



Project River Recovery Annual Report

1 July 2013 – 30 June 2014

A.L. Rebergen and C.B. Woolmore



Department of
Conservation
Te Papa Atawhai

Project River Recovery is a Department of Conservation project that mitigates habitat degradation in braided rivers and wetlands in the upper Waitaki basin. It is funded through a compensatory agreement with Meridian Energy Limited and Genesis Energy in recognition of the adverse effects of hydro-electric power development on these ecosystems.

Project River Recovery Reports are internal reports that provide a record of research or management work carried out or funded by Project River Recovery.

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In the interest of forest conservation, we support paperless electronic information sharing. Limited copies of this report are printed. It is also available from the departmental website in pdf form; refer www.doc.govt.nz/braidedrivers, then *Project River Recovery's Work*, then *Publications*.

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Summary

- This report summarises Project River Recovery's (PRR) progress towards its six key objectives identified in its strategic plan for the period 1 July 2013 – 30 June 2014. These objectives are to:
 - Maintain indigenous vegetation and enhance habitat by removing problem weeds
 - Explore opportunities to enhance wetland conservation
 - Continue to build knowledge of natural heritage in braided river ecosystems
 - Test the effectiveness of large-scale predator control
 - Facilitate research by external agencies to improve our understanding of the ecology of braided river ecosystems
 - Continue to increase public awareness of braided rivers and wetlands
- PRR continues to prioritise prevention of weed invasion of the near-pristine 'upper rivers', above the hydro lakes of the upper Waitaki basin. The work's success depends on working closely with stakeholders including landholders, Land Information New Zealand and Environment Canterbury.
- Over 3,940 hours of targeted, ground-based spot spraying of weeds was carried out in the Godley, Macaulay, Cass, Tasman, Tekapo, Ohau and Ahuriri riverbeds.
- PRR spent \$534,726 in the 2013/2014 financial year.
- The Tasman predator control project delivered catches of 574 hedgehogs, 174 stoats, 236 feral cats, 38 ferrets, 33 possums, 6 weasels and 3 rats. The project, a joint initiative between PRR and the Kākī Management Programme, uses a range of predator-control techniques.
- A programme of intensive predator trapping, in a 1 km radius around a black-fronted tern colony in the upper Ohau River, continued this year.
 - During the twelve-month period from 1 March 2013 to 28 February 2014, a total of 203 hedgehogs, 158 ferrets, 93 feral cats, 22 stoats, 19 rats and 2 weasels were caught.
 - The 2013-14 season was the third consecutive successful breeding season under the predator control regime. Of 358 observed black-fronted tern nests at the island tern colony, 89.7% of nests hatched at least one chick. Fledging success was also high compared with previous years: at least 174 chicks fledged.
- Walk-through riverbed bird counts were completed on the Tasman, Godley, Macaulay, and Cass rivers.
- Other wetland management included fence maintenance, weed control, and water-level manipulation at Waterwheel and Ruataniwha wetlands.
- The braided river multi-species poster, braided river field guide and braided river teacher resource continue to prove popular, and were distributed for free to many schools and visitors.

1. Introduction

Project River Recovery (PRR) commenced operations in 1991, following establishment of a compensatory funding agreement with energy providers in the upper Waitaki River. The agreement recognised the adverse impacts of hydro-electric power development on braided river and wetland ecosystems. Since then a key focus of the programme has been to maintain the integrity of braided river ecosystems, particularly against invasive plants. The programme has also made considerable efforts to gauge the impacts of mammalian predators on riverbed fauna, and develop effective methods for their control in riverbed environments.

These and other goals are set out in the current seven-year strategic plan¹, which aligns with the funding agreement with energy providers Meridian Energy Limited and Genesis Power Limited.

This annual report for the year 1 July 2013 to 30 June 2014:

- Summarises progress toward the six key objectives identified in the strategic plan
- Describes staffing
- Presents financial statements
- Lists recent publications and internal reports

2. Staff

The project employed three permanent staff during the 2013-14 season: Chris Woolmore (manager of PRR), assisted by Susan Anderson and Rhys Garside.

Rhys played a key role in the summer weed-control work, focusing on high priority, small-scale weed control operations. Larger-scale weed control was mostly undertaken by contractor OK Vegetation Control. Susan focussed her efforts on management of natural heritage in braided rivers; the work included a trial programme of intensive predator control in the upper Ohau River to protect nesting black-fronted terns. This predator-control work was serviced by contractor Ecological Contracting Services Limited.

PRR also worked closely with the Kakī Management Programme, by jointly funding a large-scale predator-control project to protect riverbed fauna in the Tasman River.

3. Progress toward objectives of the strategic plan

PRR's progress towards achieving the objectives of the strategic plan is summarised below. PRR's internal reports contain further details of seasonal results, outcomes from trials, and data analysis; these are available on request from the Te Manahuna/Twizel Office.

¹ Available on the DOC website

3.1 Objective 1: Maintain indigenous vegetation and enhance habitat by removing problem weeds

Riverbed weed-control programme continues

PRR's weed control programme takes place in the main braided rivers, some of their tributaries, and in various natural and managed wetlands of the upper Waitaki basin. The total area of braided-river habitat in the large rivers of the upper Waitaki basin is approximately 32,000 hectares.

PRR's highest priority is to prevent new incursions of invasive weeds and removing newly-established infestations at priority locations. Priority sites are generally still relatively 'clean' in terms of the number of weed species and the extent of their distribution. The rationale for prioritising particular sites and locations is set out in PRR's weed control plan (Woolmore 2004).

Rivers above major lakes are in excellent condition

PRR continues to maintain the excellent condition of rivers above Lakes Tekapo and Pukaki, and the Ahuriri River above Longslip Creek. Invasion by several potentially damaging weeds at these sites has been prevented or reversed in its early stages. The Godley and Ahuriri rivers above Longslip Creek are almost entirely free of Russell lupins and broom, and Russell lupin infestations on the Tasman River have reduced substantially. These rivers now only need annual checks to remove small patches of weeds and seedlings.

Work continues to control invasive weed on rivers below lakes

The rivers below the lakes, and the Ahuriri River below Longslip Creek, contain many more species of invasive plants, and infestations are much larger. Not all invasive weeds can be controlled at these sites; we continue to work to reach a sustainable, realistic level of weed control at priority locations only.

Other river work shows solid progress

In the 2013-14 season our good progress continued, with ongoing maintenance control of lupins and broom in the Tasman, Ahuriri, Cass, Godley and Mistake rivers.

Improvements in the Ohau and Tekapo Rivers include progressively lower numbers and size of target weeds each year, according to visual inspections.

For the seventh consecutive year PRR, ECan and LINZ continued an integrated weed-control programme in the upper Tekapo River – targeting gorse, broom, Russell lupins, and willows. LINZ and ECan contractors carried out the weed-control work.

In areas where control was undertaken by PRR, contractors and staff applied herbicides from the ground using knapsack sprayers. Target species included willow, broom, gorse, wilding pine, yellow tree lupin, buddleia, oxeye daisy, Californian poppy and Russell lupin.

Active monitoring of contractor practices and weed control

Contractor work practices were monitored by site visits and discussions with contractors. Contractors are committed to, and continue to maintain, high standards. Effectiveness of weed control was monitored by site inspections by the PRR manager, before and after weed control. The level of control achieved was generally very good.

Weed control operations are further detailed in the **Appendix**.

Further control of willows in the upper Ahuriri was needed

Willows sprayed aerially and not completely killed in 2012/13 needed follow-up treatments. This was disappointing and hard to explain, as an experienced operator

completed the control and previous aerial willow control with this herbicide has been very successful. Partly-dead trees were treated by hand using a basal herbicide application method.

Good progress towards goals for control of yellow tree lupin and buddleia

Rhys continued to make excellent progress towards our goal for controlling of zero density of mature yellow tree lupin and buddleia outside residential sites in the upper Waitaki basin.² All known establishment sites of both species were checked for regrowth, and controlled where necessary.

While the number of known sites with yellow tree lupin remained reasonably constant, the average number of lupins found at these sites continues to decline.

We have made good progress containing the spread of buddleia in river systems, and maintaining zero density of seeding buddleia at known riverbed sites. Scattered plants were removed from the Twizel and lower Ohau Rivers.

A new weed species discovered – and subjected to control

A new weed species – mat grass (*Nardus stricta*) – was discovered at the Tasman river delta. This weed threatens low-growing indigenous species present at the lake delta, including important populations of the threatened pygmy clubrush (*Isolepis basilaris*). All known sites of mat grass were treated with glyphosate herbicide, which appears to control this weed well. Regular inspections and control to zero density will be needed in future.

Table 1: PRR’s weed control effort (person hours) and the type and quantity of herbicide used by PRR staff and contractors, July 2013 – June 2014

SITE	GROUND HOURS	AERIAL HOURS	GLYPHOSATE (LITRES)	TRICLOPYR (LITRES)	X-TREE BASAL (LITRES)
Tekapo					
Mistake Stream	50		0.62	0.22	
Ahuriri Upper	91				235.0
Forks	1463			253	
Tasman	1804.5		70.4	45.09	
Cass	10			0.05	
Ohau tern island	52		7.25		
Godley	20		0.4	0.2	
Lower Ohau	302			0.52	
Ruataniwha/ Waterwheel wetland	31				23.0
YTL/buddleia	117		0.45	0.4	7.0
TOTAL	3940.5	0.0	79.12	299.48	265.0

For information about the penetrants and dyes used please refer to the **Appendix**.

Contract spraying was done by contractor OK Vegetation Control using knapsack sprayers. Work carried out in the Tekapo River by Land Information New Zealand and Environment Canterbury is excluded from this table.

² PRR’s specific goal is to achieve zero density of mature yellow tree lupin and buddleia outside residential sites in the upper Waitaki basin. This and other goals are further set out in the Strategic Plan, available on the DOC website.

3.2 Objective 2: Explore opportunities to enhance wetland conservation

The man-made Ruataniwha wetlands and Waterwheel wetlands continued to provide habitat for a range of native fauna and flora. PRR managed these wetlands by manipulating water levels and controlling weeds.

3.3 Objective 3: Continue to build knowledge of natural heritage in braided-river ecosystems

Riverbed bird surveys to monitor population trends

PRR continued its programme of riverbed bird counts. This is part of a regular cycle of surveys to monitor long-term population trends of threatened – and more common – birds in braided rivers.³

In the early 1990s PRR completed surveys of all the Upper Waitaki rivers over three years. As we don't have the resources to re-survey every river each year, we plan to re-survey each river system over three consecutive years on a rotational basis.

This season we completed the first year of counts in the Godley, Macaulay, and Cass rivers. The Tasman River is surveyed every year. The survey results are summarised in **Tables 2 and 3**.

Table 2: Braided-river bird species recorded in walk-through surveys of the Macaulay, Godley, and Cass Rivers in November 2013

SPECIES	MACAULAY	GODLEY	UPPER CASS	LOWER CASS
Banded dotterel	66	424	132	165
Wrybill	2	116	10	26
Black stilt (node J)	0	22	0	4
Pied stilt or ≤ node E stilt	0	3	11	6
South Island pied oystercatcher	11	69	28	29
Spur-winged plover	1	17	5	1
Black-fronted tern	26	114	134	53
Caspian tern	0	8	0	0
Black-billed gull	0	10	77	2
Southern black-backed gull	2	212	190	19
Black shag	2	36	0	1
Paradise shelduck	7	28	17	20
Mallard/grey duck/hybrid	0	30	0	1
Canada goose	7	432	8	13
Black swan	0	0	0	2
Swamp harrier	0	1	1	3

We plan to compare these counts with counts from the same river sections in 1991–1994, once three consecutive years of counts are completed in the Macaulay, Godley and Cass rivers.

³ Walk-through counts of riverbed birds have been used for many years in New Zealand. The survey data show trends in bird populations over time in upper Waitaki rivers, and can be compared directly with other riverbed bird surveys around the country.

Table 3: Bird survey results on the Tasman River 1992-2013

SPECIES	1992	1993	1994	2004	2005	2006	2007	2008	2009	2010	2012	2013
Banded dotterel	599	572	523	837	569	778	858	847	743	395	452	570
Wrybill	151	128	120	86	99	32	111	143	156	92	84	165
Black-fronted tern	110	175	79	217	121	47	92	101	143	155	131	173
Black-billed gull	25	8	7	32	7	10	37	5	6	11	22	6
Black stilt	5	1	1	2	8	9	15	15	32	2	5	3
Hybrid stilt	9	1	1	8	9	4	10	4	1	1	0	2
Pied stilt	21	12	18	17	54	12	9	2	0	0	2	2
SIPO	76	59	46	100	61	86	69	64	52	65	53	109
Caspian tern	2	2	2	0	3	0	0	0	3	0	0	1
Black-backed gull	537	608	609	258	151	95	154	127	243	228	413	366
Swamp harrier	11	3	0	3	3	1	9	7	1	1	2	1
Spur-winged plover	23	17	18	25	31	21	37	23	12	5	7	23
White-faced heron	1	2	2	0	3	2	0	0	2	1	3	0
Waterfowl and shags	357	407	334	702	382	345	842	377	336	205	177	295
TOTAL	1,927	1,995	1,760	2,287	1,511	1,442	2,245	1,715	1,730	1,161	1,351	1,716

3.4 Objective 4: Test the effectiveness of large-scale predator control

Tasman River – large-scale predator control

PRR and the Kakī Management Programme continue to implement a large-scale, extensive predator-control project in the Tasman valley. The project aims to reduce predation of river birds so depleted populations can recover and large populations are stable. The project takes a catchment-based approach, using a variety of control methods throughout the year. Success of the project will be measured against target increases in fledging success and population growth for a range of river birds over a five-year time frame.

This was the tenth season of operation. 1,369 traps (183 Fenn, 305 DOC250, 90 DOC150, 219 Conibear traps, and 572 Victor leg-hold traps) were in place. They caught 574 hedgehogs, 174 stoats, 38 ferrets, 236 cats, 33 possums, 6 weasels, and 3 rats (Cleland et al., 2014).

In November 2013 we carried out a black-backed gull control operation, using alpha chloralose bread baits, at the largest colony site near the Tasman delta. 401 black-backed gulls were culled. Follow-up operations for the next three seasons will keep the population at low levels.⁴

Two fully-certified predator dogs have previously been used, under the National Predator Dog Scheme, to indicate the presence of cats in previously trapped areas and to target individual (especially ‘trap-shy’) cats. This year the dogs worked in selected trapped areas throughout the valley; they destroyed 12 cats inside key protection areas, and found activity ‘hotspots’ that we may target in future.

Outcome monitoring followed the nesting success of wrybill and black-fronted tern. Hatching success of wrybill (n=38 nests) was 68%, with fledging success of 47%. Hatching success of black-fronted tern (n=51 nests) was 78%, with fledging success of 63%.

Ohau River

The Upper Ohau predator control programme began in 2009. It aims to improve the breeding success of a large black-fronted tern colony that nests each year on an island in the upper Ohau River.

The project involves:

- Intensive predator-control in a grid arrangement of kill traps within a 1 km radius of the tern colony island
- Rabbit control within a 1.2 km radius of the same island
- Kill traps run continuously at 436 locations during March 2013 – February 2014:
 - 334 with traps targeting mustelids, rats and hedgehogs (DOC 150 and DOC 250 traps)
 - 84 with traps targeting cats (Twizel cat traps (two traps per tunnel), Belisle Super X 220 traps, and modified Timms traps)
 - 18 with traps targeting possums (Warrior traps)

In total 508 predators were caught: 22 stoats, 158 ferrets, 2 weasels, 19 Norway rats, 203 hedgehogs, 93 cats, and 11 possums.

⁴ Fewer than 50 adult birds and 10 breeding pairs.

Rabbits continue to be monitored with spotlight counts, and controlled to low numbers using night shooting and patch poisoning within the 1 km management area. Rabbits are key prey for high-level predators; by removing rabbits from the area close to nesting birds, we expect predators will hunt in areas away from the colony where higher prey numbers exist.

Toxin operations to control Norway rats and possums were undertaken between August 2013 and mid-February 2014. Diphacinone cereal pellets were used in 158 bait stations to target Norway rats, and encapsulated potassium cyanide baits were used in 71 bait stations to target possums.

Norway rat and possum numbers were monitored with WaxTags[®] placed along the river margins. While possum activity was detected at five locations during March and two locations in July, none was found on the island.

Nesting success for Black-fronted terns

Black-fronted tern nests were monitored weekly from late September 2013 to the end of January 2014. The 2013–14 season was the third consecutive successful breeding season for the island colony under this predator-control regime:

- More than 670 adults were present in the Ohau island colony at its peak, the largest number recorded since monitoring began at this site. In total, 10 different sub-adults were seen.
- Incubation and fledgling successes were also high:
 - 89.7% of the 358 monitored island nests successfully hatched chicks or reached full incubation term; fewer than 8% of the nests confirmed as failing prior to hatching.
 - Fledgling numbers reached at least 174, with the fledgling rate per nest being at least as good as the best season previously recorded at this site.

Terns also nested on the mainland terraces on each side of the river adjacent to the island and on a gravel bar downstream from the island. We believe an unconfirmed number of chicks successfully fledged from nests on the true left, in the early and middle parts of the season. No terns were confirmed as fledging from the nests on the true right mainland terrace.

3.5 Objective 5: Facilitate research by external agencies to improve our understanding of the ecology of braided-river systems

Luke Javernick from the Canterbury University Civil and Natural Resources Engineering Department completed his PhD study “Modeling flood-induced processes causing Russell lupin mortality in the braided Ahuriri River, NZ”. The research aimed to investigate how flood-induced processes affect lupin mortality, and to determine the correlating flood events that drive these processes.

It was thought that removing large woody weeds would allow large floods in the Ahuriri to clear lupins and other vegetation from large stretches of riverbed. Flooding could also maintain enough open riverbed areas over time to create and sustain the habitat of wader birds. However the study showed that while flooding causes lupin mortality, it is unlikely to create enough open habitat to maintain wader-bird populations in the lower river.

3.6 Objective 6: Continue to increase public awareness of braided rivers and wetlands

PRR staff continued to give presentations to schools on the value of braided river ecosystems, and how to manage threats they face. PRR has also provided similar support to university field trips.

PRR staff also met with various stakeholders – including the PRR Liaison Group, the Tekapo/Pukaki/Ohau Operational Agreement working group, Fish and Game, ECan, and private landholders.

PRR supported the Waterwise Trust Programme that gives selected students from South Island secondary schools the opportunity to look at water issues in the Waitaki catchment. PRR and other DOC staff at Twizel contributed to another successful pilot programme. We expect this will become an annual event.

PRR continues to update and reprint its information resources, and distribute them to schools, businesses and community groups. The braided river multi-species poster and braided river field guide are still popular, while the colour information booklet, brochures and poster continue to raise interest from schools and volunteer groups.

4. Project River Recovery's financial statements 1 July 2013 – 30 June 2014

PRR spent \$534,726 in the 2013/2014 financial year. PRR's revenue and expenditure for the 2013/2014 financial year is itemised in Tables 4-6. The PRR Trust Account had a balance of \$131,163 at the end of the 2013/2014 financial year. These funds are invested in an interest-bearing call deposit account at Westpac Bank, Government Branch, Wellington.

Table 4: Project River Recovery Statement of Financial Performance for year ending 30 June 2014

	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
	(\$000)	(\$000)	(\$000)	(\$000)	(\$000)	(\$000)	(\$000)	(\$000)	(\$000)	(\$000)	(\$000)	(\$000)	(\$000)
REVENUE													
Stakeholder transfers from revenue in advance	516	492	499	485	472	555	425	437	428	556	416	545	260
Other revenue	18	37	0	0	0	0	0	0	0	12	1	1	0
TOTAL REVENUE	534	529	499	485	472	555	425	437	428	568	417	546	260
EXPENDITURE													
Personnel costs													
Salaries	138	138	140	129	119	118	172	108	109	68	98	106	67
Wages	3	0	2	1	12	13	4	1	4	1	9	23	30
Other personnel	1	0	-3	-2	6	3	1	1	0	7	2	1	9
Total personnel costs	141	138	139	128	137	134	177	110	113	76	109	130	106
Administration costs													
Administration costs	0	0	0	0	0	1	1	0	2	1	0	5	0
Communications/EDP	27	27	27	26	26	25	25	25	25	25	25	18	18
Accommodation	0	0	0	0	0	1	2	0	0	0	1	1	1
Office costs	27	27	27	26	26	27	28	25	27	26	26	24	19
Total administration costs													
Operating costs													
Professional fees	6	5	1	9	2	15	12	23	6	7	152	100	20
Travel	2	1	1	1	7	5	1	1	2	4	1	3	3
Vehicle expenses	34	40	41	42	38	37	17	12	14	13	11	15	11
Field operations	321	306	278	273	260	335	190	257	261	436	106	266	95

Information and publicity	1	2	1	4	6	5	1	2	3	2	7	8	6
Grants and miscellaneous	3	10	11	2	3	0	2	6	2	4	7	1	0
Total operating costs	367	363	333	331	316	397	223	301	288	466	284	393	135
TOTAL EXPENDITURE	535	529	499	485	479	558	428	437	428	568	419	547	260
NET SURPLUS (DEFICIT)	-1	0	0	0	-7	-3	-3	0	0	0	-2	-1	0

Table 5: Summary of core task expenditure for the year ending 30 June 2014

TASK	EXPENDITURE 2013/14 (\$)	% 2013/14	EXPENDITURE 2012/13 (\$)	% 2012/13
001 Project management	179,142	33.5	190,544	36
002 Weed control	197,287	36.9	202,953	38.4
004 Research and monitoring	91,542	17.1	66,870	12.7
003 Wetland enhancement				
006 Advocacy	714	0.1	1,231	0.2
007 Predator control	66,041	12.4	67,002	12.7
TOTAL	534,726	100	499,348	100

Table 6: Statement of Financial Position as at 30 June 2014

	TOTAL	MERIDIAN	GENESIS
	(\$)	(\$)	(\$)
OPENING BALANCE 1 JULY 2013	136,419.92	129,447.25	6,972.67
Funds transferred to Westpac Trust Account during 2013/14	519,460.98	452,710.26	66,750.72
Subtotal	655,880.90	582,157.51	73,723.39
Less transfers (withdrawals) from Trust Account to Operating during 2013/14	527,139.00	459,628.00	67,511.00
Plus interest on Trust Account applied 31 March 2014	2,421.35	2,273.86	147.49
CLOSING BALANCE IN WESTPAC TRUST ACCOUNT 30 JUNE 2014	131,163.25	124,803.37	6,359.88
POST BALANCE DATE TRANSACTION RELATED TO 2014 YEAR			
Amount in advance in Department Balance Sheet transferred to Trust Account after balance date	0.00		
FUNDS AVAILABLE AS AT 30 JUNE 2014	131,163.25	124,803.37	6,359.88

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- Javernick, Luke A. 2013: Modeling flood-induced processes causing Russell lupin mortality in the braided Ahuriri River, New Zealand. Thesis submitted for partial fulfilment of the requirements for the degree of Philosophy (PhD), Civil and Natural Resources Engineering, University of Canterbury. 441 p.
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Appendix

Project River Recovery weed control programme summary 2013-14

Location:	Tasman River
Start Date:	6 Jan 14
Finish Date:	31 Mar 14
Target Species:	Russell lupin (<i>Lupinus polyphyllus</i>). Also: broom, crack willow, vipers bugloss, woolly mullein, sweet briar, wilding trees.
Control Method:	Handheld – knapsack spot spray. Glyphosate 510 Agpro green 110 mL per 15L + Herbisafe 110 mL per 15L; or Grazon 90 mL per 15 L + Aquakynde 30 mL per 15 L, both with Agpro blue marker dye.
Area treated:	4,460 ha scattered plants; Total area 4,460 ha
Results:	Post control inspection – excellent control achieved
Other:	1,804.5 person hours. 70.4 L glyphosate and 45.09 L Grazon concentrate applied. Annual monitoring completed. Extensive seedling regrowth in area reworked by floods in middle of river from power pylons to just above Freds Stream.

Location:	Lower Ohau River
Start Date:	1 Oct 13
Finish Date:	15 Dec 13
Target Species:	Broom. Also Russell lupin, buddleia, yellow tree lupin, sweet briar, willow, wilding trees.
Control Method:	Handheld – knapsack spot spray. Glyphosate 510 Agpro green 110 mL per 15 L + Herbisafe 110 mL per 15L + Agpro blue marker dye.
Area treated:	117 ha scattered plants. Total area 117 ha.
Results:	Post-control inspection – excellent control achieved.
Other:	302 person hours. 46.24 L glyphosate concentrate applied.

Location:	Fork Stream
Start Date:	30 Oct 13
Finish Date:	4 Jan 14
Target Species:	Russell lupin, broom
Control Method:	Handheld – knapsack spot spray. Glyphosate 510 Agpro green 110 mL per 15 L + Herbisafe 110 mL per 15 L + Agpro blue marker dye. Vehicle mounted spray unit – Glyphosate Agpro green 700 mL per 100 L + Aquakynde 200 mL per 100 L + Agpro Blue marker dye.
Area treated:	80 ha. Total area 93 ha.
Results:	Post-control inspection – excellent control achieved.
Other:	Riverbed and margin only sprayed, width depends on landowner permission. 1,463 person hours, 253 L Grazon concentrate applied. Area above SH8 bridge (13 ha approx.) completed by the Ministry of Defence this year

Location:	Ahuriri River – Ben Avon to Birchwood
Start Date:	
Finish Date:	
Target Species:	Willow
Control Method:	Handheld low pressure backpack: X-Tree basal (premixed product)

Area treated:	930 ha. Total area 935 ha.
Results:	To be assessed in 2015.
Other:	91 person hours, 235 L X-Tree basal applied.

Location:	Mistake Creek, Godley true right
Start Date:	6 Nov 2013 to 22 Nov 2013
Finish Date:	6 Nov 2013 to 22 Nov 2013
Target Species:	Russell Lupin, willow, gorse, broom
Control Method:	Handheld - knapsack spot spray. Glyphosate 510 Agpro green 110 mL per 15 L + Herbisafe 110 mL per 15 L + Agpro blue marker dye. Grazon 90 mL per 15L + Herbisafe 90 mL per 15 L + Agpro blue marker dye.
Area treated:	Recorded GPS spot locations
Results:	Visual inspection, excellent results
Other:	50 person hours. 0.62 L glyphosate concentrate and 0.22 L Grazon concentrate applied.

Location:	Cass River
Start Date:	13 Nov 13
Finish Date:	13 Nov 13
Target Species:	Willow, broom, lupins
Control Method:	Handheld - knapsack spot spray. Grazon 90 mL per 15 L + Herbisafe 90 mL per 15 L + Agpro blue marker dye
Area treated:	Recorded GPS spot locations.
Results:	Visual inspection, excellent results.
Other:	10 person hours. 0.05 L Grazon.

Location:	Godley true left
Start Date:	4 Dec 2013 and 11 Dec 2013
Finish Date:	4 Dec 2013 and 11 Dec 2013
Target Species:	Broom, gorse, lupins
Control Method:	Handheld - knapsack spot spray. Grazon 90 mL per 15 L + Herbisafe 90 mL per 15 L + Agpro blue marker dye.
Area treated:	Recorded GPS spot locations.
Results:	Visual inspection, excellent results.
Other:	20 person hours. 0.52 litres Grazon concentrate applied.

Location:	Ohau tern island
Start Date:	6 Sep 2013, 13 Feb 2014 and 3, 4 Mar 2014
Finish Date:	6 Sep 2013, 13 Feb 2014 and 3, 4 Mar 2014
Target Species:	Willow, broom, sweet briar, vipers bugloss, woolly mullein, tall exotic herbaceous vegetation
Control Method:	Handheld - knapsack spot spray, and vehicle-mounted gun and hose. Glyphosate 510 Agpro green 110 mL per 15L + Herbisafe 110 mL per 15 L (knapsack). Grazon 700 mL per 100L + Herbisafe 700 mL per 100 L, both with Agpro blue marker dye.
Area treated:	1.2 ha; total area 1.2 ha
Results:	Visual inspection, good results
Other:	52 person hours; 7.25 L glyphosate concentrate applied

Location:	Waterwheel wetland
Start Date:	
Finish Date:	
Target Species:	Broom
Control Method:	Handheld – basal bark application, X-Tree basal ready to use.
Area treated:	
Results:	Visual inspection, excellent results.
Other:	3 person hours; 1 L X-Tree basal applied.

Location:	Ruataniwha wetland
Start Date:	
Finish Date:	
Target Species:	Broom, sweet briar, willow
Control Method:	Handheld – basal bark application, X-Tree basal ready to use.
Area treated:	
Results:	Visual inspection, excellent results
Other:	28 person hours; 22 L X-Tree basal applied.

Location:	YTL Upper Waitaki
Start Date:	
Finish Date:	
Target Species:	Yellow tree lupin
Control Method:	Handheld – knapsack spot spray. Glyphosate 510 Agpro green 110 mL per 15 L + Herbisafe 110 mL per 15 L; Grazon 90 mL per 15 L + Herbisafe 90 mL per 15 L; both with Agpro blue marker dye. X-Tree basal applied using basal stem method.
Area treated:	Recorded GPS spot locations
Results:	Visual inspection, excellent results.
Other:	100 person hours. 0.43 L glyphosate concentrate, 0.38 L Grazon concentrate and 7 L X-tree Basal applied. All plants encountered recorded by size class and GPS location.

Location:	Buddleia Upper Waitaki
Start Date:	
Finish Date:	
Target Species:	Buddleia
Control Method:	Handheld – knapsack spot spray. Glyphosate 510 Agpro green 110 mL per 15 L + Herbisafe 110 mL per 15 L + Agpro blue marker dye.
Area treated:	Recorded GPS spot locations
Results:	Visual inspection, excellent results.
Other:	17 person hours. 0.02 L glyphosate and 0.02 L Grazon concentrate applied. All plants encountered recorded by size class and GPS location.

