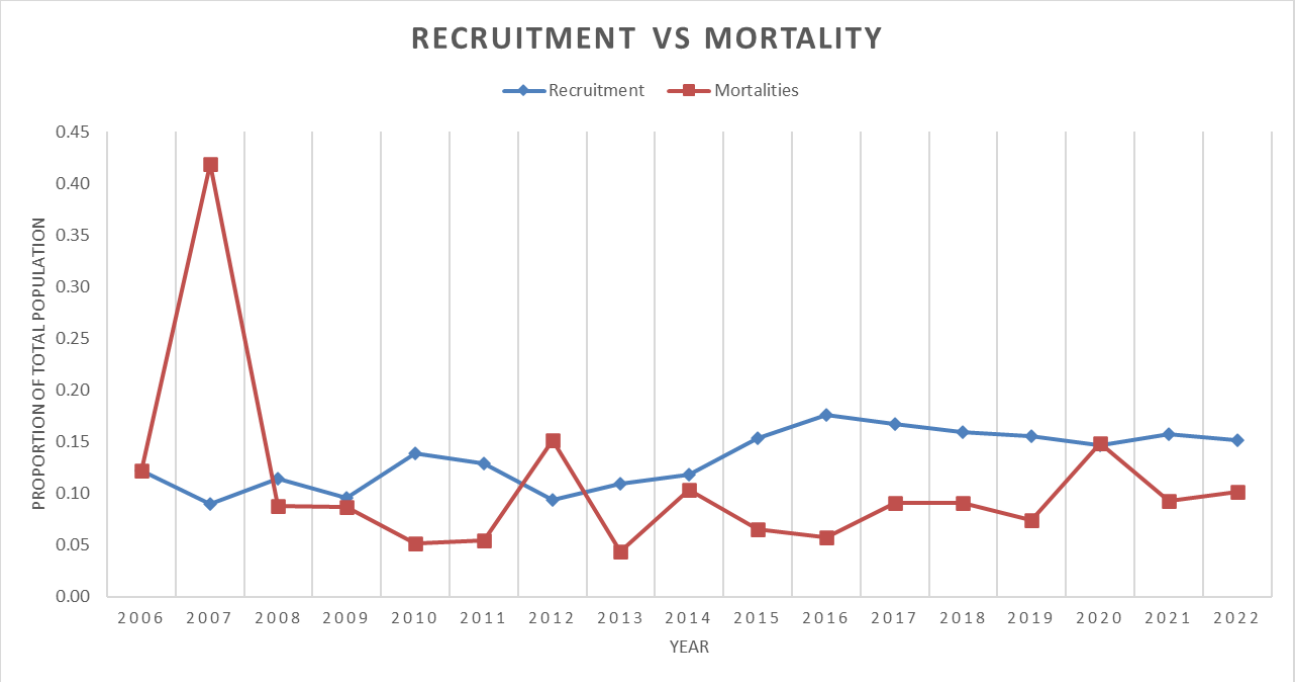


Figure 3. Takahē proportional population recruitment and mortality rates.

Given the current and forecast age structure of the population, we expect the growth rate in the Sanctuary Site population to remain relatively stable. However, there has been significant growth in the proportion of the population across the three Recovery Sites (aligning with Recovery Goals), which naturally have lower performance. While this is reflected in an overall decline in total population annual growth, a targeted overall growth rate of 3-5% is still feasible, particularly outside of stoat plague years.

3. Research

Outcome: *An increase in takahē population is supported by utilising up-to-date techniques, research and scientific evidence*.

Objective 1. Effective landscape-scale pest animal monitoring tools are used at takahē locations.

Action 1.1: Monitor updates and innovations in landscape-scale pest monitoring methodology and collaborate with others to ensure a shared understanding the potential impacts these tools may have on takahē populations and their management.

Predators

Use of baited trail cameras as a multiple pest monitoring tool is increasing, with survey design in ongoing testing and development, led by DOC's principal science advisor, Craig Gillies. The Takahē Team are heavily relying on camera data from the Murchison Mountains, Greenstone, and Rees Valley catchments, to feed into density impact function and trap efficacy models. We want to understand pest density thresholds that enable takahē populations to be maintained. These thresholds can then be used to model the pest pressures that future sites, and whether current control methods are effective. The design and outcomes are supplied to the National Eradication Team (NET) and Craig Gillies for input into their ongoing pest detection efficacy research.

While no camera trap work was completed in the Murchison Mountains this year, further work will be undertaken as resources allow.

Critical to the review of camera network utility is the close outcome monitoring for takahē populations. This is discussed in Action 2.1 and 2.2.

Deer

New methods for control and density calculation

Deer are a known competitor for food resources at all Recovery Sites. Monitoring of deer impacts on takahē habitat has previously relied on repeated transect and quadrat sampling at set locations, comparing faecal density and palatable plant abundance, and browse sign over time.

New methodology is being trialled to better understand deer densities and test control methods. The primary goals of this work are to:

1. Test the efficacy of fDNA sampling method to estimate population densities; and
2. test the efficacy of thermally assisted aerial control, compared with standard ground control methods.

Taking place in the Snag Burn, Murchison Mountains, 838 hectares were surveyed for deer pellets. Forty-three individuals were identified from 94 samples, giving an estimated local population of 77 deer (67-85; 95%CI).

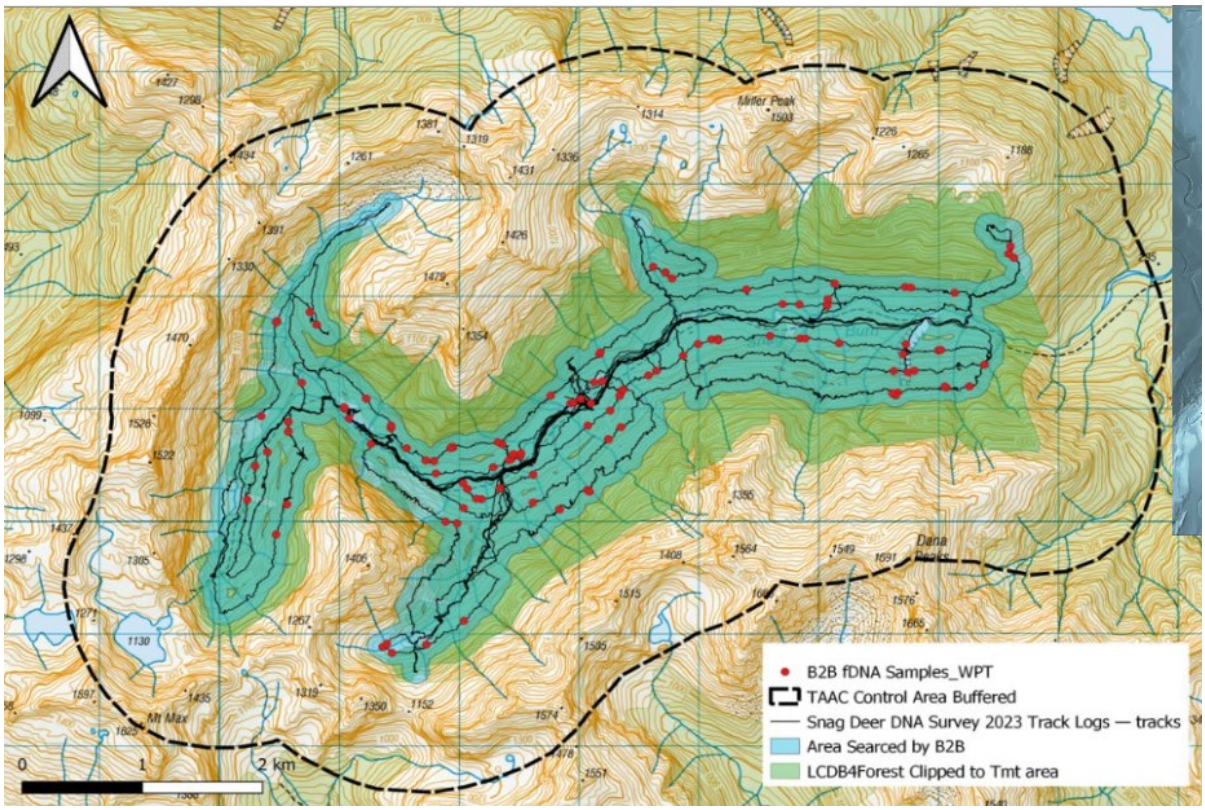
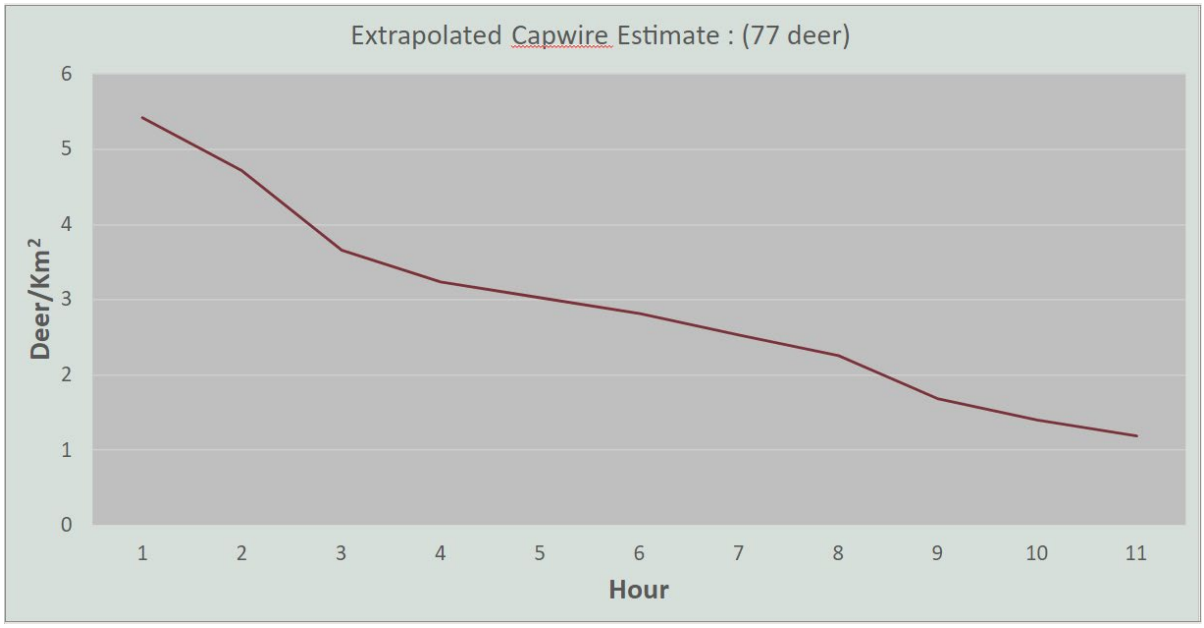


Image # Deer sampling in the Snag Burn, testing fDNA as a method for population calculation, and effectiveness of control methods.

This analysis was followed up with Thermally Assisted Aerial Control (TAAC), utilising infrared camera technology to identify animals under forest cover. Sixty deer were killed, with a strike rate of 94%. After eleven hours of flight time (8 flights), the estimated deer population in the study area had dropped from 5.4 to 1.2 deer/km^2 (78% reduction).



Cost analysis shows TAAC control to be significantly cheaper per deer than traditional ground control methods ($250 - $750 per deer versus $800 per deer).

Next steps involve a test of efficacy at higher deer density locations, and in multilayer forest environments.

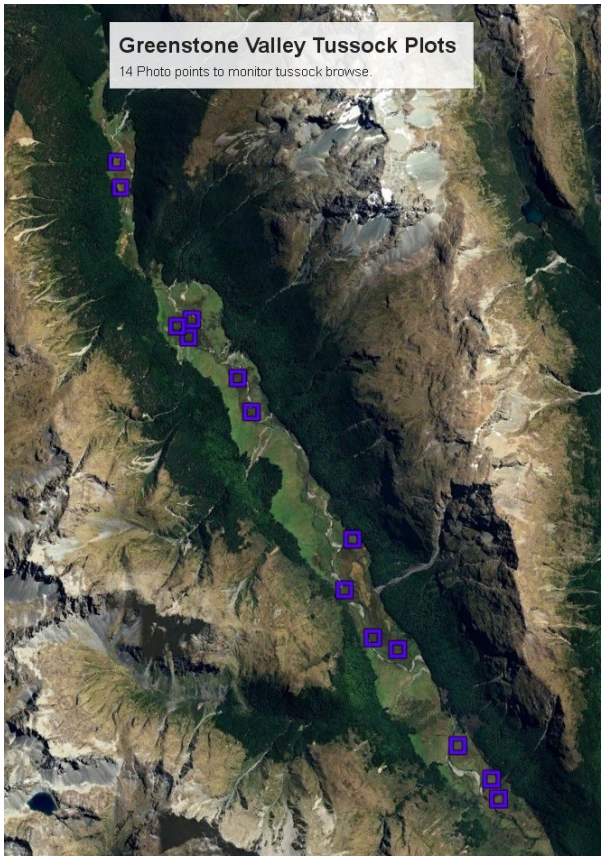
Measuring impact of deer in the Greenstone

In the Greenstone we are measuring the impacts of the three primary grazers on the tussock. This information will help us define the site carrying capacity for takahē, and also provide evidence for stakeholders Ngāi Tahu, DOC, and the Deerstalkers Association on the sustainable density for both deer and cattle.

There are 14 tussock monitoring points in the Greenstone Valley, to monitor browse from both ungulates (cow and deer) and takahē. These points have:

- Aerial drone photos at 10m, 20m, and 40m altitude, to look at tussock coverage/density.
- Ground photos taken in the four compass directions from the photo point.
- A course assessment of the level of browse from the ground. Both takahē and ungulate.

This will give us a comparative long-term measure on takahē/ungulate browse, and tussock coverage/density over time.



Objective 2. **Field data quantifies the relationship between pest animal* densities and takahē population response.**

Action 2.1: Investigate and/or monitor pest animal abundance at takahē locations.

Predators

Murchison Mountains

For the Murchison Mountains predator pressure is derived from trap-catch. As at the end of this year rat and stoat catch rate was low but likely to see an increase this coming summer. There have been no known predator-induced mortality events in the population this year.

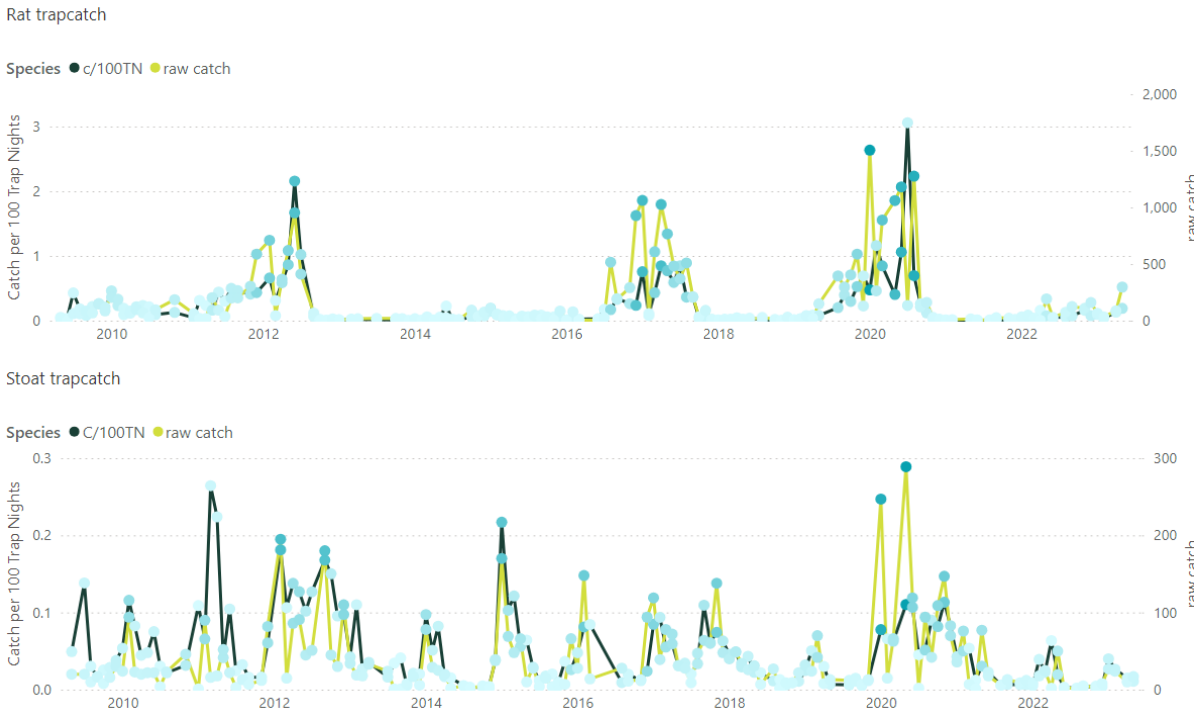
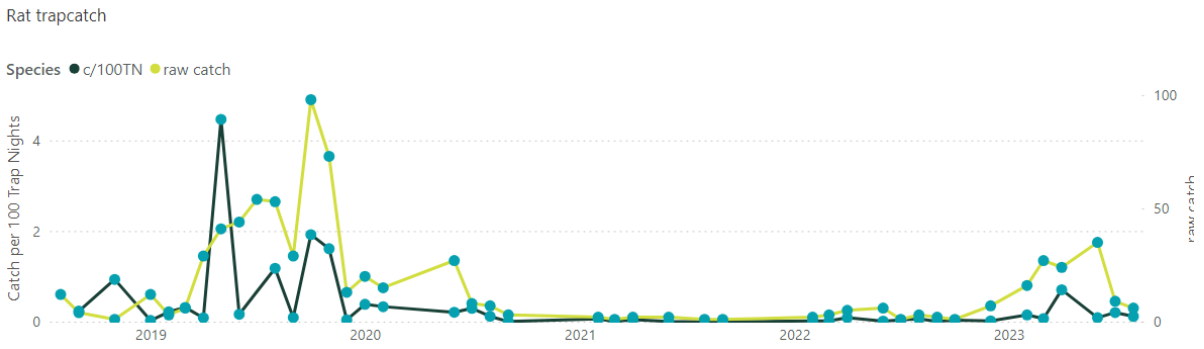


Figure # Rat and stoat catch rate for the Murchison Mountains

Kahurangi (Gouland Downs)

Predator pressure for the Gouland Downs takahē is derived from trap-catch. As at the end of this year rat and stoat catch rate was low but likely to see an increase this coming summer. There have been no known predator-induced mortality events in the population this year.



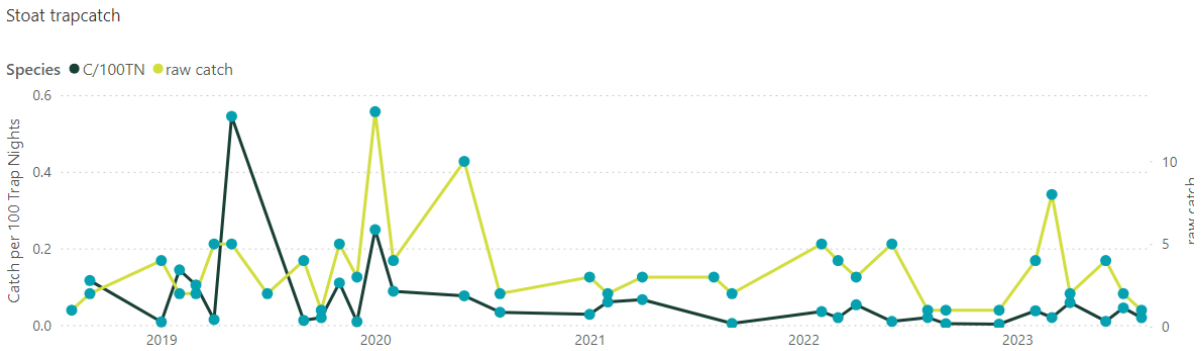


Figure # Rat and stoat catch rate for Kahurangi (Gouland Downs)

Whakatipu

In the Greenstone Valley baited camera grids are deployed twice per year. As this is a new takahē site with novel predators (ferrets and feral cats) present, it is critical that we investigate their impact through intensive monitoring of both pest density and cause of mortality within the takahē population. This will enable the construction of density impact functions to help describe the predator density thresholds required to sustain a growing takahē population, enabling refinement our predator control effort over time.

As described above, a camera grid was set up prior to takahē being reestablished. Despite some cats and stoats being taken out of the system through control efforts it is too early to confirm a discernible impact of the control on cat density via the camera traps. There have been no predator-induced mortality events in the Greenstone since release in August.

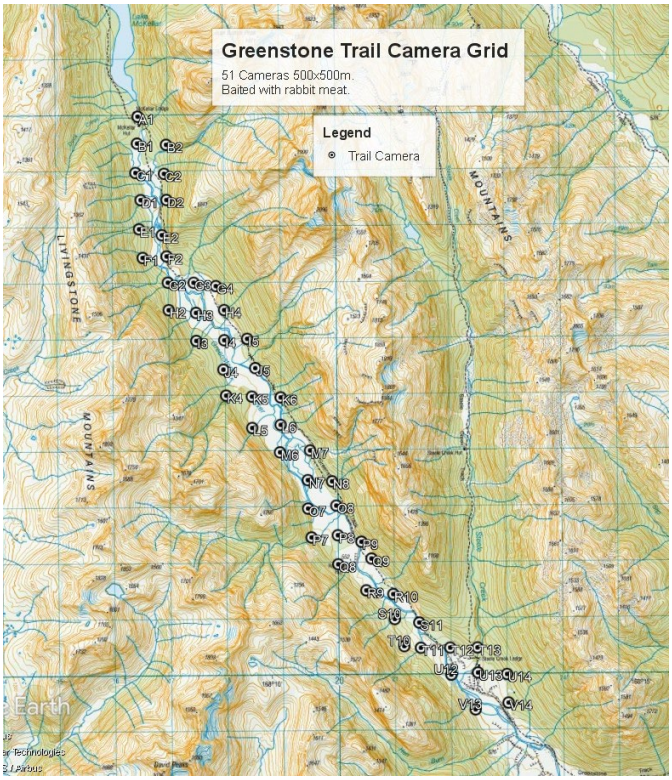


Image #. Pest indexing research utilising network of trail cameras in Greenstone.

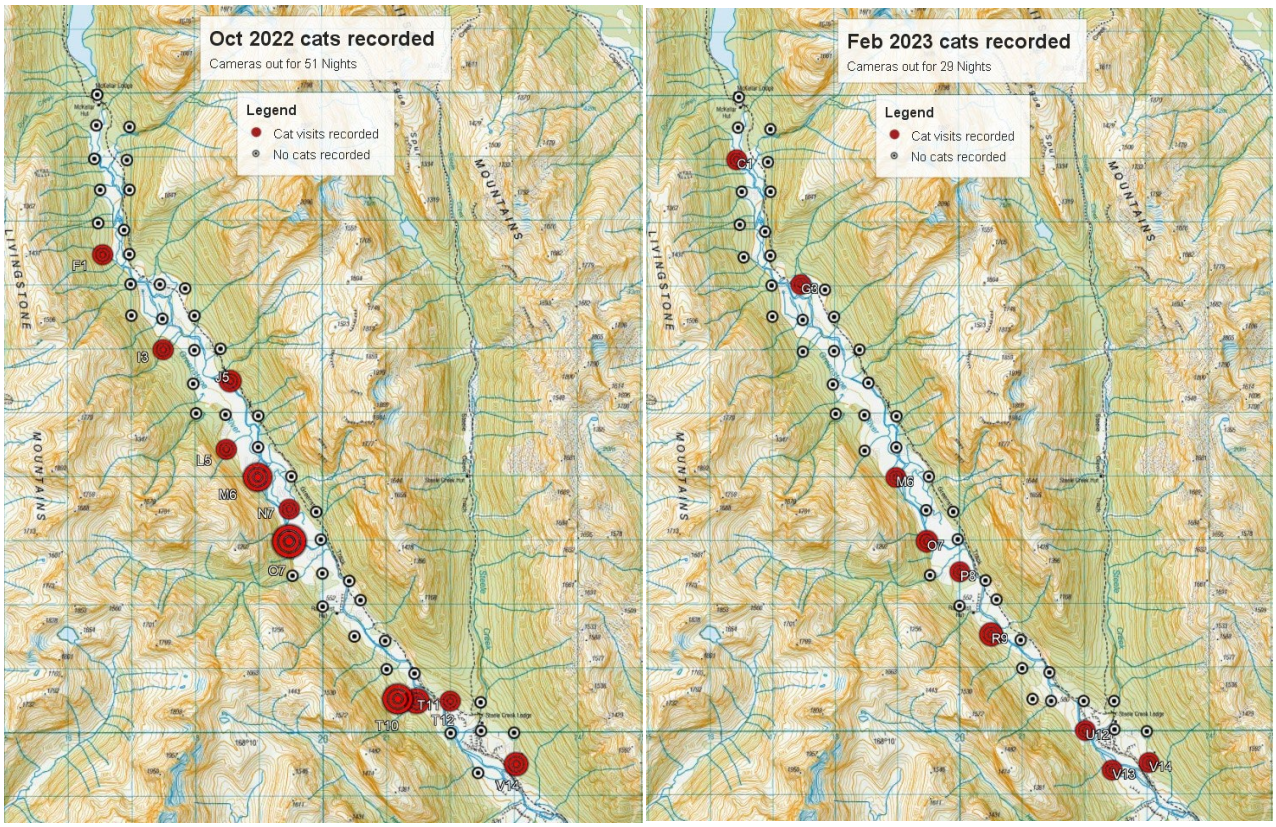


Image #. Cat results from the two camera trap rounds in the Greenstone for 2022-23.

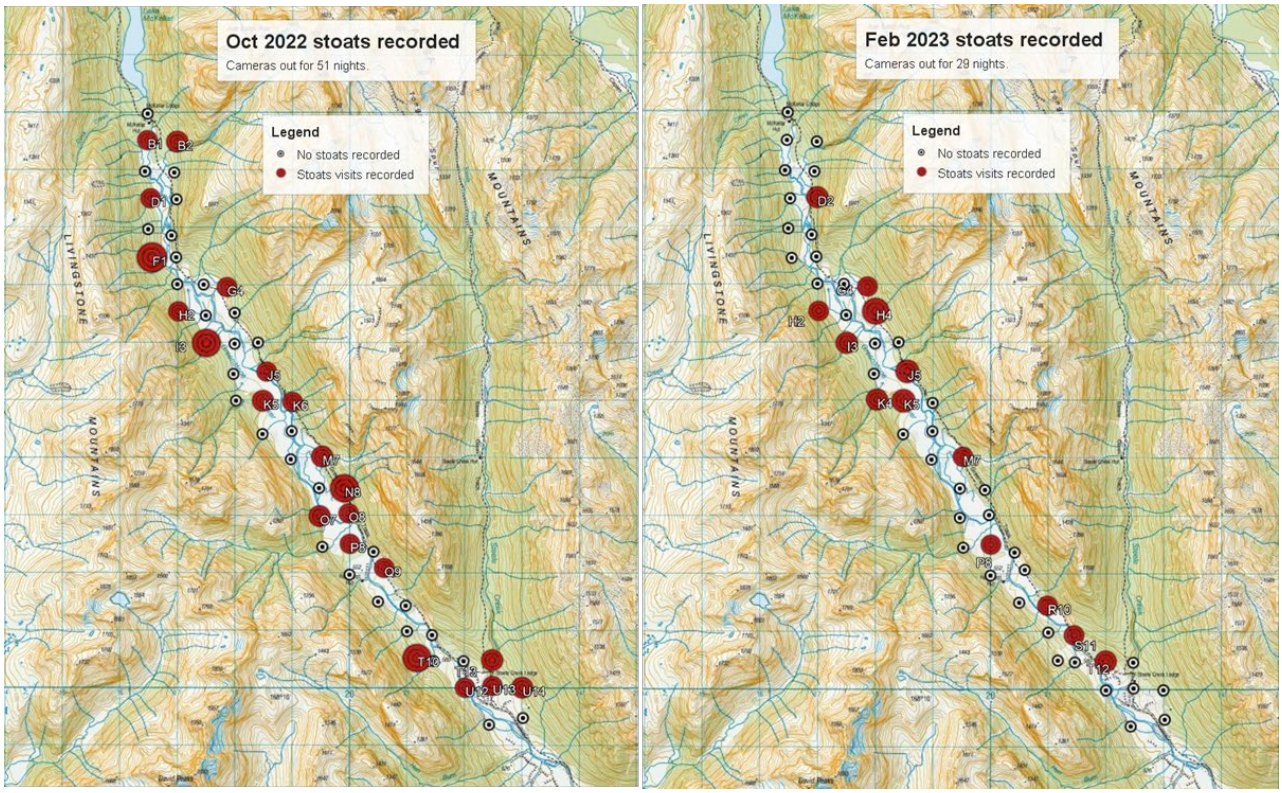


Image #. Stoat results from the two camera trap rounds in the Greenstone for 2022-23.

Deer

No deer density work is currently planned for the Greenstone Valley, although there are opportunities being investigated by DOC's Landscape Threats Team to utilise our predator camera network to measure deer abundance.

Action 2.2: Monitor takahē population dynamics at Recovery Sites where pest animal abundance is known.

Takahē outcome monitoring is completed at all Recovery Sites, the level of which is determined by cost and existing knowledge of population performance and pressures. This information is essential for understanding the suitability of sites and the impact of site and bird management.

2.2.1 Murchison Mountains

The source of all takahē remaining today, and the only continuous population, the 'Murchies' takahē have been monitored for almost the entirety of the 75 years since rediscovery. Performance and pressures are well known as a result of significant research and several decades of outcome monitoring. A combination of ground survey and recovery and modelling utilising a subset of radio-transmittered individuals, has given us a good understanding on the impact of natural and introduced factors.

Stoats and deer have been supressed for many decades, and throughout this time we have a well-established survey regime. This regime is due for a review in 2024 as we expand the Recovery Site portfolio to include the Upper Whakatipu. The next full

The scale, stability, and relative isolation of the 'Murchies' population, along with the good knowledge base and expansion into new Recovery Site locations, has meant surveying effort has recently reduced, and new technology/methodology is deployed.

Since 2014, our method has focussed on remote monitoring and recovery of a subset of the takahē population, utilising radio-transmitters and aircraft to check bird status and location. The modelling that provides an estimated population size is ground-truthed once every four years (next due in November 2024).

Results from this year's full survey will help further test the accuracy of our remote-monitoring-derived population modelling. Refinements will continue as factors such as dispersal rates change with time as a result of bird density.

Next year will also see a review undertaken to

Action 2.3: Undertake density impact function analyses to quantify effect of pest densities on takahē mortality.

These analyses will be run in the coming years, following data collection on pest densities and takahē survivorship and cause of death.

Objective 3. Takahē population dynamics are understood and guide management actions.

Action 3.1 Maintain a sample of radio-tagged takahē at each Recovery Site to monitor survival (via aerial methods), and, wherever possible, determine cause of death. An appropriate sample size and regime will be determined for each location, dependent on management needs.

Murchison Mountains

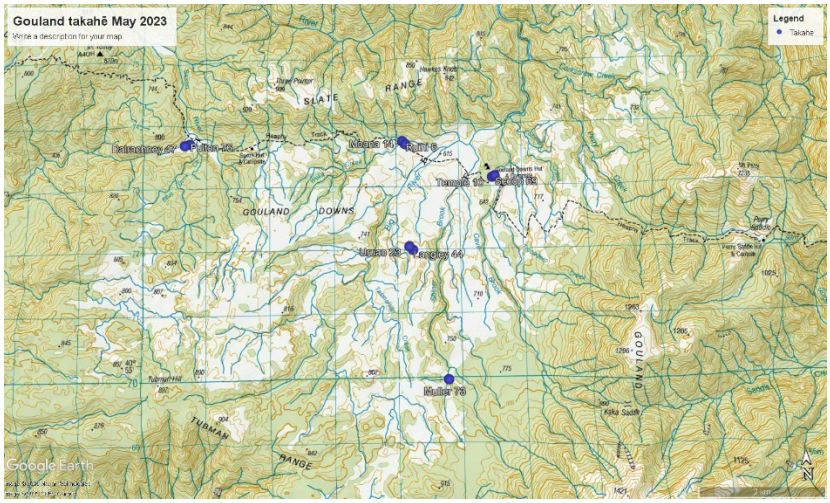
The sub-sample of transmittered takahē in the Murchison Mountains is normally monitored four times a year from the air. This gives us an adult survivorship/mortality figure, which is used to model the current population estimate.

Month	Dec 22	Feb 23	Jul 23	Oct 23
Takahē monitored	14	43	40	29
Dead birds	1	1	0	1
% Mortality	7.1	4.7	0	3.4

Cumulative Mortality	15.2%

Kahurangi (Gouland Downs)

There were nine adult takahē on Gouland Downs, Kahurangi National Park. They are all wearing transmitters. The Gouland Downs takahē are checked monthly October to March, to monitor for breeding attempts & success. Muller was a single female down the southern part of the Downs, she lost her mate the previous winter. Muller dispersed off the Downs in July, and was seen by a local farmer on his farm, then wasn't seen again despite a search by our local contractor.
Aside from this one dispersal off Gouland Downs, there were no mortalities observed with the Kahurangi takahē this year.



Action 3.2 Maintain a sample of radio-tagged adult takahē at new or recently established Recovery Sites to monitor productivity rates. An appropriate sample size and regime will be determined for each location, dependent on management needs.

Kahurangi (Gouland Downs)

@Jas pls outline the TX and monitoring effort to determine productivity at Gouland. Report on previous years recruitment (2 subbies).

Of the nine takahē on Gouland Downs. eight made up four pairs.

Of the four pairs, three nested during the 2022/2023 breeding season:

- Temple & Scoop hatched a chick but it didn't survive.
- Dalrachney & Fulton successfully raised one chick to one year old.
- Ruihi & Moana successfully raised one chick to one year old.
- Uruao & Langley did not nest.

Whakatipu (Greenstone Valley)

The first breeding season following release starts after the writing of this year's Annual Report (1 Oct – 31 Jan). Our approach for monitoring will be

fortnightly checks of all birds, locating nests, candling eggs to determine number and fertility rate, and hatch checks for any fertile eggs.

Chick survivorship will be determined at winter health check time, in July 2024. It is expected, however, that incidental sightings of chicks will be recorded through the summer and autumn seasons.

Action 3.3 Develop models to predict population trends and assess alternative management actions.

Modelling of population health and impact of various management action is undertaken on a five-yearly basis. The TRP engaged specialists from the Conservation Planning Specialist Group (CPSG), with Dr Caroline Lees as the primary researcher, in 2015 and 2020. These reports can be found here (****).

As a brief summary:

- continued improvement of the security of demographic and genetic variables, with 25-year forecasts showing robust growth.
- Burwood Takahe Centre remains critical to the future sustainability of takahē recovery.
- The Murchison Mountains population is in a precarious position, with ongoing supplementation required.
- Sanctuary Site capacity can be reduced to 65 breeding pair spaces (from 90), due to the ongoing strength of meta-population management and subsequent improvements in the health of the key population parameters.

The next review is due in 2025 and will focus on future viability of the three existing Recovery Sites and review the ongoing importance of the Burwood Takahē Centre at its current scale.

Action 3.4 Regularly critique innovations and new technology in monitoring methods for suitability of deployment within takahē populations.

Jas – pls briefly summarise the work into Druid here.

Action 3.5 Use mixed-effects models to assess environmental, predator and management factors that affect takahē recruitment and survival.

This work is ongoing, with completion for the Murchison Mountains population expected in 2025.

Action 3.6 Regularly update mixed-effects models with new environmental and population data and input results into demographic models, to refine and target population management where needed and to gauge habitat suitability via the birds' observed response to the environment.

A mixed effect model is being refined for the Murchison Mountains, with completion expected in 2025.

Objective 4. Landscape-scale management tools for pest animal control are safe for takahē.

Action 4.1: Advocate for takahē to be considered during the development of landscape-scale pest management tools.

The Takahē Recovery Team continue to work closely with DOC's Terrestrial Biodiversity, and National Eradication Teams, to share understanding of needs and opportunities. It is through this relationship and regular communication that the involvement of takahe in the PAPP trials was initiated.

Action 4.2: Test susceptibility of takahē to new toxins and their application methods for stoat, rodent, cat, and ferret control.

Summarise PAPP toxic trials

Action 4.3: Test available mitigation methods used in aerial toxin applications (e.g., repellents, palatability, exclusion zones).

PAPP palatability trials

Two rounds of non-toxic PAPP consumption trials have been run on Burwood takahe, with a total of ## individuals 'exposed'. A third, and final, round will be run this coming summer, 2023/24. Consumption rates are, so far, very low, with only one individual involved.

Following this final round a full analysis and report will be completed, expected by August 2024.

Exclusion Zones

There is a 1080 operation expected to include the Gouland Downs area in Autumn 2024. While yet to be confirmed, the TRP will be requesting an exclusion zone significantly larger than that used in 2020 (see Figure #), in response to the 'failure' of the 2020 versions at protecting the birds. The low rat and stoat numbers at the site give DOC confidence that this exclusion zone will not adversely affect the efficacy of the 1080 operation.

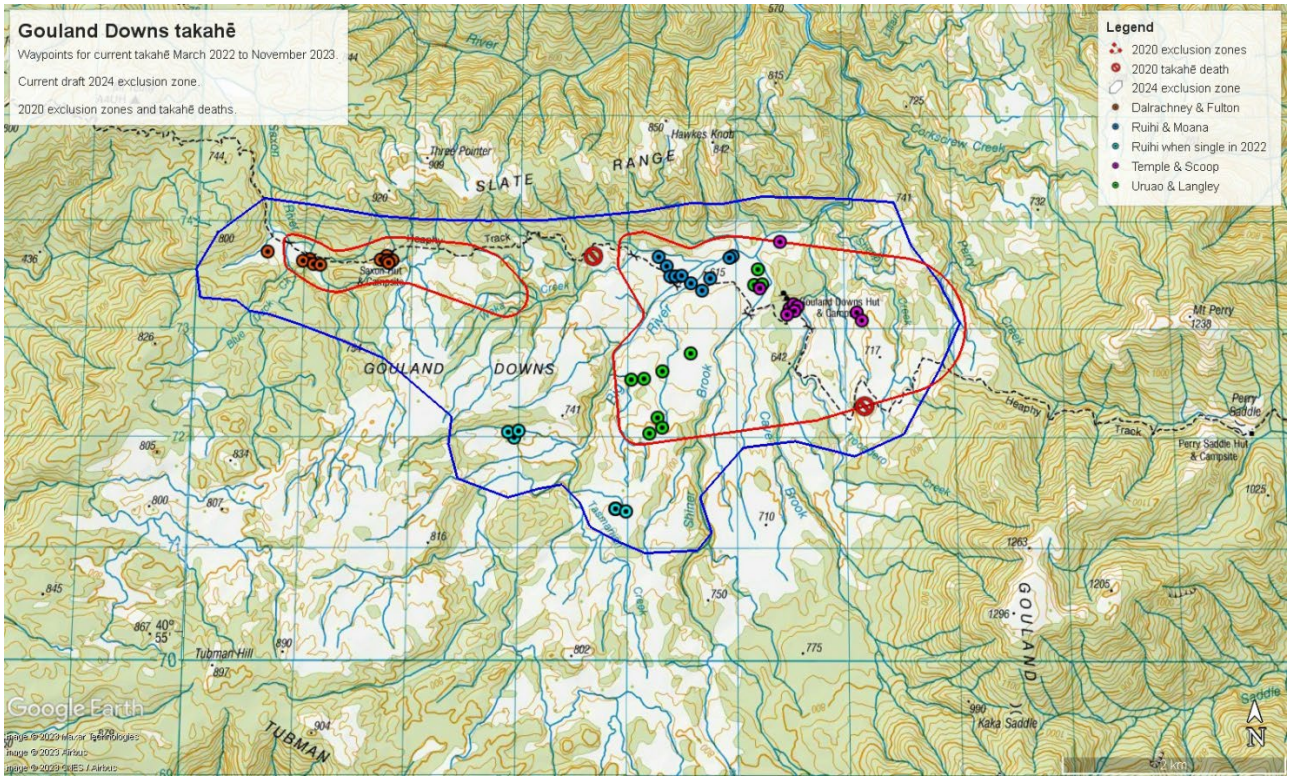


Figure #. Draft exclusion zone (blue), compared with 2020 exclusion zones (red) and takahe locations since 2020.

Exclusion zones would likely form a major part of any mitigation applied to help protect takahe during a 1080 operation in the Murchison Mountains. The TRP is working with the Te Anau DOC Biodiversity Team and National Predator Control Programme (NPCP) to scope the opportunity and risks associated with using aerial 1080 as a stoat suppression tool in the Murchison Mountains. We hope to report on this in next year's Takahe Annual Report.

Action 4.4: Estimate risk/benefit to takahē for toxins considered for application to takahē habitat to produce a net gain to the takahē population size.

1080

1080 is not currently considered to be a viable pest control option for aerial application at a takahe site – at least where a significant proportion of the population has been captive-reared. This is based on the outcome of the 2020 1080 application at Gouland Downs, where 50% of the exposed takahe died as a direct result of 1080 consumption. This strongly suggests that both toxicity and consumption rates are prohibitively high in takahē.

Until we can show that wild, pellet naïve, takahe display a significantly lower risk of consumption, aerial application will rely on large exclusion zones, regardless of the calculated benefit provided through reduced predation pressure. For the Murchison Mountains the extent of exclusion zones is considered to have too large an impact on operation efficacy to enable 1080 to be used on a large scale.

PAPP

PAPP is considered the most promising tool in development for mustelid and feral cat control. Estimating the risk to takahē combines the following:

- Toxicity.
- Availability (sow rate and bait uptake).
- Bait degradation/toxicity decline with time.
- Takahe consumption rate.

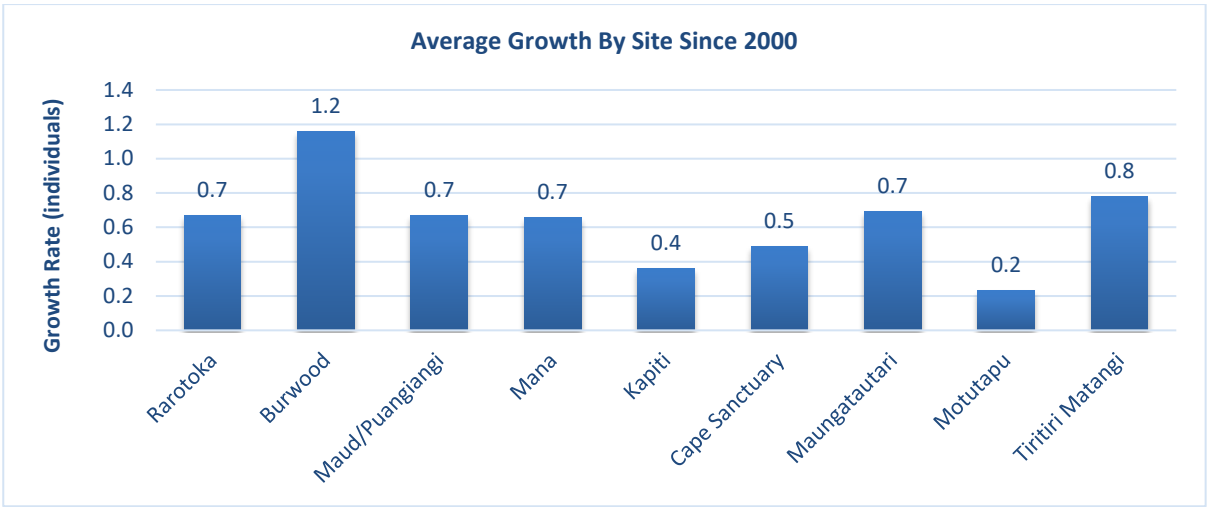
As described in 4.2, we now have a good idea of the toxicity of PAPP to takahē, enabling an estimated LD50 figure that can be used to define risk. It is estimated that takahe could consume 2 fresh stoat-sized PAPP baits, or one cat-sized PAPP bait.

Objective 5. The criteria and parameters of suitable habitat for persistent populations of takahē are known; to evaluate and improve current location success through habitat manipulation and inform viability of proposed sites for expansion.

Action 5.1: Identify and monitor the main drivers of individual population performance, e.g., habitat, climate, native predator impacts, interspecific competition.

Factors influencing takahe performance at individual sites are well understood, if not always directly manageable. Population performance is tracked closely, and investigations are made should a site underperform for an extended period. At the most extreme level they may determine whether a site loses its status as a breeding site, or as a takahe site entirely – as was the case with Maud Island in 2016. More likely is an investment in bird or site management, or a reduction in the number of birds held. This last option is commonly applied as Sanctuary Sites revert to forest and scrub over time, excluding prime takahe habitat.

All Sanctuary Sites are performing to an expected standard in recent years with both mortality and recruitment levels within historic ranges and meeting the critical population stability threshold. Tawharanui Open Sanctuary remains under scrutiny due to lack of recruitment, but dispersal and adult mortality have ceased following the reduction in the number of takahe held and increase in supplementary feeding, and the site provides good advocacy benefit. This ongoing recruitment issue may be attributed in part to individual fitness exacerbated by the small population (two pairs). This will only be discovered over time.


Average Growth By Site Since 2000
Growth Rate (individuals)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.7
1.2
0.7
0.7
0.4
0.5
0.7
0.2
0.8
Rarotoka
Burwood
Maud/Puangiangi
Mana
Kapiti
Cape Sanctuary
Maungatautari
Motutapu
Tiritiri Matangi


Tiritiri Matangi Island
RESIDENT GROWTH (INDIVIDUALS)
6
4
2
0
-2
-4
-6
2000
2001
2002
2003
2004
2005
2006
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2013
2014
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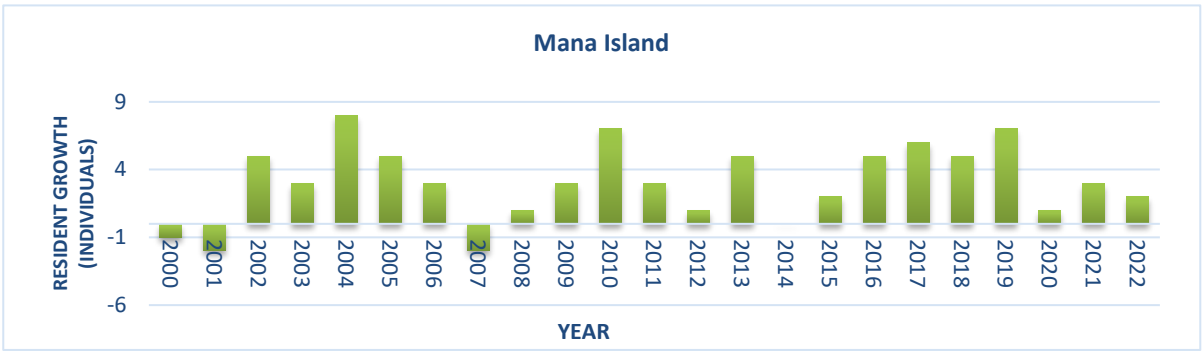
2017
2018
2019
2020
2021
2022
YEAR


Mana Island
RESIDENT GROWTH (INDIVIDUALS)
9
4
-1
-6
2000
2001
2002
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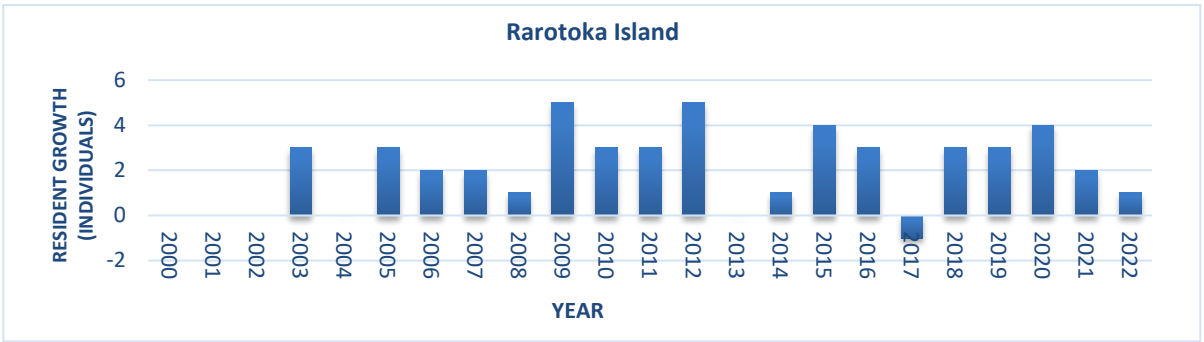
Rarotoka Island
RESIDENT GROWTH (INDIVIDUALS)
6
4
2
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2000
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YEAR

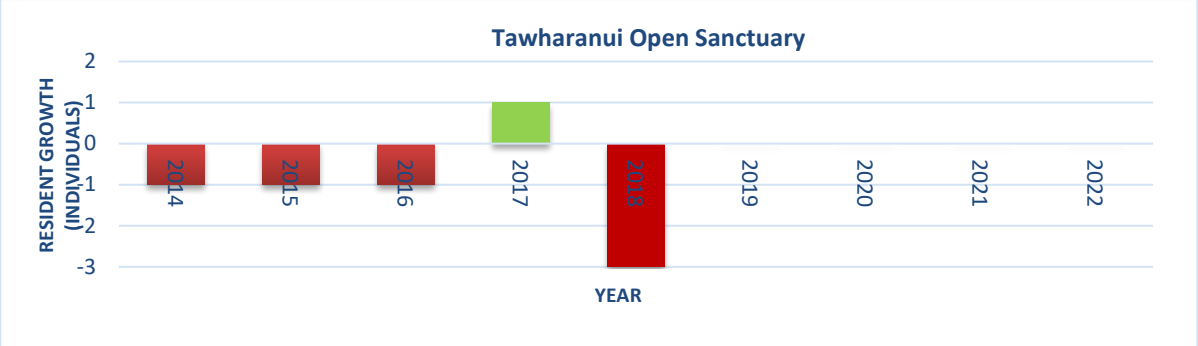


Figure # Examples of individual site demographic performance.

Action 5.2: Develop management methods to improve recruitment and survival rates at locations where one or more of the environmental factors discussed in Action 5.1 pose a risk to takahē populations.

Monitoring carrying capacity of

+

There is currently no

Action 5.3: Use the information derived from 5.1 and 5.2 to classify and rank suitable habitat areas for takahē across New Zealand, including existing locales.

4. Conservation Management.

Outcome: *At Sanctuary Sites, the takahē population is at a minimum of 90 breeding-aged pairs. At Recovery Sites, a minimum of two populations are managed to maximise genetic and demographic performance, targeting 80% of the estimated site carrying capacity.*

Objective 6: **At Sanctuary Sites**: Manage the meta-population to optimise productivity and genetic health.

Action 6.1: Manipulate Burwood Takahē Centre pairings to produce a minimum of 20 takahē per year.

The productivity at the Burwood Takahe Centre was 22 recruited juveniles this year. While down on the past three years (see fig. #), this was expected due to a reduction in breeding pair numbers and intensive nest management.

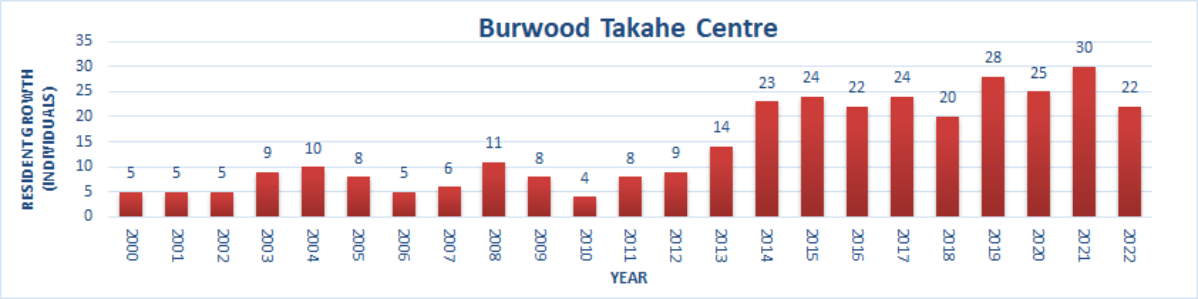


Figure # - annual takahē productivity at Burwood since 2000

There has been a significant outbreak of *salmonella* at Burwood this year (discussed further ##). One of the important management strategies to eradicate the pathogen from the site is to spell the enclosures for one year, enabled by transferring adult pairs elsewhere.

With all current sites being at, or near, capacity, high productivity was not considered a priority. Investment into nest management to induce re-clutching was reduced and reallocated to other projects.

Action 6.2: Maximise genetic diversity and minimise inbreeding at metapopulation level, utilising modelling-informed pair management and transfers as the primary tools.

We track population Mean Kinship (MK) and Genetic Diversity (GD) estimates to review the impacts that our management options are having on the broader population.

Table #: Critical genetic value tracking

		2012 (Baseline)	2015	2016	2017	2018	2019	2020	2021	2022
Burwood	GD	0.88	0.9618	0.9677	0.9702	0.9699	0.9698	0.9693	0.97	0.968
	MK	0.045	0.0382	0.0224	0.0156	0.0136	0.0136	0.014	0.013	0.013
Metapopulation	GD	0.926	0.96	0.9583	0.963	0.965	0.97	0.9719	0.972	0.972
	MK	0.0523	0.04	0.0374	0.0328	0.0296	0.0281	0.0281	0.015	0.015
Total Population	GD	0.9725	0.9718	0.9729	0.9725	0.9726	0.9728	0.9734	0.973	0.973
	MK	0.032	0.0282	0.0272	0.0268	0.0258	0.026	0.0266	0.0248	0.0255

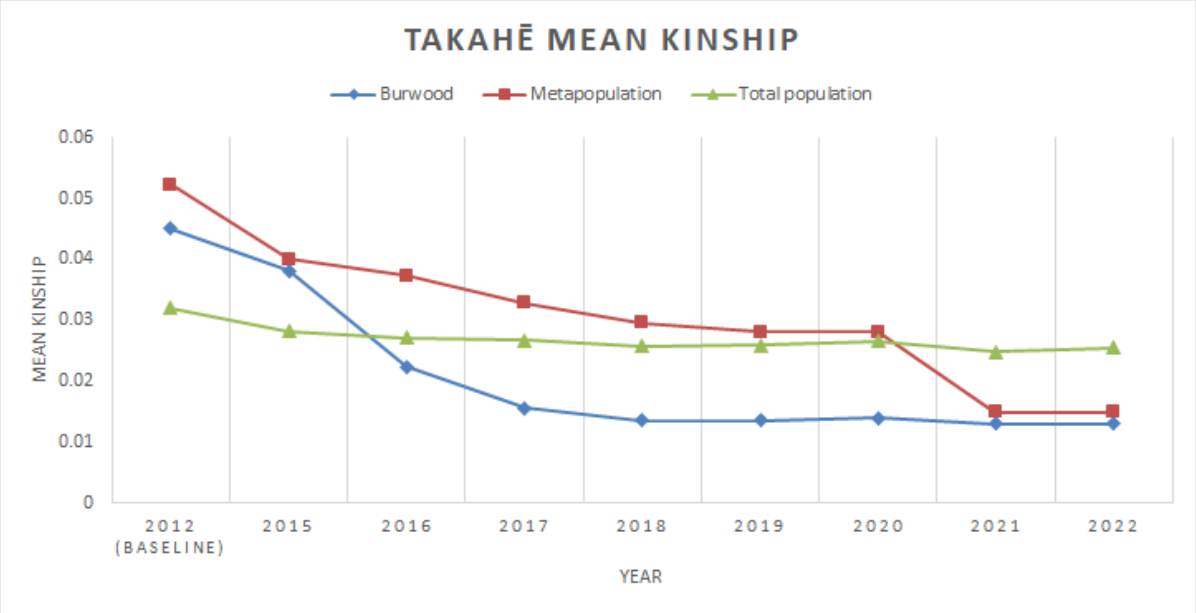


Table #: Tracking mean kinship (average relatedness of individuals) since 2021 baseline year.

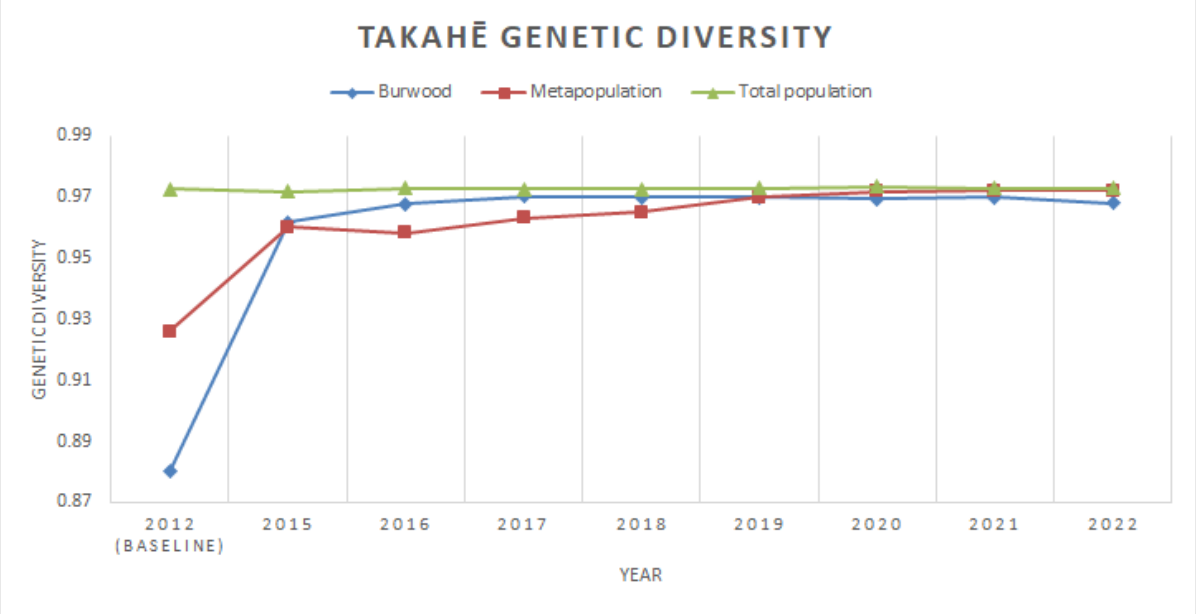


Table #: Tracking estimated Genetic Diversity (GD) retained in the population, as a proportion of the total known since management of the species began.

Action 6.3: Complete five-yearly forecasts and annual reporting on genetic targets and population growth targets.

Next due in 2025/26.

Action 6.4: Regularly review progress against genetic and population security targets, utilising best practice.

Targets are set as part of the above population health review. Population genetic diversity retention has been set at 0.95 over the 25 years following the 2020

modelling. As can be seen in table #, the estimated genetic diversity of the takahē population has remained steady at around 97.3%.

Action 6.5: Specify site-specific contributions to takahē recovery goals and outline these contributions in the site-specific management plans that are reported annually, to allow for location re-classification, including disestablishment.

Site specific management plans are all complete and approved, aside from Motutapu Island. This last plan is pending approval while decisions are made regarding monitoring effort. Our minimum standards, set in consideration of the purpose of the site, are being met. Ngai tai, whose rohe Motutapu Island sits, would like more intensive monitoring to be done, which would come at the expense of the local DOC district.

There are no concerns for any of the current sites, with all performing to expected standards.

Action 6.6: Regularly update best practice for takahē management in site management plans and in the takahē husbandry manual.

These are reviewed as new information/risks arise. All are up to date and approved (aside from Motutapu Is as discussed in 6.6).

Action 6.7: Ensure site managers have adequate understanding of the ecology, habitat (including pest management) and breeding requirements of takahē, through regular operating reviews* and the provision of the relevant documents discussed in 6.6

Operating reviews are completed by the Sanctuary Sites Project Lead, three times per year. These are documented here: Takahe_Shared_Files\Sanctuary Sites\Op reviews sanctuary sites.

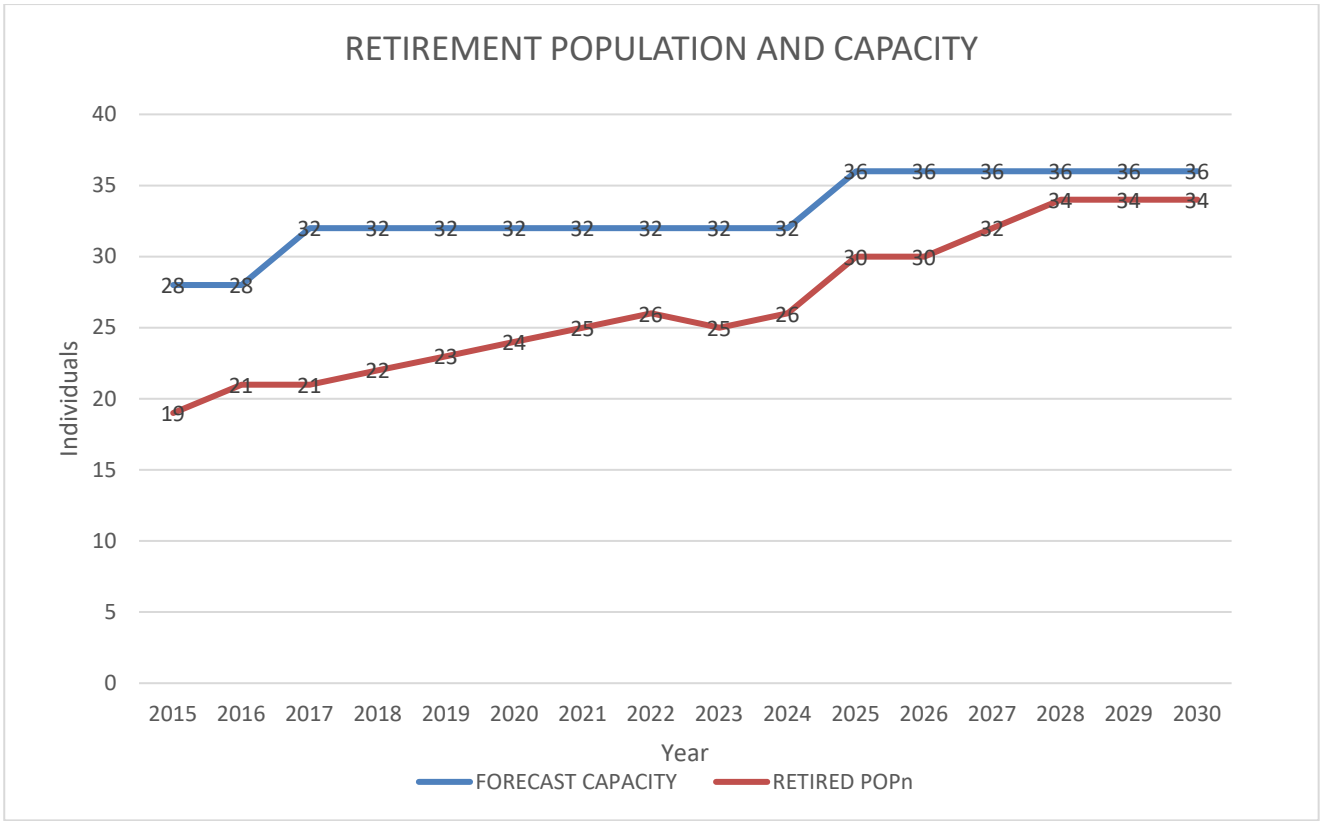
Objective 7: Sanctuary Sites combined have ongoing sufficient capacity to hold the total required pair number determined by latest population modelling.

Action 7.1: Develop a timeline that identifies targets for maintaining capacity.

Sanctuary Site capacity targets are set as part of the 5-yearly population modelling, last done in 2020-21. This last review enabled the target to be lowered to 65, from 90, pair spaces, due to strong growth in security in the previous period.

Action 7.2: Increase the capacity of Retirement Sites as required, to support optimal bird management at Sanctuary Sites.

The locations identified as 'Retirement Sites' has remained static since 2015, when Wairakei Golf and Sanctuary was added to the network. While there is sufficient capacity currently available, further space may be required beyond 2030, depending on the scale (site number and bird capacity reducing with time) and future classification (breeding, retirement, or mixed) of existing Sanctuary Sites.



Objective 8: **At Recovery Sites**: Takahē populations persist in primarily indigenous ecosystems, via cost-effective management.

Action 8.1: Work proactively with Ngāi Tahu and owners/managers of potential new locations to identify suitable and sufficient large South Island sites for takahē, with capacity to hold at least 30 pairs each, and a combined 100 pairs across Recovery sites.

This has been achieved with the re-establishment of takahe at Kahurangi in 2018, and in the Upper Whakatipu (Greenstone Valley) in August this year. There are currently an estimated 138 breeding pairs across the three Recovery Sites.

Expansion beyond the current locations will be in neighbouring catchments, building on existing capacity and security. The current aim is to return takahe to the Rees Valley area in summer 2024/25.

Action 8.2: Initial population establishment with a minimum of 25 birds at the new Recovery Sites (in 8.1).

The Upper Whakatipu takahē population was established in August 2023, with an initial 18 adult takahē released. A second release of 12 birds will follow over summer 2023-24, bringing the population to around 30 individuals – the target size to enable a test of the habitat and pest pressure.

Action 8.3: Support appropriate levels of pest ungulate control in the Recovery Sites to optimise vegetation condition, and the monitoring of outcome of control on important takahē resources.

Deer are a known competitor for food resources for takahe, and likely also have a direct impact on quality of cover, and on nesting success via disturbance. Red deer have been under management in the Murchison Mountains since the 1970s, with a combination of aerial and ground control. Population thresholds have been set, with a targeted population of under 500, and an annual cull of 120 animals.

This annual cull figure continues to be met, however, there are concerns about the current accuracy of the threshold required to suppress deer, given an apparent increase in deer sign observed. This could be attributed to a focus on aerial control, deer population responding to changes in the local environment, or an underestimation in population fecundity in the original models. It is hoped that new methodology will provide both a future monitoring tool and more effective control. This is especially critical now as funding for the ungulate browse plots has been pulled.

@ Jas please chase up deer cull numbers from the Murchies this year.

Action 8.4: Apply sufficient levels of suppression to achieve set thresholds.

Action 8.5: Supplement takahē populations at Recovery Sites with new birds as required, to enable an adequate test of habitat suitability and to ensure populations persist.

Summarise releases

5. Partnership and Advocacy

Outcomes: *The value of takahē as a taonga and conservation icon is widely known and understood.*
Strong relationships and partnerships benefit takahē management.

Objective 9: Ngāi Tahu is recognised and functions effectively as the primary partner in the Takahē Recovery Programme.

Action 9.1 High level strategic and operational decision making is collaborative through Kaitiaki rōpū committee and Taonga species representative; identifying opportunities for ensuring principles of mātauranga Māori are embedded.

Action 9.2 Ensure other parties understand the primary partnership between the Department and Ngāi Tahu; and that other partnerships are compatible with this relationship.

Action 9.3 Working with tangata whenua, provide a range of opportunities to cultivate their involvement, education, research objectives, governance in takahē recovery – such as cadetships, student programmes.

Objective 10: Takahē at all sites are managed and cared for in adherence to this management plan.

Action 10.1 Ensure all takahē populations have an approved task assignment (DOC sites), or Memorandum of Understanding and Wildlife Permit (external sites) before takahē are released. Monitor adherence to these documents - as well as the Takahē Management Plans.

All populations, except the Greenstone Valley, have up to date MOU (non-DOC sites) or Task Assignments (DOC sites), permit, and management plans.

We are working with Ngāi Tahu to develop a plan appropriate to the Greenstone Valley situation, given it is Ngāi Tahu whenua. It is expected that an MOU will be in place by June 2024.

Action 10.2 Work with Iwi katoa to ensure appropriate tikanga take place when receiving manu/kaitiakitanga from Ngāi Tahu.

Objective 11: Takahē management is supported by multiple relationships for science and technical capability.

Action 11.1 Establish and cultivate collaborations (for example, with tertiary institutions and zoos) to achieve the research and management needs of the Takahē Recovery Programme.

Action 11.2 Present results of the conservation management and research programmes for takahē to the scientific community, including Papers for peer-reviewed journals.

Objective 12: The takahē programme obtains external (non-DOC) financial support to achieve management objectives.

Action 12.1 Establish and cultivate collaborations (for example, with tertiary institutions and zoos) to achieve the research and management needs of the Takahē Recovery Programme.

Action 12.2 Maintain external financial partnerships for mutual benefit, fulfilling requirements of relevant agreements.