



2007/08 State of the Environment Fishery Report



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1. Executive Summary

Over the 2007/08 summer, 16 rivers were electric-fished across the Southland region, as part of Environment Southland's first State of the Environment (SoE) fish monitoring programme. The aim of the survey was to take a snapshot of the distribution and abundance of fish species in Southland rivers and streams.

Ten of the 16 survey sites were in reaches classified as lowland river types. Sites selected this year were mainly within the Matura, Oreti and Aparima River catchments.

A total of 13 fish species, plus the freshwater crayfish *Paranephrops zelandicus* were recorded during the 2007/08 survey. At some sites, bully and galaxiid species were described to the lowest taxonomic level possible, as there was some difficulty in identifying them fully.

Longfin eel were the most widespread of all species caught, being found at three-quarters of all sites (12 sites). Brown trout were also ubiquitous in their distribution, caught at 11 sites.

The Cascade Stream at Pourakino Valley Road had the greatest diversity with six fish species recorded.

The number of fish caught at each site ranged from none (Oteramika Stream at Seaward Downs) to 443 (Oreti River at McKellars Flat). Accordingly, the highest density of any fish species was recorded at the latter site, with four juvenile and adult galaxiids counted per m² fished.

Interesting or less common fish finds from the 2007/08 SoE fish monitoring sites included several bluegill bullies in the Cascade Stream. A solitary lamprey was caught in the Pourakino River, while one banded kokopu was collected from Moffat Creek. The only shortfin eel identified in the survey was recorded in the Winton Stream at the Winton Substation Road site.

Generally, fish species recorded for most sites were typical of what might have been expected for each site at this time of year. However, follow up monitoring should be undertaken at two of the survey sites to determine why fish species numbers had decreased compared to historical data. Past surveys on the Oteramika Stream at or near the Seaward Downs survey site at a similar time of year had recorded at least four fish species. In this year's survey, two brown trout were observed, but no fish were captured. Likewise, the Waituna Creek at Marshall Road site also had greatly reduced fish species diversity compared with previous surveys and overall had a low fish population.

In contrast, the Moffat Creek at Moffat Road site, although appearing to be in a poor state visually, recorded four fish species and bullies were caught in very high numbers.

The 2007/08 monitoring programme will most likely be modified for upcoming summers, as the programme attempted to sample a number of rivers across the region and build on flow, water quality and macroinvertebrate information. This approach limits the number of sites within a catchment that are able to be sampled each summer.

In the future, targeting of individual catchments would provide more detailed information of fish species distribution and fish community composition within catchments. Catchment specific fishery data would provide more valuable and robust information for water resource managers when making catchment scale water resource decisions, such as the setting of ecological flows and managing water allocation.

2. Introduction

Environment Southland has monitored macroinvertebrate (stream insect) health since 1996 as a tool to monitor water quality impacts on stream biota. Until now, there has been no monitoring of the impacts of water quality on Southlands native and exotic fish species.

In the last two years, a number of New Zealand regional councils (including Otago, Hawke's Bay and Horizons) have developed fish survey programmes to help provide a stocktake of the fish species present within their waterways.

The 2007/08 summer heralded the first annual State of the Environment (SoE) fish monitoring programme of selected streams and rivers in the Southland region.

The establishment of this monitoring programme primarily aims to provide an inventory of fish species and populations in selected streams on an annual basis. Another aim is to document changes in fish abundance and community composition to help determine the impacts of variable habitat availability and quality.

As more pressure is applied to the surface water resources of the Southland region, environmental flows set by Environment Southland will need to be assessed to ensure they are providing adequate habitat for aquatic biota. The State of the Environment fish monitoring programme will be fundamental in the delivery of this information.

The New Zealand Freshwater Fish (NZFF) database contains thousands of records of fish surveys performed around the country. Hence, an added benefit of this monitoring programme is to help "fill in" gaps in the database for the Southland region.

3. Fish Sampling Methods

A total of 16 sampling sites (Figure 1) were assessed between February and April 2008 to record presence/absence of fish species, fish densities and lengths. The selected sites were chosen to interlink where possible those sites with long term flow, water quality and macroinvertebrate information.

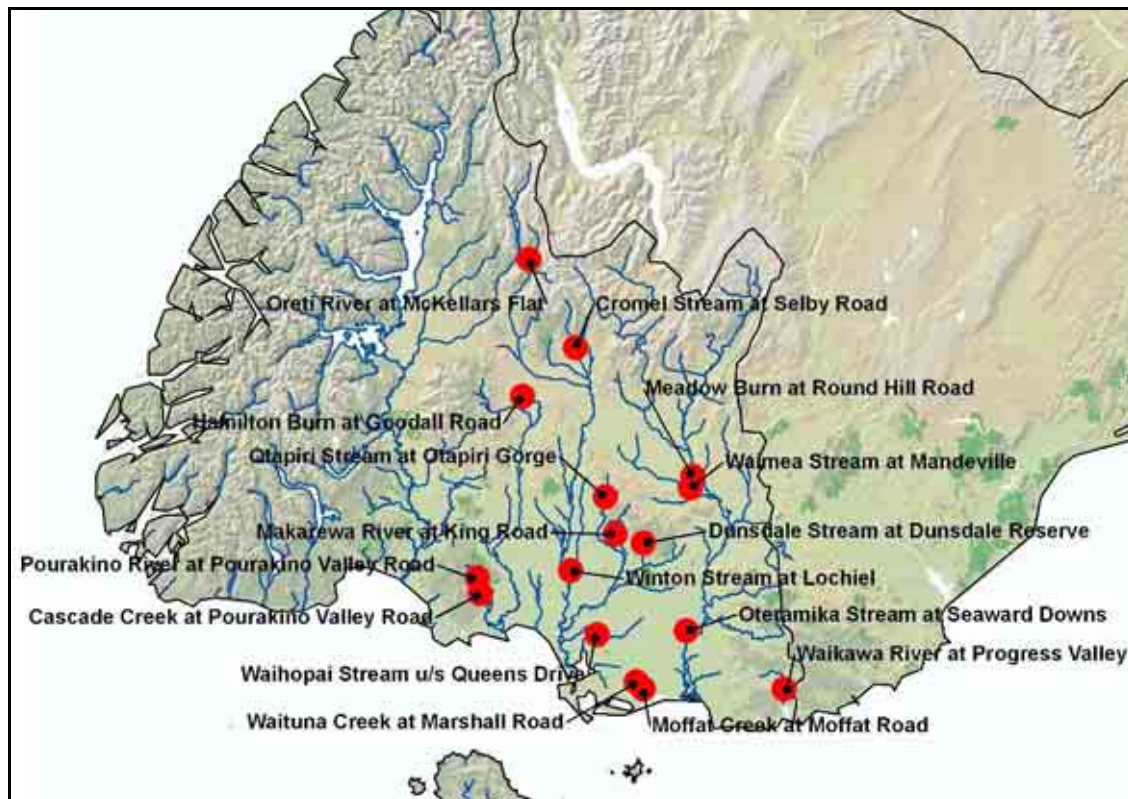


Figure 1: Electric fishing sites 2007/08

All sites were fished with a Kainga EFM300 battery powered, back-pack mounted electric-fishing machine. At each site, a 30 metre reach of riffle/run habitat was closed off with both up and downstream stop-nets. The closed off 30 metre reach was then fished in a downstream direction with three passes of the electric-fishing machine.

The electric-fishing operator was equipped with a scoop sieve to retrieve stunned fish in the vicinity of the catching anode. An assistant with a pole net was located a short distance downstream of the operator to retrieve fish that attempted to escape downstream.

All captured fish were identified, counted and measured. Fish were released a short distance from the closed off 30 metre reach to limit possible movement back into the survey area.

Site information and fishing results were entered into the New Zealand Freshwater Fish database for each site. The completed forms have been included in this report (Appendix 1).

4. Site Distribution

To help manage surface water resources, Environment Southland has classified similar surface water types into various water quantity management units. These management units are based on the River Environment Classification (REC) “source of flow” classifications. Figure 2 clearly shows that lowland streams and rivers dominated the types of sites fished in the 2007/08 SoE fish survey. This in part reflects the large number of lowland classified waterways in the region, but also the need to develop knowledge of these lowland surface water resources. More often than not, it is lowland waterways that are often at risk of deterioration in water quality or over allocation of water resources. Ideally, it would be better to have a more even distribution of SoE sites amongst REC classification types in the future.

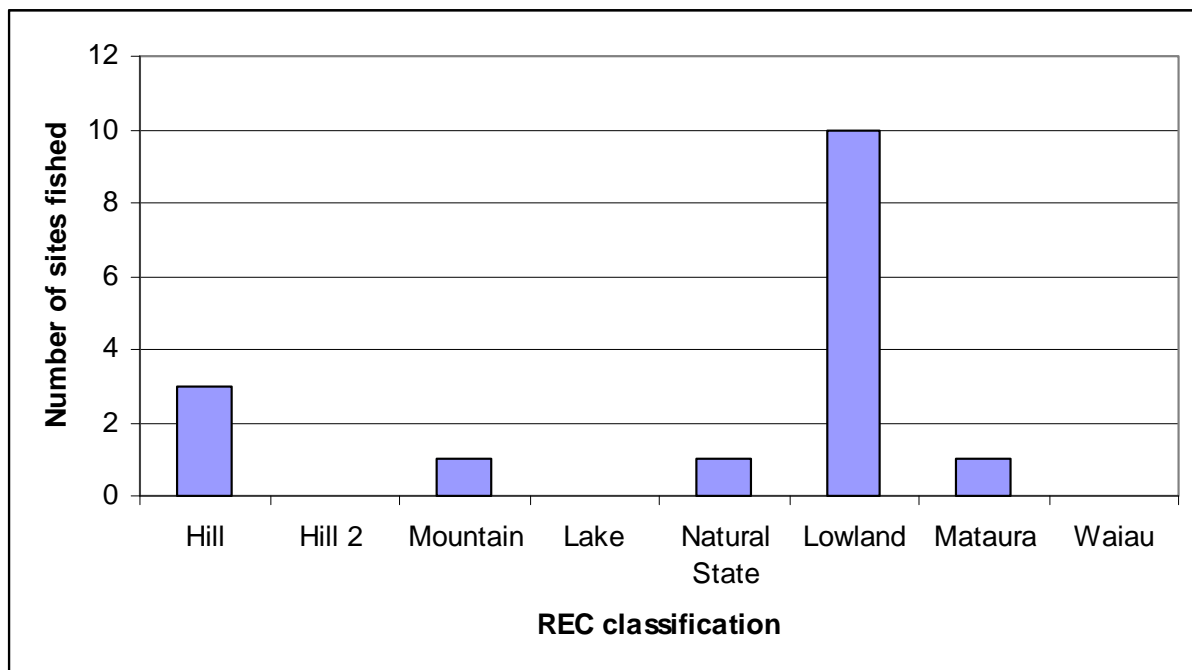


Figure 2: Number of sites fished in various water quantity management units

Environment Southland has sub-divided the surface water catchments of the region into 17 surface water management zones to help manage surface water allocation and quality.

Figure 3 shows the number of sites fished in each of the surface water zones. The majority of electric fishing in 2007/08 was performed on tributaries of Southland’s major river systems - the Oreti, Mataura and Aparima river catchments. Again, this reflects the increased pressure on these water resources and hence the need for fisheries information in these areas. Notwithstanding this, increased fishing effort should be directed towards streams in Environment Southland’s smaller surface water resource zones, such as the Waimatuku or coastal Longwoods, particularly in areas with low amounts of existing information.

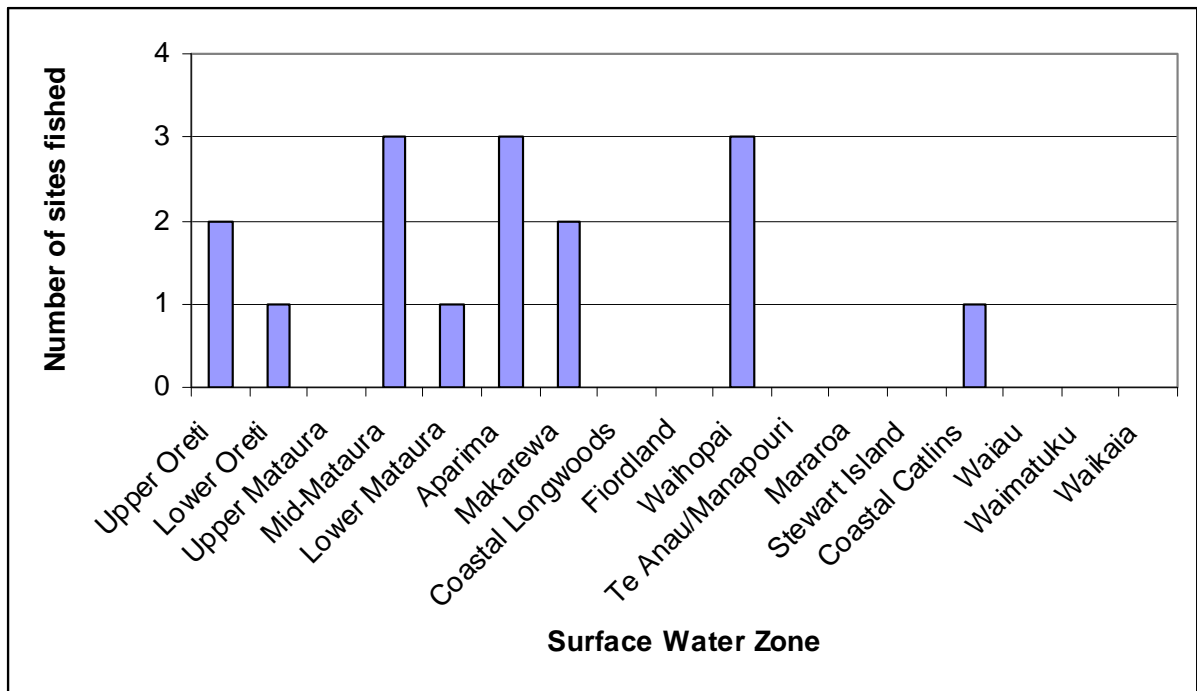


Figure 3: Number of sites fished in respective surface water zones

5. Results

A total of 13 fish species were recorded during the 2007/08 SoE fish survey. In addition to these species the freshwater crayfish, or koura, was also caught at several sites (Table 1).

Table 1: Species caught in the 2007/08 SoE fish survey

Common Name	Scientific Name
Longfin eel	<i>Anguilla dieffenbachii</i>
Shortfin eel	<i>Anguilla australis</i>
Lamprey	<i>Geotria australis</i>
Common bully	<i>Gobiomorphus cotidianus</i>
Redfin bully	<i>Gobiomorphus huttoni</i>
Upland bully	<i>Gobiomorphus breviceps</i>
Bluegill bully	<i>Gobiomorphus hubbsi</i>
Brown trout	<i>Salmo trutta</i>
Gollum galaxiid	<i>Galaxias gollumoides</i>
Southern flathead galaxiid	<i>Galaxias southern sp.</i>
Koaro	<i>Galaxias brevipinnis</i>
Inanga	<i>Galaxias maculatus</i>
Banded kokopu	<i>Galaxias fasciatus</i>
Freshwater crayfish (koura)	<i>Paranephrops zelandicus</i>

The most commonly caught fish species was the longfin eel, which was found at 12 of 16 sites (Figure 4). Brown trout were also well spread, recorded at 11 of 16 sites. Apart from common bully and koura, most of the other 10 recorded species were only recorded at one or two sampling sites.

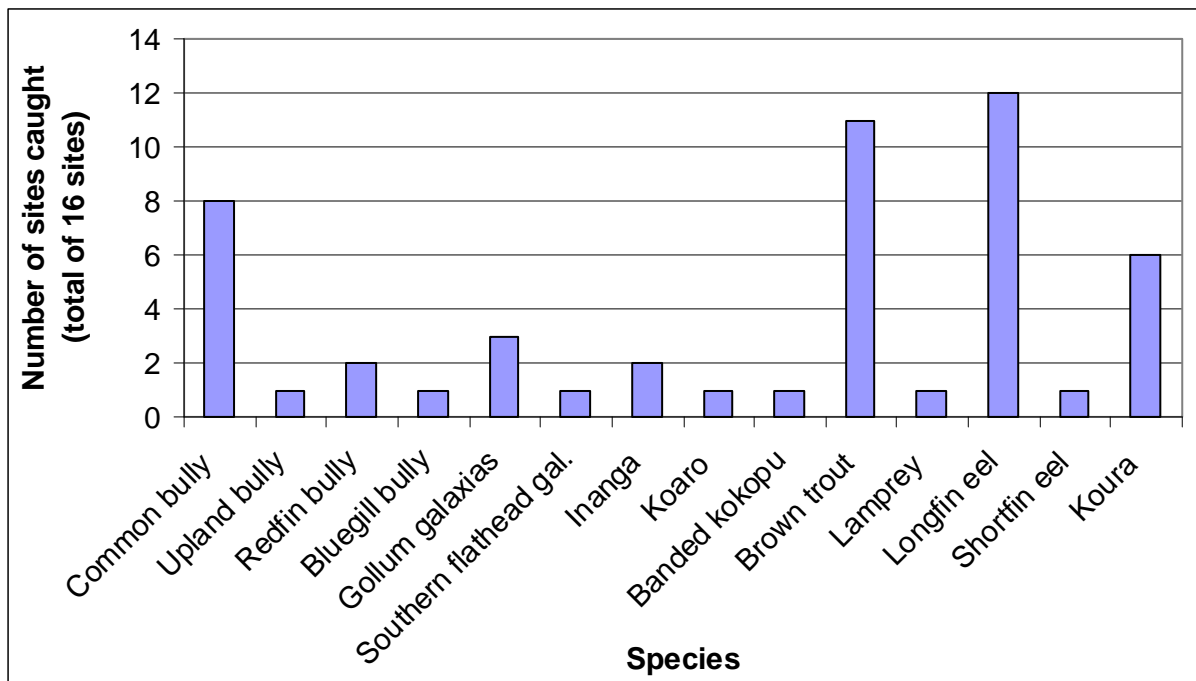


Figure 4: Total number of sites each fish species was caught

Table 2 summarises the relative abundance of each fish species population recorded at all of the 2007/08 SoE fish survey sites. Fish density (or relative fish abundance) was calculated by counting the number of fish caught per m² of river fished.

The highest fish density of any fish species occurred on the Oreti River at McKellars Flat Bridge. Juvenile and adult galaxiids, ranged in length from 20 to 105 mm at this site and had a relative abundance of four individuals per m² fished. This density was almost 10 times higher than that of any other fish species abundance at all other survey sites. Other high densities included 0.47 bully per m² fished at the Makarewa River at King Road site and 0.42 brown trout per m² fished on the Cromel Stream site. Longfin eel, which were well distributed throughout the survey sites, recorded a highest density of 0.28 fish per m² fished on the Waihopai River upstream of the Waihopai Dam.

Table 2: Relative abundance (no./m²) for 3 pass electric fishing. For spot fishing; p = present; a = abundant. LF = longfin eel; SF = shortfin eel; L = lamprey; G = galaxiid species; B = common and upland bully; RF = redfin bully; BB = bluegill bully; BK = banded kokopu; I = inanga; BT = brown trout; K = koura

Site No.	Description	Location	Area fished (m ²)	Relative fish abundance										
				LF	SF	L	G	B	RF	BB	BK	I	BT	K
1	Meadow Burn	Roundhill Road	120	0.008										
2	Oreti River	McKellars Flat	105	0.01			4.04						0.162	
3	Waikawa River	Biggar Road	180	0.239								0.006	0.022	
4	Makarewa River	King Road	150	0.02				0.467					0.013	0.013
5	Otapiri Stream	Otapiri Gorge	120	0.008									0.017	
6	Waituna Creek	Marshall Road	Spot					p				p		p
7	Cromel Stream	Selbie Road	120				0.067						0.417	
8	Oteramika Stream	Seaward Downs	45											
9	Cascade Stream	Pourakino Valley Road	180	0.061				0.172	0.006	0.017			0.033	0.017
10	Pourakino River	Pourakino Valley	240			0.004		0.083					0.146	0.009
11	Hamilton Burn	Goodall Road	90				0.056	0.133					0.044	
12	Moffat Creek	Moffat Road	Spot	p				a	p		p			
13	Waimea Stream	Mandeville	180	0.011				0.017						0.006
14	Dunsdale Stream	Dunsdale Reserve	210	0.029				0.005					0.081	
15	Winton Stream	Lochiel	180	0.039	0.006			0.006					0.006	
16	Waihopai River	u/s Waihopai Dam	180	0.28				0.139					0.006	

6. Site Descriptions

Aparima Water Resource Zone

Cascade Stream at Pourakino Valley Road



Figure 5: Cascade Stream at Pourakino Valley Road

The Cascade Stream is one of several catchments that drain the eastern slopes of the Longwoods Range. These catchments are very high yielding in terms of flow discharge per square kilometre of catchment. This is due to the very high annual precipitation recorded in the Longwoods Range. Logging of the catchment has occurred in the past and sustainable logging is still carried out today, particularly 1-2 km upstream of the survey site.

Environment Southland has undertaken monthly water quality sampling at this site since 2001 and has also carried out macroinvertebrate and periphyton monitoring each summer since 1996. Limited hydrological information is available for this catchment, excepting a small number of spot flow gaugings.

Two past fish surveys have been undertaken at this site on the Cascade Stream. A 1972 survey by the National Institute of Water and Atmospheric Research (NIWA) recorded the presence of brown trout and redfin bully. In 1997, a Cawthron Institute survey recorded longfin eel, shortfin eel, redfin bully, brown trout and freshwater crayfish.

Other records from the NZFF database for other Cascade Stream sites also identified giant kokopu and unidentified galaxiids.

This year's survey was undertaken in ideal low flow conditions in riffle/run habitat immediately upstream of the road bridge. Longfin eel, brown trout, bully, redfin bully, bluegill bully (Figure 6) and freshwater crayfish were all collected from this site. These six recorded species resulted in Cascade Stream having the greatest fish diversity of all sites sampled this summer.



Figure 6: Bluegill bully collected from the Cascade Stream at Pourakino Valley Road - note blue colour on gill membrane (circled)

Hamilton Burn at Goodall Road



Figure 7: Hamilton Burn at Goodall Road

The Hamilton Burn is a medium sized rain-fed stream that drains the eastern slopes of Mt Hamilton in the Takatimu Mountains. Apart from the slopes of Mt Hamilton, which are forested, the rest of the catchment is generally in tussock grasslands and pasture. The Hamilton Burn above the Goodall Road survey site is one of the few catchments in Southland that still retains its original meandering course over its floodplain.

At Goodall Road, Environment Southland monitors macroinvertebrate community composition and periphyton levels each summer. A rated water level recorder is located on the Hamilton Burn, approximately two kilometres further down the catchment, at Waterloo Road.

Several fish surveys have been carried out since 1979 in the Hamilton Burn and Braxton Burn catchments. These surveys were mainly undertaken by Fish and Game, the Department of Conservation (DOC) and NIWA. The most commonly caught species were upland bully, brown trout and longfin eel. Other species recorded in the Hamilton Burn include lamprey, freshwater crayfish, and unidentified galaxiid species.

This year's survey, in the reach upstream of the Goodall Road bridge was undertaken in low to below normal flows. Brown trout, bully and galaxiids were the only fish species recorded in the survey. The galaxiids caught at the site (Figure 8) were identified only to genus level in the NZFF database, but are most likely southern flatheads.



Figure 8: Galaxiid collected from the Hamilton Burn at Goodall Road

Pourakino River at Pourakino Valley



Figure 9: Pourakino River at Pourakino Valley

The Pourakino catchment is the largest catchment draining the eastern Longwoods Range.

The majority of the catchment consists of native forest and bush, however much of this has been cut over and exotic plantations now cover several square kilometres of catchment.

In recent years, Environment Southland has installed two water level recorders in the catchment. These recorders provide floodwarning information to adjacent landowners and also provide hydrological data for the Pourakino catchment. Macroinvertebrate and periphyton monitoring has been carried out each summer at Ermedale Road since 1996, whilst water quality sampling has occurred on a monthly basis too, since 1995.

A large number of fish species have been recorded in the Pourakino catchment over several surveys since 1972 that have been undertaken by NIWA, DoC and Fish and Game. Species present have included brown trout, longfin eel, shortfin eel, freshwater crayfish, gollum galaxiid (*Galaxias gollumoides*), inanga, unidentified bully and common bully.

Fishing was reasonably difficult in this reach due to the size of area fished (240 m²) and a number of small fish managing to avoid capture in the shallow stream margins by concealing themselves under the large cobble substrate.

Lamprey, bully, brown trout, longfin eel and freshwater crayfish were all recorded in the survey. This was the only site where lamprey were recorded in this year's SoE fish survey (Figure 10).



Figure 10: Lamprey collected from the Pourakino River at Pourakino Valley

Coastal Catlins Water Resource Zone

Waikawa River at Biggar Road



Figure 11: Waikawa River at Biggar Road

The Waikawa River catchment is a rain-fed system located on the south-eastern margin of the Southland region. This area has a rich saw-milling heritage and as such, large extents of the original forest cover have been logged over the last century. Land cleared of forest and scrub is now utilised as productive farmland. The lower reaches and tributaries of the Waikawa River and its estuary most likely provide significant rearing habitat for diadromous fish species.

Surface water monitoring at Biggar Road has been limited historically. However, in December 2007, a permanent water level recorder was installed at this site to provide hydrological information for the catchment. Monthly water quality sampling is undertaken 2 km further down the catchment at the Waikawa River at Progress Valley site. Each summer, macroinvertebrate and periphyton monitoring is also performed at this site.

Although no specific fish surveys have been undertaken at Biggar Road, a small number of surveys have been carried out on the Waikawa River and its tributaries in the past. These surveys date back to 1952 and have been carried out by a variety of organisations including Department of Conservation, Fish and Game New Zealand and the University of Otago. Fish species recorded as present in past surveys of the catchment include redfin bully, longfin eel, gollum galaxiid, giant kokopu, lamprey, brown trout and freshwater crayfish.

Three fish species were recorded from the fast flowing riffle habitat that was predominant within the sample reach. A single inanga was caught, along with four juvenile brown trout. 48 juvenile eel, measuring between 60 and 210 mm, were also collected.

Makarewa Water Resource Zone

Dunsdale Stream at Dunsdale Reserve



Figure 12: Dunsdale Stream at Dunsdale Reserve

The Dunsdale Stream is a picturesque rain-fed stream that drains the Hokonui Forest area of the Hokonui Hills. Above the Dunsdale Reserve sampling site, the catchment is mainly in native forest, although areas of this have been cut over in the past. The stream is relatively entrenched, with substrate generally grading from large gravels, to cobbles and in-situ bedrock.

Environment Southland has collected monthly water quality data from the Dunsdale Stream at the Dunsdale Reserve for more than 10 years and has also collected macroinvertebrate and periphyton data on an annual basis for several years. Hydrological data is limited to a number of spot flow gauging measurements at various points in the catchment.

Historical NZFF database entries for the Dunsdale Stream are limited to two surveys, one performed in 1973 and the other in 2005.

The 1973 fish survey was located at the Glencoe Highway, approximately 7 km downstream of the Dunsdale Reserve. This survey recorded the presence of eel, brown trout and common bully.

In 2005, a University of Otago fish survey at the Dunsdale Reserve sampling site determined brown trout as being present.

This survey recorded three fish species, these being brown trout, longfin eel and a single galaxiid (Figure 13). This galaxiid was only identified to genus level in the NZFF database, but is most likely a juvenile koaro or southern flathead. This is the first time that a non-migratory galaxiid has been identified in the Dunsdale Stream catchment.



Figure 13: Galaxiid collected from the Dunsdale Stream at Dunsdale Reserve

Makarewa River at King Road



Figure 14: Makarewa River at King Road

The Makarewa River at King Road site is located in the mid to upper reaches of the Makarewa catchment. The Makarewa River and its tributary streams mainly drain from the native forest of the Hokonui Hills. Above the King Road site, much of the forested area has been milled, with farming now occurring on the cleared rolling hill country.

Environment Southland has monitored the macroinvertebrate and periphyton community composition for nine years at this site, to help examine long-term water quality trends. Aside from this, limited water resource monitoring work has occurred in this part of the catchment.

No historical fish survey records exist for this site in the New Zealand Freshwater Fish database. However, records do exist of two fish surveys undertaken in 1981 by Fish and Game in the vicinity of the King Road site.

Lamprey, bully, brown trout, eel and freshwater crayfish were collected from the Lora Stream, a tributary of the Makarewa River, approximately 13 km upstream of the King Road site.

Lamprey, longfin eel, brown trout and freshwater crayfish were recorded from the Makarewa River at Scott Road, approximately 5 km downstream of the King Road site.

The present fish survey was undertaken in low flow conditions and there was an associated high percentage covering of periphyton over much of the substrate.

Brown trout, longfin eel and freshwater crayfish were recorded in relatively low numbers. Bullies were reasonably abundant throughout the sample reach, ranging in length from 15-60 mm.

Unlike the above mentioned surveys, lamprey were not recorded in this year's survey. This is most likely a factor of the substrate sampled at King Road, which was generally large gravels, cobbles and in-situ bedrock. Juvenile lamprey (ammocoete) generally prefer sandy or silty substrate in which they can burrow.

Otapiri Stream at Otapiri Gorge



Figure 15: Taylors Stream at Matthews Road spot fishing site (Note: This site is separate to the Otapiri Stream at Otapiri Gorge site entered into the NZFF database)

The Otapiri Stream is a relatively small rain-fed system, draining the north-western margins of the Hokonui Hills. The catchment above the monitoring site is predominantly in tussock grasslands, with areas of extensive farming. Occasional pockets of remnant native bush still exist in some side valleys. There are some wetland areas in the vicinity of Ben Callum Road and Scaldfield Creek. Through the Otapiri Gorge, the Otapiri Stream is hemmed in by the Hokonui Hills and flows over a bed of basement rock.

Environment Southland has collected a considerable amount of water resource information from the Otapiri Stream at the Otapiri Gorge. A rated flow recorder has been installed at this site for approximately 40 years, whilst water quality monitoring has been undertaken on a monthly basis since 2000. Macroinvertebrates and periphyton are sampled each summer, several kilometres further down the catchment, at Anderson Road.

No fish survey results have been recorded in the past for this particular site on the Otapiri Stream. However, fish species recorded both up and downstream in surveys by Fish and Game in the early 1980s and the University of Otago in 2005 included longfin eel, brown trout, freshwater crayfish, galaxiid species, upland bully and lamprey.

The present survey was undertaken in low to below normal flows in a reach where the stream flowed over embedded bedrock. Due to shading and water colour, it was reasonably difficult to see into the water column, which hampered the spotting of fish. Two brown trout and one longfin eel were recorded at this site. A spot fishing of the Taylors Stream at Matthews Road a couple of kilometres upstream of the Otapiri Gorge site was undertaken due to the small number of fish caught at the Otapiri Gorge site.

In addition to brown trout and longfin eel again being caught, upland bully were also collected.

Lower Maitara Water Resource Zone

Oteramika Stream at Seaward Downs



Figure 16: Oteramika Stream at Seaward Downs

The Oteramika Stream rises north of Edendale township as a series of small rain-fed drainage channels. The Oteramika receives a significant amount of groundwater input from the Edendale aquifer, particularly in the reach between Seaward Downs and the Maitara River confluence, as the Oteramika traverses the Edendale terrace.

Environment Southland formerly monitored flow discharge at the Seaward Downs site with a rated flow recorder. Water quality is still monitored on a monthly basis at the site, while macroinvertebrate sampling occurs annually each summer.

A number of past fishing surveys have been performed either at, or nearby the Seaward Downs sampling site. A 1996 NIWA survey recorded species such as gollum galaxiid, longfin eel, brown trout and upland bully in the Oteramika Stream or its tributaries.

The low flow and extensive weed growths limited the survey at this site to spot fishing a length of the Oteramika Stream for presence/absence of fish species. Although dairy cows were fenced off from the stream, one cow had broken through and was observed grazing the stream margins and had been defecating in and alongside the streambed. Despite fishing the stream for a good distance, no fish were caught, although two brown trout were observed.

When comparing the results from the present survey to those of 1996, it is concerning that fish species diversity has decreased from four species to one. This result could potentially be due to deteriorating water quality in the Oteramika catchment, or it may represent the fact that it was a relatively dry summer and the majority of the fish population had migrated downstream.

Mid Matura Water Resource Zone

Meadow Burn at Roundhill Road



Figure 17: Meadow Burn at Roundhill Road

The Meadow Burn is the largest of several contact springs that drain into the Mataura River near Riversdale and is approximately 10 km in length. The Meadow Burn is a significant brown trout spawning stream and also provides refuge for trout when the nearby Mataura River is at either end of its flow regime.

Environment Southland's surface water monitoring at this site involves annual macroinvertebrate and periphyton surveying. A water level recorder has also been operating at the site since 2003. A large amount of research, including concurrent gauging and piezometric surveys, has been carried out on the Meadow Burn spring to examine the significant surface and groundwater interactions that occur along its length.

This site was electric fished in the 2006/07 summer by Environment Southland. On that occasion, large adult brown trout and longfin eel were caught, as well as a single non-migratory galaxiid, possibly a gollum galaxiid.

A fish survey by the DOC on the upper reaches of the Meadow Burn (York Road) in 2004 identified longfin eel and gollum galaxiid as being present.

The 2007/08 survey recorded the presence of a solitary longfin eel. Rather than representing a decline in fish diversity and abundance in comparison with the previous two surveys, it reflects difficulty in setting the downstream stop-net due to the high water velocity. As the survey reach was being fished, large amounts of periphyton and macrophyte material were sloughed off the substrate and caught in the net. As a result, the downstream stop-net blew out consistently. This facilitated the escape of a number of longfin eel and trout that had been observed within the reach.

A spot survey of the Meadow Burn at York Road was undertaken to examine fish species distribution further up the catchment. There was very little flow at this site, but some deep pools were present. A large percentage covering of macrophytes dominated the water column. It appeared that the macrophyte beds had recently been sprayed, as they were browning off. No fish were caught, but a couple of small brown trout were observed.

Waimea Stream at Mandeville



Figure 18: Waimea Stream at Mandeville

The Waimea Stream drains from the Lintley Range, near Lumsden, before flowing for several kilometres across the Waimea Plains. The Waimea Stream formerly meandered in a very sinuous pattern across its floodplain. However, extensive straightening and deepening of the channel to increase drainage of surrounding farmland has resulted in many kilometres of river length being lost.

The Waimea Stream gains a considerable amount of flow along its length from groundwater inputs. It is thought this could be a contributing reason to the reasonably poor water quality often experienced in this stream. In dry summer periods, this problem can be exacerbated due to the higher component of groundwater and the reduced amount of rainfall sourced runoff. In some drier summers, small fish kills have been reported in the Waimea Stream.

A couple of dead bullies were noticed prior to sampling, indicating some pressure was on the fish population during this year's summer period. This potentially could be due to high water temperatures, extensive weed growth and reduced dissolved oxygen levels.

Environment Southland has a rated water level recorder at Mandeville. Monthly water quality sampling is undertaken at this site, as well as macroinvertebrate and periphyton monitoring each summer. A targeted water quality monitoring programme for the Waimea catchment has been undertaken over the last three years to help determine where surface water quality degradation is occurring.

No records exist in the NZFF database for the Waimea Stream at Mandeville. However, at sites further up the catchment, brown trout, gollum galaxiid, upland bully, freshwater crayfish and longfin eel were recorded in Fish and Game and DoC surveys undertaken in 1980 and 2004 respectively.

The present fish survey was hampered by the very low stream flows and the large amounts of macrophyte in the water column and periphyton on the substrate. The reach surveyed was mainly a slow flowing pool, with a small percentage of run and riffle located at the bottom of the reach. The hydraulic characteristics of the selected site generally did not provide for an efficient and effective electric fishing sample.

Few fish were collected during the survey. Three bullies were recorded, along with two juvenile longfin eel. A freshwater crayfish was also recorded.

Lower Oreti Water Resource Zone

Winton Stream at Lochiel



Figure 19: Winton Stream at Lochiel

The Winton Stream originates in the Hokonui Hills, east of Dipton. The Winton Stream is constrained by the steeply rolling hill country of the Hokonui Hills, before opening out on the Oreti Plains, which the stream traverses for several kilometres. The Winton Stream flows parallel to the Oreti River before joining the Oreti near Lochiel.

A large flood retention dam is located in the mid to upper reaches off the Winton Stream to hold back high river levels from flooding low lying land downstream. Large lengths of the Winton Stream have been

channelised and straightened to improve drainage of surrounding farmland, resulting in a greatly modified stream channel and kilometres of river being lost.

Upstream of Matthews Road, towards the head of the catchment, the stream drops over the 25 metre high Winton Falls – a barrier to upstream fish migration.

Environment Southland undertakes monthly water quality and annual macroinvertebrate and periphyton monitoring at the Lochiel site to provide information on water quality trends in the Winton Stream catchment.

Very limited fishery data is available for the Winton Stream catchment. The NZFF database has a record of a survey undertaken in 1964 by NIWA at Winton and a second survey carried out at Kauana Road in 1993 by Fish and Game. Fish species recorded as present in the catchment include redfin bully, upland bully, inanga, brown trout and longfin eel.

The SoE fish survey was undertaken during a low flow period in the catchment. The habitat sampled was representative of typical run and riffle habitat with a small percentage of pool habitat. Very few fish were caught over the three electric fishing passes of the survey reach, but composed of four different species; longfin eel, shortfin eel, brown trout and bully. The shortfin eel caught in the Winton Stream was the sole shortfin eel caught during the entire SoE fish survey.

Upper Oreti Water Resource Zone

Cromel Stream at Selbie Road



Figure 20: Cromel Stream at Selbie Road

The Cromel Stream originates from the Helen Peaks area of the Eyre Mountain Conservation Park. Upstream of the Selbie Road site, the Cromel catchment consists mainly of alpine and snow tussock vegetation above the snowline, while largely untouched stands of beech forest dominate the lower lying catchment areas. At the Selbie Road survey site, the Cromel Stream leaves the forested catchment and flows for several kilometres across the thick gravel measures of the Five Rivers Basin. Downstream of the Selbie Road bridge, the catchment vegetation is dominated by pasture grasslands and sheep and beef farming is commonly practiced. It is in this lower reach that the Cromel Stream loses much of its flow to groundwater. In 2007, the invasive alga *Didymosphenia geminata* (didymo) was discovered in the Cromel Stream. The uppermost extent of the didymo distribution is believed to be currently downstream of the reach fished in this years survey.

Monthly water quality measurements have been taken on the Cromel Stream at Selbie Road since 2000, while spot measurements date back to 1996. Macroinvertebrate monitoring is also undertaken on an annual basis at this site to further help understand long-term water quality trends. Since 2002, a number of flow gaugings have been performed at Selbie Road to help understand the water balance of the Cromel Stream and help examine the significant surface water and groundwater interactions that occur in its lower reaches.

In 2005, DOC survey recorded the presence of a galaxiid species and brown trout at Selbie Road. A 2007 DOC survey 3 km below the Mossburn-Five Rivers Highway recorded brown trout, upland bully and galaxiid species as present.

The present survey was undertaken in low to normal flow conditions, downstream of the Selbie Road bridge. A deep, high velocity run was located in the survey reach and the substrate generally consisted of cobbles, large gravels and some boulders. Juvenile brown trout were abundant throughout the reach, while several koaro were also caught (Figure 21). This site was one of the few survey sites this year that did not yield any longfin eel, which was most likely due to the high velocities in the survey reach.



Figure 21: Koaro collected from the Cromel Stream at Selbie Road

Oreti River at McKellars Flat



Figure 22: Oreti River at McKellars Flat

The Oreti River at McKellars Flat site is located in the upper reaches of the Oreti catchment. The catchment headwaters drain the alpine environment of the Thomson Mountains, before flowing through native forest upstream of McKellars Flat. Agricultural activity above the fishing site is restricted to grazing of cattle on the tussock and grass pastures of McKellars Flat.

Environment Southland monitoring is limited at this site to annual surveying of the macroinvertebrate and periphyton communities. Formerly, a rated water level recorder site existed at the McKellars Flat Bridge from 1977 to 1986.

A small number of electric fishing surveys have been undertaken in the vicinity of the McKellars Flat bridge in the last 25-30 years.

In 1981, longfin eel, upland bully, galaxiid species and brown trout were recorded by Fish and Game, while in 2005 a DOC survey identified upland bully, galaxiid species and brown trout. A DOC survey in 2007 also recorded brown trout, upland bully and galaxiid species, whilst further delineating some galaxiid species as alpine galaxiids and gollum galaxiids.

This year's survey recorded a small population of juvenile brown trout, a singular juvenile longfin eel and a very large number of both juvenile and adult galaxiids (Figure 23).

The galaxiid population at this site recorded the highest density of any fish species recorded at all of the sites, with four galaxiids recorded per m² fished.

Interestingly, for the first time, no upland bully were recorded at this site during this years survey, even though they had been recorded in all of the past surveys at or near this site.



Figure 23: Unidentified galaxiids collected from the Oreti River at McKellars Flat

Waihopai Water Resource Zone

Moffat Creek at Moffat Road



Figure 24: Moffat Creek at Moffat Road

Moffat Creek is one of the largest tributary streams draining into the Waituna Lagoon. Accordingly, it has been recognised as a particularly important rearing ground for a number of native species. The sampling site at Moffat Road is located approximately 2 km upstream of Moffat Creek's confluence with the Waituna Lagoon. Much of the catchment is still in original wetland, but increasing encroachment of intensive land-use development, particularly dairying, is occurring in the catchment.

Since 2001, Environment Southland has undertaken monthly water quality monitoring of Moffat Creek at the Moffat Road site. In 2007, a temporary water level recorder was installed at this site to gain information on the flow regime of the Moffat Creek catchment.

Past electric fishing results in the NZFF database for Moffat Creek are limited to a 1984 Fish and Game survey.

This survey recorded the presence of five native species, these being giant kokopu, inanga, redfin bully, common bully, and longfin eel.

Due to the very low flows and extensive macrophytic weed growth at the time of surveying, conventional three-pass electric fishing was not feasible at the Moffat Road site. Instead, spot sampling for presence/absence of species was performed in areas where stunned fish could be collected relatively easily.

Despite the aesthetically poor state of Moffat Creek, four native fish species were recorded during the survey, whilst brown trout were observed but not captured. A singular redfin bully, longfin eel and banded kokopu (Figure 25) were recorded whereas large numbers of common bully were captured. Only a portion of the common bully that were stunned were captured. This was due to the sheer number of bullies present and the difficulties involved in capturing them in the weedy conditions.



Figure 25: Banded kokopu collected from the Moffat Creek at Moffat Road

Waihopai River u/s Waihopai Dam



Figure 26: Waihopai River u/s Waihopai Dam

The Waihopai River and its tributaries have been greatly modified over the years. Formerly a sinuous stream that meandered across its floodplain, the Waihopai River now flows through straightened channels and is constrained between flood banks, especially in its lower reaches. Immediately downstream of the survey reach, a flood retention dam has been built to help hold back large flow events from flooding low lying residential and suburban areas of Invercargill city.

Original land cover in the Waihopai catchment most likely consisted of large wetland and bog areas, as well as large stands of native bush. This has largely been drained and cleared to produce the productive farmland seen today.

Numerous water resource monitoring programmes are managed by Environment Southland on the Waihopai River catchment. These include catchment scale sized studies, such as the Waihopai Living Streams project. A rated water level recorder is located on the Waihopai River at Kennington approximately 7 km upstream of the fish survey site. Downstream of the fish survey site, monthly water quality sampling is undertaken upstream of Queens Drive. Annual sampling of macroinvertebrates and periphyton is also undertaken upstream of Queens Drive and at the Waihopai Dam.

Historical entries into the NZFF database for the Waihopai River have been limited to surveys undertaken by Fish and Game in 1985 and DoC in 2001. A number of fish species have been recorded including longfin eel, inanga, banded kokopu, upland bully and brown trout.

The survey this year was carried out in a low flow period and there were areas of substantial periphyton growth within the survey reach.

One juvenile brown trout was recorded, while bullies were reasonably common in the survey reach. A total of 50 juvenile longfin eel (length range 80-480mm) were counted and measured over the three passes of the reach.

Waituna Creek at Marshall Road



Figure 27: Waituna Creek at Marshall Road

Waituna Creek is the largest of the streams that drain into Waituna Lagoon. Flowing into the western end of the lagoon, Waituna Creek has significant fishery values. It provides breeding grounds for an array of native fish species and is also an important trout spawning stream. The upper reaches of Waituna Creek extend close to Morton Mains and in this area the natural catchment drainage patterns have been modified by channel straightening and tile drainage. In the lower reaches, there is concern that the wetland and peat bog areas that feed into Waituna Creek are coming under increasing pressure from land-use development.

Environment Southland formerly operated a rated water level recorder at Marshall Road between 2001 and 2007. This site has since been decommissioned, however flow discharge at Marshall Road is now estimated by modelling the flow correlation relationship with the Waihopai River at Kennington. Monthly water quality monitoring has occurred at Marshall Road since 1995, while macroinvertebrate and periphyton monitoring has also been performed since 1996.

A number of surveys have been undertaken on the Waituna catchment in the past, particularly by Fish and Game in the mid 1980s, although no records for Marshall Road exist on the New Zealand Freshwater Fish database. Species listed as present in the Waituna system include common bully, redfin bully, giant kokopu, lamprey, brown trout, longfin eel, shortfin eel, inanga, black flounder, smelt and freshwater crayfish.

Due to the low flows of the Waituna Creek and high level of weed growth in the stream, upstream and downstream stop-nets were unable to be effectively deployed. As a result, the fish survey at this site was limited to spot fishing for presence/absence of fish species.

Collected fish species were inanga, bully and freshwater crayfish. All species were present in very low numbers. Interestingly, two relatively common species, longfin eel and brown trout, were not observed at this site, even though both species have been recorded upstream and downstream of Marshall Road in historical surveys.

The lack of fish species diversity and general fish abundance at this site is concerning. This result could potentially be due to deterioration in water quality in the Waituna catchment, or it may represent the fact that it was a relatively dry summer and the majority of the fish population had migrated downstream to areas of increased flow and lower water temperatures.

7. Discussion

The 2007/08 SoE fish monitoring programme has been useful in producing new or updated fishery information for various Southland rivers and streams. Some of the sites fished had no previous entries in the NZFF database, so this data will act as a baseline of what fish species might generally be found at a specific site at a similar time of the year.

A small number of fish species were recorded in rivers and streams where there was no past record of them existing in those catchments in NZFF database records. For example, bluegill bully had not been identified in the Cascade Stream catchment, despite several historical site surveys. No records existed of any galaxiids in the Dunsdale Stream catchment until the survey this summer. Likewise, the capture of a shortfin eel in the Winton Stream is a new addition to the list of species previously recorded in the database.

The Cascade Stream and Pourakino sampling sites, both draining the eastern flanks of the Longwoods Range, had reasonably diverse fish species composition. These sites also produced two of the rarer finds in the fish survey this year, with bluegill bully recorded in the Cascade Stream as mentioned before and a lamprey from the Pourakino River.

The upper Oreti River at McKellars Flat produced the highest densities of fish, as a result of the very large juvenile and adult galaxiid population in the survey reach. Interestingly, no upland bully were caught in this survey, even though they had been caught in each previous survey in this area.

Results obtained from this summer's monitoring indicate a small number of sites should be resurveyed to identify the potential causes of a lack of fish species or very low fish numbers when compared against historical records.

The Southland region as a whole experienced relatively dry conditions over the summer and early autumn period. The resultant low flow conditions in some streams may have impacted on fish community composition at some sites and seen some fish species migrate further downstream.

The Oteramika Stream at Seaward Downs recorded no fish species, whereas several fish species have been recorded from the same stream at a similar time of year in past surveys. A re-survey of the reach should be undertaken when flows are higher to see whether fish have moved back into the survey reach.

The Waituna Creek at Marshall Road site also recorded relatively few fish species and fish abundance was very low. Flow in the creek was very low and macrophytes were abundant. Another survey at higher flows may determine whether the lack of fish was a flow related phenomenon or a result of water quality degradation in the catchment.

The Waimea Stream at Mandeville site also recorded a limited fish species diversity and very low fish numbers in general. A more diverse and abundant fish community was expected, notwithstanding the site location not being overly conducive to effective electric fishing. The Waimea Stream has in the past had water quality issues, with some minor fish kills reported in drier summer periods. Some dead bullies were noticed lying on the streambed before the commencement of this year's survey.

A survey of the fish population at several points along the length of the Waimea Stream may help delineate where in the catchment deteriorating water quality begins to have a detrimental effect on fish community assemblages.

This year's monitoring has highlighted some points that should be addressed in order for more usable and robust fishery data to be obtained.

Although providing useful information, the format of the 2007/08 SoE fish survey programme will most likely be adjusted in upcoming years. The present sampling format attempts to sample a number of rivers across the region and add further to flow, water quality or macroinvertebrate information collected at each site. Unfortunately, this approach allows only one or two sites within a catchment to be sampled a year. Also selecting sites with flow, water quality or macroinvertebrate information generally results in larger streams being fished. Electric fishing is an efficient tool, but this efficiency decreases when stream width and depth increases. Therefore electric-fishing larger areas of water, such as fished at some survey sites this year, can result in larger margins of error and data can only be used for presence/absence of species.

A more targeted survey of individual catchments would provide detailed information of fish species distribution and fish community composition within catchments. This data would be crucial for water resource managers, particularly when making catchment scale water resource decisions, such as the setting of an ecological flow and managing water allocation.

A small number of catchments should be surveyed longitudinally each summer, with these catchments being resampled on a revolving basis. Where possible, these surveys should tie in with other focus studies, such as the Waihopai Living Streams project.

It would also be beneficial to survey additional sites outside of the chosen catchments for a given year. These sites would be selected to fill in gaps in the NZFF database, or where there was concern with water quality.

8. Recommendations

- Widen scope of fish monitoring programme to:
 - ◆ continue regional scale SoE fish monitoring at several sites;
 - ◆ conduct focussed catchment scale fishery investigations.
- Re-survey the Oteramika Stream at Seaward Downs and Waituna Creek at Marshall Road sites at different times of the year or at higher flows to further examine the low fish species diversity and abundance observed in the 2007/08 SoE fish survey.
- Conduct a survey of fish populations along the length of the Waimea Stream to examine the effect of declining water quality within the catchment.
- Consider alternative fishing methods (spot lighting, minnow traps, fyke netting) at sites where electric fishing is impracticable.
- Core staff should attend fish identification courses, particularly to help enable full identification of galaxiid species.

9. Acknowledgements

The 2007/08 SoE fish monitoring programme could not have been undertaken (or completed), if not for the contribution of a number of people. Hence, I would like to thank the following for their assistance with the running of this programme:

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In addition, I would also like to thank Kirsten Meijer and Chris Arbuckle for their review and comments on the draft version of this report.

10. References

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Appendix 1: NZ Freshwater Fish Database site forms

Meadow Burn at Roundhill Road

FRESHWATER FISH DATABASE FORM								1	
Date	04/04/2008		River/Lake system Mataura River				Catchment number	775.630	
Time	1130		Sampling locality Meadow Burn u/s Mataura River confluence						
Observer	sal		Access				Altitude (m)		
Organisation	envs		NZMS 260 Map no. f45		Coord. 2185400 5464200		Distance inland (km)		
Fishing method	nfc		Area fished (m ²) or no. nets used 120		Number of electric fishing passes 3		Tidal water n		
HABITAT DATA									
Water	Colour u			Clarity c			Temp.		pH
	Average width (m) 4.0		Average depth (m) 0.3		Maximum depth (m)		Conductivity		
Habitat type (%)	Still 0	Backwater 0	Pool 0	Run 70	Riffle 30	Rapid 0	Casc. 0		
Substrate type (%)	Mud 20	Sand 30	Fine gravel 30	Coarse gravel 20	Cobble 0	Boulder 0	Bed-rock 0		
Fish cover (yh)	Macrophyte y	Instream debris n	Undercut bank n	Bank veg. y					
Catchment vegetation (%)	Native forest 0	Exotic forest 0	Farm 100	Urban zone 0	Scrub 0	Swamp land 0	Other 0		
Riparian vegetation (%)	Native forest 0	Exotic forest 0	Grass tussock 100	Exposed bed 0	Scrub willow 0	Raupo flax 0	Other 0		
Type of river/stream/lake									
Water level n			Downstream barrier n			Pollution l			
Large invertebrate fauna		Koura			Paratya		Freshwater mussel		
Bottom fauna abundance u			Predominant species group			Permanent water y			
FISH DATA									
Species				Abundance		Length		Habitat/Comments	
Anguilla dieffenbachii Longfin eel				1 (o)		200			
Comments Cows had been grazing along margins									

Oreti River at McKellars Flat

FRESHWATER FISH DATABASE FORM						2	
Date	19/02/2008	River/Lake system Oreti River				Catchment number	786.000
Time	1215	Sampling locality McKellars Flat Bridge					
Observer	sal	Access				Altitude (m)	
Organisation	env s	NZMS 260 Map no.	e42	Coord. 2134516 5531255		Distance inland (km)	
Fishing method	nfc	Area fished (m ²) or no. nets used	105	Number of electric fishing passes	3	Tidal water n	
HABITAT DATA							
Water	Colour			u	Clarity		c
	Average width (m)	3.5	Average depth (m)	0.2	Maximum depth (m)		Conductivity
Habitat type (%)	Still	0	Back-water	0	Pool	0	Run
Substrate type (%)	Mud	0	Sand	0	Fine gravel	0	Coarse gravel
Fish cover (yr)	Macrophyte	n	Instream debris	n	Undercut bank	n	Bark veg.
Catchment vegetation (%)	Native forest		Exotic forest		Farm		Urban zone
Riparian vegetation (%)	Native forest	0	Exotic forest	0	Grass tussock	100	Exposed bed
Type of river/stream/lake							
Water level			I	Downstream barrier			n
Large invertebrate fauna			Koura		Paratya		Freshwater mussel
Bottom fauna abundance			u	Predominant species group			Permanent water y
FISH DATA							
Species				Abundance	Length	Habitat/Comments	
Anguilla dieffenbachii				Longfin eel	1	350	
Salmo trutta				Brown trout	17	65-100	
Galaxias				Galaxiid	425 (a)	20-105	
Comments Very abundant galaxiid population							

Waikawa River at Biggar Road

FRESHWATER FISH DATABASE FORM						3	
Date	18/02/2008		River/Lake system Waikawa River			Catchment number 766.000	
Time	0915		Sampling locality Biggar Road				
Observer	sal		Access			Altitude (m)	
Organisation	env s		NZMS 260 Map no. g47	Coord. 2213800 5398300		Distance inland (km)	
Fishing method	nfc		Area fished (m ²) or no. nets used 180	Number of electric fishing passes 3		Tidal water n	
HABITAT DATA							
Water	Colour t			Clarity c		Temp.	pH
	Average width (m) 6.0	Average depth (m) 0.4		Maximum depth (m)		Conductivity	
Habitat type (%)	Still 0	Back-water 0	Pool 0	Run 60	Riffle 40	Rapid 0	Casc. 0
Substrate type (%)	Mud 0	Sand 0	Fine gravel 0	Coarse gravel 80	Cobble 20	Boulder 0	Bed-rock 0
Fish cover (yr)	Macrophyte	Instream debris	Undercut bank	Bark veg.			
Catchment vegetation (%)	Native forest 40	Exotic forest 0	Farm 50	Urban zone 0	Scrub 0	Swamp land 10	Other 0
Riparian vegetation (%)	Native forest 0	Exotic forest 0	Grass tussock 95	Exposed bed 0	Scrub willow 5	Raupo flax 0	Other 0
Type of river/stream/lake							
Water level n			Downstream barrier n			Pollution l	
Large invertebrate fauna		Koura		Paratya		Freshwater mussel	
Bottom fauna abundance u			Predominant species group			Permanent water y	
FISH DATA							
Species				Abundance	Length	Habitat/Comments	
Salmo trutta		Brown trout		4	65-95		
Galaxias maculatus		Inanga		1	55		
Anguilla dieffenbachii		Longfin eel		43 (a)	60-210		
Comments							

Makarewa River at King Road

FRESHWATER FISH DATABASE FORM						4	
Date	03/04/2008		River/Lake system Oreti River			Catchment number 786.120	
Time	1120		Sampling locality Makarewa River at King Road				
Observer	sal		Access			Altitude (m)	
Organisation	env s		NZMS 260 Map no. e45	Coord. 2161400 5446300		Distance inland (km)	
Fishing method	nfc		Area fished (m ²) or no. nets used 150	Number of electric fishing passes 3		Tidal water n	
HABITAT DATA							
Water	Colour u			Clarity c		Temp.	pH
	Average width (m) 5.0	Average depth (m) 0.2		Maximum depth (m)		Conductivity	
Habitat type (%)	Still 0	Back-water 0	Pool 0	Run 50	Riffle 50	Rapid 0	Casc. 0
Substrate type (%)	Mud 0	Sand 0	Fine gravel 0	Coarse gravel 45	Cobble 45	Boulder 0	Bed-rock 10
Fish cover (yr)	Macrophyte	Instream debris	Undercut bank	Bark veg.			
Catchment vegetation (%)	Native forest	Exotic forest	Farm	Urban zone	Scrub	Swamp land	Other
Riparian vegetation (%)	Native forest 0	Exotic forest 0	Grass tussock 95	Exposed bed 0	Scrub willow 5	Raupo flax 0	Other 0
Type of river/stream/lake							
Water level n			Downstream barrier n			Pollution l	
Large invertebrate fauna		Koura o		Paratya		Freshwater mussel	
Bottom fauna abundance u			Predominant species group			Permanent water y	
FISH DATA							
Species				Abundance	Length	Habitat/Comments	
Salmo trutta		Brown trout		2	125-130		
Gobiomorphus		Bullies		70 (a)	15-60		
Anguilla dieffenbachii		Longfin eel		3 (o)	110-110		
Paranephrops		Koura		2	25-35		
Comments							

Otapiri Stream at Otapiri Gorge

FRESHWATER FISH DATABASE FORM										5	
Date	03/04/2008		River/Lake system Oreti River					Catchment number		786.128	
Time	1000		Sampling locality Otapiri Stream at Otapiri Gorge								
Observer	sal		Access					Altitude (m)			
Organisation	env s		NZMS 260 Map no. e45		Coord. 2158200 5457800			Distance inland (km)			
Fishing method	nfc		Area fished (m ²) or no. nets used 120		Number of electric fishing passes 3			Tidal water n			
HABITAT DATA											
Water	Colour u			Clarity c			Temp.		pH		
	Average width (m) 4.0		Average depth (m) 0.4		Maximum depth (m)			Conductivity			
Habitat type (%)	Still 0	Back-water 0	Pool 10		Run 50	Riffle 40	Rapid 0	Casc. 0			
Substrate type (%)	Mud 0	Sand 0	Fine gravel 0	Coarse gravel 15	Cobble 30		Boulder 30	Bed-rock 25			
Fish cover (y/n)	Macrophyte n	Instream debris n	Undercut bank y	Bark veg. n							
Catchment vegetation (%)	Native forest	Exotic forest	Farm	Urban zone	Scrub	Swamp land	Other				
Riparian vegetation (%)	Native forest 0	Exotic forest 0	Grass tussock 30	Exposed bed 0	Scrub willow 70	Raupo flax 0	Other 0				
Type of river/stream/lake											
Water level n			Downstream barrier n			Pollution l					
Large invertebrate fauna			Koura			Paratya			Freshwater mussel		
Bottom fauna abundance u			Predominant species group				Permanent water y				
FISH DATA											
Species				Abundance		Length		Habitat/Comments			
Salmo trutta		Brown trout		2		245-330					
Anguilla dieffenbachii		Longfin eel		1		270					
Comments											

Waituna Creek at Marshall Road

FRESHWATER FISH DATABASE FORM						6	
Date	18/02/2008		River/Lake system Waituna Lagoon			Catchment number 776.010	
Time	1230		Sampling locality Waituna Creek at Marshall Road				
Observer	sal		Access			Altitude (m)	
Organisation	env s		NZMS 260 Map no. e47		Coord. 2167900 5400500		Distance inland (km)
Fishing method	efp		Area fished (m ²) or no. nets used		Number of electric fishing passes 3		Tidal water n
HABITAT DATA							
Water	Colour t			Clarity c		Temp.	pH
	Average width (m)		Average depth (m)		Maximum depth (m)		Conductivity
Habitat type (%)	Still	Back-water	Pool	Run	Riffle	Rapid	Casc.
Substrate type (%)	Mud 35	Sand 0	Fine gravel 55	Coarse gravel 10	Cobble 0	Boulder 0	Bed-rock 0
Fish cover (y/n)	Macrophyte y	Instream debris n	Undercut bank y	Bank veg. y			
Catchment vegetation (%)	Native forest 0	Exotic forest 0	Farm 55	Urban zone 0	Scrub 0	Swamp land 45	Other 0
Riparian vegetation (%)	Native forest 0	Exotic forest 0	Grass tussock 100	Exposed bed 0	Scrub willow 0	Raupo flax 0	Other 0
Type of river/stream/lake							
Water level			I	Downstream barrier		n	Pollution I
Large invertebrate fauna		Koura o			Paratya		Freshwater mussel
Bottom fauna abundance			u	Predominant species group			Permanent water y
FISH DATA							
Species				Abundance	Length	Habitat/Comments	
Paranephrops Koura				1	100		
Galaxias maculatus Inanga				2	45-45		
Gobiomorphus Bullies				4	30-60		
Comments							

Cromel Stream at Selbie Road

FRESHWATER FISH DATABASE FORM						7	
Date	19/02/2008		River/Lake system Oreti River			Catchment number 786.901	
Time	0800		Sampling locality Cromel Stream at Selbie Road Bridge				
Observer	sal		Access			Altitude (m)	
Organisation	env s		NZMS 260 Map no. e43	Coord. 2148986 5503858		Distance inland (km)	
Fishing method	nfc		Area fished (m ²) or no. nets used 120	Number of electric fishing passes 3		Tidal water n	
HABITAT DATA							
Water	Colour u			Clarity c		Temp.	pH
	Average width (m) 4.0	Average depth (m) 0.4		Maximum depth (m)		Conductivity	
Habitat type (%)	Still 0	Back-water 0	Pool 0	Run 60	Riffle 40	Rapid 0	Casc. 0
Substrate type (%)	Mud	Sand	Fine gravel	Coarse gravel	Cobble	Boulder	Bed-rock
Fish cover (y/n)	Macrophyte n	Instream debris n	Undercut bank n	Bank veg. n			
Catchment vegetation (%)	Native forest 99	Exotic forest 0	Farm 1	Urban zone 0	Scrub 0	Swamp land 0	Other 0
Riparian vegetation (%)	Native forest 5	Exotic forest 0	Grass tussock 95	Exposed bed 0	Scrub willow 0	Raupo flax 0	Other 0
Type of river/stream/lake							
Water level n		Downstream barrier n			Pollution n		
Large invertebrate fauna			Koura		Paratya		Freshwater mussel
Bottom fauna abundance u			Predominant species group			Permanent water y	
FISH DATA							
Species				Abundance	Length	Habitat/Comments	
Salmo trutta		Brown trout		50	55-150		
Galaxias brevipinnis		Koaro		8	65-100		
Comments							

Oteramika Stream at Seaward Downs

FRESHWATER FISH DATABASE FORM						8	
Date	04/04/2008		River/Lake system Mataura River			Catchment number 775.080	
Time	0930		Sampling locality Oteramika Stream at Seaward Downs				
Observer	sal		Access			Altitude (m)	
Organisation	env s		NZMS 260 Map no.	f46	Coord. 2183400 5416300		Distance inland (km)
Fishing method	nfc		Area fished (m ²) or no. nets used	45	Number of electric fishing passes	2	Tidal water n
HABITAT DATA							
Water	Colour			u	Clarity		c
	Average width (m)		1.5	Average depth (m)	0.2	Conductivity	
Habitat type (%)	Still	Back-water	Pool	Run	Riffle	Rapid	Casc.
Substrate type (%)	Mud	Sand	Fine gravel	Coarse gravel	Cobble	Boulder	Bed-rock
Fish cover (y/n)	Macrophyte	y	Instream debris	n	Undercut bank	n	Bark veg.
Catchment vegetation (%)	Native forest	0	Exotic forest	0	Farm	100	Urban zone
Riparian vegetation (%)	Native forest	0	Exotic forest	0	Grass tussock	100	Exposed bed
Type of river/stream/lake							
Water level			l	Downstream barrier		n	Pollution
Large invertebrate fauna		Koura			Paratya		Freshwater mussel
Bottom fauna abundance			u	Predominant species group			Permanent water
FISH DATA							
Species				Abundance	Length	Habitat/Comments	
Comments Two brown trout observed, not caught							

Cascade Stream at Pourakino Valley Road

FRESHWATER FISH DATABASE FORM						9	
Date	22/02/2008		River/Lake system Aparima River			Catchment number 789.054	
Time	0815		Sampling locality Cascade Stream at Pourakino Valley Road				
Observer	sal		Access			Altitude (m)	
Organisation	env s		NZMS 260 Map no. d46	Coord. 2119500 5427800		Distance inland (km)	
Fishing method	nfc		Area fished (m ²) or no. nets used 180	Number of electric fishing passes 3		Tidal water n	
HABITAT DATA							
Water	Colour t			Clarity c		Temp.	pH
	Average width (m) 6.0	Average depth (m) 0.3		Maximum depth (m)		Conductivity	
Habitat type (%)	Still 0	Back-water 0	Pool 0	Run 20	Riffle 80	Rapid 0	Casc. 0
Substrate type (%)	Mud 0	Sand 0	Fine gravel 0	Coarse gravel 60	Cobble 40	Boulder 0	Bed-rock 0
Fish cover (y/n)	Macrophyte n	Instream debris y	Undercut bank y	Bark veg. n			
Catchment vegetation (%)	Native forest 90	Exotic forest 0	Farm 0	Urban zone 0	Scrub 10	Swamp land 0	Other 0
Riparian vegetation (%)	Native forest 100	Exotic forest 0	Grass tussock 0	Exposed bed 0	Scrub willow 0	Raupo flax 0	Other 0
Type of river/stream/lake							
Water level l			Downstream barrier n			Pollution n	
Large invertebrate fauna		Koura o		Paratya		Freshwater mussel	
Bottom fauna abundance u			Predominant species group			Permanent water y	
FISH DATA							
Species			Abundance	Length	Habitat/Comments		
Anguilla dieffenbachii Longfin eel			11	105-730			
Salmo trutta Brown trout			6	65-135			
Gobiomorphus Bullies			31	40-85			
Gobiomorphus huttoni Redfin bully			1	75			
Gobiomorphus hubbsi Bluegill bully			3	85-95			
Paranephrops Koura			3	60-95			
Comments							

Pourakino River at Pourakino Valley

FRESHWATER FISH DATABASE FORM						10				
Date	21/02/2008		River/Lake system Aparima River			Catchment number	789.050			
Time	1330		Sampling locality Pourakino River at Pourakino Valley							
Observer	sal		Access			Altitude (m)				
Organisation	env s		NZMS 260 Map no.	d46		Coord.	2118635 5432780			
Fishing method	nfc		Area fished (m ²) or no. nets used	240		Number of electric fishing passes	3			
Tidal water								n		
HABITAT DATA										
Water	Colour			t	Clarity		c			
	Average width (m)		8.0		Average depth (m)		0.3			
Habitat type (%)	Still	0	Back-water	0	Pool	0	Run	30		
	Riffle	70	Rapid	0	Casc.	0	Conductivity			
Substrate type (%)	Mud	0	Sand	0	Fine gravel	0	Coarse gravel	30		
Fish cover (yr)	Macrophyte	n	Instream debris	n	Undercut bank	y	Bark veg.	n		
	Catchment vegetation (%)	Native forest	65	Exotic forest	28	Farm	2	Urban zone	0	
Riparian vegetation (%)	Native forest	100	Exotic forest	0	Grass tussock	0	Exposed bed	0		
Scrub		5	Swamp land	0	Other	0	Type of river/stream/lake			
Rauo flax		0	Other	0	Water level					
Other		0	Downstream barrier					n	Pollution	l
Large invertebrate fauna			Koura		o	Paratya		Freshwater mussel		
Bottom fauna abundance			u	Predominant species group			Permanent water		y	
FISH DATA										
Species				Abundance	Length		Habitat/Comments			
Paranephrops				Koura	2	60-100				
Anguilla dieffenbachii				Longfin eel	21	80-440				
Salmo trutta				Brown trout	35 (c)	45-170				
Gobiomorphus				Bullies	20 (c)	45-90				
Geotria australis				Lamprey	1	400				
Comments										

Hamilton Burn at Goodall Road

FRESHWATER FISH DATABASE FORM						11	
Date	03/04/2008		River/Lake system Aparima River			Catchment number 789.600	
Time	1400		Sampling locality Hamilton Burn at Goodall Road				
Observer	sal		Access			Altitude (m)	
Organisation	env s		NZMS 260 Map no. e44	Coord. 2132600 5488800		Distance inland (km)	
Fishing method	nfc		Area fished (m ²) or no. nets used 90	Number of electric fishing passes 3		Tidal water n	
HABITAT DATA							
Water	Colour u			Clarity c		Temp.	pH
	Average width (m) 3.0	Average depth (m) 0.3		Maximum depth (m)		Conductivity	
Habitat type (%)	Still 0	Back-water 0	Pool 0	Run 50	Riffle 50	Rapid 0	Casc. 0
Substrate type (%)	Mud 0	Sand 0	Fine gravel 0	Coarse gravel 0	Cobble 20	Boulder 50	Bed-rock 30
Fish cover (yr)	Macrophyte n	Instream debris n	Undercut bank n	Bark veg. n			
Catchment vegetation (%)	Native forest 25	Exotic forest 0	Farm 50	Urban zone 0	Scrub 25	Swamp land 0	Other 0
Riparian vegetation (%)	Native forest 0	Exotic forest 0	Grass tussock 15	Exposed bed 25	Scrub willow 60	Raupo flax 0	Other 0
Type of river/stream/lake							
Water level l			Downstream barrier n			Pollution l	
Large invertebrate fauna		Koura		Paratya		Freshwater mussel	
Bottom fauna abundance u			Predominant species group			Permanent water y	
FISH DATA							
Species				Abundance	Length	Habitat/Comments	
Salmo trutta		Brown trout		4	85-120		
Gobiomorphus		Bullies		12	20-65		
Galaxias		Galaxiid		5	45-75		
Comments							

Moffat Creek at Moffat Road

FRESHWATER FISH DATABASE FORM										12				
Date	18/02/2008		River/Lake system Waituna Lagoon					Catchment number		776.020				
Time	1205		Sampling locality Moffat Creek at Moffat Road											
Observer	sal		Access					Altitude (m)						
Organisation	env s		NZMS 260 Map no.		f47		Coord. 2170000 5398300		Distance inland (km)					
Fishing method	efp		Area fished (m ²) or no. nets used			Number of electric fishing passes			Tidal water		n			
HABITAT DATA														
Water	Colour			t		Clarity		c		Temp.	pH			
	Average width (m)		2.0		Average depth (m)		0.2		Maximum depth (m)		Conductivity			
Habitat type (%)	Still	0	Back-water	0	Pool	20	Run	30	Riffle	50	Rapid	0	Casc.	0
Substrate type (%)	Mud	30	Sand	10	Fine gravel	60	Coarse gravel	0	Cobble	0	Boulder	0	Bed-rock	0
Fish cover (y/n)	Macrophyte	y	Instream debris	n	Undercut bank	n	Bark veg.	y						
Catchment vegetation (%)	Native forest	0	Exotic forest	0	Farm	50	Urban zone	0	Scrub	10	Swamp land	40	Other	0
Riparian vegetation (%)	Native forest	0	Exotic forest	0	Grass tussock	100	Exposed bed	0	Scrub willow	0	Raupo flax	0	Other	0
Type of river/stream/lake														
Water level				Downstream barrier				Pollution						
Large invertebrate fauna			Koura			Paratya			Freshwater mussel					
Bottom fauna abundance			Predominant species group					Permanent water				y		
FISH DATA														
Species						Abundance		Length		Habitat/Comments				
Anguilla dieffenbachii		Longfin eel		1		480		Very abundant						
Gobiomorphus		Bullies		a		30-85								
Gobiomorphus huttoni		Redfin bully		1		75								
Galaxias fasciatus		Banded kokopu		1		115								
Comments Brown trout observed, but not caught														

Waimea Stream at Mandeville

FRESHWATER FISH DATABASE FORM						13								
Date	13/02/2008		River/Lake system Mataura River			Catchment number 775.560								
Time	1310		Sampling locality Waimea Stream at Mandeville											
Observer	sal		Access			Altitude (m)								
Organisation	env s		NZMS 260 Map no.	f45	Coord. 2184600 5460700		Distance inland (km)							
Fishing method	nfc		Area fished (m ²) or no. nets used	180	Number of electric fishing passes	3	Tidal water n							
HABITAT DATA														
Water	Colour			Clarity		Temp.	pH							
	Average width (m)	6.0		Average depth (m)	0.4		Conductivity							
Habitat type (%)	Still	0	Back-water	0	Pool	60	Run	30	Riffle	10	Rapid	0	Casc.	0
Substrate type (%)	Mud	0	Sand	20	Fine gravel	30	Coarse gravel	40	Cobble	10	Boulder	0	Bed-rock	0
Fish cover (y/n)	Macrophyte	y	Instream debris	n	Undercut bank	n	Bark veg.	y						
Catchment vegetation (%)	Native forest	0	Exotic forest	0	Farm	90	Urban zone	0	Scrub	10	Swamp land	0	Other	0
Riparian vegetation (%)	Native forest	0	Exotic forest	0	Grass tussock	100	Exposed bed	0	Scrub willow	0	Raupo flax	0	Other	0
Type of river/stream/lake														
Water level			l	Downstream barrier			n	Pollution	m					
Large invertebrate fauna			Koura			o	Paratya		Freshwater mussel					
Bottom fauna abundance			u			Predominant species group			Permanent water					y
FISH DATA														
Species						Abundance	Length	Habitat/Comments						
Gobiomorphus			Bullies			3	25-45							
Paranephrops			Koura			1	90							
Anguilla dieffenbachii			Longfin eel			2	230-260							
Comments														

Dunsdale Stream at Dunsdale Reserve

FRESHWATER FISH DATABASE FORM						14	
Date	13/02/2008	River/Lake system Oreti River				Catchment number	786.126
Time	1030	Sampling locality Dunsdale Stream at Dunsdale Reserve					
Observer	sal	Access				Altitude (m)	
Organisation	env s	NZMS 260 Map no.	f45	Coord. 2170100 5443600		Distance inland (km)	
Fishing method	nfc	Area fished (m ²) or no. nets used	210	Number of electric fishing passes	3	Tidal water n	
HABITAT DATA							
Water	Colour			t	Clarity		c
	Average width (m)	7.0	Average depth (m)	0.3	Maximum depth (m)		Conductivity
Habitat type (%)	Still	0	Back-water	0	Pool	0	
Substrate type (%)	Mud	0	Sand	0	Fine gravel	5	
Fish cover (yr)	Macrophyte	n	Instream debris	n	Undercut bank	n	
Catchment vegetation (%)	Native forest	100	Exotic forest	0	Farm	0	
Riparian vegetation (%)	Native forest	95	Exotic forest	0	Grass tussock	0	
Type of river/stream/lake							
Water level			Downstream barrier			Pollution	
Large invertebrate fauna			Koura		Paratya		Freshwater mussel
Bottom fauna abundance			Predominant species group			Permanent water y	
FISH DATA							
Species				Abundance	Length	Habitat/Comments	
Salmo trutta		Brown trout		17	65-110		
Anguilla dieffenbachii		Longfin eel		6	210-480		
Galaxias		Galaxiid		1	50		
Comments							

Winton Stream at Lochiel

FRESHWATER FISH DATABASE FORM						15										
Date	13/02/2008		River/Lake system Oreti River			Catchment number	786.330									
Time	0844		Sampling locality Winton Stream at Winton Substation Road													
Observer	sal		Access			Altitude (m)										
Organisation	env s		NZMS 260 Map no.	e46		Coord. 2147415 5435021	Distance inland (km)									
Fishing method	nfc		Area fished (m ²) or no. nets used	180		Number of electric fishing passes	3									
Tidal water								n								
HABITAT DATA																
Water	Colour			u		Clarity	c	Temp.	pH							
	Average width (m)	6.0		Average depth (m)	0.2		Maximum depth (m)	Conductivity								
Habitat type (%)	Still	0	Back-water	0	Pool	10	Run	50	Riffle	40	Rapid	0	Casc.	0		
Substrate type (%)	Mud	0	Sand	15	Fine gravel	70	Coarse gravel	15	Cobble	0	Boulder	0	Bed-rock	0		
Fish cover (yr)	Macrophyte	n	Instream debris	n	Undercut bank	n	Bark veg.	n								
Catchment vegetation (%)	Native forest	0	Exotic forest	5	Farm	81	Urban zone	2	Scrub	10	Swamp land	2	Other	0		
Riparian vegetation (%)	Native forest	0	Exotic forest	0	Grass tussock	40	Exposed bed	0	Scrub willow	60	Raupo flax	0	Other	0		
Type of river/stream/lake																
Water level				l		Downstream barrier			n		Pollution				m	
Large invertebrate fauna			Koura			Paratya			Freshwater mussel							
Bottom fauna abundance				u		Predominant species group					Permanent water				y	
FISH DATA																
Species							Abundance		Length		Habitat/Comments					
Anguilla dieffenbachii			Longfin eel			7		160-370								
Anguilla australis			Shortfin eel			1		140								
Salmo trutta			Brown trout			1		95								
Gobiomorphus			Bullies			1		65								
Comments																

Waihopai River u/s Waihopai Dam

FRESHWATER FISH DATABASE FORM						16	
Date	18/02/2008	River/Lake system Waihopai River				Catchment number	785.000
Time	1500	Sampling locality Waihopai Dam					
Observer	sal	Access				Altitude (m)	
Organisation	env s	NZMS 260 Map no.	e46	Coord. 2155800 5415000		Distance inland (km)	
Fishing method	nfc	Area fished (m ²) or no. nets used	180	Number of electric fishing passes	3	Tidal water n	
HABITAT DATA							
Water	Colour			u	Clarity		c
	Average width (m)	6.0		Average depth (m)	0.2		Maximum depth (m)
Habitat type (%)	Still	0	Back-water	0	Pool	0	Run
Substrate type (%)	Mud	0	Sand	20	Fine gravel	60	Coarse gravel
Fish cover (y/n)	Macrophyte	n	Instream debris	n	Undercut bank	n	Bark veg.
Catchment vegetation (%)	Native forest	0	Exotic forest	0	Farm	95	Urban zone
Riparian vegetation (%)	Native forest	0	Exotic forest	0	Grass tussock	70	Exposed bed
Type of river/stream/lake							
Water level			I	Downstream barrier			n
Large invertebrate fauna			Koura		Paratya		Freshwater mussel
Bottom fauna abundance			u	Predominant species group			Permanent water y
FISH DATA							
Species				Abundance	Length	Habitat/Comments	
Gobiomorphus Bullies				25 (c)	20-85		
Anguilla dieffenbachii Longfin eel				50 (c)	80-480		
Salmo trutta Brown trout				1	95		
Comments							