

Waitaha River Hydro-electric proposal:

Assessment of terrestrial invertebrate ecology and review of Entecol invertebrate report

Warren Chinn

Technical Advisor (invertebrate ecology)

Science and Technical Group, Christchurch

August, 2015

Summary

- Westpower (the applicant) have applied to construct a run-of-river hydro electric power scheme on the lower Waitaha River, Westland. Westpower have provided a suite of necessary ecological assessment reports which are of a high standard and present sound ecological information.
- The Waitaha Valley has high ecological, wilderness and recreational values. The valley, which terminates at the Adams Wilderness Area, has been a focus for kayakers, trampers, hunters and mountaineers seeking a remote and challenging natural environment. Scientific interest has been high as well. Hydrology and glaciology studies were conducted at the Ivory Glacier, head of the Waitaha in the late 1960's to 1980's
- This report provides an ecological assessment of the Waitaha using the Department of Conservation's latest (2014) ecological criteria. The ecological score given for the area proposed for development was a 3:2 ratio between Medium and High value. High scores were applied to ecological Representativeness and Naturalness.
- This report critiques the commissioned invertebrate ecology assessment. The invertebrate assemblage was high in native species especially lepidoptera (moths and butterflies). Several un-described stiletto flies were collected and the beetle fauna was of conservation interest for its diversity of endemic species.
- Recommendations are provided for consideration. Weed incursion at Kiwi Flat is considered to be a significant ecological threat. There is a risk of blackberry, gorse, broom and lupin becoming established at Kiwi Flat through. Construction activities in sensitive ecological areas tend to have unintended consequences.

Introduction

WestPower Ltd have applied to the Department of Conservation (DOC) for a concession to build a hydroelectric power scheme at Morgan Gorge, Waitaha River, about 32 kms south of Ross, Westland. Approximately 3.7 ha of terrestrial vegetation will be removed to make way for buildings, roads and water diversion structures in the Waitaha River.

Westpower's proposal is a 'run-of-the-river' (ROR) scheme that proposes to divert a portion of the river flow through power turbines, returning the water to the main river channel downstream. ROR schemes don't require major storage dams but they do require a minimum flow regime to operate and none of the large West Coast rivers will ever run very low or dry in the current climatic conditions. The water take generally allows the main river to continue flowing through its original channel, thus, ROR hydro schemes are noted for their comparatively low environmental impact and have been used extensively in British Columbia, Pakistan, Bhutan and Sri Lanka.

Westpower has commissioned a suite of environmental impact assessments, including landscape (Boffa Miskel 2014), recreation (Greenaway 2014), vegetation (TACCRA Ltd 2013), lizards (Whitaker Consultants 2013), birds and bats (Buckingham 2014), fish (Drinan and McMurtrie 2014) and invertebrates (Toft 2014). This report provides a critique of Toft (2014) and compliments the Department of Conservation botanical and avifauna reports by Marshall (2015) and O'Donnell (2015) respectively.

Although this report was a desk-top exercise, I have spent several decades tramping and mountaineering throughout the Waitaha catchment, and consider that I have an appropriate level of knowledge to comment on the ecological landscape and recreational values in addition to the invertebrate biology.

Waitaha Valley background

The Waitaha River Valley is public conservation estate (stewardship land) managed by the Department of Conservation). The Valley, situated within the Wilberg Ecological District (McEwan 1987), has significant natural values (see Appendix 1 for an assessment of ecological values), including mountains above 2000m and ecosystem sequences from lowland podocarp forest to high-precipitation alpine ecosystems (a range between 110 – 2620m asl). The Westland explorer, Charlie Douglas said of the Waitaha: "I hear a great deal here about the impassable gorges of the Totara, but they can't be a patch on the Waitaha..." (Langton 2000).

Recreational use of the Waitaha valley is low when compared to the Great Walks and front country tracks however the Waitaha is, in fact, well known and revered among kayakers, trampers and mountaineers for its complex, remote, and challenging terrain. The high wilderness values of the Waitaha include remoteness, natural landscape, natural quiet and a low human footprint (six small tramping huts and three swing bridges). At the head of the valley are the County and Ivory Glaciers and the 2620m Mt Adams, remote natural places that abut the Adams Wilderness Area.

The Waitaha catchment has also been the focus of considerable glaciology and hydrology research at the Ivory glacier (source of the Waitaha River). This work was carried out in the late 1960's and 1970's, by the Ministry of Works and culminated in one of the first precipitation maps of the

Southern Alps, revealing the Waitaha to be one of New Zealand's wettest places, with over 11 meters of rain per year (Chinn 1978; 2001).

A brief assessment of Ecological and Conservation values

Westpower propose to build the intake point for the hydro scheme at Kiwi Flat, immediately above Morgan Gorge, on the true right of the river. The construction footprint includes a permanent concrete weir across the Waitaha River and the intake structure built into the bedrock, giving flow to the penstock tunnel. The tunnel will be approximately 2km horizontally with 110m drop to the powerhouse at the mouth of Morgan Gorge and farmed outwash plain.

The proposal also includes constructing a short (tens of meters) access road between the service tunnel portal and the intake. The road would be cut through Rata / Kamihi forest producing the largest area of permanent effect on the local terrestrial ecology. A temporary building platform is proposed, where machinery and site buildings would be positioned. At the weir site, blasting, cement, steel, boxing and rock spoil would be typical of the physical impacts, while the introduction of weeds (thistles and grasses) certainly has a high likelihood at the site. However, thistles (*Cirsium* sp.) and several exotic grasses are present on Kiwi Flat.

On the basis of the author's visits to Kiwi Flat and a reading of Westpower's commissioned ecological reports, the following combined assessment of values is provided (criteria from the Department of Conservation's ecological criteria, DOC 2014). Relative to the entire Waitaha Valley, the combined upper and lower Morgan Gorge ecosystem values are split 3:2 between medium and high ecological values –a similar estimate to that arrived at by the commissioned surveys.

Table 1. Summary of significance for ecological values at Morgan Gorge and power house site, Waitaha Valley.

Representativeness	High
Diversity and Pattern	Medium
Rarity and Special Features	Medium
Naturalness	High
Long-term Ecological Viability	Medium

Comments on the Entecol Invertebrate report

Richard Toft's report (Toft / Entecol 2014) on the invertebrate values at the proposed construction sites is comprehensive and reasonable. The report lists 218 identified taxa (from 4200 specimens), of which the majority were lepidoptera (moths and butterflies) and flies, a typical result for rapid inventory surveys in highly vegetated environments. I agree with Toft's findings and conclusion that the construction foot print is very small relative to the ecological district and that weed and pest

control is an appropriate inclusion in the applicant's proposal, particularly at Kiwi Flat (the least ecologically modified / most intact area within the proposal) .

Toft points out that the riparian margins are dynamic environments with a different assemblages of plants (chiefly seral) and therefore invertebrates. The Waitaha River bed is frequently subject to immense disturbance during large floods, so the system a high colonisation and dynamic succession regime. It was from this river bed habitat that three un-described species of stiletto fly (*Anabarhynchus*: Therividae) were collected. While this is an interesting outcome, it is often the case with invertebrate surveys that entomologists have a tendency to focus on likely locations or habitats of their taxonomic interest group.

Curiously, the invertebrate report makes little comment about community ecology, including pollination, herbivores and predators. Generally it's useful to also characterise the composition of shrublands and associated invertebrates, although extensive discussion is made of the lepidopteran fauna.

In general, invertebrate surveys for ecological assessments are useful if they target large, flightless and free living taxa. These organisms tend to be the targets of introduced mammalian predators and, in many cases are themselves rare or threatened. Rhytid land snails, large weta, beetles and spiders are good examples. Mention is made of *Powelliphanta* snails particularly alpine species (*Powelliphanta rossiana rossiana*) in the Toft (2014) and Buckingham (2014) reports. The snail shell found is likely to have been washed down the main Waitaha River from the up-valley tussock country. It is encouraging to know these snails are in existence in the valley.

The Toft survey also provides a species list that is strong on moths and butterflies. While the Lepidoptera and dipteran list is comprehensive and appropriate, it could be argued that some taxonomic groups have been omitted. I would have expected, for instance, several key groups to have been included (especially in February). These 'missing' groups include: Cicada (Homoptera), cricket (Gryllidae), cave weta (Rhaphidophoridae), cockroaches (Blattidae), damselflies (Coenagrionidae) and non-insect groups including: Leaf veined slugs (Athoracophoridae).

Toft's spider (araneae) list is also surprisingly brief given the diversity of spiders in Westland. There was no pitfall trapping at Kiwi Flat, which is curious given the efficacy of pitfall traps to collect many large ground dwelling taxa such as spiders, weta and ground beetles. Spiders expected to occur at Kiwi Flat include forest prowling spiders *Uliodon* spp. (zoropsidae), Agelenids (*Neoramia* spp.), jumping spiders (salticidae) and mygalomophae (*Porrhothele* sp.). In any case, the large sheet web spider (*Cambridgea* sp.) at Kiwi Flat made an interesting find.

Recommendations

In general, I support the findings and ecological view of the commissioned ecology reports. I recommend that contractors be scrupulous against weed invasion into the riparian environment during construction of the weir at Kiwi Flat. This is particularly important in the light penetrating forest margins surrounding the short service road (between the tunnel portal and the weir) and the turf surfaces of Kiwi Flat.

My concern is that although 'standard procedures' will be diligently adopted to mitigate weed invasion during construction, the duration and frequency of equipment and human movements to and from the site will, almost inevitably introduce an exotic plant that currently does not grow there.

The chances of blackberry, Lupin, broom and gorse establishing at Kiwi is quite high, and all would thrive on the flats and riparia. Presently, there are three potential vectors for these weeds at Kiwi Flat: People walking in (seeds on socks etc), helicopter landings (at the nearby hut) and animals (goats, deer, possums). So far, few weeds have established at the flat and a disciplined approach will be required to prevent exotic plants being spread to the area during the hydro construction. Unintended ecological consequences are the norm where building activity occurs.

Recreational recommendations

Westpower have stated they will provide for unobstructed public foot access up Morgan Gorge to Kiwi Flat. This is encouraging and will be essential for trampers, hunters and so forth to access the valley. If the old true left track can be re-instated, all the better as this will be clear of the power house construction area.

In my opinion, one condition of Westpower's concession should include provision to fund or provide resources to DOC for long term maintenance of a legal public foot track up Morgan Gorge to Kiwi Flat. This provision might include purchasing land (or an easement) across the private property on the true left of the lower Waitaha River, a property which has been difficult to gain permission to traverse since a change of ownership in the early 2000's.

References

Boffa Miskel (2014). Waitaha Hydro Scheme Natural Character, Landscape and visual Effects prepared for Westpower Ltd. <http://www.westpower.co.nz/news/article/application-concessions-and-assessment-effects>.

Buckingham, R. (2014). Assessment of the potential effects of the proposed waitaha hydro scheme on vertebrate fauna (birds and bats). Wildlife Surveys report for Westpower Ltd by Wildlife Surveys Ltd.

Chinn, T. (1978). 'How wet is the wettest of the wet West Coast?' *New Zealand Alpine Journal* 32: 86

Chinn, T.J. (2001): Distribution of the glacial water resources of New Zealand. *Journal of Hydrology (NZ)* 40(2), pp 139-187

DOC (2014). Department of Conservation guidelines for assessing and identifying significant ecological values. *In Press*.

Drinan and McMurtrie (2014). Proposed Waitaha Hydro Scheme Assessment of Environmental Effects: Fish of the Waitaha Catchment. Aquatic research consultants. <http://www.westpower.co.nz/news/article/application-concessions-and-assessment-effects>

Greenaway, R. (2014). Westpower Waitaha Hydro Scheme Investigations Recreation and Tourism Assessment of Effects. Rob Greenaway & Associates. <http://www.westpower.co.nz/news/article/application-concessions-and-assessment-effects>.

Langton, G. 2000. Mr Explorer Douglas. Canterbury University Press. Pp. 198.

Marshall, J. (2015). Waitaha Hydro Scheme – Terrestrial Ecology report. Unpublished Department of Conservation internal report.

McEwen, M. W.(1987). *Ecological regions and districts of New Zealand*. Wellington, N.Z.: Dept. of Conservation

O'Donnell, F.J. (2015). Waitaha hydro scheme: Application for concessions and assessment of effects. Advice regarding conservation values and effects of proposed hydro scheme on bird and bat faunas (excluding blue duck). Unpublished Department of Conservation internal report.

TACCRA Ltd (D.J. Derks) 2013. Waitaha Hydro Scheme Terrestrial flora description and assessment of effects. <http://www.westpower.co.nz/news/article/application-concessions-and-assessment-effects>

Toft, R. (2014). Potential Effects of the Waitaha Hydro Scheme on Terrestrial Invertebrates. Entecol report for Westpower Ltd. <http://www.westpower.co.nz/news/article/application-concessions-and-assessment-effects>.

Whitaker Consultants Limited (2013). An assessment of the potential effect of the proposed waitaha hydro scheme on the lizard fauna of the lower waitaha river, westland. <http://www.westpower.co.nz/news/article/application-concessions-and-assessment-effects>.

Appendix 1. Ecological assessment criteria and scores for the Waitaha Valley and proposed Morgan Gorge Hydro power proposal

Criteria	Rank	Significant Conversation and Ecological Features
Representativeness	High	<p>Highly representative of mid Holocene original vegetation in the Wilberg ED.</p> <p>Bird and other fauna are highly representative of the natural ecosystems of the ED.</p> <p>Example of undisturbed Westland altitudinal sequences from outwash plain to glaciated mountains.</p> <p>Penultimate northern glaciated catchment in Westland</p>
Diversity and Pattern	Medium	<p>Species-rich plant, bird and invertebrate communities.</p> <p>Diverse mosaic of vegetation communities. Including riparian shrublands, mixed podocarp hard wood (Rata and Kamihi), Totara and Miro.</p> <p>Structurally-diverse forests supporting birds and invertebrates with different feeding strategies.</p> <p>Diverse altitude, rainfall and topographic variation gradients occur in this ED. Waitaha Valley includes all these factors.</p>
Rarity and Special Features	Medium	<p>Several un-described species of Stiletto fly and many endemic moths occur at Kiwi Flat.</p> <p>Low incidence of exotic invertebrates and few weeds in the area above Morgan Gorge</p>

Naturalness

High

The Waitaha Valley including Morgan Gorge is highly natural including geomorphology, hydrology and biology.

Long-term ecological viability

Medium

Provided appropriate weed prevention and predator control methods are adopted at Kiwi Flat (during and after hydro construction), the area should remain in present ecological state (medium). However, ecological viability is relative in an area with the degree of disturbance that Kiwi Flat and Morgan Gorge experience.
