

BEFORE THE CANTERBURY REGIONAL COUNCIL

IN THE MATTER OF the Resource Management Act 1991

AND

IN THE MATTER OF Resource consent applications (42 applications for
water take and 13 associated land use and discharge
permits)

APPLICANTS LOWER WAITAKI APPLICANTS

EVIDENCE OF GRAEME HUGHES

28 August 2008

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Introduction

1. My name is Graeme Hughes. I am employed as a Fish and Game Officer; from 1966 to 1976 in Canterbury for the North Canterbury Acclimatisation Society, from 1976 to 1990 as the senior Field Officer for the Waitaki Valley Acclimatisation Society based in Kurow. In 1990 Acclimatisation Societies were abolished and Fish and Game Councils were formed. I remained in Kurow as a Fish and Game Officer for the Central South Island Region of Fish and Game New Zealand. As of February of this year I have completed 40 years of service in freshwater fisheries and gamebird management.
2. In 1980 I was elected President of the Waitaki Rod and Gun Club, a position I still hold today. The Rod and Gun Club, formed in 1954, has assisted Fish and Game authorities over the years and presented submissions on matters which affect the region's natural resources, with emphasis on the Waitaki Valley, the Waitaki River and its tributaries.
3. I am an elected committee member of the recently formed Lower Waitaki River Enhancement Society. I am a financial member of the International Game Fishing Association (USA). I am a financial member of Ducks Unlimited (USA).
4. As a Fish and Game Officer based in Kurow on the banks of the Waitaki River a substantial proportion of my work time has involved the Waitaki River and its tributaries. As an angler and hunter I spend a significant portion of my recreation time fishing and hunting in the Waitaki Valley.
5. The two major tributaries of the lower Waitaki River, the Hakataramea and Maerewhenua Rivers, are of special interest and I have been able to spend many hours on them as a dedicated fly caster.
6. My experience on the Hakataramea and Maerewhenua Rivers began in 1976. Even with 32 years on these rivers they remain as two of my favourite four rivers of the region.
7. During this time I have witnessed many changes, which I comment on in my evidence.
8. The evidence I present is primarily a commentary on the fisheries values of the Hakataramea River and the Maerewhenua River from an anglers' perspective over a 30-year period, supported by professional observations I make as an experienced Fish and Game Officer.
9. I will firstly address the Hakataramea River and then move onto the Maerewhenua River.

Hakataramea River - A fishery under stress

10. The Hakataramea River is well known by anglers. It is synonymous with trout fishing and historically important as the birth place of chinook salmon in New Zealand. In 1901 from a purpose built hatchery in the valley the first successful releases from salmon ova imported from North America began the South Island salmon fishery. The chinook salmon, often called quinnat salmon, is a species which attracts anglers from all over the country who gather at major east coast, snow fed rivers during the salmon spawning migrations. At the Hakataramea River Waitaki River confluence salmon may congregate before beginning migrating into the Hakataramea River to spawn.



A 17 kg (37.5 lb) chinook salmon caught at the Hakataramea Waitaki River confluence in 1999.



Mid reaches of the Hakataramea River upstream of the "Struan" swing bridge. November 2006

11. One of three major salmonid spawning tributaries of the Waitaki River, the Hakataramea River is well known for the trout population it holds and the large number of anglers that fish for them. The Hakataramea River was formerly known for its brown trout fishing. However in more recent times the population of rainbow trout has become a major attraction, especially early in the fishing season.

12. The Hakataramea River is fishable over most of its length from its confluence with the Waitaki River to its very headwaters, a distance in excess of 50 kilometres. The Hakataramea River, although quite accessible for fishing, has limited legal public access. This limited legal access is based mainly at bridges or where the river flows near the road edge. There is no “Queens Chain” on the River. The river is owned or leased to its centre line by the adjacent landowner. Despite the lack of access, Hakataramea Valley landowners have always shown goodwill and patience, accepting anglers crossing their land to reach the river.

13. The Hakataramea River is a popular fishery for several reasons. The Hakataramea River is close to home for many South Canterbury and North Otago residents living in major population centres of Waimate and Oamaru. The Hakataramea River is a small and safe river. With a mean flow of 5.25 cumecs, it can be successfully crossed in many places without risk. Comfortable wading depths allow anglers to cast a line to any trout lie from either bank. Despite its small size it is a very productive fishery. The river produces a prolific population of aquatic invertebrates, the major food source for fish. Both trout species are resident and their size and condition factors are highly regarded by anglers. The river banks in many places are shaded by mature willow trees. Tall riparian cover, deep pools and undercut banks provide ample escape cover for trout. Fishing the Hakataramea River is a challenge. Because the river is small, location of trout is relatively easy, conversely, trout can easily see an approaching angler and will use escape cover in an instant should the angler be careless in approach or cast.



A happy angler with a Hakataramea River brown trout. November 2007



Fishing the upper reaches of the Hakataramea River at Round Hill.

The angler pictured landed 4 rainbow trout from this one pool. November 2007

14. The Hakataramea River supports a population of indigenous fish species. Eels, both longfinned and shortfinned, are common where available cover exists. Common and upland bullies are the most numerous of the fish species. The lesser known galaxiid species, common river galaxiid and koaro (*Galaxius brevipinnis*), are common although seldom seen.
15. Along with the afore mentioned three introduced species of sports fish (brown trout, rainbow trout and chinook salmon). American brook char can be found in a headwater tributary, Dalgety Stream. In the Hakataramea Valley brook char are small and difficult to

find. They do not coexist well with other salmonids and their range is confined to small high altitude tributaries where they exist as small stunted specimens seldom exceeding 150mm in length.

16. Chinook salmon ascend the Hakataramea River, migrating in from the Waitaki River to spawn in April. The fishing season for salmon is closed at this time to provide protection during their spawning period. They are therefore not available to the angler. Salmon excavate their redds from the confluence with the Waitaki River upstream to about the Two Mile Stream, a distance of 31 kilometres.
17. Brown and rainbow trout are popular species and anglers may fish for them from the first Saturday in November until the last day of April. Both species use the Hakataramea River for spawning with rainbow trout pushing well up into the very headwaters. Although there are river resident numbers of both species, during autumn and winter trout, both brown and rainbow, migrate from the Waitaki into the Hakataramea River to spawn. Waitaki River rainbow trout appear to be tributary spawners, i.e. they are not known to spawn in the Waitaki River but use three tributaries, namely the Awakino River, the Maerewhenua River and the Hakataramea River, as spawning grounds.
18. After spawning all salmon die. However trout species will live to spawn a second time and some will spawn several times. After spawning not all migrants return to the Waitaki and those that remain provide the annual recruitment which are available to the angler in the spring when the fishing season re-opens.
19. Competition for space and cover is at a premium at this time and many individuals are displaced and can be observed moving downstream. As the summer progresses water levels lower and water temperatures rise causing more of the migrants to return to the Waitaki River.



An angler hooks a trout in a willow-clad glide in the mid reaches of the Hakataramea River. November 2007.

20. Trout inhabit the Hakataramea River over its entire length and fishing is not restricted excepting in times of low flow. During summer, in the lower section of the river, low flows combined with irrigation abstraction will dry runs and riffles for up to 8 kilometres and only the deepest pools remain.
21. The fishing season for the Hakataramea River began on the first Saturday of November 2007 when the recorded flow was 3.6 cumecs. (NB: I obtain and record the flow from the CRC website on a weekly basis as part of a weekly radio fishing report.) Although well below the 5.25 cumec mean flow, the river flow was sufficient to hold good numbers of trout for anglers. By December 2007 the flows had steadily decreased to 1.2 cumecs. At this level, past experience has shown that the fishery is at risk and stranding of salmonids and indigenous fish can occur. On inspection of the area between “Foveran” and Wrights Crossing, the first area to dry, surface flow was imperceptible and fish passage was no longer possible. Large numbers of trout fingerlings and salmon smolts were visible in runs and pools and larger trout sought security in deeper pools.
22. During the month of January 2008 flows continued to decline and by the end of that month the recorder showed flow to be at 630 litres per second. In my report to Council for December 2007 / January 2008 I wrote:

“Fish Salvage

Approximately 8000 to 9000 salmonid juveniles, brown and rainbow trout and chinook salmon smolts have been netted or electro fished from drying areas of the Hakataramea River. 60 adult trout from 1.0 kg up to 3.0 kg were also captured and released into the Waitaki River. About 4 kilometres of river bed required fish salvage from receding pools.

*Extreme low flows up and downstream of the affected area resulted in unsuitable habitat for most fish species. Some 40 eels and several thousand common and upland bullies, have also been rescued. A small number of common galaxiids, 20 to 30, were also captured. Due to the long sunshine hours the increase in filamentous algae growth combined with *Ranunculus*, *Potamogeton* and *didymo* has negated the use of seine nets. Electro-fishing of 75% of the total catch has been a slow process. Assistance has been received from local volunteers and Fish and Game Officer Hamish Stevens”.*



A drying pool in a 5-km stretch of the Hakataramea River near “Wrights Crossing”. The NIWA water recorder 11km below this point at State Highway 82 Bridge showed the river flow to be 850 litres per second. January 18 2008

23. During February and March 2008 despite two minor rain events which temporarily halted the decline, the flow continued on a downward trend with a low flow of 700 litres per second recorded. A further 2000 trout and salmon were rescued from drying pools as the river receded further.
24. In April 2008, the last month of the fishing season, a low flow of 500 litres per second was recorded, the lowest recorded flow for the year. At this level all irrigation is prohibited. The river increased to 600 litres per second mid month before resuming the low flow of 500 litres per second after a day or two. The river remained at this level for the next month.
25. Historically, spawning chinook salmon migrate into the Hakataramea River during the first week of April. No salmon attempted to ascend the river at this time. A small run of salmon entered the river in mid May however they did not move above “Foveran” due to difficulty of passage brought about by the continued low flows. On the 30th May 2008, 103 salmon were counted in The Hakataramea River from the Waitaki River to just above “Foveran”, a

distance of approximately 9 kilometres. When flows are adequate salmon migrate upstream as far as Cattle Creek, a distance of 30 kilometres.

26. Many thousands of fish are rescued by Fish and Game staff, however just as many fish perish. They die from lack of water and oxygen or predation from herons, shags, gulls and hawks. Low flows persist through the summer months and encourage the growth of dense beds of filamentous algae, creating conditions which are uninhabitable for all fish species. Angling effort is reduced and catch rate decreases during the latter part of the season. Although irrigation bans are put in place drying has already occurred in the lower reaches and habitat destruction continues upstream and downstream of the dry river bed as the summer progresses.
27. Trout fishing in the Hakataramea River has always been regarded as a highly valued experience. In the last postal survey of anglers on 12 rivers of the Waitaki Valley district¹ the Hakataramea River attracted the third highest number of anglers in the district, the Waitaki River being the highest, followed by the Ahuriri River. The survey showed that anglers valued the ease of access, they believed that the river and its surroundings were scenically attractive and that it provided fishing in peace and solitude. Camping and picnicking are popular in the middle reaches.



About to be released, this Hakataramea River rainbow trout caught by a visiting Irish angler was estimated to weigh 2.75kg.

28. Angler catch rate in the Hakataramea River is above average. The trout caught are mostly large mature adults, remnants of the previous spawning migrations. Resident trout

¹ “The Relative Value of Waitaki Valley Rivers to Waitaki Valley Anglers” Fisheries Environmental Report No. 19, Fisheries Research Division, Ministry of Agriculture and Fisheries. 1982.)

caught may attain a weight of 3 kg, however most trout landed are only half this size. The high catch rate can be attributed to several factors which are peculiar to the Hakataramea River. Excepting for the kilometre of river from State Highway 82 to the Waitaki River the Hakataramea River is restricted to Fly Fishing Only. Fly fishers tend to be more experienced and more skilled at catching trout. Fly fishing in its different forms will on most occasions catch more trout than other methods. The Hakataramea River is small, therefore placing the trout population in easy reach of anglers. Trout are easier to see in small rivers. The rainbow trout population is high in the early part of the season. Rainbow trout are easier to catch than brown trout.

29. Despite the limited fishing due to low flows the Hakataramea River is still a popular fishery in the early part of the fishing season, usually from November and through December. The Hakataramea River is within an hour's drive of two main population centres of Waimate and Oamaru.
30. The Hakataramea River catchment has a low annual rainfall. Historically the river has experienced dry periods in the lower reaches. In my experience the dry section is now more extensive and stays dry for longer periods. Low flows which are to be expected in times of low rainfall now tend to be annual events.

Irrigation

31. Proposals to obtain more water for irrigation from the Hakataramea River are of concern for anglers when several kilometres of the river already dries at flows of 1 cumec at the recorder site near State Highway 82. For the 2007 /2008 fishing season the opening day (3/11/07) the river flow was recorded at below the mean flow (5.25 cumecs) at 3.6 cumecs. By December the flow had dropped to 1.25 cumecs and in January flows continued to decline further to 630 litres per second. The river recovered after rain in mid February, rising to 2.3 cumecs, but within 2 weeks was back down to 1.2 cumecs. Flows steadily declined and by the end of the fishing season (30th April) the river flow had dropped to below 1.0 cumec. Although irrigation restrictions begin at 1.5 cumecs a total irrigation ban does not apply until the flow falls to 500 litres per second.



Thousands of fingerlings trapped in a drying pool of the Hakataramea River, January 2008.

32. During this period Fish and Game staff rescued over 5000 juvenile sports fish, both salmon and trout juveniles, and approximately 50 large trout up to 2.7 kg in weight, fish that most anglers would call “trophy fish”. While the numbers of fish rescued and released into permanent water were significant, larger numbers of smaller fish mainly indigenous bullies and galaxiids – perished or were consumed by predatory birds. During the continued drying, fish mortalities and fish salvage, irrigation was still permitted.
33. Information regarding alleged illegal takes of water is common in times of irrigation restrictions. During the 2008 irrigation season such allegations in the Hakataramea River included irrigating under the cover of darkness and using heavy machinery to dam and divert the entire river flow into pump intakes. Environment Canterbury has recommended the offender for prosecution regarding the latter complaint, and the file is currently with the legal section.
34. The Waitaki Catchment Commission and Regional Water Board recognised the values of the Hakataramea River and in a report “The Resources and Usage of Water in the Hakataramea River Catchment” (1976) the chief engineer wrote:

“7.5 Recreation. The popularity of the Hakataramea River as a recreation area will continue and possibly increasing numbers of people will make use of it.

The value of the river to sport fishing will undoubtedly increase as population numbers grow and transport and access continue to improve. Unfortunately, the natural flows in the river do not allow an uninterrupted flow of water throughout its entire length and the stretch between Wrights Crossing and “Foveran” does periodically run dry.

7.7 Conclusions.

1. *The natural river flows cannot provide sufficient water to irrigate the potentially suitable areas.*
2. *More piped water supply schemes to replace open races would improve the distribution and help to conserve the supplies of stock and domestic requirements.”*

35. Increased irrigation proposals for the Hakataramea River are of concern to anglers, recreationalists and existing irrigators. The low flow set for the Hakataramea River is inadequate and this is demonstrated by the low flows and dry areas which occur annually. Water storage by capturing tributary flows during times of high flow appears to be an attractive alternative. However, high flows and flood events are important natural events in all rivers. These lifts in volume and velocity perform essential cleaning of the receiving water, turning gravels of the substrate, transport silt deposits, remove macrophytes and control riparian brush weeds in the flood bed. The cleaned silt-free gravels and cobbles ensures optimum habitat for aquatic invertebrates and fish. The recharge of low flows and physical sculpturing of river banks and bed by a flood event is essential natural maintenance for a healthy and productive fishery.



70 cumecs and rising. Flood flows in the Hakataramea River July 31- 2008. The last significant flood in the Hakataramea River was in August 2000.

36. Warnings of poor water quality are posted by the Regional Council advising river users that swimming is not safe after rain events. Dilution created by an increased flow would be beneficial to instream residents and river users. If floods and freshes are captured or decreased by water harvesting and storage the natural river processes will fail. Several years of low rainfall and no flood events in the Hakataramea River have demonstrated the significant changes in the substrate, the most obvious being the beds of aquatic plants

which have colonised pools and runs. In slow water areas accumulated silt is obvious amongst the gravels and cobble interstices and in places the substrate appears to be completely covered, with only larger cobbles showing. Small freshes creating minor increases in flow are insufficient to transport silt or remove macrophytes from the stream bed. Floods are an important natural process.

Didymo

37. *Didymosphenia geminata* was identified in the Hakataramea River in November 2007. As has been demonstrated in smaller streams the invasive algae will colonise the substrate bank to bank where there is insufficient flow to control midstream growth. A low flow Hakataramea River is likely to assist its spread and the algae will decimate invertebrate populations and severely limit the success and enjoyment of anglers. Flood events will help suppress the growth of didymo.

Summary

38. The Hakataramea River is a productive trout fishery and an important salmon spawning and rearing water. It is well fished and highly regarded by local and visiting anglers.
39. The Hakataramea River is an important source of irrigation water for Hakataramea Valley farmers.
40. The Hakataramea River is situated in a low rainfall area and there are irrigation restrictions at low river levels.
41. The minimum flow is ineffective, the river is at a critical stage before restrictions are applied, and at 1.0 cumec the river is already dry. Complete prohibition of abstraction occurs at 500 litres per second at which time several kilometres of riverbed are dry and minimal flows above and below the dry area are uninhabitable for fish and other aquatic life.
42. Didymo has been found in the Hakataramea River.
43. Proposals to increase the irrigation take from the Hakataramea River are of concern to anglers, other river users and existing irrigators.
44. The period of low flow appears to be increasing; dry areas are extending and stay dryer longer. Experienced Hakataramea River anglers believe the fishery is in decline due to the long periods of minimal flows. The minimum low flow has become the normal river flow.

Maerewhenua River

45. The Maerewhenua River is the second largest and the most seaward of three major tributaries of the Waitaki River. Although the Maerewhenua River lacks the important fishery history of the better known Hakataramea River, it does have a gold mining history which was an impediment to the acclimatisation of introduced sports fish to its catchment.
46. The steep hill country of the Maerewhenua River headwaters still carries the obvious scars of sluicing for gold. Excavated water channels, now dry and in disrepair, scribe the hill sides, further testament to the efforts of the early gold seekers.



*The North Branch
of Maerewhenua
River.
The South Branch
enters bottom left.
2005.*

47. As the gold sluices carved into the slopes the runoff entered the Maerewhenua River and its flow was permanently turbid. The Maerewhenua River was officially designated a “sludge channel” and remained as such during management by the Waitaki Catchment Board 1947-1989.
48. When large scale sluicing ceased the river cleared but the disturbed and unstable sluicing sites continued to affect water quality. Rain events would immediately turn the Maerewhenua River turbid as silt and sand washed downstream.
49. Today there has been consolidation of the historic sluicing sites and silt loading in the river after rain events has lessened. The Maerewhenua River is now clear running. However as a result of its historic background, in the lower reaches where the bed is wide and flat the substrate consists of quartz gravels and sands transported from the

upstream gold working sites. The substrate is unsuitable for invertebrate production and fish habitat is limited.

50. Approximately 12 kilometres upstream of the Maerewhenua/Waitaki River confluence the river bed narrows. The white quartz and yellow sand gives way to gravel beds, cobbles and rock seams. Aquatic invertebrates are plentiful and both introduced and indigenous fish species find suitable habitat in runs and pools which are absent further downstream.

51. At about 17 kilometres upstream the river forks into the North and South Branches. Here, the Danseys Pass Road leaves the river and access for anglers who want to fish either branch is on foot. The North Branch is the larger of the two and the most fished. The topography is steep, however walking the narrow river bed is not difficult for those with a reasonable degree of fitness. The river is crossed by the Danseys Pass Road for the last time at about 7 kilometres upstream of the confluence of the two branches.



An angler fishes a pool in the North Branch of the Maerewhenua River. November 2007.

52. The South Branch is more difficult to negotiate and in contrast to the tussock slopes of the North Branch the adjacent land forms here include bluffs and rocky outcrops with native forest and bush shading the water in many places.



Areas of the South Branch of the Maerewhenua River are shaded by native bush. December 2005

53. The upper Maerewhenua River, including both branches, holds numbers of brown and rainbow trout which share habitat with indigenous species: eels, bullies and galaxiids. New Zealand's largest aquatic invertebrate koura, freshwater crayfish, find suitable habitat in the upper reaches and smaller tributaries.
54. 30 years ago, when the river held a large number of mainly brown trout, it received scant attention by anglers. 10 years on in a Fisheries Environmental Report "The Relative Value of Waitaki Valley Rivers to Waitaki Valley Anglers" (1982) the authors commented, *"Although few anglers fished this most seaward tributary of the Waitaki, all seven factors which contribute to the angling experience (distance, access, area fishable, scenic beauty, solitude, catch rate, size of fish received average or above average ratings. In fact Maerewhenua ratings were comparable to those awarded on the more highly valued and larger Hakataramea."* Today the situation is quite different. Angler visits are high and it is not uncommon to see several vehicles parked at the North and South Branch confluence and at the Danseys Pass Road Bridge. The trout population remains high although the population appears to have changed from a brown trout fishery with some rainbow trout to a rainbow trout fishery with a few browns. The size and condition factor of trout caught in the Maerewhenua River remains high, although early season rainbow trout still recovering from the rigours of spawning are in typical post-spawning condition. The prolific and diverse invertebrate population provides an ample food source and by mid December most adult fish have regained their former condition.



Rainbow trout are abundant in the upper Maerewhenua River. An angler releases a rainbow back into the South Branch. December 2005.

55. As with the larger Hakataramea River, annual recruitment from the Waitaki River occurs annually during spawning migrations. Similarly, many stay in the Maerewhenua. However as the season progresses, competition for space, low flows and increased water temperatures will cause some to seek the security and cooler waters of the main stem Waitaki.
56. While it is unlikely that the North and South Branches of the Maerewhenua River will be subjected to irrigation due to the steep nature of the catchment, there is abstraction in the lower reaches. During particularly dry periods in summer and autumn the Maerewhenua River dries in the flat, quartz gravel areas and large numbers of trout fingerlings along with indigenous bully species have been rescued from shallow pools. During summer, river levels in the vicinity of the Highway 82 Bridge remain at low level and these conditions can exist through the autumn.
57. The mean flow of the Maerewhenua River is 2.96 cumecs. The recorder is situated 10 kilometres above major water takes and has no reference to the volume in the lower river where low flows affect aquatic habitats and fish passage. Flow recordings at the Kellys Gully gauge throughout the 2007-2008 fishing season averaged out at approximately 958 litres per second. Increased water temperatures in the lower reaches where there is minimal shading and escape cover is likely to be a barrier to fish passage, including that for adult trout returning to the Waitaki River and for out-migrating salmonid juveniles and indigenous species.
58. It is highly likely that minimal flows into the Waitaki prevent chinook salmon migrating into the Maerewhenua River. Chinook salmon spawn in other tributaries, the Hakataramea River and the Awakino River, with mean flows of 5.25 and .98 cumecs,

respectively. As happens in other tributaries, the salmon spawning migration period often coincides with the annual low flows of the Maerewhenua. If salmon could enter the Maerewhenua River and they successfully spawned, low flows, high water temperatures and an increased risk of predation could decimate the downstream migrating smolts before they reached the Waitaki River.

59. The invasive algae, *Didymosphenia geminata*, was found in the Maerewhenua River in May 2007. Low volume streams have been observed to be severely affected by “didymo”.



*The Otiake River, a low flow ephemeral tributary of the Waitaki River, illustrates bank to bank infestation by the invasive algae, *Didymosphenia geminata*.*

Summary

60. The Maerewhenua River is a productive brown and rainbow trout fishery. It is well fished and highly regarded by local and visiting anglers.
61. The Maerewhenua River has good road access until the confluence of the North and South Branches is reached. In the prime upstream fishing areas anglers are limited to foot access although land owners' permission is sought by some to access the mid reaches of the North and South Branches of the Maerewhenua River on foot and by 4WD vehicles.
62. The angler catch is predominantly mature rainbow trout with a lesser number of mature brown trout.

63. The Maerewhenua River is open to spin and fly fishing downstream of State Highway 83 Bridge. The remainder of the Maerewhenua River is restricted to fly fishing only.
64. Due to the difficulty of access and the scenic values, the Maerewhenua River provides wilderness type fishing within an hour's drive of the population centre of Oamaru.
65. The isolation factor is a highly valued component of the Maerewhenua River fishery.
66. The Maerewhenua River is a popular and productive fishery. Angler visits are likely to increase further.
67. The low flows and occasional drying of the Maerewhenua River in the lower reaches threatens and limits the fishery. Both introduced sports fish and indigenous fish species require access to the Waitaki River. The lower section of the Maerewhenua River is a barrier to fish passage in times of low flow.
68. Rainbow trout are tributary spawners; they have not been observed spawning in the Waitaki River. Rainbow trout spawn in only 3 Waitaki River tributaries: the Awakino River, the Hakatamea River and the Maerewhenua River.
69. Low flows in autumn will dissuade salmon from entering the Maerewhenua River to spawn.
70. The water recorder site is upstream of points of irrigation abstraction.
71. The periods of low flow in the lower Maerewhenua River appear from my point of view to be increasing. Minimal flows in the lower Maerewhenua River impede and at times prevent entry and egress by salmonids and indigenous fish. Low flows during the late summer and autumn prevent spawning chinook salmon entering the Maerewhenua River. Increased irrigation abstraction will exacerbate critical low flow events which occur annually in the lower reaches. The low flow and drying of the Maerewhenua River limits fish populations in the Maerewhenua River and the Waitaki River.

Graeme Hughes

28 August 2008