Waipara River

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Instream values

- The Waipara River is a typical South Island east coast river, with a variable flow regime, a diverse diadromous native fish community, river birds, and periphyton accrual during periods without freshes, usually in summer.
- A fish survey in 1994 showed that densities were relatively high compared to other New Zealand rivers. Upland bullies were particularly widespread and abundant, with densities close to the highest recorded in our national survey. Bluegill bullies were abundant in the lower reaches, with densities slightly lower than the highest recorded in our national survey. Torrentfish were also abundant in the lower reaches and their density was higher than that recorded in any other South Island river.
- Although trout are present in the river and probably spawn upstream of White Gorge, the habitat and flow regime are not particularly suited to trout because of its spring floods and poor trout habitat.
- The river, particularly near the mouth, provides significant winter feeding habitat for river birds, including wrybill, black-fronted tern, banded dotterel, and bittern.
- The key values in the Waipara River are native fish and river bird feeding habitat near the river mouth.

Hydrology

Site	Mean	Median	MALF
White Gorge	2.81	0.87	0.1
Teviotdale	3.83	1.30	0.30

- Water exchange occurs along the Waipara River.
- Surface loss occurs across the alluvial plains, and gain occurs in the canyon below the Omihi Stream.
- The Omihi contributes about 50% of summer low flows.
- The river loses water into the gravels between the canyon and lagoon. Near the mouth, the river is dry in some summers.

Date	White Gorge	Below Omihi	Teviotdale	Lagoon
June 2001	0.168	0.396	0.376	0.046
March 2001	0.062	0.235	0.167	0

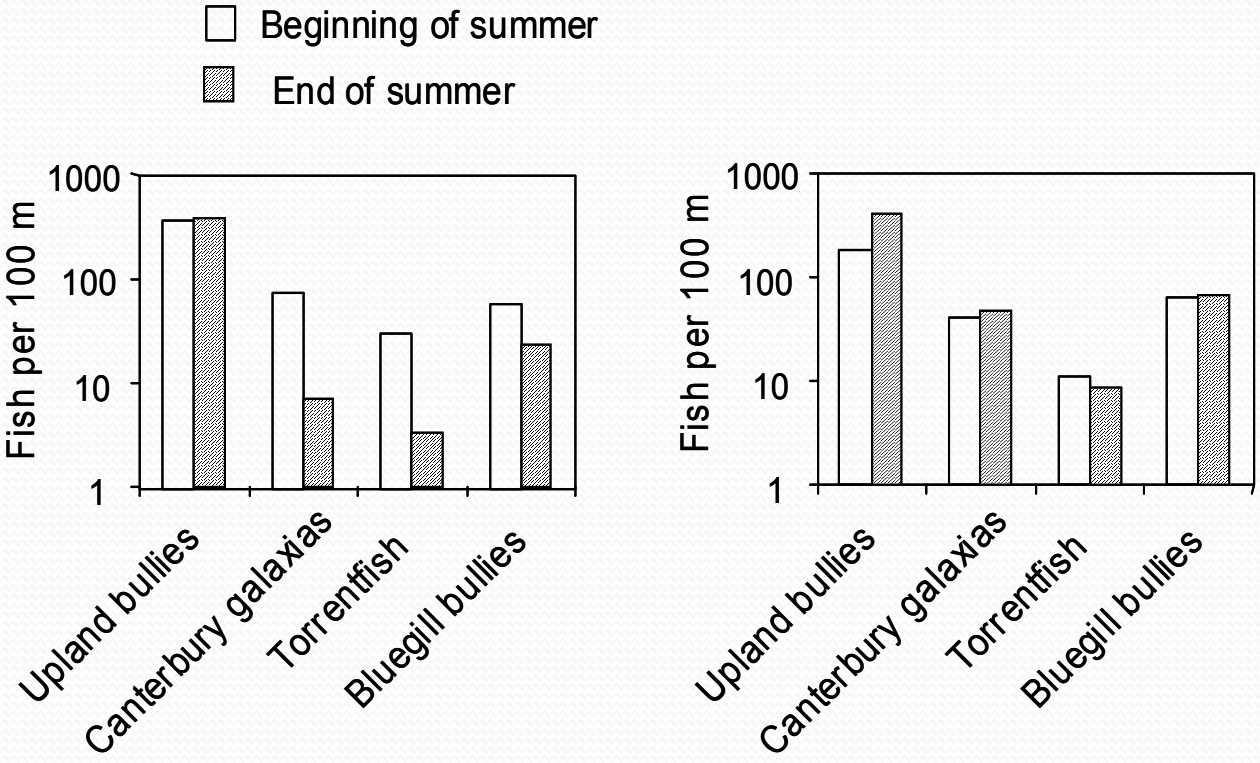
Instream habitat analysis

- At flows below 1 m^3/s, habitat for the two fast-water species, torrentfish and bluegill bullies declines linearly.
- The other species (eels, upland bully, Canterbury galaxias, common bully) all show a rapid decline in habitat when flows fall below about 0.075 - 0.2 m^3/s, with the highest flow requirement being for common bullies and the lowest for Canterbury galaxias, upland bully and shortfin eel.
- Habitat for black-fronted tern also showed a sharp decline beginning at a flow of 0.1 - 0.2 m^3/s. There was relatively little variation in wrybill feeding habitat with flow.
- A minimum flow of 0.12 m^3/s at Teviotdale would prevent a sharp decline in habitat for eels, upland bully, Canterbury galaxias, common bully and black-fronted tern.

Effect of flow on fish abundance

- The fish surveys (1998 - 2001) showed that the effect of low flows on fish populations increased with the magnitude and duration of low flow.
- When the mean flow at White Gorge was 0.647 m^3/s, flows were less than 0.11 m^3/s for 34% of the time, and fell to a minimum of 0.031 m^3/s, there was a substantial decline in the abundance of three of the four common fish species in the river (left).
- When the mean flow at White Gorge was 1.069 m^3/s, flows were less than 0.11 m^3/s for only 10% of the time, with a minimum of 0.062 m^3/s, there was little change in fish abundance (right).

Effect of flow on fish abundance



Effect of flow on fish abundance

- Fast water species (bluegill bullies and torrentfish) are affected when the flow at White Gorge falls below 0.06 m^3/s.
- Canterbury galaxias is affected when the flow at White Gorge falls below about 0.04 m^3/s.
- Upland bullies are not affected until the river is practically dry.

Flow (m^3/s) at White Gorge	Flow (m^3/s) at Teviotdale	Effect on fish
0.031	0.154	Fast-water species and Canterbury galaxias affected
0.054	0.174	Fast-water species affected
0.062	0.193	No significant effect.

Minimum flows

- Environment Canterbury has suggested a minimum flow of 0.05 m^3/s at White Gorge and a minimum flow of 0.11 m^3/s at the Teviotdale recorder.
- A minimum flow of 0.05 m^3/s at White Gorge is more conservative than 0.11 m^3/s at Teviotdale, with the White Gorge minimum about 50% of MALF compared to 37% of MALF at Teviotdale.
- With a minimum flow of 0.05 m^3/s at White Gorge for all consents, abstraction will have a small effect on the fast-water fish species, but not Canterbury galaxias and upland bullies. However, a minimum flow of 0.11 m^3/s at Teviotdale would affect torrentfish, bluegill bullies, and Canterbury galaxias.
- Flow near the lagoon would cease before flow reaches the minimum at either site and this would restrict feeding opportunities for river birds. A flow of about 0.35 m^3/s would be required to maintain flow to the lagoon

Partial restrictions

- Consents have been issued for abstraction of up to 0.26 m^3/s below White Gorge. Most consents are required to cease when flows fall to the minimum at White Gorge, however some consents are required to cease when flows fall to the minimum at Teviotdale.
- Where the flow monitoring site is upstream of abstractions (i.e. at White Gorge), partial restrictions are required so that the minimum flow provides the intended degree of environmental protection.
- Without partial restrictions, full abstraction would leave parts of the river dry even when the flow at White Gorge is greater than the minimum flow.
- If partial restrictions are not applied, the minimum flow at White Gorge should be increased.

CONCLUSIONS

- The key instream values of the Waipara River are the native fish community and feeding habitat for wading birds at the river mouth.
- The key elements of the flow regime are the magnitude and duration of low flows, as well as the occurrence of spring floods that allow recruitment of diadromous species.
- Abstraction of water has no significant effect on the magnitude and frequency of freshes and floods that are required to open the river mouth and remove algae.
- The fish study demonstrated the resilience of the fish community to occasional years of low flow, with numbers recovering quickly due to recruitment from upstream in the case of Canterbury galaxias or from the sea for torrentfish and bluegill bullies.

CONCLUSIONS

- A minimum flow of 0.05 m^3/s at White Gorge will have a small effect on torrentfish, bluegill bullies, whereas a minimum flow of 0.11 m^3/s at Teviotdale will affect Canterbury galaxias as well as torrentfish, bluegill bullies.
- A minimum flow of 0.12 m^3/s at Teviotdale Bridge would ameliorate the effect, especially for Canterbury galaxias.
- Flow near the river mouth ceases when the flow at Teviotdale is about 0.35 m^3/s and this restricts feeding opportunities for river birds.
- Abstraction with the proposed minimum flows will have detrimental effects on the native fish population and river bird feeding at the river mouth. Such effects would occur naturally, but to a lesser degree.
- The proposed minimum flows are a balance between the beneficial effects of out-of-river benefits with the negative instream effects of abstraction.