Ministry for the Environment
Manatū Mō Te Taiao

Snapshot of
Water Allocation in New Zealand

Prepared for Ministry for the Environment
by Aqualinc Research Limited

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Abbreviations

ARC	Auckland Regional Council
DOC	Department of Conservation
EBOP	Environment Bay of Plenty
ECAN	Environment Canterbury
ES	Environment Southland
EW	Environment Waikato
GDC	Gisborne District Council
GWRC	Greater Wellington Regional Council
HBRC	Hawkes Bay Regional Council
HRC	Horizons Regional Council
MDC	Marlborough District Council
MfE	Ministry for the Environment
NCC	Nelson City Council
Ncc	National catchment coverage
NIWA	National Institute for Water and Atmosphere
NRC	Northland Regional Council
ORC	Otago Regional Council
TDC	Tasman District Council
TRC	Taranaki Regional Council
WCRC	West Cost Regional Council

Acknowledgements

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Hawkes Bay Regional Council – Helen Codlin
Horizons Regional Council – Jon Roygard
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Nelson City Council – Deborah Bradley
Northland Regional Council – Susie Osbaldiston
Otago Regional Council – Sarah Ibbotson and Robin Crawford
Tasman District Council – Rob Smith, Lynda Cross and Joseph Thomas
Taranaki Regional Council – Karl Browne
West Coast Regional Council – Simon Moran

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Executive Summary

This report summarises the results of the 2006 survey of water take consents for consumptive use (including drinking water supply, industry, irrigation and stock water supply). It follows on from and updates a similar survey in 1999. It also draws on information from work in the intervening years; national water accounts, agricultural census (2002) and monitoring of surface-water flows.

Number of consents

There are currently close to 20,000 consented water takes in New Zealand. The majority of coldwater consents are taken from groundwater (66%), with 29 percent from surface water (run-of-river), 3 percent from storage (dams and lakes) and 2 percent from geothermal sources. Irrigation accounts for the greatest number of consents (78 percent) followed by industry (11 percent) and public water supply (9 percent). While stock water supply accounts for only 2 percent of consented takes, it should be borne in mind that the vast majority of takes for stock water are non-consented as they fall within permitted activity and/or reasonable use criteria.

Figure ES-1: Consents (number) by source

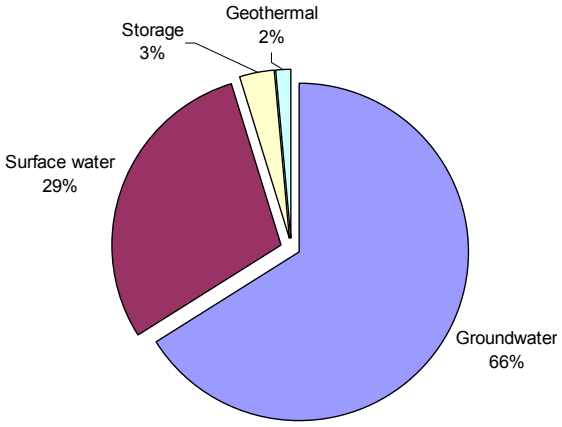
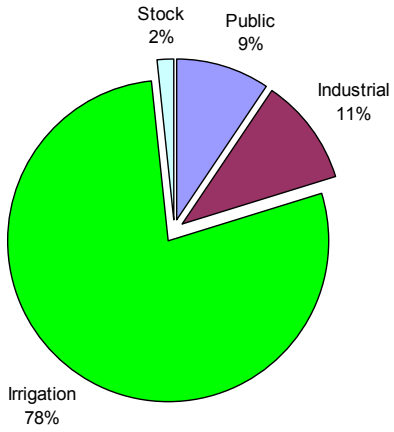


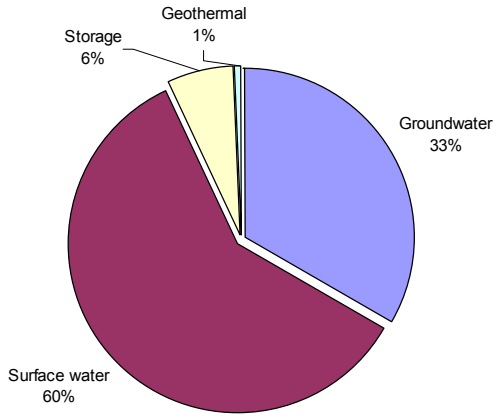
Figure ES-2: Consents (number) by use



Volume of water allocated

Nationally the total allocation rate is 679 cubic metres per second (m^3/s), equal to about double the average flow rate of the Waikato River. Two thirds of this allocation is from surface-water sources (run-of-river and storage) and a third from groundwater. Irrigation accounts for 77 percent of allocations, public water supply for 11 percent and industrial use for 9 percent.

Figure ES-3: Distribution of allocation (m^3/s)



Allocation from source:

- Surface water (run-of-river) 60%
- Groundwater 33%
- Storage 6%
- Geothermal 1%

Allocation by use:

- Irrigation 77%
- Public 11%
- Industry 9%
- Stock 3%

Regional distribution

Figure ES-4:Regional water allocation (m^3/s) by source

Canterbury: 55% (373 m^3/s)

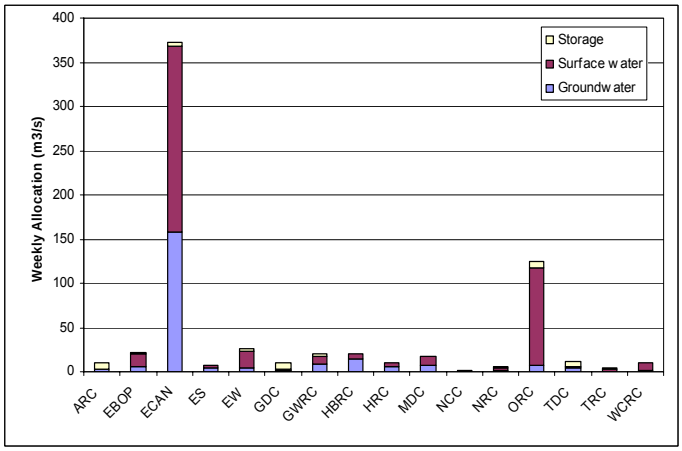
- 56% surface water
- 43% groundwater

Otago: 18% (125 m^3/s)

- 88% surface water
- 6% storage
- 6% groundwater

Others: 27% (177 m^3/s)

- 48% surface water
- 17% storage
- 35% groundwater

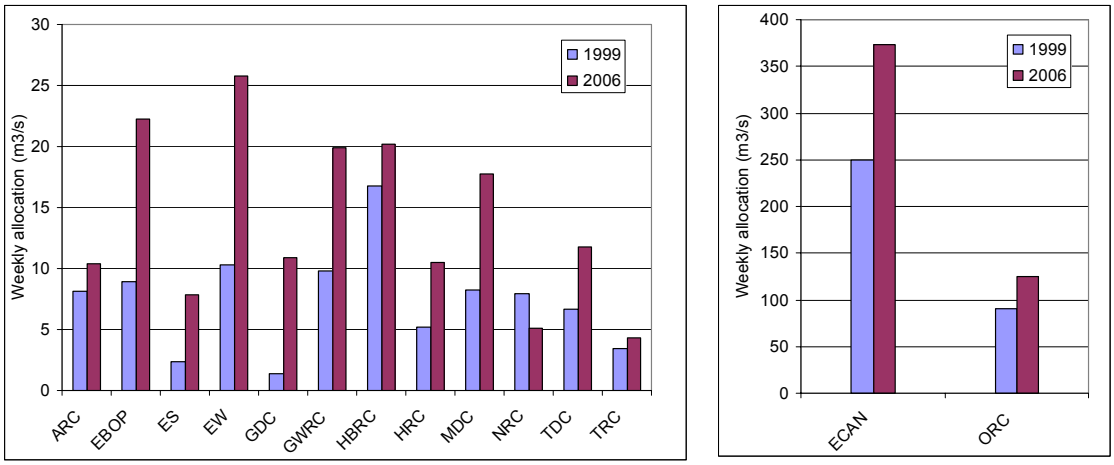


Allocation trends

Nationally, water allocation increased by approximately 50 percent between 1999 and 2006. The figures below show the increases in allocation by council.

- Allocations increased by less than 50 percent in: Auckland, Canterbury, Hawkes Bay, Otago, Northland and Taranaki.
- Allocations increased by more than 50 percent in: Bay of Plenty, Southland, Waikato, Gisborne, Greater Wellington, Manawatu–Wanganui, Marlborough and Tasman.

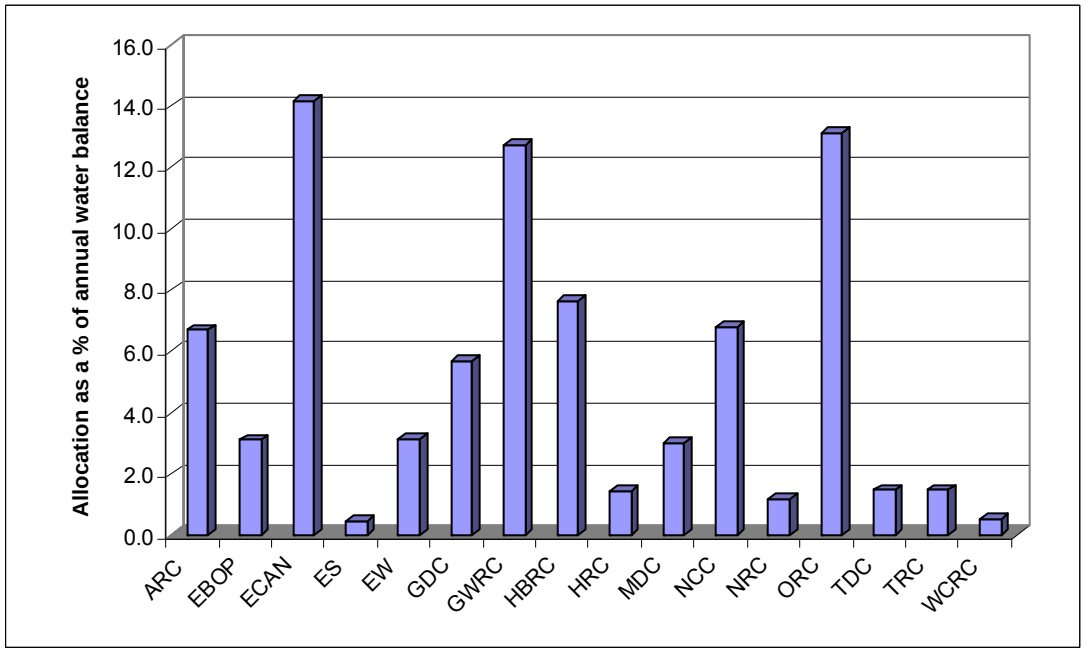
Figure ES-5: Regional water allocation (m^3/s) 1999 and 2006



Annual allocations

The total annual allocation is close to 10 billion cubic metres per year (Bm^3/y) which is equivalent to about 17 percent of the volume of Lake Taupo. This is just over 4 percent of the annual water balance (as per National Water Accounts). As indicated in the figure below, the annual allocation as percent of the annual water balance varies between regions. In the regions with high irrigation and/or drinking water demand (Canterbury, Otago, and Wellington), it is greater than 10 percent.

Figure ES-6: Annual allocation as percent of annual water balance

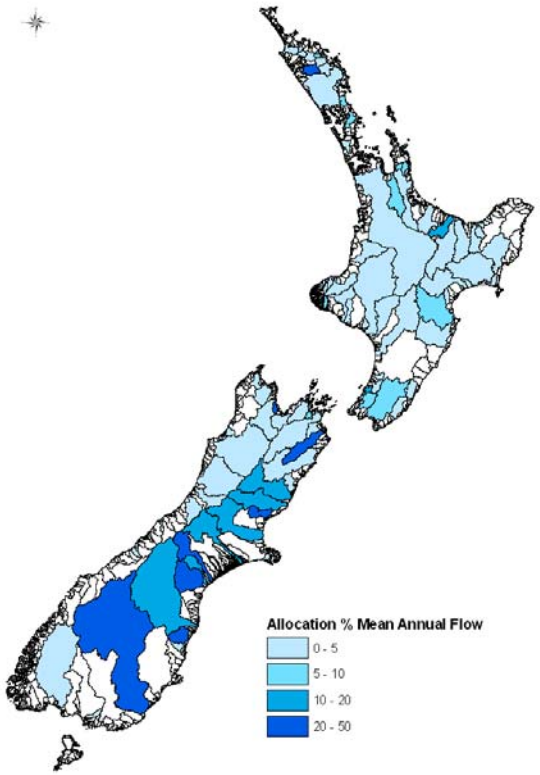


Surface-water allocations

The study included determination of allocation of surface water takes as a percent of mean annual flow and mean annual low flow.

The figure to the right shows allocation as percent of mean flows (per catchment). While there are some limitations to the approach (due to monitoring site locations), it does show relative pressure on catchments. It shows high levels of allocation for major catchments on the east coast of the South Island, particularly in Canterbury and Otago.

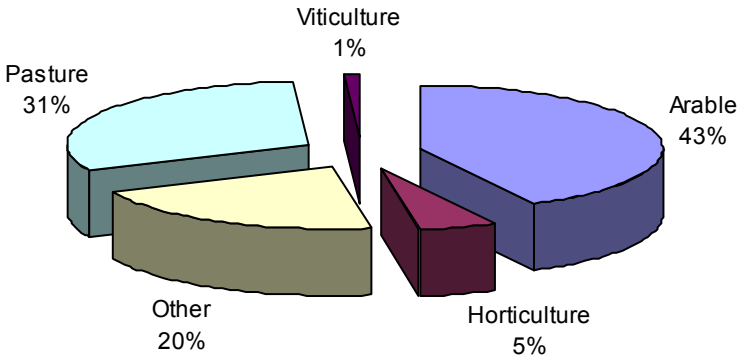
Figure ES-7: Allocation as a % of mean annual flow



Consented irrigated area

- Total consented irrigated area is 970,000 hectares.
- The majority of the area is in Canterbury (66 percent) and Otago (14 percent).
- As indicated below, 75 percent of the area is in arable crops and pasture.

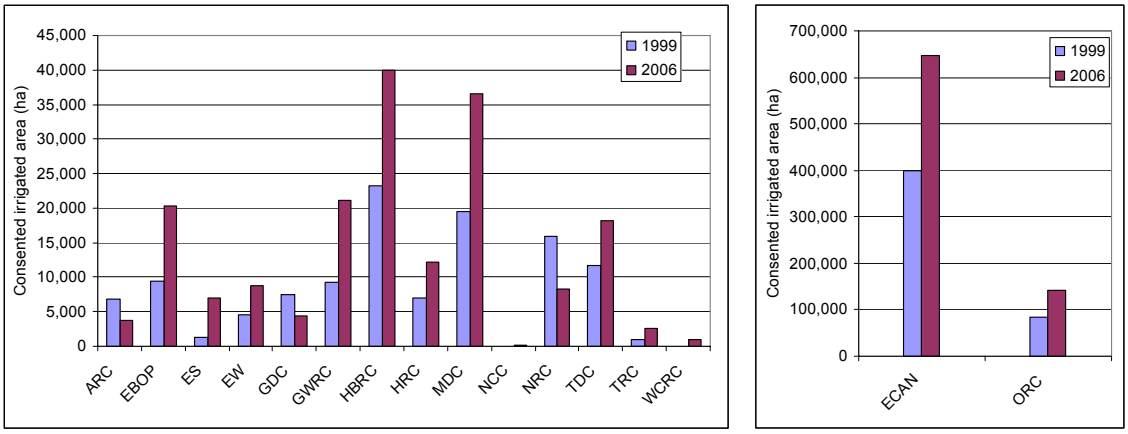
Figure ES-8: Consented irrigated area crops (%)



The area increased by 55 percent over that reported in the 1999 survey (600,000 hectares). The figures below show the growth in consented irrigated area for the 16 councils. The apparent

decrease in consented irrigated area for Northland, Auckland and Gisborne reflects tightening of consenting and recording processes.

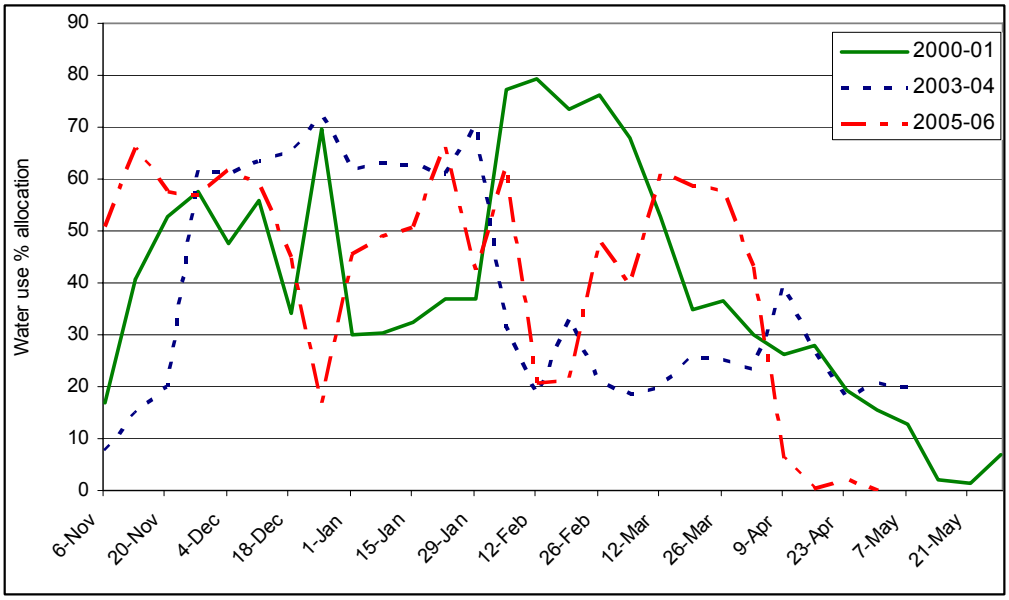
Figure ES-9: Consented irrigated area (ha) 1999 and 2006



Water use

Water use as a percent of allocation within catchments and groundwater zones varies during and between years. This study presented a number of case examples which show an upper use of 80 percent of allocation but ranging down to 20 percent. The variation in percent of use reflects the variability of demand but also highlights a constraint to the current consent process which is based on a high level of supply reliability. The figure below is an example of water use from the lower confined aquifer on the Waimea Plains, Tasman District. It shows weekly water use as percent of allocation for three irrigation seasons (2000/01, 2003/04 and 2005/06).

Figure ES-10: Water use Waimea Plains – lower confined aquifer



1 Introduction

This study was commissioned by the Ministry for the Environment (MfE) to update information on water allocation in New Zealand. It follows on from an earlier survey (1999) of allocations which showed that less than 3 percent of New Zealand's freshwater was allocated at that time. In the intervening years, demand for water has grown to meet an expansion in irrigated area and population growth.

1.1 Project scope

The general purpose of the project is to update estimates of water allocation regionally and nationally from those published in the report prepared by Lincoln Environmental in 2000. The earlier study, in addition to determining the then levels of allocation, also included elements looking at economic returns to irrigation water and allocation policy. This current study is focused specifically on the quantities of water allocated and looks more closely at the allocation of surface-water resources. It has the advantage of work in the intervening years on surface-water catchments and national water accounts.

The project scope included the following elements:

- compilation of consent records for water takes for all regions
- development of a consent database incorporating the above records
- determination of allocations as a percent of water availability by region
- comparison of current allocations with those reported in the 1999 survey
- determination by catchment of surface-water allocation as a percent of water availability
- determination of irrigated area and comparison with estimates from previous studies and agricultural census
- analysis and presentation of actual water use versus allocation for a series of case examples and indicator catchments.

1.2 Related work

Related work to this study includes the following:

a) Information on water allocation in New Zealand (LE, 2000)

The report presented the results of the 1999 survey of both regional and national water allocations and forms a reference point for current and future studies into water allocation in New Zealand. In addition to allocations, it also included elements evaluating returns to irrigation water and regional allocation policy.

The analysis of consumptive water use allocation showed that:

- 70 percent of water allocations were from surface water
- 77 percent of allocations were for irrigation, and 16 percent and 7 percent for public supply and industry respectively
- 58 percent of allocations were in the Canterbury region
- consented irrigated area[1] of 600,000 hectares of which 400,000 and 84,000 hectares were in Canterbury and Otago respectively
- irrigated area had increased 55 percent per decade for the past 30 years.

b) National water accounts (Stats, 2003)

The national water accounts are published by Statistics New Zealand. They present a summary water balance regionally and nationally and are composed of surface and groundwater elements. The approach is based on calculation of physical stock accounts for water based on inflows from precipitation and snow, and outflows to evapotranspiration, other regions and to the sea, as well as change in storage. The national water accounts present annual accounts for the seven-year period 1995 to 2001. The average annual water balance for this period is approximately 230 billion cubic metres (Bm^3) but ranged from 198 to 263 Bm^3/year. Per capita, this is equivalent to 60,000 cubic metres.

c) Identifying freshwater ecosystems of national importance for biodiversity (Chadderton et al, 2004)

Previous work by central government to assess nationally important values for water bodies developed national catchment coverage. These units were defined by NIWA and included all units with an area greater than 100 hectares. Based on this criterion, there was a total 4,711 units of which 4,427 are classified as parent catchments and 284 as sub-catchments. The same catchment coverage has been used for catchment-level analysis in this report and is referred to as the Ncc (national catchment coverage).

d) Agricultural census (Stats, 2002)

The 2002 agricultural census presented irrigated area by territorial authority. It lists the total area of land under irrigation as 467,731 hectares of which 384,227 hectares were irrigated in the year ending 30 June 2002. It should be noted that the assessment of irrigated area varies between the agricultural census and consented allocations. The former is based on reported area where as the latter is based on the area listed on the consent or, if not listed, calculated from allocation and peak demand. The difference in approach is important as there are significant differences between the two for some regions, a point further discussed in relevant sections of this report.

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[1] The term consented irrigated area refers to the irrigated area for water has been allocated. As discussed in the latter sections of this report, there may be cases where the actual area of irrigation development is less than the consented area.

1.3 Outline of this report

The report includes the following:

- Section 2: Methodology; summarises the study approach and methods.
- Section 3: Consent Database; presents an overview of the consent database development, structure and summary of number of consents.
- Section 4: Allocations and Areas; presents the results of analysis of consumptive water use allocation by region, source and use, and consented irrigated area.
- Section 5: Comparisons and Trends; presents the comparison of current allocations and consented areas with the 1999 survey, national water availability (from national water accounts) and the 2002 agricultural census.
- Section 6: Surface-water Allocations; presents the results of analysis of surface-water allocations as percent of mean annual and mean annual low flow by National catchment coverage (Ncc).
- Section 7: Water Use; presents case study examples of water use versus allocations for selected locations and catchments.
- Section 8: Recommendations; lists key study recommendations for future analysis and updating of national water allocation information.
- Appendices: presents supporting information and details of analysis including; database structure, parameters and assumptions, and national and regional summaries.

2 Methodology

The following subsections outline key elements of the approach and methods adopted in the study.

2.1 Consent database

The compilation of a database of water take consents was a principal project objective. The database is a compilation of water take consents from all 16 regional authorities (12 regional councils and four unitary authorities).

The collection and compilation of consent records included the following steps:

- request for consent information from councils
- QA of records to identify replicate records, gross errors and missing primary fields
- formatting database fields as per standard format (Appendix A)
- if not stated in consent record calculation of weekly and annual allocations and consented irrigated areas (based on parameters listed in Appendix B)
- summary returned to councils for verification
- finalisation and submission of final consent database.

Key elements and process in development of the consent database were as follows:

- it is based on current consents and expired consents for which a renewal application had been lodged
- it is a compilation of consents for water takes from groundwater and surface-water sources for consumptive water use activities including drinking-water supply, industry, irrigation and stock-water supply
- it excludes consents for temporary activities such as well testing and river diversions
- it excludes consents associated with flood control and protection
- it is based on consent status as of May 2006
- quality control of records included screening for:
  - duplicates
  - exceptionally high allocation rates or volumes
  - missing key fields for water source and primary use
  - location; consent fell within council boundaries
  - use type consistent with allocation rate/volume.
- clarifications; councils were requested to clarify apparent anomalies in records.

Table 2.1 shows the database structure adopted for this study.

Key elements of the database are:

- primary fields for region, identifier, primary source, source catchment, primary use, easting and northing
- secondary fields for source type, source identifier, use type
- source type includes a 'blank' for non-geothermal groundwater and unspecified surface-water source, however, in the analysis by primary source 'blank' surface water takes were deemed by default to be direct run-of-river takes
- location (easting and northing); Nelson City Council consents were identified by national catchment coverage boundaries only, therefore were assigned a common location by catchment mid-point
- region ID is identified by abbreviation of regional authority as listed in the list of abbreviations in this report.

Table 2.1: Database structure

Field name	Records	Description
Region ID	ARC	Abbreviated regional authority name
Consent identifier	A888888#	Unique identifier as per council records
Primary source	Ground Surface	 Includes all surface-water takes
Source type	Dam Geothermal Lake River Stream Blank	 Groundwater or if unspecified for surface water
Source identifier		Catchment or aquifer description
Source catchment	#####	As per national catchment coverage
Primary use	Drinking Heating Industrial Irrigation Stock Unspecified	
Use type	Arable Community Domestic Energy Forestry Frost protection Heating Horticulture Mining Municipal Nursery	

Field name	Records	Description
Use type (continued)	Pasture Quarry Recreational Service Stock water Swimming Storage Unspecified Viticulture Waste	
Instantaneous rate		Listed value or calculation if not listed
Daily rate		Listed value or calculation if not listed
Weekly rate		Listed value or calculation if not listed
Annual rate		Listed value or calculation if not listed
Irrigated area		Listed value or calculation if not listed
Easting		UTM co-ordinate
Northing		UTM co-ordinate

2.2 Surface flows

The analysis of surface-water allocations included the following:

- analysis based on national catchment coverage; 4,427 parent catchments (greater than 100 hectares) and 287 sub-catchments.
- subcontract with NIWA for provision of catchment and flow information including catchment boundaries, flow records (mean annual and mean annual low flow) for sites in NIWA database and as requested from councils. Information provided by NIWA and analysis of consent allocations yielded the following:
  - there are 535 parent catchments with surface-water allocations. These catchments cumulatively account for approximately 95 percent of total surface-water allocations
  - there were a total of 476 and 362 sites with mean annual flow and mean annual low flow records respectively. However, there were multiple sites in a large number of catchments and in many cases on tributary branches of the catchment. The site records were screened to select sites which provide a representative record for the whole catchment
  - there is one or more mean annual flow sites in 128 catchments from which representative sites were selected for 113 catchments
  - there is one or more mean annual low flow sites in 113 catchments from which representative sites were selected in 78 catchments.

2.3 Consented irrigated areas

The analysis of consented irrigated area was based on area reported within consent records and, if not listed, calculated for use type based on peak weekly allocation specific to the region.

In the Otago region, there are approximately 500 former mining water right consents used for irrigation. As discussed in the 2000 report (LE, 2000), these consents were originally issued in the period 1860–1940 as surface-water takes for sluicing activities associated with gold mining. Apart from the take rate and primary use (irrigation), there is no information on the irrigated crop or area. As reported by Otago Regional Council (personal communication), the take rate often exceeds available resource and therefore irrigated area and seasonal duration is limited. The approach to the assessment of irrigated area and take rate was based on estimated cumulative area and take rate for the group of consents and as listed in Appendix B.

2.4 Water use

The purpose of this element of the study was to present examples of water use for indicator catchments. Experience both in New Zealand and internationally with the analysis of actual water use, particularly in the agricultural sector, is that there can be a number of issues associated with the accuracy and completeness of water meter readings.

The approach to the acquisition of water use records and information was therefore based on the following:

- discussion with councils to determine type and extent of water use monitoring activities and specific work on water use. This identified the type and extent of work that had been carried out and the availability of information. The core approach was to tap into existing work and analysis which had been verified and therefore would provide a reasonably accurate assessment of use
- presentation of 'case' examples of water use to provide geographic spread and range of water uses. However, generally the focus on metering programmes is on the agricultural sector, in particular irrigation use.

Water use records and information on water use was received from the following councils:

- Auckland Regional Council consent records included quarterly use records for the period 2002–05 for the Region
- Hawkes Bay Regional Council provided details of water use for 52 consented takes in the Ngaruroro catchment (both surface and shallow groundwater takes) for two irrigation seasons
- Horizons Regional Council has established a telemetry trial in the Upper Manawatu River. Relevant sections of water resource assessment reports for the Rangitikei and Upper Manawatu Rivers were submitted. These presented an outline of metering and water use to 2005
- Taranaki Regional Council has a monitoring programme on irrigation takes (approximately 45) some of which are fitted with data loggers. Water use was reported for the past two irrigation seasons. Taranaki Regional Council provided water use records for consents within four of the high demand irrigation zones

- Tasman District Council provided water use data for three water management zones; Hau, Waimea-Waimea West and Motueka Hau
- Marlborough District Council provided a summary of annual water use based on metered crop water use for the Southern Valley, a water short area to the south-west of Blenheim. Water is sourced from deep aquifers (30–200 m) to irrigate 820 hectares, predominantly in grapes
- Otago Regional Council provided water use records for the 2005–2006 season for the Kakanui Valley.

In addition to the above, Environment Waikato, Environment Bay of Plenty and Environment Southland also indicated they have water use records and analysis of water use. However, records and/or reports were not submitted in time or available in a suitable format for inclusion in this report.

2.5 Study units

The following units for area, volume and flow have been adopted:

- Area
  - Square kilometres (km^2)
  - Hectares (ha).
- Volume
  - Cubic metres (m^3)
  - Million of cubic metres (Mm^3)
  - Billion of cubic metres (Bm^3).
- Flow rate
  - Litres per second (l/s)
  - Cubic metres per day (m^3/d)
  - Cubic metres per week (m^3/wk)
  - Cubic metres per second (m^3/s).

3 Allocations and Areas

This section presents a summary of consumptive water use consents by number, allocations and consented irrigated area. The information below is derived from the consent database and presented in further detail in the supporting appendices.

3.1 Consent numbers

There are a total of 19,833 consumptive water use consents in the 2006 consent database of which 19,531 are coldwater takes and 302 geothermal water. The series of figures below show the distribution of consents (numbers) in total and by regional authority for primary source and use.

Key points to note are:

- 66 percent and 32 percent of consents are from groundwater and surface water (direct takes and storage) respectively (Figure 3.1)
- irrigation accounts for 78 percent of all consents (Figure 3.2)
- irrigation accounts for 72 percent of surface-water consents (Figure 3.3) and 81 percent of groundwater consents (Figure 3.4)
- Figure 3.5 shows the distribution of consents by region and primary source; note the predominance of groundwater consents in all regions except Otago where there are a large number of mining water rights from surface water which are currently used for irrigation
- Figure 3.6 shows the distribution of consents by use; irrigation consents account for the largest proportion of consents in most regions (apart from Southland and West Coast).

Figure 3.1: Consents (numbers) by source

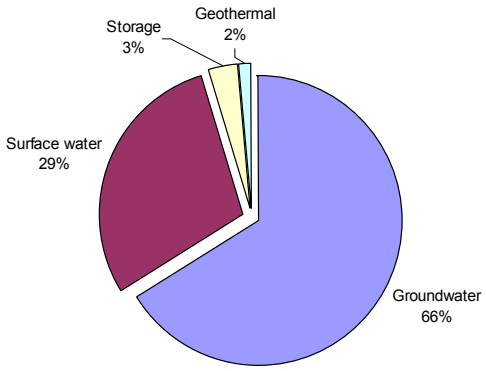


Figure 3.2: Consents (numbers) by use

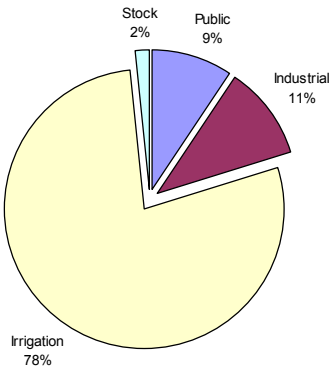


Figure 3.3: Surface-water consents (numbers) by use

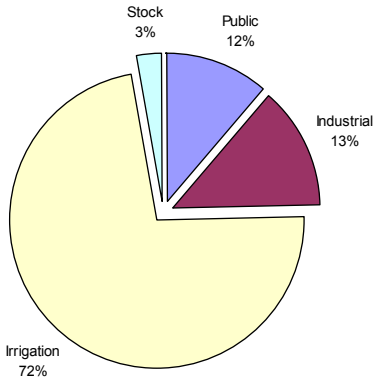


Figure 3.4: Groundwater consents (numbers) by use

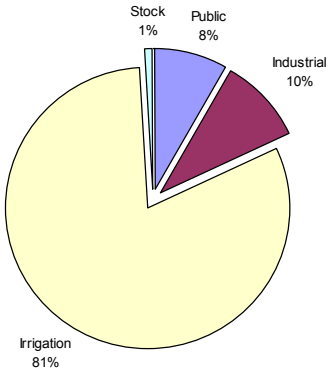


Figure 3.5: Distribution of consents by authority and source

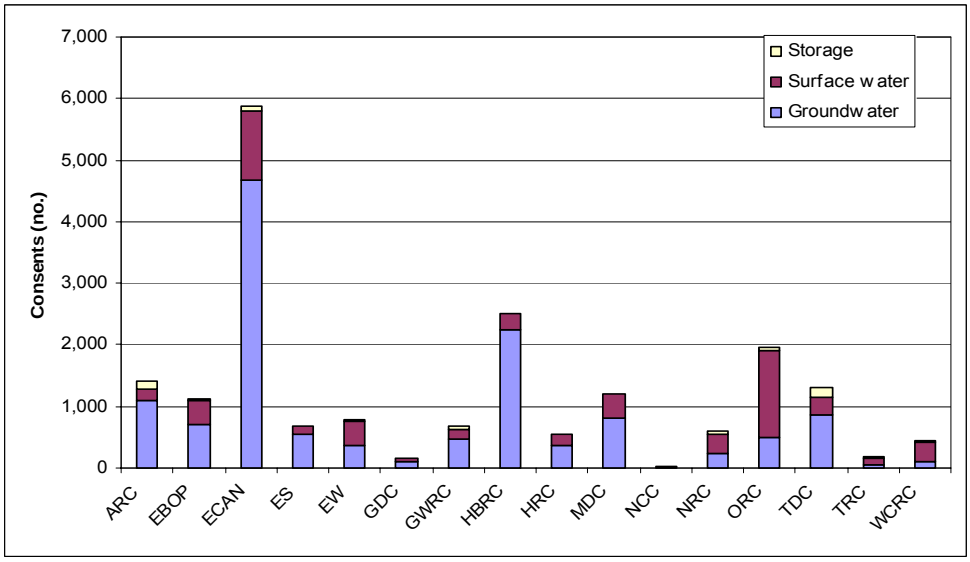
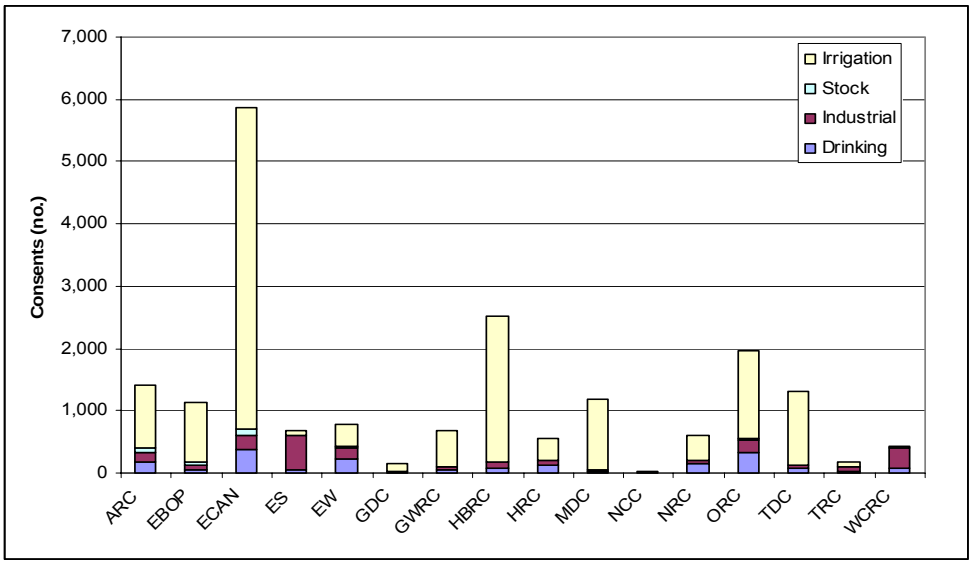


Figure 3.6: Distribution of consents by authority and use



The distribution of surface-water and groundwater consents is shown in Figures 3.7 and 3.8 respectively. Figure 3.9 shows the distribution of irrigation consents.

Appendix C lists details of number of consents in total and by region for water source and primary use.

Figure 3.7: Distribution of surface-water consents

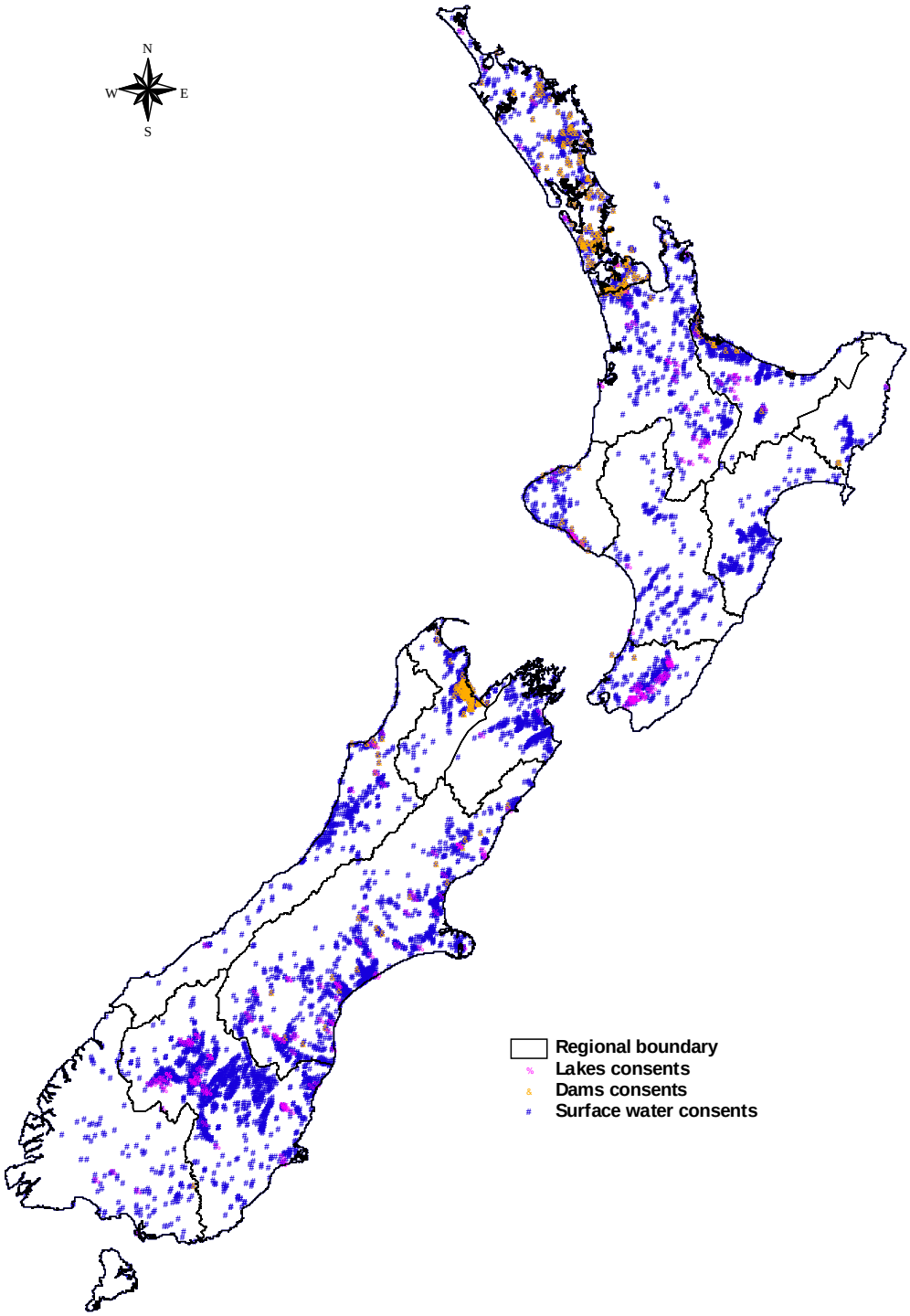


Figure 3.8: Distribution of groundwater consents

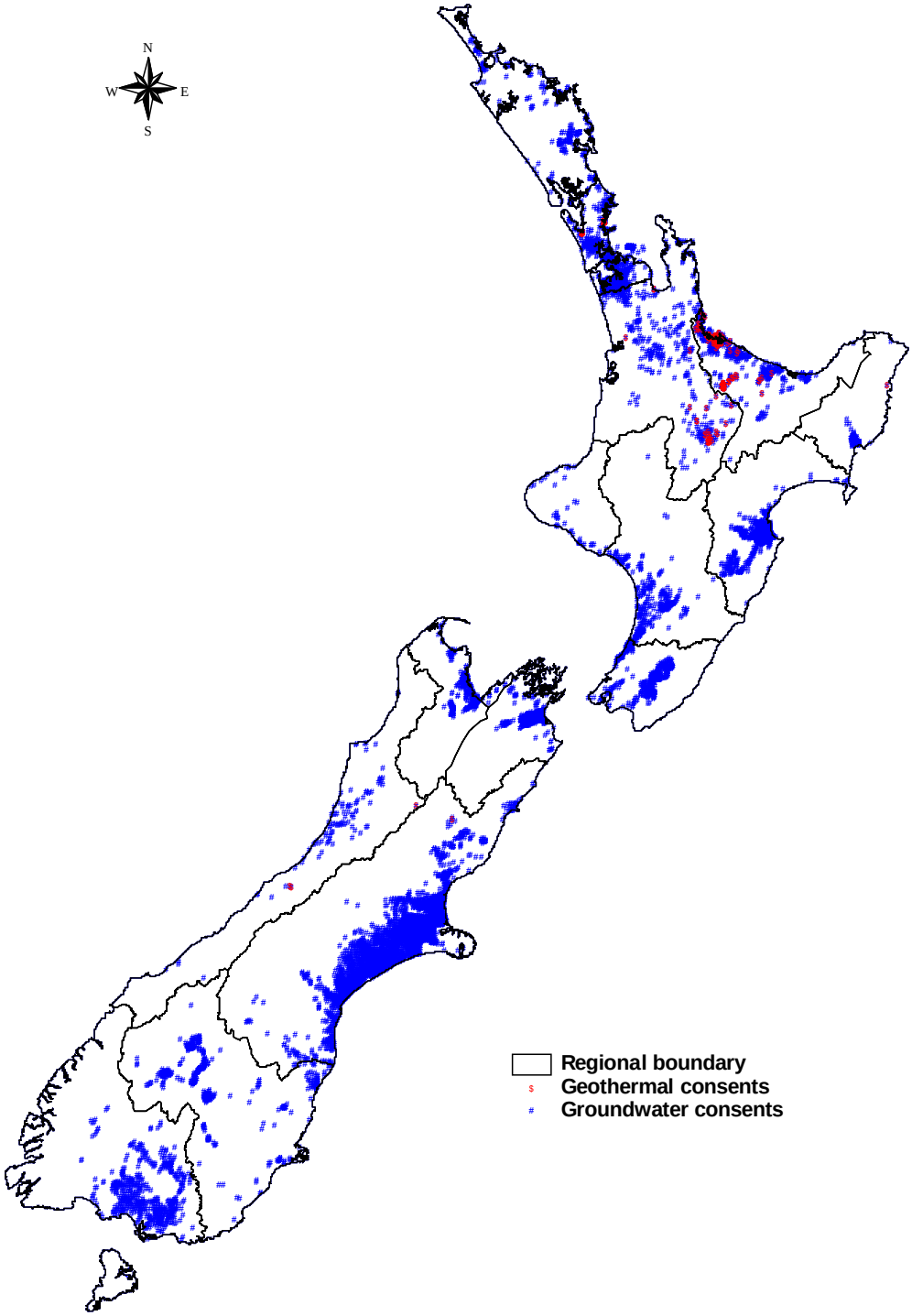
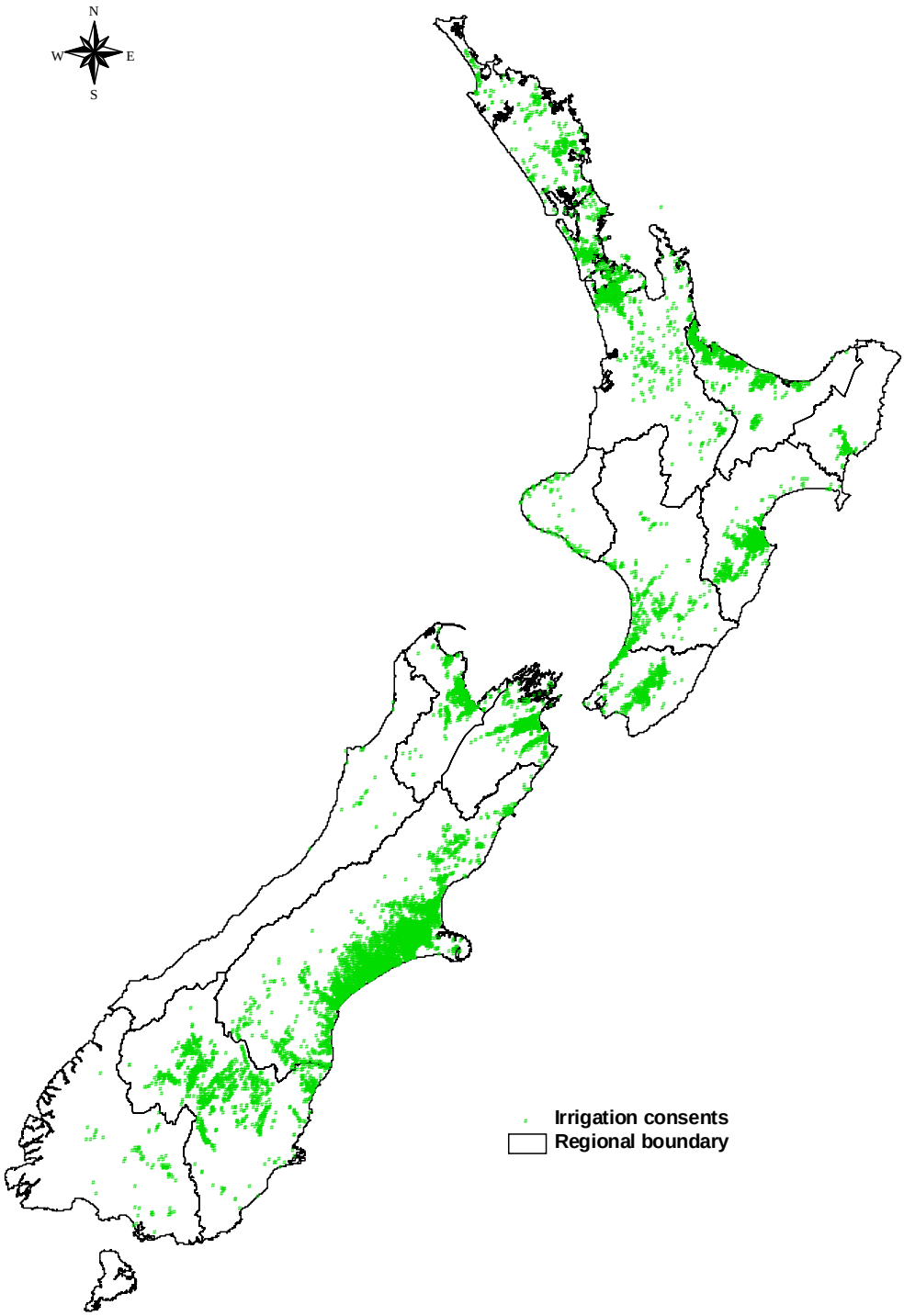


Figure 3.9: Distribution of irrigation consents



3.2 Water allocation

The tables and figures below present a summary of weekly and annual allocations by water source and use. Further details of both the consent number and allocations are listed in Appendix C. Summaries of consents and allocation are also listed by regional authority in Appendix D.

Table 3.1 is a summary of weekly allocations (m^3/s) by council for cold and geothermal water along with percentage of allocation from primary source. Key points to note are:

- coldwater allocations:
  - total weekly allocation is 676 m^3/s
  - surface-water weekly allocation is 60 percent of allocations (406 m^3/s)
  - groundwater weekly allocation is 34 percent of allocations (227 m^3/s)
  - weekly allocation from storage sources is approx. 6 percent (43 m^3/s)
  - Canterbury and Otago regions account for 54 percent (373 m^3/s) and 18 percent (125 m^3/s) of weekly allocations respectively
- geothermal allocations:
  - total weekly allocation is just over 4 m^3/s
  - the Waikato region accounts for 87 percent (3.5 m^3/s) of weekly allocations.

Table 3.1: Weekly allocation (m^3/s) by water source

Council	Weekly allocation (cold water)				Geothermal (m^3/s)
	Total (m^3/s)	Groundwater (%)	Surface water[1] (%)	Storage[2] (%)	
ARC	10.3	28	6	66	0.03
EBOP	22.2	25	67	8	0.44
ECAN	372.8	42	56	1	0.05
ES	7.8	60	38	2	
EW	25.8	17	72	12	3.52
GDC	10.8	7	16	77	
GWRC	19.9	47	43	9	
HBRC	20.2	73	27		
HRC	10.5	57	43		
MDC	17.8	37	63		
NCC	1.0	0	97	3	
NRC	5.1	15	57	28	
ORC	125.1	6	88	6	
TDC	11.8	38	16	46	
TRC	4.3	7	73	20	
WCRC	10.0	12	85	3	0.01
Total	**675.6**	**34**	**60**	**6**	**4.06**

Notes: 1: Direct takes from surface water (river, stream and unspecified), 2: Specified takes from lakes and dams.

Table 3.2 is a summary of annual allocations (Mm^3) by council and primary source. Note geothermal water is excluded from this summary as annual allocations were not included in the analysis. Total annual allocation for consumptive water use is approximately 9.8 Bm^3/y of which 63 percent (6.1 Bm^3/y) is from direct takes from surface water, 28 percent (2.7 Bm^3/y) from groundwater and 9 percent (0.9 Mm^3/y) from storage sources. There is considerable variation between regions in the contribution of water from sources. While storage contributes a relative low proportion of total national water allocation, for some councils (Auckland, Gisborne and Tasman) it is the largest contribution. Figure 3.10 illustrates the variations in annual allocation between councils and water sources.

Table 3.2: Annual allocation (Mm^3/y) by water source

Council	Total (Mm^3/y)	Groundwater (%)	Surface water (%)	Storage (%)
ARC	152.3	31	4	65
EBOP	438.7	19	75	6
ECAN	4015.8	38	61	1
ES	166.5	48	49	3
EW	668.0	16	71	13
GDC	296.4	4	8	88
GWRC	830.1	23	73	4
HBRC	443.1	70	30	0
HRC	198.0	56	44	0
MDC	186.2	43	57	0
NCC	29.2	0	99	1
NRC	114.0	18	57	25
ORC	1749.9	8	85	7
TDC	148.9	38	14	49
TRC	105.6	8	69	23
WCRC	272.9	12	85	4
Total	**9,815.6**	**28**	**63**	**9**

Figure 3.10: Annual allocation by council and water source

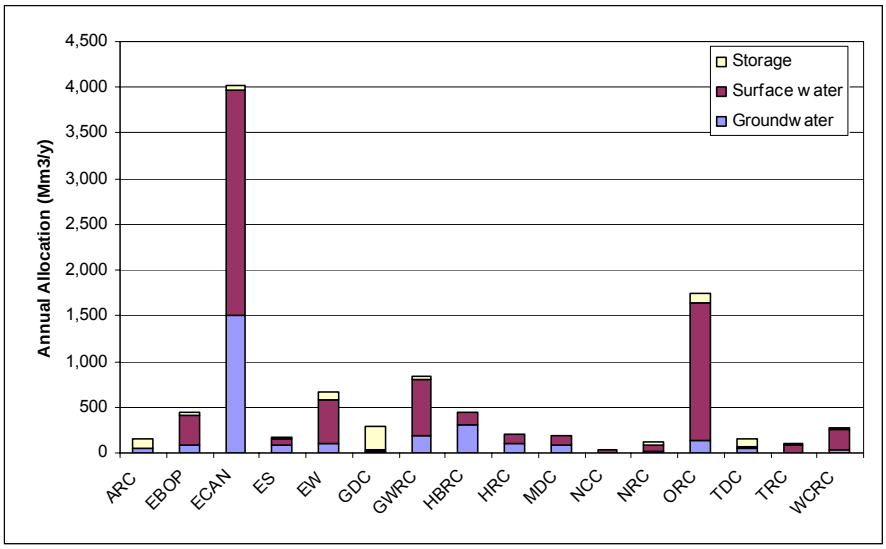


Table 3.3 lists weekly allocation by council for primary water uses. Irrigation accounts for 77 percent weekly allocation (518 m^3/s), public supply[2] for 11 percent (73 m^3/s), industry for 10 percent (65 m^3/s) and stock water for 3 percent (19 m^3/s). In Canterbury, Marlborough and Tasman councils; irrigation accounts for more than 80 percent of allocations. Allocations to stock water only represented those takes requiring consent approval, however it should be borne in mind that the vast major of stock takes are permitted activities under the RMA and regional plans.

Table 3.3: Weekly allocation (m^3/s) by water use

Council	Total (m^3/s)	Public (%)	Industrial (%)	Irrigation (%)	Stock (%)
ARC	10.3	45	33	21	0.4
EBOP	22.2	19	22	47	12.6
ECAN	372.8	4	2	90	3.9
ES	7.8	17	40	44	0.1
EW	25.8	26	51	23	0.1
GDC	10.8	81	0	19	
GWRC	19.9	38	8	54	0.03
HBRC	20.2	13	13	70	3.4
HRC	10.5	30	12	57	
MDC	17.8	4	0	95	0.01
NCC	1.0	95	0	4	
NRC	5.1	21	6	68	5.2
ORC	125.1	10	13	76	0.8
TDC	11.8	4	10	86	0.01
TRC	4.3	30	40	30	0.1
WCRC	10.0	11	73	15	0.4
Total	**675.6**	**11**	**10**	**77**	**3**

[2] Public supply includes water for reticulated municipal and community supply for domestic, commercial and industrial consumption.

Table 3.4 lists annual allocation by council for primary water use. Note that irrigation accounts for just over 50 percent of annual allocation (the proportion is lower than the weekly allocation due to seasonal demand), public water supply for 24 percent, industry for 19 percent and stock water supply for 6 percent.

Table 3.4: Annual allocation (Mm^3/y) by water use

Council	Total (Mm^3/y)	Public (%)	Industrial (%)	Irrigation (%)	Stock (%)
ARC	152.3	55	39	6	0.4
EBOP	438.7	30	33	23	13.9
ECAN	4015.8	5	6	78	11.3
ES	166.5	24	56	20	0.1
EW	668.0	32	60	8	0.1
GDC	296.4	93	0	7	
GWRC	830.1	74	4	23	0.01
HBRC	443.1	19	18	57	4.9
HRC	198.0	51	20	29	
MDC	186.2	13	1	86	0.03
NCC	29.2	98	0	1	
NRC	114.0	29	8	55	7.3
ORC	1749.9	22	28	49	1.9
TDC	148.9	10	24	66	0.02
TRC	105.6	39	49	12	0.1
WCRC	272.9	13	81	5	1.1
Total	**9815.6**	**24**	**19**	**51**	**6**

3.3 Consented irrigated area

This section provides information on consented irrigated area by region. It compares these values with areas reported in the 2002 Agricultural Census.

Table 3.5 lists a summary of consented irrigated area by council and percentage of area by water source. The total area is estimated to be in the order of 972,000 hectares with 51 percent supplied from surface water, 46 percent from groundwater and 3 percent from storage. The highest proportion of area occurs in Canterbury with 647,000 hectares (66 percent), followed by Otago with 141,000 hectares (15 percent).

Table 3.5: Consented irrigated area (ha) by water source

Council	Area (ha)	Groundwater (%)	Surface water (%)	Storage (%)
ARC	3,732	63	18	19
EBOP	20,310	39	59	2
ECAN	647,006	53	46	1
ES	7,053	86	14	
EW	8,832	19	75	6
GDC	4,366	31	69	
GWRC	21,200	52	35	13
HBRC	39,978	77	23	
HRC	12,149	58	42	
MDC	36,590	43	57	1
NCC	87	6	35	59
NRC	8,205	6	61	33
ORC[1]	141,275	6	89	5
TDC	18,271	42	20	38
TRC	2,590	4	86	10
WCRC	1,011	31	69	
Total	**972,653**	**46**	**51**	**3**

Note 1: includes area supplied from mining water rights estimated to be approximately 80,000 ha.

Table 3.6: Consented irrigated area by water use

Council	Area (ha)	Arable (%)	Horticulture (%)	Other[1] (%)	Pasture (%)	Viticulture (%)
ARC	3,732	40	28		32	
EBOP	20,310		33	37	30	
ECAN	647,006	59	1	6	34	1
ES	7,053		8	3	90	
EW	8,832		1	92	7	
GDC	4,366	10	67	2	21	
GWRC	21,200		2	60	35	3
HBRC	39,978	45	20		21	14
HRC	12,149	73	7		20	
MDC[1]	36,590			17	16	66
NCC	87		24	74	2	
NRC	8,205	5	30		65	
ORC	141,275		16	56	27	1
TDC	18,271			100		
TRC	2,590		2		98	
WCRC	1,011				100	
Total	**972,653**	**42**	**5**	**20**	**31**	**1**

Note 1: For some councils crop type was not specified for all consents and such records have been assigned to the 'other' category. It is therefore likely that a substantial proportion of crop use currently assigned in the 'other' category actually relates to pasture.

Note that consented irrigated area accrued per region is based on the consent location. While the irrigation command area generally falls within the consenting authority boundary, there are a small number of cross-boundary transfers, most notably the lower end of the Lower Waitaki Irrigation Scheme and the recently commissioned Downlands Irrigation Scheme. Both have takes from Canterbury region but with part and all the command areas in Otago region respectively.

4 Comparisons and Trends

A number of related surveys and census in the past decade form a useful basis upon which to compare the current allocation levels and irrigated areas. The 1999 allocation survey was the first national survey of allocations and therefore is a good benchmark to determine trends over the past seven years. The agricultural census in 2002, along with earlier census, provides a basis to compare reported irrigated area with consented irrigated area. The national water accounts provide regional estimates of water availability and a simple basis on which to determine the proportion of total water currently allocated.

4.1 Comparison with 1999 survey

The tables below present a comparison of current allocation levels with those reported in 1999. The 1999 survey was based on information from 14 councils (West Coast and Nelson which comprise less that 2 percent of allocations in the current study were not included in the survey).

Weekly allocation

Table 4.1 shows a comparison of weekly allocation between the 1999 and the current survey. Total allocation increased by 55 percent from 429 to 665 m^3/s. Much of this increase has been in storage and groundwater allocations. However, there are several differences in interpretation between the two surveys which contribute to higher estimates of allocation in 2006, in particular the interpretation of allocations for mining water rights in Otago used for irrigation (which are the equivalent of 50 m^3/s). Discounting these consents, overall weekly allocation increased by approximately 50 percent in the period 1999 to 2006.

Table 4.1: Weekly allocation (m^3/s) 1996 and 2006

Survey	Groundwater	Surface water	Storage	Total
1999	127	286	15	429
2006[1]	226	396	43	665
% change	77%	39%	176%	55%

Note 1: For comparison purposes with the 1999 survey, the weekly allocation values exclude West Coast Regional Council and Nelson City Council (11 m^3/s).

Figure 4.1 shows the comparison of weekly allocation for 14 councils (excluding Canterbury and Otago). Apart from Northland, all other councils show an increase in allocations since 1999. The decline in allocations in Northland may be actual or due to differences in the way consent records were assessed and compiled.

Figure 4.2 is a separate plot for Canterbury and Otago weekly allocations. The increase in Otago allocation is due in part to the difference in accounting for mining water rights. It also shows a large increase in allocation (48 percent) in Canterbury from 250 to 370 m^3/s.

Figure 4.1: Comparison with 1999 survey by region (excluding Canterbury and Otago)

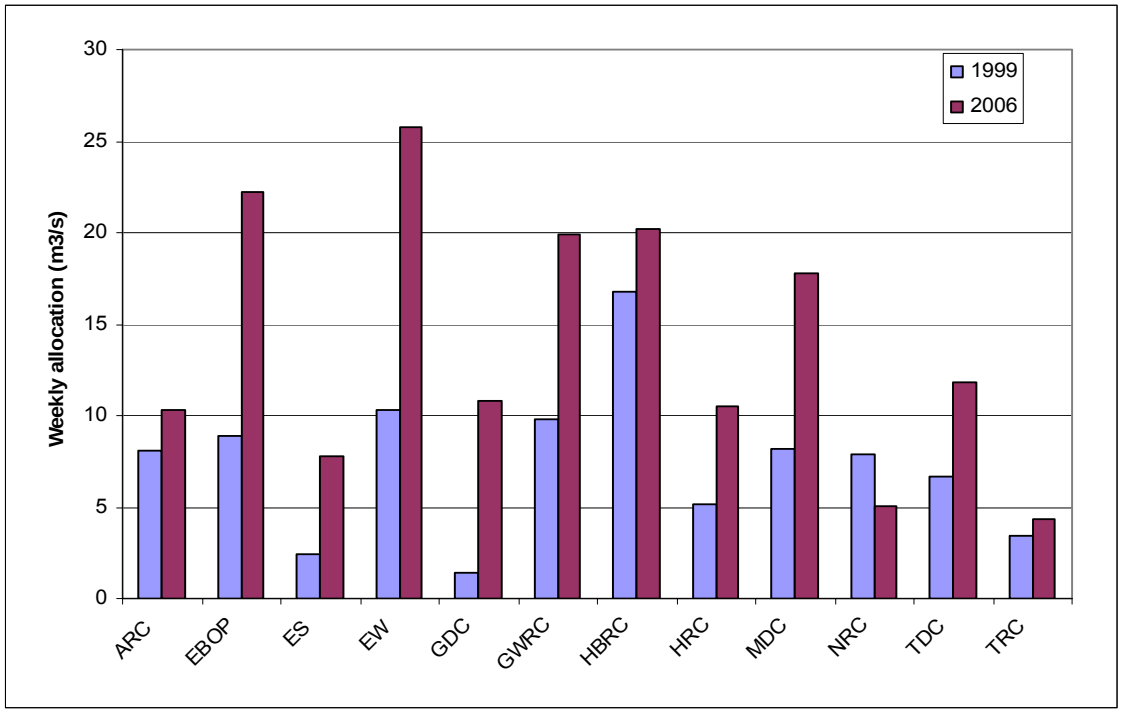


Figure 4.2: Comparison with 1999 survey for Canterbury and Otago

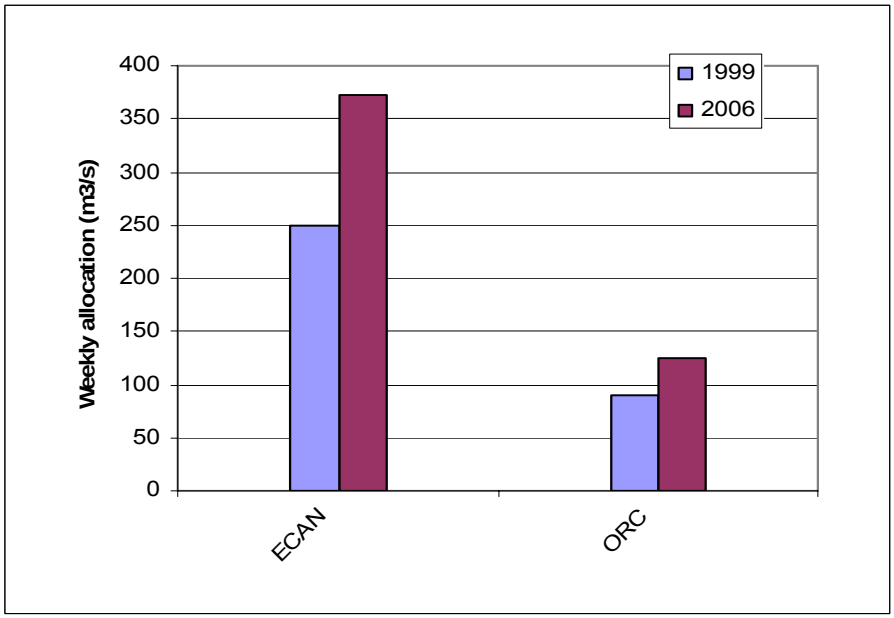
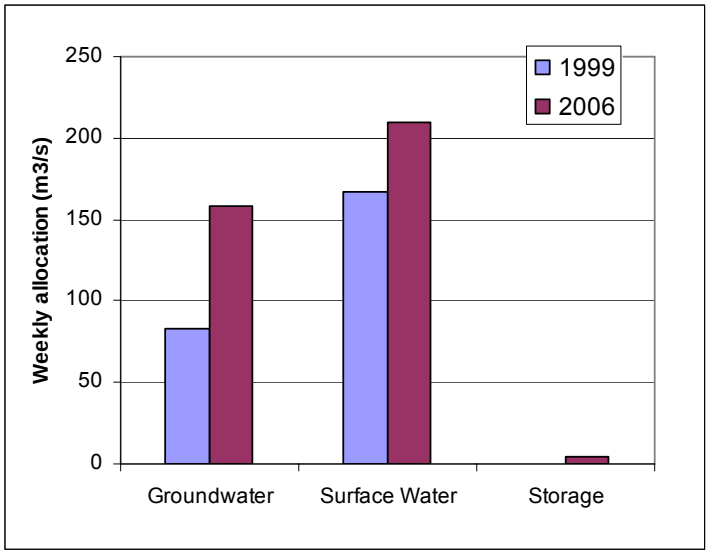


Figure 4.3 looks at allocation increases in Canterbury. Groundwater and surface-water allocations increased by approximately 92 percent and 25 percent respectively. Part of the increase in surface-water allocation (43 m^3/s) is attributable to the consent (17 m^3/s) for the Barhill Chertsey irrigation scheme.

Figure 4.3: Weekly allocations in Canterbury 1999–2006



Consented irrigated area

The consented irrigated area in the 1999 survey was just over 600,000 hectares (for the 14 councils). The total for the 2006 survey is 972,000 hectares, an increase of 372,000 hectares (62 percent), Table 4.2. However, discounting for the difference in number of the councils between the two surveys and the difference of interpretation of the mining water right consents in Otago, the increase is closer to 310,000 hectares or an increase of 52 percent. This is an equivalent annual increase of about 7 percent, which is slightly higher than the 55 percent per decade rate (5.5 percent per annum) reported in the 1999 survey.

Table 4.2: Consented irrigated area by region (2006 data)

Council	2006 survey
ARC	3,732
EBOP	20,310
ECAN	647,006
ES	7,053
EW	8,832
GDC	4,366
GWRC	21,200
HBRC	39,978
HRC	12,149
MDC	36,590
NCC	87
NRC	8,205
ORC	141,275
TDC	18,271
TRC	2,590
WCRC	1,011
Total	**972,653**

It should also be noted that the 2006 survey total includes 40,000 hectares for the Barhill Chertsey irrigation scheme (yet to be developed) and 25,000 hectares for reclassification of the Waimakariri stock-water race consent from stock water to irrigation use (both in Canterbury) which, in combination, account for 20 percent of the overall increase. If both of these takes are excluded, the overall increase in area between the two surveys is approximately 40 percent (245,000 hectares) which is similar to the rate (5.8 percent pa) reported in the 1999 survey.

4.2 National water accounts

A national water balance was determined as a mean annual value (Mm^3/y) over the period 1995–2001 from the national water accounts. It is calculated as the outflow to the sea. In the national water accounts values are reported as annual volumes (Mm^3/y). Table 4.3 lists a summary of average water balances by regional authority.

Table 4.3 presents a summary of allocations as percentage of water balance. Nationally, allocations are 4.3 percent of total water balance but range widely between councils. It is greater than 10 percent in the councils with high levels of irrigation demand (Canterbury and Otago) and high municipal demand (Greater Wellington).

Table 4.3: Annual allocation (Mm^3/y) as percent of water balance

Council	Balance		Allocation	
	(Mm^3/y)	%	(Mm^3/y)	%
ARC	2,258	1	152	6.7
EBOP	14,160	6	439	3.1
ECAN	28,320	12	4,016	14.2
ES	37,022	16	166	0.4
EW	21,311	9	668	3.1
GDC	5,233	2	296	5.7
GWRC	6,515	3	830	12.7
HBRC	5,816	2	443	7.6
HRC	13,946	6	198	1.4
MDC	6,226	3	186	3.0
NCC	428	0.2	29	6.8
NRC	9,557	4	114	1.2
ORC	13,310	6	1,750	13.1
TDC	10,124	4	149	1.5
TRC	7,201	3	106	1.5
WCRC	51,511	22	273	0.5
Total	**232,940**		**9,815**	**4.3**

4.3 Agricultural census

The table below, Table 4.4, presents information on irrigated area from the 2002 agricultural census. The agricultural census information was obtained from the Statistics New Zealand website. The regional data was compiled from the summary of irrigated area per territorial authority (TA). While TA boundaries generally correspond to regional boundaries, there are two notable exceptions: Franklin District which is bisected by the Auckland Waikato regional boundary, and Waitaki District which is bisected by the Canterbury Otago boundary. In both cases, the reported irrigated area within each regional boundary was calculated at the current distribution of irrigated area within the district and regional boundaries.

The census total irrigated area (463,239 ha) is considerably lower than both the consented irrigated areas in the 1999 survey and current survey (600,000 and 970,000 ha respectively). The overall difference in areas between the 2002 census and the allocation surveys indicates the differences and approach in methodologies. As discussed earlier, the census is based on the reported irrigated area (as per census questionnaire). It is a simple approach which is reliant on the accuracy and completeness of information supplied by landholders. The reported area probably reflects the area of installed irrigation and regularly irrigated. The consented irrigated area is as reported on the consent application or the calculated area based on peak weekly demand (for the consent database). Often, the requested consent and irrigated area represent a potential upper gross irrigated area for a property and includes a safety factor for future development.

A best estimate is that overall actual irrigated area is probably on the order of 80 percent of consented area. On this basis, the actual total irrigated area for the 2006 survey would be approximately 780,000 hectares which is an increase of 68 percent over the 2002 census.

Table 4.4: Reported irrigated area based on 2002 census

Council	2002 census
ARC	5,665
EBOP	10,378
ECAN	297,108
ES	3,594
EW	11,692
GDC	1,325
GWRC	9,310
HBRC	18,157
HRC	7,568
MDC	20,188
NCC	NA
NRC	7,042
ORC	57,547
TDC	10,042
TRC	2,955
WCRC	668
Total	**463,239**

5 Surface-water Allocation

This section presents analysis of surface-water takes relative to mean annual low flow and mean flow of individual catchments. As outlined in Section 2.2, the analysis is based on surface flow records from sites in the NIWA database and from regional authority records.

The objective was to determine surface-water allocations (direct takes) as a percentage of mean annual and mean annual low flow for the National catchment coverage. Surface water is allocated in 535 catchments with a combined weekly allocation of 387 m^3/s (out of a total surface-water allocation of 405 m^3/s). There were one or more flow monitoring sites within 128 of these catchments (128 catchments with mean flow and 113 catchments with mean annual low flow). However, there were issues and constraints for a number of sites, these included: location of sites in upper reaches or on tributaries which therefore did not provide a good measure of whole catchment flow; modified flow regime due to storage and hydropower generation; and limited duration of records. After screening of flow records, mean annual flow sites were selected for 113 catchments (from 128) and 78 catchments for mean annual low flow (from 113 catchments).

Bearing in mind the above constraints, the figures below provide an indication of levels of allocation (specific allocation calculated a weekly allocation per catchment area) and allocation as percentage of mean flow and mean annual low flow. Note un-shaded catchments in the figures are those for which flow records were unavailable or unsuitable.

Figure 5.1 shows the distribution of specific allocations ($l/s/km^2$) for catchments with surface-water allocations. In the North Island, specific allocations, apart from a number of small urban catchments, are mostly less than 5 $l/s/km^2$. In the South Island, there are a number of larger catchments (Waitaki, Rangitata, Rakaia and Waimakiriri) greater than 5 $l/s/km^2$ reflecting the high allocations for irrigation.

Figure 5.2 shows the distribution of catchments by percentage allocation of mean flow. However, it should be recognised that, as discussed above, there are a number of limitations with the current analysis. In particular, where sites are not representative of the whole catchment flow, the percent allocation flow will be inflated. Nevertheless, the figure does show the relative allocation pressure on catchments.

Figure 5.3 shows the distribution of catchments by percentage allocation of mean annual low flow. The same limitations apply as discussed above.

Figure 5.1: Specific allocation for parent catchments

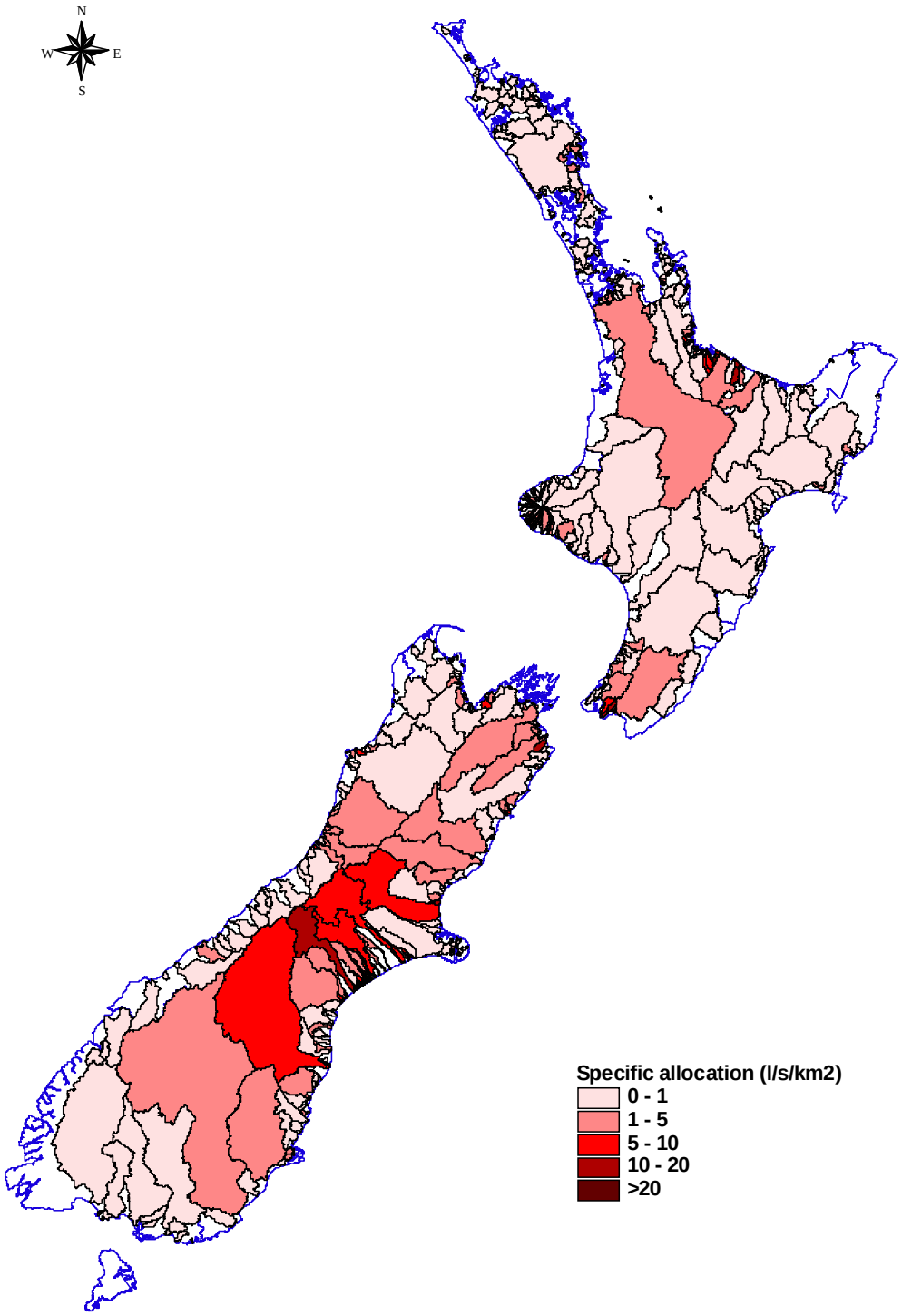


Figure 5.2: Allocation as percentage of mean flow

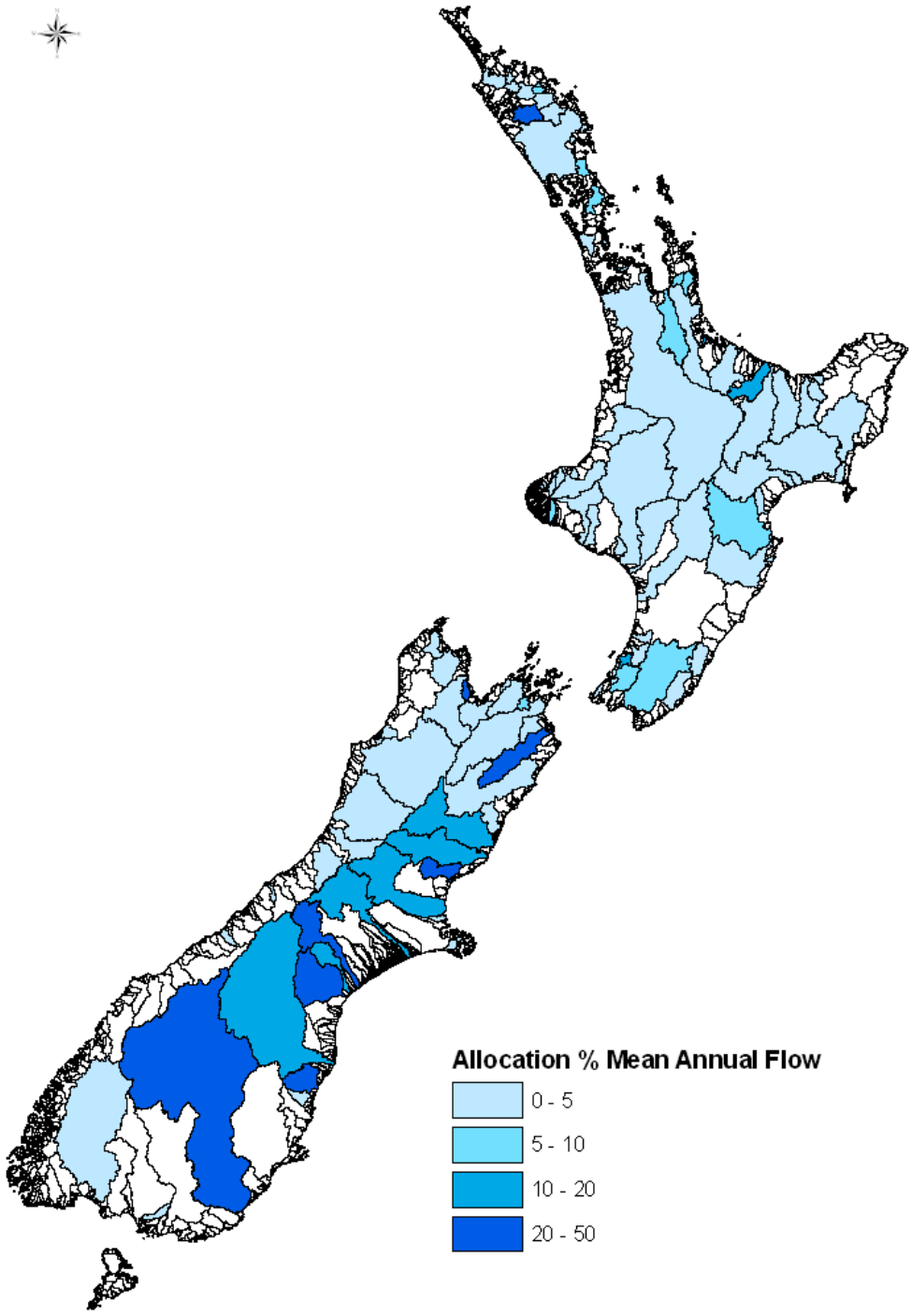
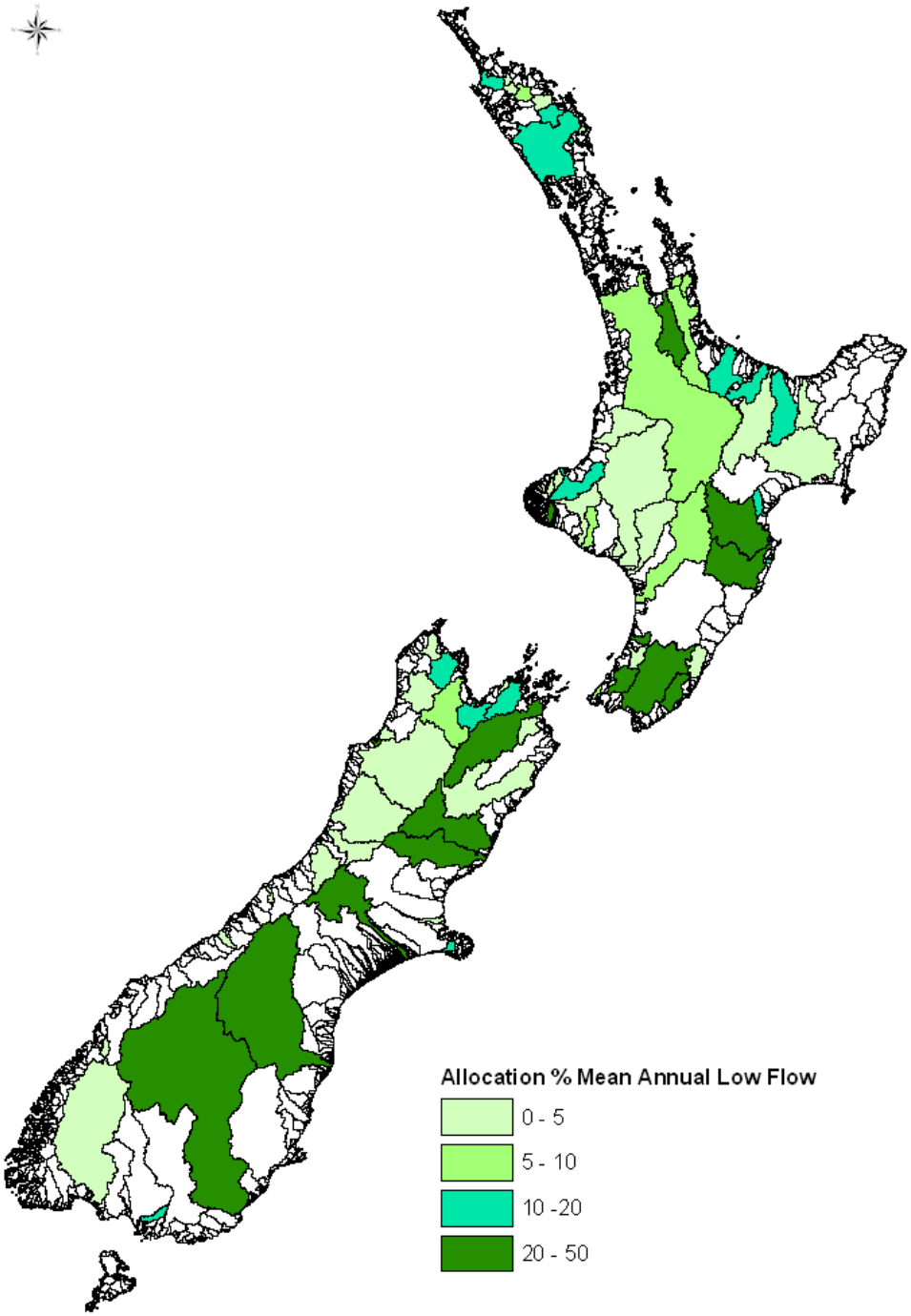


Figure 5.3: Allocation as percentage of mean annual low flow



6 Water Use

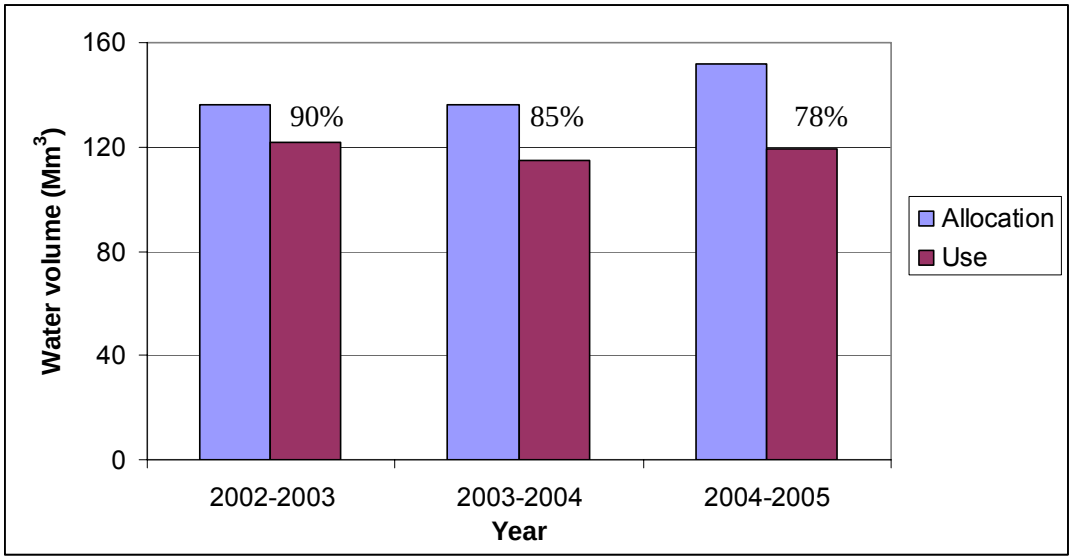
The following subsections present the analysis of water use. It should be noted the analysis is presented in a variety of timeframes and scales. This reflects the periods and scale of data submitted by the councils. They show there is considerable seasonal and annual variability in water use.

6.1 Auckland Regional Council

Auckland Regional Council requires all consented water takes be fitted with a water measuring device. Approximately 90 percent of consent holders make water use returns every quarter, and approximately 4 percent of consent holders fail to make a return annually.

Figure 6.1 shows comparison of annual water allocation and actual use for the Auckland Region past three years. This shows that region's annual use ranged from 78 percent up to 90 percent of allocation.

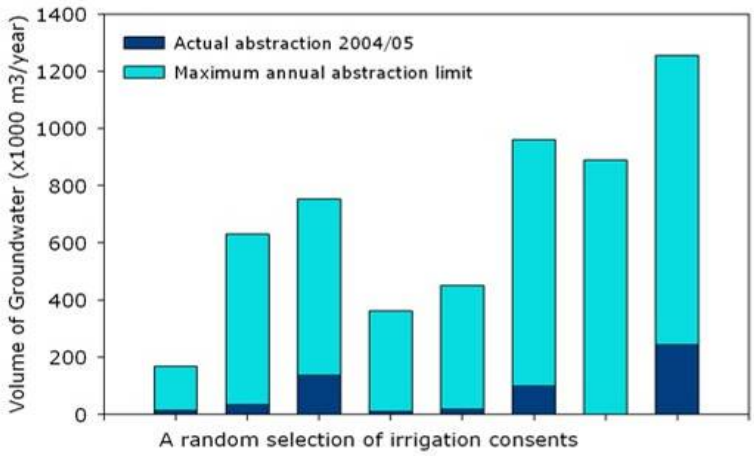
Figure 6.1: Water allocation and use in Auckland Region



6.2 Environment Southland

Figure 6.2 is reproduced from the Environment Southland water quantity report card (ES, 2005). As listed, it shows actual use versus allocations for nine consents. The report does not indicate details on the type of water use for the consents, however, it does show low levels of use with all the consents being less than 20 percent of allocation.

Figure 6.2: Environment Southland assessment of water use



6.3 Horizons Regional Council (Manawatu–Wanganui Regional Council)

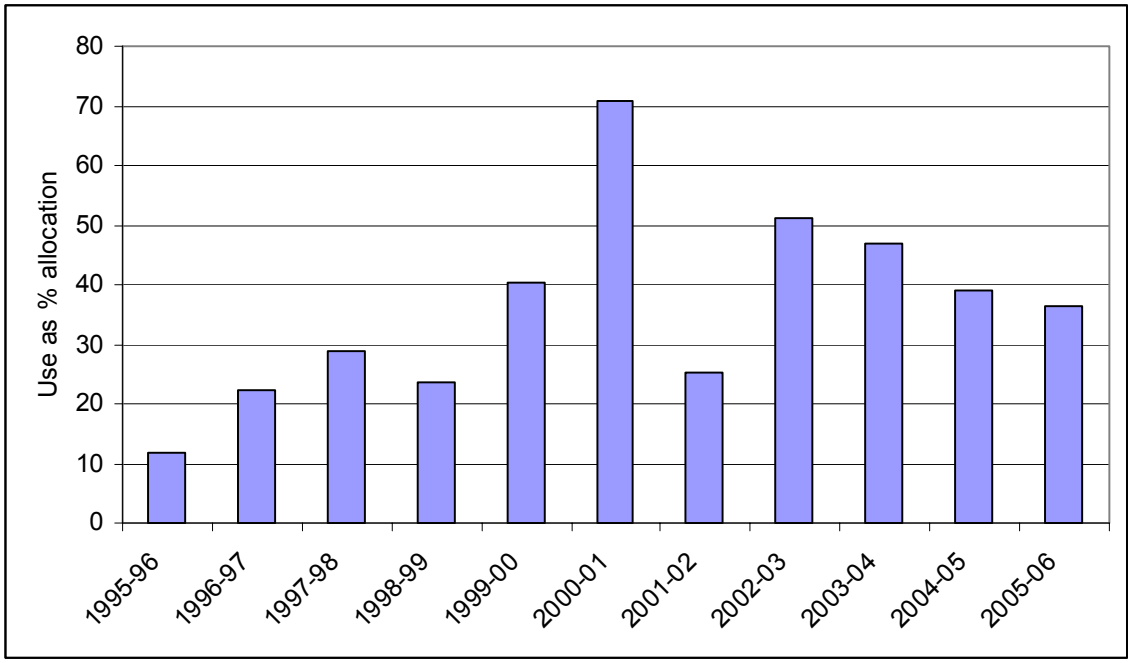
Horizons provided information on metering and water use for the Rangitikei and Upper Manawatu Rivers. In 2003, the Council established a metering telemetry trial in the upper Manawatu. As of July 2005, 10 telemetry units had been installed on 24 of the consents required to meter use within the study zone.

The assessment of water use as a proportion of allocation in the Rangitikei and Upper Manawatu showed a wide variation between consents. Water use for municipal water supplies to several towns was typically up to a maximum of 60 percent of daily allocations (Marton, Halcombe and Ohakea). However, water use for rural water takes was more variable both in daily use and frequency of use, ranging from less than 20 percent to more than 100 percent.

6.4 Marlborough District Council

Figure 6.3 shows use for 11 consecutive seasons from 1995–2006. Note the allocation is based on an irrigated area of 820 ha and annual demand for grapes of 155 mm. The analysis is based on annual use versus calculated annual allocation. As shown, peak use occurred in the 2000–2001 season at 70 percent but on average over the period is 36 percent.

Figure 6.3: Water use Southern Valley aquifer



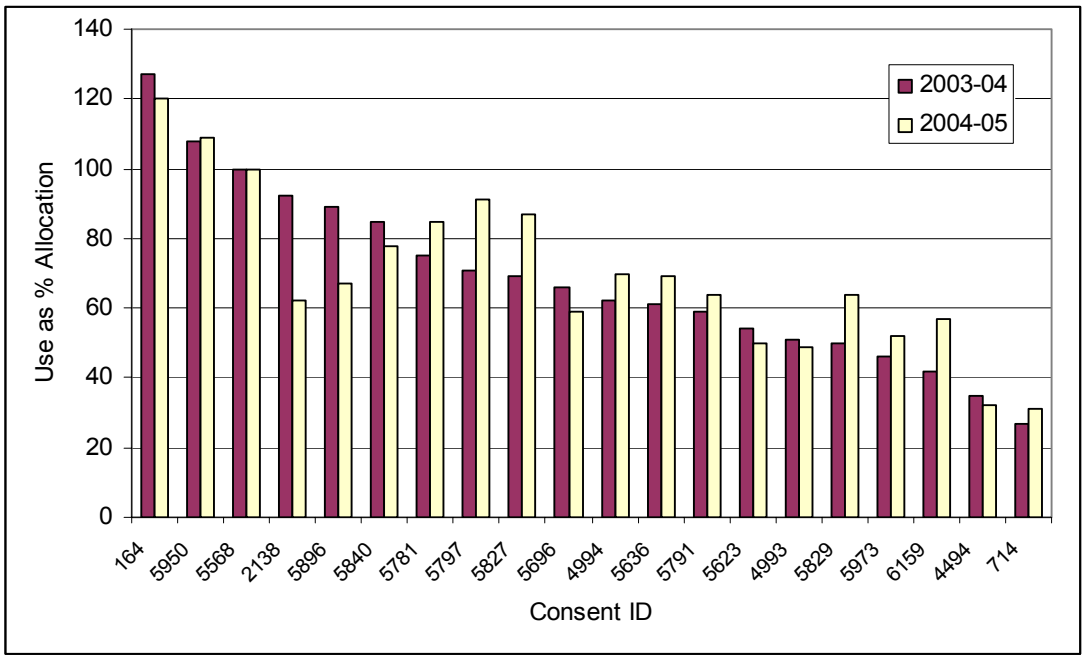
6.5 Otago Regional Council

Otago Regional Council has a monitoring programme for 31 consents in the Kakanui catchment. Annual records for the 2005–2006 season were submitted for this study. Analysis of 21 of the consents indicates average use is just over 50 percent of allocation. However, there appear to be a number of anomalies in the analysis with several consents in excess of 200 percent.

6.6 Taranaki Regional Council

Taranaki Regional Council monitors irrigation takes in the region. Virtually all of the takes are for irrigation of pasture for dairy farming. Water use for the takes for the 2003–2004 and 2004–2005 seasons are presented in annual technical reports (TRC, 2005 and 2006). The analysis of annual use shows that on average it is close to 70 percent of allocation but varies between consents from less than 20 percent to more than 120 percent. Figure 6.4 shows use as percent of annual allocation for 20 of the consents with records for both seasons.

Figure 6.4: Taranaki Regional Council irrigation consents



6.7 Tasman District Council

Figures 6.5 to 6.7 present the analysis of water use as a percent of allocation on a weekly basis for three groundwater zones for three irrigation seasons (2000–2001, 2003–2004 and 2005–2006). Use varied within and between seasons for the three zones. Weekly use was up to 80 percent of allocation but at times was as low as 20 percent.

Figure 6.5: Water use for Motueka Hau zone

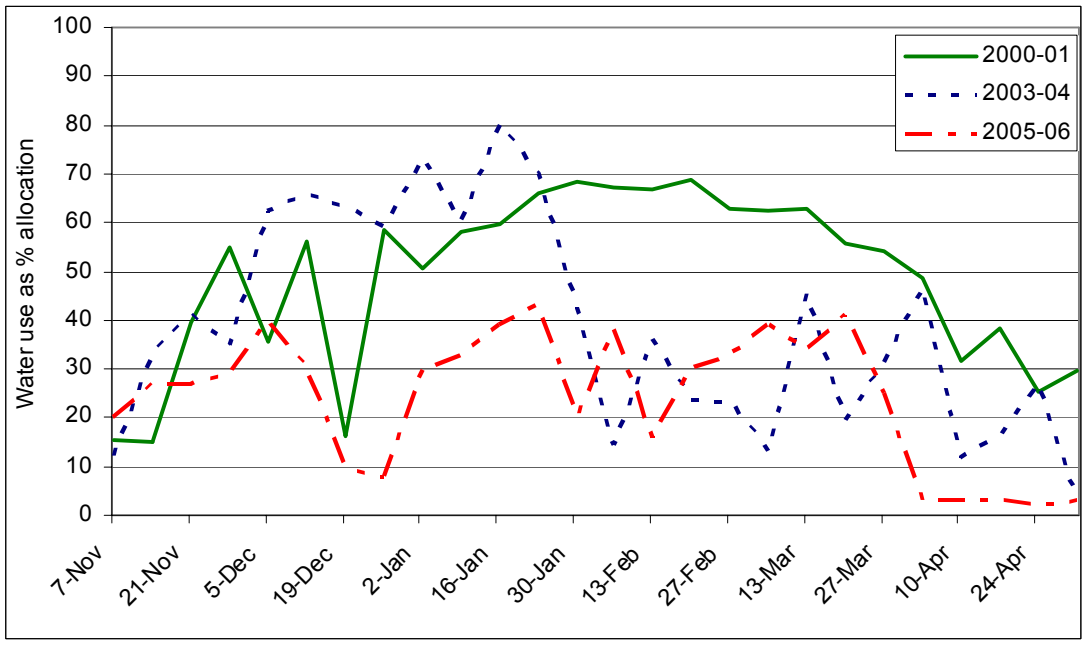


Figure 6.6: Water use Waimea Plains – lower confined aquifer

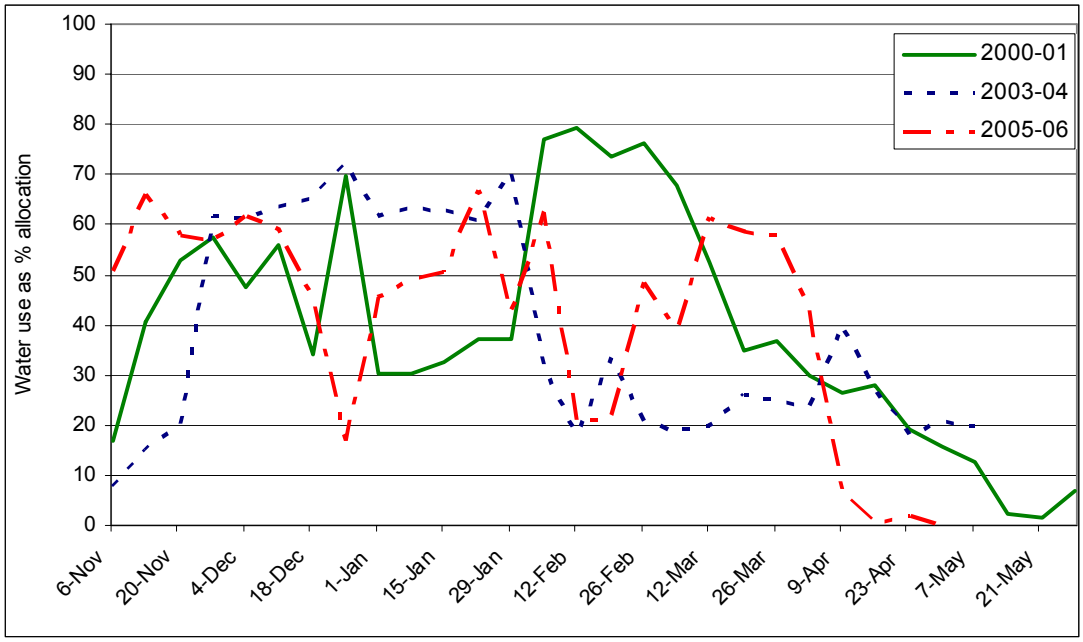
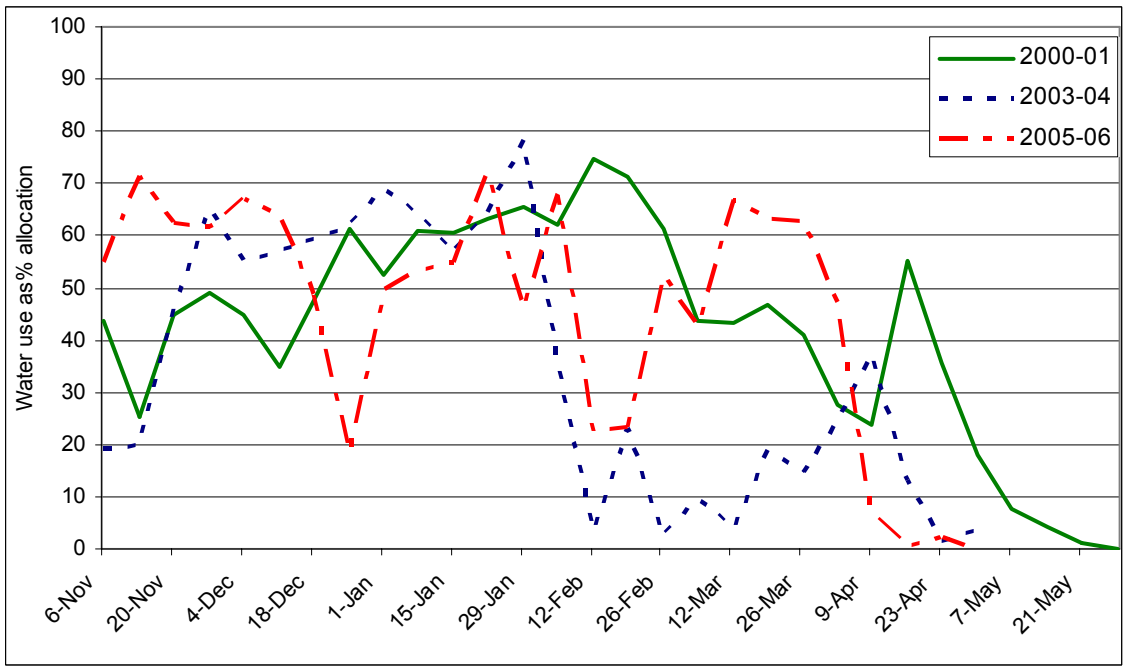


Figure 6.7: Water use Waimea-Waimea west zone – unconfined aquifer



Virtually all of the above examples of water use versus allocation are for irrigation water use. They show similar trends in terms of variability in use, that is low use on the irrigation season margins (early and late season) and considerable variations between seasons. This is be expected as allocations are generally issued as a fixed peak take rate intended to provide a high level of supply reliability while demand varies according to climate, crop type and growth stage. On a catchment or groundwater zone, maximum use is up to 80 percent of allocation during periods or seasons of high demand. However, it is on average generally around 50–60 percent of allocation.

Appendix A: Database Format

The table below lists the database structure.

Field name	Records	Explanation	Units
Region ID	ARC EBOP ECAN ES EW GDC GWRC HBRC HRC MDC NCC NRC ORC TDC TRC WCRC	Auckland Regional Council Environment Bay of Plenty Environment Canterbury Environment Southland Environment Waikato Gisborne District Council Greater Wellington Regional Council Hawkes Bay Regional Council Horizons Regional Council Marlborough District Council Nelson City Council Northland Regional Council Otago Regional Council Tasman District Council Taranaki Regional Council West Cost Regional Council	
Consent identifier	A888888#	Unique identifier as per council records	
Primary source	Ground Surface	 Include all SW take include dams and lakes	
Source type	Dam Geothermal Lake River Stream		
Source identifier		Catchment or aquifer description as per council db	
Source catchment		As per national catchment coverage #	
Primary use	Drinking Heating Industrial Irrigation Recreational Stock		
Use type	Arable Community Domestic Forestry Frost protection Heating Horticulture Mining Municipal		

Field name	Records	Explanation	Units
Use type (continued)	Nursery Pasture Quarry Recreational Service Stock water Swimming Storage Unspecified Viticulture Waste		
Instantaneous rate		Listed value or calculation if not listed	l/s
Daily rate		Listed value or calculation if not listed	m3/d
Weekly rate		Listed value or calculation if not listed	m3/wk
Annual rate		Listed value or calculation if not listed	m3/yr
Irrigated area		Listed value or calculation if not listed	ha
Easting			
Northing			

Appendix B: Assumptions and Parameters

The following assumptions and parameters were adopted in the study.

1. Consented irrigated area: Consented irrigated area if not listed on the consent record was calculated from the weekly allocation divided by peak weekly crop water requirements for the crop type and region. Peak weekly crop water requirements were as per published values and modelling of irrigation water requirements. Publications and information sources on weekly and annual irrigation water requirements by region included the following:

    - Auckland:
        - Green S R, Mills T M, Clothier B E. 1996. A Review of Crop Water Requirements for the Auckland Region. A report prepared for Auckland Regional Council by HortResearch, Palmerston North.
        - Aqualinc Research Ltd. 2004. Assessment of Water Harvesting in Franklin District. A report prepared for the Franklin Sustainability Group by Aqualinc Research Ltd, Hamilton.
    - Bay of Plenty:
        - Lincoln Environmental. 2003. Investigating Irrigation Efficiency in the Reporoa Basin. A report prepared for Environment Waikato by Lincoln Environmental, Hamilton.
    - Canterbury:
        - Lincoln Environment. 2002. Field Proven Irrigation Efficiency Benchmarks. A report prepared for the Ashburton–Lyndhurst Irrigation Society by Lincoln Environmental.
        - Environment Canterbury. Proposed Natural Resources Regional Plan, Chapter 5 Water Quantity, Schedule WQN9.
    - Manawatu–Wanganui:
        - Aqualinc Research Ltd. 2004. Water Allocation Project. A report prepared for Horizons Regional Council by Aqualinc Research Ltd, Hamilton.
    - Marlborough:
        - Marlborough District Council, irrigation water requirements as listed in the council publication ‘Fresh Water’.
    - Otago:
        - Aqualinc Research Ltd. 2005. Water Requirements for Irrigation Throughout the Otago Region. A report prepared for the Otago Regional Council by Aqualinc Research Ltd, Christchurch.
    - Taranaki:
        - Lincoln Environmental. 2003. Optimisation of Farm Irrigation. A report prepared for Taranaki Regional Council by Lincoln Environmental, Hamilton.
    - Tasman:
        - Tasman Resource Management Plan, Table 31.1D page 31. Tasman Regional Council.

- Waikato:
  - Watt J, McIndoe I, Green S. 1998. Crop Water Requirements for Irrigation in the Waikato Region. Contract Report LC9798/021. Landcare Research, Hamilton.
  - Environment Waikato, Regional Plan, Table 3.7: Estimated Irrigation Water Requirements for Pasture and Crops – Waikato Region.

2. Annual allocation: The allocation, if not listed on the consent record, was calculated as the weekly allocation times the number of weeks of supply per season (52, 50 and 16 weeks for drinking, industrial and irrigation use respectively). The 16 weeks for irrigation is equivalent to the total annual volume for crop type and region as per published information (as above) and modelled irrigation water requirements. For the Auckland region, all data is based on an annual allocation figure supplied by ARC.

3. Weekly allocation is expressed as cubic metres per second (m^3/s); this is the weekly allocation rate (m^3/week) converted to an equivalent take rate of m^3/s (ie, m^3/week divided by 1.653×10^{-6} (ie, 7 x 24 x 3600)).

4. Otago Regional Council mining water rights for irrigation: The determination of weekly allocation and consented irrigated area was based on advice from Otago Regional Council and regional assessment of irrigated area and cumulative take rates. The following approach was adopted:
   - Weekly allocations are 60 percent of consented allocation rates (this value is based on the Otago Regional Council estimate of irrigated area and cumulative allocation rate).
   - Annual allocations are based on an eight-week irrigation season. The rationale for the shorter supply season is due to the limitations of water availability.
   - Consented irrigated area is calculated at an equivalent peak weekly demand of 400 m^3/week. This value is based on the assumption that a high proportion of the takes are for flood irrigation.

Appendix C: Consent Database Summaries

The series of tables below summarises the consent database. The term 'surface water' in the tables refers to consents and allocations from run-of-stream and the term 'storage' from dams and lakes.

Table C.1: Summary of consents (number) by authority and source

Council	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
ARC	1,097	187	136	1,420	69	1,489
EBOP	710	390	27	1,127	196	1,323
ECAN	4,668	1,138	66	5,872	1	5,873
ES	548	126	5	679		679
EW	375	385	29	789	31	820
GDC	96	62	3	161	1	162
GWRC	469	163	45	677		677
HBRC	2,242	275		2,517		2,517
HRC	358	192	2	552		552
MDC	804	385	2	1,191		1,191
NCC	8	22	3	33		33
NRC	245	295	66	606		606
ORC	507	1,406	55	1,968		1,968
TDC	856	281	182	1,319		1,319
TRC	44	121	21	186	1	187
WCRC	102	316	16	434	3	437
Total	**13,129**	**5,744**	**658**	**19,531**	**302**	**19,833**

Table C.2: Summary of weekly allocations (m^3/s) by authority and source

Council	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
ARC	2.9	0.6	6.8	10.3	0.03	10.4
EBOP	5.6	14.8	1.8	22.2	0.44	22.7
ECAN	158.1	209.9	4.8	372.8	0.05	372.8
ES	4.7	3.0	0.2	7.8		7.8
EW	4.3	18.4	3.1	25.8	3.52	29.3
GDC	0.8	1.8	8.3	10.8	0.00003	10.8
GWRC	9.4	8.7	1.9	19.9		19.9
HBRC	14.8	5.5		20.2		20.2
HRC	6.0	4.6	0.005	10.5		10.5
MDC	6.6	11.1	0.1	17.8		17.8
NCC	0.0	0.9	0.03	1.0		1.0
NRC	0.7	2.9	1.4	5.1		5.1
ORC	7.1	110.2	7.8	125.1		125.1
TDC	4.5	1.9	5.4	11.8		11.8
TRC	0.3	3.1	0.9	4.3	0.003	4.3
WCRC	1.2	8.5	0.3	10.0	0.01	10.0
Total	**226.8**	**405.9**	**42.9**	**675.6**	**4.06**	**679.7**

Table C.3: Summary of annual allocations (Mm^3/y) by authority and source

Council	Groundwater	Surface water	Storage	Total
ARC	47.1	5.9	99.3	152.3
EBOP	84.1	329.8	24.8	438.7
ECAN	1,512.6	2,453.5	49.7	4,015.8
ES	79.8	82.3	4.4	166.5
EW	107.1	474.6	86.4	668.0
GDC	10.6	23.7	262.2	296.4
GWRC	192.1	605.1	32.9	830.1
HBRC	310.3	132.8		443.1
HRC	110.0	87.9	0.1	198.0
MDC	79.6	105.9	0.7	186.2
NCC		28.9	0.2	29.2
NRC	20.6	64.8	28.6	114.0
ORC	142.0	1,492.1	115.8	1,749.9
TDC	56.0	20.6	72.3	148.9
TRC	8.5	72.6	24.5	105.6
WCRC	32.0	230.8	10.1	272.9
Total	**2,792.3**	**6,211.1**	**812.0**	**9,815.6**

Table C.4: Summary of consents (number) by primary use

Council	Public	Industrial	Irrigation	Stock	Total
ARC	166	159	1,028	67	1,420
EBOP	59	64	953	51	1,127
ECAN	386	224	5,168	94	5,872
ES	57	535	82	5	679
EW	223	192	354	20	789
GDC	12	5	144	0	161
GWRC	49	59	564	5	677
HBRC	76	100	2,335	6	2,517
HRC	120	86	346	0	552
MDC	33	9	1,143	6	1,191
NCC	9	3	20	1	33
NRC	152	41	400	13	606
ORC	329	188	1,423	28	1,968
TDC	63	52	1,202	2	1,319
TRC	24	71	85	6	186
WCRC	73	333	25	3	434
Total	**1,831**	**2,121**	**15,272**	**307**	**19,531**

Table C.5: Summary of weekly allocations (m^3/s) by primary use

Council	Public	Industrial	Irrigation	Stock	Total
ARC	4.70	3.44	2.17	0.04	10.34
EBOP	4.18	4.81	10.43	2.81	22.24
ECAN	15.78	7.85	334.74	14.42	372.79
ES	1.30	3.09	3.41	0.01	7.80
EW	6.73	13.19	5.84	0.03	25.79
GDC	8.78	0.01	2.06	0.00	10.85
GWRC	7.62	1.61	10.69	0.01	19.92
HBRC	2.72	2.69	14.15	0.69	20.24
HRC	3.21	1.30	6.03	0.00	10.54
MDC	0.76	0.06	16.96	0.00	17.78
NCC	0.91	0.00	0.04	0.00	0.96
NRC	1.06	0.31	3.46	0.26	5.10
ORC	12.48	16.08	95.52	1.03	125.11
TDC	0.46	1.20	10.13	0.00	11.79
TRC	1.31	1.72	1.28	0.00	4.31
WCRC	1.10	7.28	1.54	0.10	10.02
Total	**73.10**	**64.64**	**518.45**	**19.41**	**675.60**

Table C.6: Summary of annual allocations (Mm^3/y) by primary use

Council	Public	Industrial	Irrigation	Stock	Total
ARC	83.6	58.7	9.3	0.6	152.3
EBOP	131.4	145.6	100.8	60.9	438.7
ECAN	194.2	233.5	3,135.1	452.9	4,015.8
ES	40.7	92.7	32.9	0.2	166.5
EW	211.7	398.9	56.5	0.9	668.0
GDC	276.2	0.3	19.9		296.4
GWRC	613.0	30.0	187.0	0.1	830.1
HBRC	85.4	81.3	254.6	21.8	443.1
HRC	100.9	39.3	57.7		198.0
MDC	23.8	2.0	160.4	0.0	186.2
NCC	28.7	0.0	0.4	0.0	29.2
NRC	33.4	9.5	62.8	8.3	114.0
ORC	383.9	481.5	852.1	32.4	1,749.9
TDC	14.5	36.4	98.0	0.0	148.9
TRC	41.2	51.9	12.4	0.1	105.6
WCRC	34.6	220.3	14.9	3.1	272.9
Total	**2297.3**	**1882.0**	**5054.8**	**581.3**	**9,815.6**

Table C.7: Summary of groundwater weekly allocations (m^3/s) by primary use

Council	Public	Industrial	Irrigation	Stock	Total
ARC	0.80	0.72	1.34	0.03	2.89
EBOP	1.23	0.16	4.20	0.00	5.59
ECAN	10.58	4.20	143.15	0.15	158.08
ES	0.42	1.30	2.93	0.00	4.65
EW	0.52	2.63	1.10	0.01	4.27
GDC	0.14	0.01	0.61		0.76
GWRC	3.38	0.75	5.28	0.01	9.41
HBRC	1.84	1.61	11.30	0.00	14.75
HRC	1.69	0.79	3.49		5.96
MDC	0.71	0.05	5.83	0.00	6.59
NCC	0.00	0.00	0.00		0.00
NRC	0.08	0.22	0.20	0.25	0.75
ORC	1.61	2.05	3.47	0.00	7.13
TDC	0.43	0.16	3.91	0.00	4.49
TRC	0.07	0.19	0.05	0.00	0.31
WCRC	0.22	0.78	0.15		1.15
Total	**23.72**	**15.61**	**187.01**	**0.46**	**226.80**

Table C.8: Summary of groundwater annual allocations (Mm^3/y) by primary use

Council	Public	Industrial	Irrigation	Stock	Total
ARC	20.9	17.1	8.4	0.6	47.1
EBOP	38.6	4.9	40.6	0.0	84.1
ECAN	138.2	124.1	1,246.3	4.0	1,512.6
ES	13.1	38.4	28.3	0.0	79.8
EW	16.4	79.5	10.6	0.5	107.1
GDC	4.4	0.3	5.9		10.6
GWRC	97.4	11.9	82.7	0.1	192.1
HBRC	58.0	48.6	203.6	0.0	310.3
HRC	53.0	23.9	33.1		110.0
MDC	22.3	1.6	55.6	0.0	79.6
NCC	0.0	0.0	0.0		0.0
NRC	2.5	6.8	3.6	7.8	20.6
ORC	45.1	62.1	34.8	0.1	142.0
TDC	13.5	4.7	37.8	0.0	56.0
TRC	2.3	5.6	0.5	0.1	8.5
WCRC	6.8	23.7	1.5		32.0
Total	**532.5**	**453.3**	**1,793.2**	**13.3**	**2,792.3**

Table C.9: Summary of surface-water weekly allocations (m^3/s) by primary use

Council	Drinking	Industrial	Irrigation	Stock	Total
ARC	0.1	0.1	0.4	0.0	0.6
EBOP	2.9	3.9	6.0	1.9	14.8
ECAN	5.2	3.6	186.9	14.2	209.9
ES	0.9	1.7	0.5	0.0	3.0
EW	5.6	8.5	4.4	0.0	18.4
GDC	0.3		1.4		1.8
GWRC	4.2	0.6	3.9	0.0	8.7
HBRC	0.9	1.1	2.8	0.7	5.5
HRC	1.5	0.5	2.5		4.6
MDC	0.0	0.0	11.1		11.1
NCC	0.9	0.0	0.0	0.0	0.9
NRC	0.9	0.0	2.0	0.0	2.9
ORC	9.8	13.0	86.3	1.0	110.2
TDC	0.0	0.1	1.7	0.0	1.9
TRC	0.5	1.5	1.1	0.0	3.1
WCRC	0.9	6.2	1.4	0.1	8.5
Total	**34.7**	**40.7**	**312.5**	**18.0**	**405.9**

Table C.10: Summary of surface-water annual allocations (Mm^3/y) by primary use

Council	Public	Industrial	Irrigation	Stock	Total
ARC	2.0	0.7	3.1	0.1	5.9
EBOP	92.7	118.0	58.2	60.9	329.8
ECAN	55.1	107.1	1,843.6	447.7	2,453.5
ES	27.6	50.0	4.5	0.2	82.3
EW	175.2	256.7	42.3	0.4	474.6
GDC	9.6		14.0		23.7
GWRC	515.6	16.5	73.0	0.0	605.1
HBRC	27.4	32.7	51.0	21.8	132.8
HRC	47.9	15.5	24.5		87.9
MDC	1.5	0.4	104.1		105.9
NCC	28.7	0.0	0.1	0.0	28.9
NRC	27.0	1.4	36.3	0.1	64.8
ORC	308.1	389.0	762.7	32.3	1,492.1
TDC	1.0	2.7	16.8	0.0	20.6
TRC	16.9	45.0	10.7	0.0	72.6
WCRC	27.8	186.6	13.4	3.0	230.8
Total	**1,364.2**	**1,222.1**	**3,058.3**	**566.5**	**6,211.1**

Table C.11: Summary of storage water weekly allocations (m^3/y) by primary use

Council	Drinking	Industrial	Irrigation	Stock	Total
ARC	3.78	2.62	0.44	0.01	6.84
EBOP	0.00	0.75	0.21	0.87	1.83
ECAN	0.04	0.08	4.66	0.04	4.82
ES		0.14	0.01		0.15
EW	0.64	2.07	0.37		3.08
GDC	8.34				8.34
GWRC		0.31	1.55		1.86
HRC	0.00		0.00		0.00
MDC			0.08		0.08
NCC			0.03		0.03
NRC	0.13	0.04	1.26	0.01	1.45
ORC	1.03	1.01	5.72		7.76
TDC		0.96	4.48		5.44
TRC	0.70	0.04	0.13		0.87
WCRC	0.00	0.33	0.00	0.00	0.33
Total	**14.65**	**8.35**	**18.93**	**0.93**	**42.87**

Table C.12: Summary of storage water annual allocations (Mm^3/y) by primary use

Council	Public	Industrial	Irrigation	Stock	Total
ARC	57.7	39.7	1.8	0.1	99.3
EBOP	0.14	22.66	1.99	0.00	24.79
ECAN	0.91	2.29	45.28	1.26	49.74
ES		4.30	0.10		4.39
EW	20.02	62.74	3.60		86.35
GDC	262.15				262.15
GWRC		1.60	31.32		32.92
HRC	0.02		0.04		0.06
MDC			0.73		0.73
NCC			0.25		0.25
NRC	3.95	1.34	22.94	0.39	28.61
ORC	30.72	30.43	54.63		115.77
TDC		28.98	43.36		72.34
TRC	22.01	1.22	1.23		24.46
WCRC	0.00	10.05	0.00	0.08	10.13
Total	**397.6**	**205.3**	**207.3**	**1.8**	**812.0**

Table C.13: Summary of irrigation consents (number) by water source

Council	Groundwater	Surface water	Storage	Total
ARC	776	149	103	1,028
EBOP	629	286	15	930
ECAN	4,161	945	55	5,161
ES	65	16	1	82
EW	146	194	9	349
GDC	85	57	0	142
GWRC	396	122	36	554
HBRC	1,914	219	0	2,133
HRC	232	113	1	346
MDC	770	368	2	1,140
NCC	5	12	3	20
NRC	140	212	48	400
ORC	306	1,077	31	1,414
TDC	787	243	172	1,202
TRC	12	60	13	85
WCRC	6	18	1	25
Total	**10,430**	**4,091**	**490**	**15,011**

Table C.14: Summary of irrigation weekly allocations (m^3/s) by water source

Council	Groundwater	Surface water	Storage	Total
ARC	1.3	0.4	0.4	2.2
EBOP	4.2	6.0	0.2	10.4
ECAN	143.0	186.9	4.6	334.5
ES	2.9	0.5	0.0	3.4
EW	1.1	4.4	0.4	5.8
GDC	0.6	1.2	0.0	1.8
GWRC	5.3	3.8	1.5	10.5
HBRC	11.2	2.8	0.0	14.0
HRC	3.5	2.5	0.0	6.0
MDC	5.8	11.0	0.1	16.9
NCC	0.0	0.0	0.0	0.0
NRC	0.2	2.0	1.3	3.5
ORC	3.2	86.0	5.7	95.0
TDC	3.9	1.7	4.5	10.1
TRC	0.1	1.1	0.1	1.3
WCRC	0.2	1.4	0.0	1.5
Total	**186.5**	**311.6**	**18.9**	**517.0**

Table C.15: Summary of irrigation annual allocation (Mm^3/y) by water source

Council	Groundwater	Surface water	Storage	Total
ARC	8	3	4	15
EBOP	41	58	2	101
ECAN	1,244	1,843	45	3,132
ES	28	4	0	33
EW	11	42	4	56
GDC	6	12	0	18
GWRC	83	73	31	187
HBRC	203	51	0	254
HRC	33	25	0	58
MDC	56	104	1	160
NCC	0	0	0	0
NRC	4	36	23	63
ORC	33	759	55	847
TDC	38	17	43	98
TRC	1	11	1	12
WCRC	1	13	0	15
Total	**1,789**	**3,051**	**209**	**5,049**

Table C.16: Summary of consented irrigation area (ha) by water source

Council	Groundwater	Surface water	Storage	Total
ARC	2,363	654	716	3,732
EBOP	7,995	11,919	395	20,310
ECAN	342,806	296,949	7,251	647,006
ES	6,066	966	20	7,053
EW	1,667	6,599	567	8,832
GDC	1,345	3,021	0	4,366
GWRC	11,085	7,449	2,666	21,200
HBRC	30,808	9,169	0	39,978
HRC	7,027	5,113	9	12,149
MDC	15,705	20,691	194	36,590
NCC	5	30	51	87
NRC	482	5,004	2,719	8,205
ORC	7,913	126,082	7,280	141,275
TDC	7,705	3,697	6,868	18,271
TRC	105	2,229	256	2,590
WCRC	311	700	0	1,011
Total	**443,388**	**500,273**	**28,992**	**972,653**

Table C.17: Summary consented irrigation weekly allocation (m^3/s) by use

Council	Arable	Forestry	Horticulture	Nursery	Pasture	Recreational	Unspecified	Viticulture	Total
ARC	0.81		0.57		0.79		0.00		2.17
EBOP	0.00		3.68		3.00		3.70	0.02	10.41
ECAN	179.87		2.79		131.02		20.01	0.81	334.51
ES			0.18		3.14		0.09		3.41
EW			0.05		0.42		5.35		5.82
GDC	0.14		1.28	0.08	0.32		0.00	0.00	1.82
GWRC	0.03		0.70		3.50		6.10	0.21	10.54
HBRC	5.24	0.01	3.42		3.35	0.07		1.89	13.99
HRC	4.40		0.41		1.21				6.03
MDC			0.00				16.90	0.00	16.91
NCC			0.01		0.00		0.03		0.04
NRC	0.13		0.92		2.41				3.46
ORC	0.59		13.85		27.97		51.90	0.67	94.97
TDC							10.13		10.13
TRC			0.03		1.25				1.28
WCRC					1.54				1.54
Total	**191.22**	**0.01**	**27.90**	**0.08**	**179.92**	**0.07**	**114.21**	**3.61**	**517.02**

Table C.18: Summary consented irrigation annual allocation (Mm^3/y) by use

Council	Arable	Forestry	Horticulture	Nursery	Pasture	Recreational	Unspecified	Viticulture	Total
ARC	4.5		4.1		6.5		0.0		15.1
EBOP	0.0		35.6		29.0		35.8	0.2	100.7
ECAN	1,655.8		21.0		1,230.0		217.7	7.9	3,132.4
ES			1.7		30.4		0.8		32.9
EW			0.5		4.1		51.7		56.3
GDC	1.3		12.4	0.7	3.1		0.0	0.0	17.6
GWRC	0.4		4.1		59.5		119.3	3.4	186.6
HBRC	95.2	0.2	62.1		60.7	1.3		34.3	253.8
HRC	42.1		3.9		11.7				57.7
MDC			0.0				160.1	0.0	160.1
NCC			0.1		0.0		0.3		0.4
NRC	2.3		16.7		43.7				62.8
ORC	5.7		142.9		270.7		421.2	6.4	846.9
TDC							98.0		98.0
TRC			0.3		12.1				12.4
WCRC					14.9				14.9
Total	**1,806.8**	**0.2**	**304.9**	**0.7**	**1,775.6**	**1.3**	**1,104.9**	**52.2**	**5,046.8**

Table C.19: Summary consented irrigation area (ha) by use

Council	Arable	Forestry	Horticulture	Nursery	Pasture	Recreational	Unspecified	Viticulture	Total
ARC	1,489		1,045		1,196		2		3,732
EBOP	5		6,750		6,043		7,465	47	20,310
ECAN	381,581		6,142		219,233		36,362	3,689	647,006
ES			539		6,329		185		7,053
EW			90		640		8,102		8,832
GDC	446		2,940	79	897		2	1	4,366
GWRC	78		455		7,323		12,776	567	21,200
HBRC	17,881	20	8,003		8,467	127		5,480	39,978
HRC	8,875		827		2,447				12,149
MDC			0				36,589	1	36,590
NCC			21		2		64		87
NRC	403		2,492		5,310				8,205
ORC	694		22,038		38,055		78,667	1,821	141,275
TDC							18,271		18,271
TRC			64		2,526				2,590
WCRC					1,011				1,011
Total	**411,452**	**20**	**51,407**	**79**	**299,478**	**127**	**198,486**	**11,605**	**972,653**

Table C.20: Comparison of weekly allocations (m^3/s) 1999 and 2006

Council	Survey	
	1999	2006
ARC	8.1	10.3
EBOP	8.9	22.2
ECAN	249.8	372.8
ES	2.4	7.8
EW	10.3	25.8
GDC	1.4	10.8
GWRC	9.8	19.9
HBRC	16.8	20.2
HRC	5.2	10.5
MDC	8.2	17.8
NRC	7.9	5.1
ORC	90.1	125.1
TDC	6.7	11.8
TRC	3.4	4.3
Total	**429.0**	**664.6**

Appendix D: Regional Summaries

The series of tables listed in this appendix summarise the consent database by regional authority.

Auckland Regional Council

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	138	16	12	166	0	166
Heating	0	0	0	0	68	68
Industrial	126	15	18	159	0	159
Irrigation	776	149	103	1028	0	1028
Stock	57	7	3	67	1	68
Total	**1097**	**187**	**136**	**1420**	**69**	**1489**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	0.80	0.12	3.78	4.70	0.00	4.70
Heating	0.00	0.00	0.00	0.00	0.03	0.03
Industrial	0.72	0.10	2.62	3.44	0.00	3.44
Irrigation	1.34	0.39	0.44	2.17	0.00	2.17
Stock	0.03	0.00	0.01	0.04	0.00	0.04
Total	**2.89**	**0.61**	**6.84**	**10.34**	**0.03**	**10.37**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	20.95	2.03	113.40	80.7
Heating	0.00	0.00	0.00	0.00
Industrial	17.15	0.68	78.02	58.7
Irrigation	8.40	3.13	3.56	9.3
Stock	0.64	0.08	0.16	0.6
Total	**47.13**	**5.92**	**195.15**	**152.3**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Arable	994.59	249.85	244.06	1.28
Horticulture	868.21	130.37	46.89	21.91
Pasture	498.56	272.91	424.58	11.46
Unspecified	1.32	0.98	0.00	0.00
Total	**2362.67**	**654.12**	**715.54**	**3732.33**

Environment Bay of Plenty

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	35	23	1	59	0	59
Heating	0	0	0	0	90	90
Industrial	32	27	5	64	101	165
Irrigation	636	302	15	953	3	956
Stock	7	38	6	51	2	53
Total	**710**	**390**	**27**	**1127**	**196**	**1323**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	1.23	2.95	0.00	4.18	0.00	4.18
Heating	0.00	0.00	0.00	0.00	0.10	0.10
Industrial	0.16	3.90	0.75	4.81	0.33	5.14
Irrigation	4.20	6.03	0.21	10.43	0.01	10.44
Stock	0.00	1.94	0.87	2.81	0.00	2.81
Total	**5.59**	**14.81**	**1.83**	**22.24**	**0.44**	**22.68**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	38.57	92.70	0.14	131.42
Heating	0.00	0.00	0.00	0.00
Industrial	4.86	118.04	22.66	145.57
Irrigation	40.64	58.22	1.99	100.85
Stock	0.00	60.87	0.00	60.87
Total	**84.07**	**329.84**	**24.79**	**438.70**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Arable	3.73	1.52	0.00	0.00
Horticulture	4,659.74	1,901.85	188.66	3.61
Pasture	2,519.78	3,345.96	176.94	126.05
Unspecified	786.93	6,648.53	29.28	15.17
Viticulture	25.14	21.47	0.00	0.00
Total	**7,995.32**	**11,919.32**	**394.88**	**20,309.53**

Environment Canterbury

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	298	83	5	386	0	386
Industrial	186	34	4	224	1	225
Irrigation	4165	947	56	5168	0	5168
Stock	19	74	1	94	0	94
Total	**4668**	**1138**	**66**	**5872**	**1**	**5873**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	10.6	5.2	0.0	15.8	0.00	15.8
Industrial	4.2	3.6	0.1	7.8	0.05	7.9
Irrigation	143.1	186.9	4.7	334.7	0.00	334.7
Stock	0.1	14.2	0.0	14.4	0.00	14.4
Total	**158.1**	**209.9**	**4.8**	**372.8**	**0.05**	**372.8**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	138.20	55.11	0.91	194.23
Industrial	124.13	107.11	2.29	233.54
Irrigation	1246.26	1843.60	45.28	3135.15
Stock	3.99	447.66	1.26	452.90
Total	**1512.58**	**2453.49**	**49.74**	**4015.82**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Arable	187,836.43	190,743.10	3,001.00	381,580.53
Horticulture	5,228.30	699.90	214.23	6,142.43
Pasture	146,687.05	70,439.63	2,106.00	219,232.68
Unspecified	30.00	34,412.00	1,920.00	36,362.00
Viticulture	3,024.70	654.00	10.00	3,688.70
Total	**342,806.48**	**296,948.63**	**7,251.23**	**647,006.34**

Environment Southland

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	15	42	0	57		57
Industrial	465	66	4	535		535
Irrigation	65	16	1	82		82
Stock	3	2	0	5		5
Total	**548**	**126**	**5**	**679**		**679**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	0.42	0.88	0.00	1.30		1.30
Industrial	1.30	1.65	0.14	3.09		3.09
Irrigation	2.93	0.46	0.01	3.41		3.41
Stock	0.00	0.01	0.00	0.01		0.01
Total	**4.65**	**3.00**	**0.15**	**7.80**		**7.80**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	13.10	27.64	0.00	40.74
Industrial	38.42	49.96	4.30	92.67
Irrigation	28.28	4.50	0.10	32.87
Stock	0.02	0.19	0.00	0.22
Total	**79.81**	**82.29**	**4.39**	**166.50**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Horticulture	449.11	89.43	0.00	538.53
Pasture	5464.50	844.31	20.16	6328.97
Unspecified	152.74	32.67	0.00	185.41
Total	**6066.35**	**966.40**	**20.16**	**7052.91**

Environment Waikato

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	126	89	8	223	0	223
Heating	0	0	0	0	2	2
Industrial	88	92	12	192	29	221
Irrigation	149	196	9	354	0	354
Stock	12	8	0	20	0	20
Total	**375**	**385**	**29**	**789**	**31**	**820**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	0.52	5.57	0.64	6.73	0.00	6.73
Heating	0.00	0.00	0.00	0.00	0.02	0.02
Industrial	2.63	8.49	2.07	13.19	3.51	16.70
Irrigation	1.10	4.37	0.37	5.84	0.00	5.84
Stock	0.01	0.01	0.00	0.03	0.00	0.03
Total	**4.27**	**18.44**	**3.08**	**25.79**	**3.52**	**29.31**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	16.44	175.22	20.02	211.67
Heating	0.00	0.00	0.00	0.00
Industrial	79.53	256.65	62.74	398.92
Irrigation	10.63	42.27	3.60	56.50
Stock	0.46	0.41	0.00	0.88
Total	**107.07**	**474.55**	**86.35**	**667.97**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Horticulture	53.89	17.02	19.15	90.06
Pasture	8.98	129.86	500.70	639.54
Unspecified	1603.82	6451.69	46.75	8102.27
Total	**1666.70**	**6598.57**	**566.61**	**8831.88**

Gisborne District Council

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	6	3	3	12	0	12
Industrial	5	0	0	5	1	6
Irrigation	85	59	0	144	0	144
Total	**96**	**62**	**3**	**161**	**1**	**162**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	0.14	0.31	8.34	8.78	0.00	8.78
Industrial	0.01	0.00	0.00	0.01	0.00	0.01
Irrigation	0.61	1.45	0.00	2.06	0.00	2.06
Total	**0.76**	**1.76**	**8.34**	**10.85**	**0.00**	**10.85**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	4.38	9.64	262.15	276.17
Industrial	0.31	0.00	0.00	0.31
Irrigation	5.88	14.03	0.00	19.91
Total	**10.56**	**23.67**	**262.15**	**296.39**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Arable	13.80	432.50		446.30
Horticulture	1255.20	1685.00		2940.20
Nursery	0.00	78.90		78.90
Pasture	74.44	823.00		897.44
Unspecified	0.34	1.93		2.27
Viticulture	1.00	0.00		1.00
Total	**1344.78**	**3021.33**		**4366.12**

Greater Wellington Regional Council

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	29	20	0	49		49
Industrial	38	17	4	59		59
Irrigation	398	125	41	564		564
Stock	4	1	0	5		5
Total	**469**	**163**	**45**	**677**		**677**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	3.38	4.24	0.00	7.62		7.62
Industrial	0.75	0.55	0.31	1.61		1.61
Irrigation	5.28	3.87	1.55	10.69		10.69
Stock	0.01	0.00	0.00	0.01		0.01
Total	**9.41**	**8.66**	**1.86**	**19.92**		**19.92**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	97.37	515.58	0.00	612.95
Industrial	11.94	16.49	1.60	30.02
Irrigation	82.67	72.98	31.32	186.97
Stock	0.10	0.02	0.00	0.12
Total	**192.09**	**605.06**	**32.92**	**830.07**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Arable	32.50	45.72	0.00	78.22
Horticulture	441.47	14.00	0.00	455.47
Pasture	4,635.69	2,685.50	2.03	7,323.22
Unspecified	5,501.71	7,128.51	0.00	12,776.22
Viticulture	473.63	93.00	0.00	566.63
Total	**11,085.00**	**9,966.72**	**2.03**	**21,199.75**

Hawke's Bay Regional Council

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	56	20		76		76
Industrial	85	15		100		100
Irrigation	2100	235		2335		2335
Stock	1	5		6		6
Total	**2242**	**275**		**2517**		**2517**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	1.84	0.87		2.72		2.72
Industrial	1.61	1.08		2.69		2.69
Irrigation	11.30	2.85		14.15		14.15
Stock	0.00	0.69		0.69		0.69
Total	**14.75**	**5.49**		**20.24**		**20.24**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	58.01	27.41		85.42
Industrial	48.62	32.65		81.28
Irrigation	203.61	50.98		254.59
Stock	0.03	21.77		21.80
Total	**310.27**	**132.82**		**443.09**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Arable	12,886.90	4,994.15		17,881.05
Forestry	0.00	20.00		20.00
Horticulture	7,429.24	573.32		8,002.56
Pasture	5,588.33	2,878.24		8,466.57
Recreational	102.05	25.00		127.05
Viticulture	4,801.97	678.52		5,480.49
Total	**30,808.49**	**9,169.22**		**39,977.71**

Horizons Regional Council

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	70	49	1	120		120
Industrial	56	30	0	86		86
Irrigation	232	113	1	346		346
Total	**358**	**192**	**2**	**552**		**552**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	1.69	1.52	0.00	3.21		3.21
Industrial	0.79	0.51	0.00	1.30		1.30
Irrigation	3.49	2.54	0.00	6.03		6.03
Total	**5.96**	**4.57**	**0.00**	**10.54**		**10.54**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	53.02	47.90	0.02	100.94
Industrial	23.88	15.46	0.00	39.34
Irrigation	33.12	24.54	0.04	57.71
Total	**110.03**	**87.90**	**0.06**	**197.99**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Arable	4,298.15	4,577.12	0.00	8,875.27
Horticulture	656.76	161.19	8.63	826.58
Pasture	2,072.34	374.90	0.00	2,447.24
Total	**7,027.26**	**5,113.20**	**8.63**	**12,149.09**

Marlborough District Council

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	22	11	0	33		33
Industrial	6	3	0	9		9
Irrigation	770	371	2	1143		1143
Stock	6	0	0	6		6
Total	**804**	**385**	**2**	**1191**		**1191**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	0.71	0.05	0.00	0.76		0.76
Industrial	0.05	0.01	0.00	0.06		0.06
Irrigation	5.83	11.06	0.08	16.96		16.96
Stock	0.00	0.00	0.00	0.00		0.00
Total	**6.59**	**11.12**	**0.08**	**17.78**		**17.78**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	22.34	1.48	0.00	23.82
Industrial	1.62	0.36	0.00	1.98
Irrigation	55.58	104.06	0.73	160.37
Stock	0.05	0.00	0.00	0.05
Total	**79.58**	**105.90**	**0.73**	**186.21**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Horticulture	0.30	0.00	0.00	0.30
Unspecified	15,704.02	20,690.79	194.00	36,588.81
Viticulture	0.50	0.00	0.00	0.50
Total	**15,704.82**	**20,690.79**	**194.00**	**36,589.61**

Nelson City Council

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	1	8	0	9		9
Industrial	2	1	0	3		3
Irrigation	5	12	3	20		20
Stock	0	1	0	1		1
Total	**8**	**22**	**3**	**33**		**33**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	0.00	0.91	0.00	0.91		0.91
Industrial	0.00	0.00	0.00	0.00		0.00
Irrigation	0.00	0.02	0.03	0.04		0.04
Stock	0.00	0.00	0.00	0.00		0.00
Total	**0.00**	**0.93**	**0.03**	**0.96**		**0.96**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	0.01	28.74	0.00	28.75
Industrial	0.02	0.01	0.00	0.02
Irrigation	0.02	0.15	0.25	0.41
Stock	0.00	0.00	0.00	0.00
Total	**0.05**	**28.89**	**0.25**	**29.19**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Horticulture	0.00	0.00	20.53	20.53
Pasture	1.80	0.00	0.00	1.80
Unspecified	3.15	30.33	30.83	64.31
Total	**4.95**	**30.33**	**51.37**	**86.65**

Northland Regional Council

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	80	59	13	152		152
Industrial	19	19	3	41		41
Irrigation	140	212	48	400		400
Stock	6	5	2	13		13
Total	**245**	**295**	**66**	**606**		**606**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	0.08	0.86	0.13	1.06		1.06
Industrial	0.22	0.05	0.04	0.31		0.31
Irrigation	0.20	2.00	1.26	3.46		3.46
Stock	0.25	0.00	0.01	0.26		0.26
Total	**0.75**	**2.91**	**1.45**	**5.10**		**5.10**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	2.46	26.99	3.95	33.40
Industrial	6.76	1.39	1.34	9.49
Irrigation	3.59	36.27	22.94	62.79
Stock	7.83	0.10	0.39	8.32
Total	**20.63**	**64.75**	**28.61**	**114.00**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Arable	0.00	397.897546	5.00	402.90
Horticulture	461.54	1532.25097	498.50	2,492.29
Pasture	20.00	3074.02876	2,215.80	5,309.83
Total	**481.54**	**5004.17727**	**2,719.30**	**8,205.01**

Otago Regional Council

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	144	172	13	329		329
Industrial	50	127	11	188		188
Irrigation	310	1082	31	1423		1423
Stock	3	25	0	28		28
Total	**507**	**1406**	**55**	**1968**		**1968**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	1.61	9.84	1.03	12.48		12.48
Industrial	2.05	13.02	1.01	16.08		16.08
Irrigation	3.47	86.33	5.72	95.52		95.52
Stock	0.00	1.03	0.00	1.03		1.03
Total	**7.13**	**110.22**	**7.76**	**125.11**		**125.11**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	45.08	308.09	30.72	383.88
Industrial	62.05	389.02	30.43	481.51
Irrigation	34.77	762.68	54.63	852.08
Stock	0.09	32.31	0.00	32.40
Total	**141.99**	**1492.10**	**115.77**	**1749.86**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Arable	74.13	619.50	0.00	693.63
Horticulture	2,621.65	14,460.29	4,956.29	22,038.22
Pasture	3,545.47	32,976.01	1,533.27	38,054.75
Unspecified	872.09	77,313.20	481.75	78,667.04
Viticulture	799.73	712.68	308.83	1,821.24
Total	**7,913.07**	**126,081.68**	**7,280.14**	**141,274.89**

Tasman District Council

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	42	21	0	63		63
Industrial	26	16	10	52		52
Irrigation	787	243	172	1202		1202
Stock	1	1	0	2		2
Total	**856**	**281**	**182**	**1319**		**1319**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	0.43	0.03	0.00	0.46		0.46
Industrial	0.16	0.09	0.96	1.20		1.20
Irrigation	3.91	1.74	4.48	10.13		10.13
Stock	0.00	0.00	0.00	0.00		0.00
Total	**4.49**	**1.86**	**5.44**	**11.79**		**11.79**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	13.49	0.98	0.00	14.48
Industrial	4.74	2.70	28.98	36.42
Irrigation	37.79	16.84	43.36	97.99
Stock	0.00	0.03	0.00	0.03
Total	**56.03**	**20.55**	**72.34**	**148.91**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Unspecified	7705.01	3697.13	6868.49	18270.62
Total	**7705.01**	**3697.13**	**6868.49**	**18270.62**

Taranaki Regional Council

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	9	14	1	24	0	24
Industrial	18	46	7	71	1	72
Irrigation	12	60	13	85	0	85
Stock	5	1	0	6	0	6
Total	**44**	**121**	**21**	**186**	**1**	**187**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	0.07	0.54	0.70	1.31	0.00	1.31
Industrial	0.19	1.49	0.04	1.72	0.00	1.72
Irrigation	0.05	1.11	0.13	1.28	0.00	1.28
Stock	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.31	3.13	0.87	4.31	0.00	4.32

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	2.29	16.87	22.01	41.17
Industrial	5.63	45.03	1.22	51.87
Irrigation	0.50	10.70	1.23	12.43
Stock	0.07	0.03	0.00	0.10
Total	**8.49**	**72.62**	**24.46**	**105.57**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Horticulture	9.37	42.49	12.06	63.92
Pasture	95.49	2,186.67	243.97	2,526.13
Total	**104.86**	**2,229.16**	**256.03**	**2,590.05**

West Coast Regional Council

Consents (number)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	22	50	1	73	0	73
Heating	0	0	0	0	2	2
Industrial	74	246	13	333	1	334
Irrigation	6	18	1	25	0	25
Stock	0	2	1	3	0	3
Total	**102**	**316**	**16**	**434**	**3**	**437**

Weekly allocation (m^3/s)

Primary use	Cold water				Geothermal	Total
	Groundwater	Surface water	Storage	Subtotal		
Drinking	0.22	0.88	0.00	1.10	0.00	1.10
Heating	0.00	0.00	0.00	0.00	0.01	0.01
Industrial	0.78	6.17	0.33	7.28	0.01	7.29
Irrigation	0.15	1.38	0.00	1.54	0.00	1.54
Stock	0.00	0.10	0.00	0.10	0.00	0.10
Total	**1.15**	**8.53**	**0.33**	**10.02**	**0.01**	**10.03**

Annual allocation (Mm^3/y)

Primary use	Groundwater	Surface water	Storage	Total
Drinking	6.80	27.79	0.00	34.59
Heating	0.00	0.00	0.00	0.00
Industrial	23.67	186.58	10.05	220.30
Irrigation	1.49	13.38	0.00	14.87
Stock	0.00	3.03	0.08	3.11
Total	**31.96**	**230.77**	**10.13**	**272.87**

Consented irrigated area (ha)

Primary use	Groundwater	Surface water	Storage	Total
Pasture	310.67	700.02	0.00	1010.69
Total	**310.67**	**700.02**	**0.00**	**1010.69**

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