

Date: October 1 2018

To: Permissions Advisor – R Beaumont

From: Terrestrial Ecosystems Unit, - J Marshall and R Hindmarsh-Walls

Subject: Haast Grazing Licence Area B - biodiversity values and impacts

Summary

- John Cowan has applied to continue a 736ha grazing licence in the Haast River valley; currently the licence has expired but the activity continues.
- The licence area supports Threatened and At-Risk¹ plant species and habitat for Threatened and At-Risk fauna. Most of the grazing licence area is within the braided river bed and includes functioning wetlands, both ecosystems are classified as naturally uncommon² and Threatened.
- The grazing licence facilitates the presence of cattle outside the licence area in adjacent public conservation land including Mount Aspiring National Park, as cattle are unable to be effectively controlled within the bounds of the lease area.
- Research has shown that cattle grazing reduces the diversity of native species in forest and is likely to be partly responsible for preventing forest expansion: our field observations are consistent with this. Research has also shown that cattle grazing can maintain higher exotic and indigenous herb and grass diversity in grassland areas in the short term. Field observations at this site show higher diversity of native shrubs and sub shrub species in grasslands where there is little evidence of cattle.
- The presence of cattle is reducing the resilience of special species populations within and adjacent to the licence through browsing, trampling and other behaviours which prevent recruitment and reduce growth and survival. The presence of cattle is having negative effects on the wetlands across the licence. Cattle movements appear to contribute to the spread of weeds.
- Maintaining the status quo will result in the continual decline in plant species diversity within the forest. It will very likely result in the reduced resilience of local populations of *C. wallii*, a species declining nationally, as well as reducing growth and survival of other native plant species. Wetlands will degrade further.
- Removing cattle will release pressure on the palatable plant species and return greater diversity within the forest and remnant patches, remove the pressures on good populations of *C. wallii*, and facilitate the recovery of freshwater and wetland ecosystems. It may also decrease the diversity of herb species in the grasslands, at least for the short term but will likely promote the survival of woody shrubs and sub-shrubs in those grassy areas.

¹ Conservation status of New Zealand indigenous vascular plants, 2018. de Lange, P.; Rolfe, J.; Barkla, Courtney, S.; Champion, P.; Perrie, L.; Beadel, S.; Ford, K.; Breitwieser, I.; Schönberger, I.; Hindmarsh-Walls, R.; Heenan, P.; and Katie Ladley, 2018. *New Zealand Threat Classification Series* 3. 70 p.

² <https://www.landcareresearch.co.nz/science/plants-animals-fungi/ecosystems/rare-ecosystems>

Introduction

John Cowan has applied to graze the Haast River Valley, between the Roaring Billy and the McFarlane Rivers, currently known as 'Area B' (Figures 1, 2 and 3). The licence area covers approximately 736 hectares which includes river bed, river flats, fans and some river terrace areas, and is located within the Cook River to Haast River Conservation Area (G360001). It is contiguous with large areas of high biodiversity value and surrounded by Ecological Management Units. Parts of the licence area are contiguous with Mount Aspiring National Park; at Sunny Flat, opposite Prospectors Flat, around the Eighteen Mile and between Imp Grotto and the Roaring Swine.

The licence area is modified (Allen, 1980) by both exotic plants and animals: it has been extensively grazed post European settlement.

The area also supports other introduced herbivores such as red deer, chamois, hares and likely rabbits. The omnivorous Australian brush-tailed possum although present is reasonably well controlled in adjacent public conservation lands i.e. Landsborough Valley, the same can be said of red deer. Downstream of licence area B are two other grazing licences also held by Mr Cowan (Fig 1).

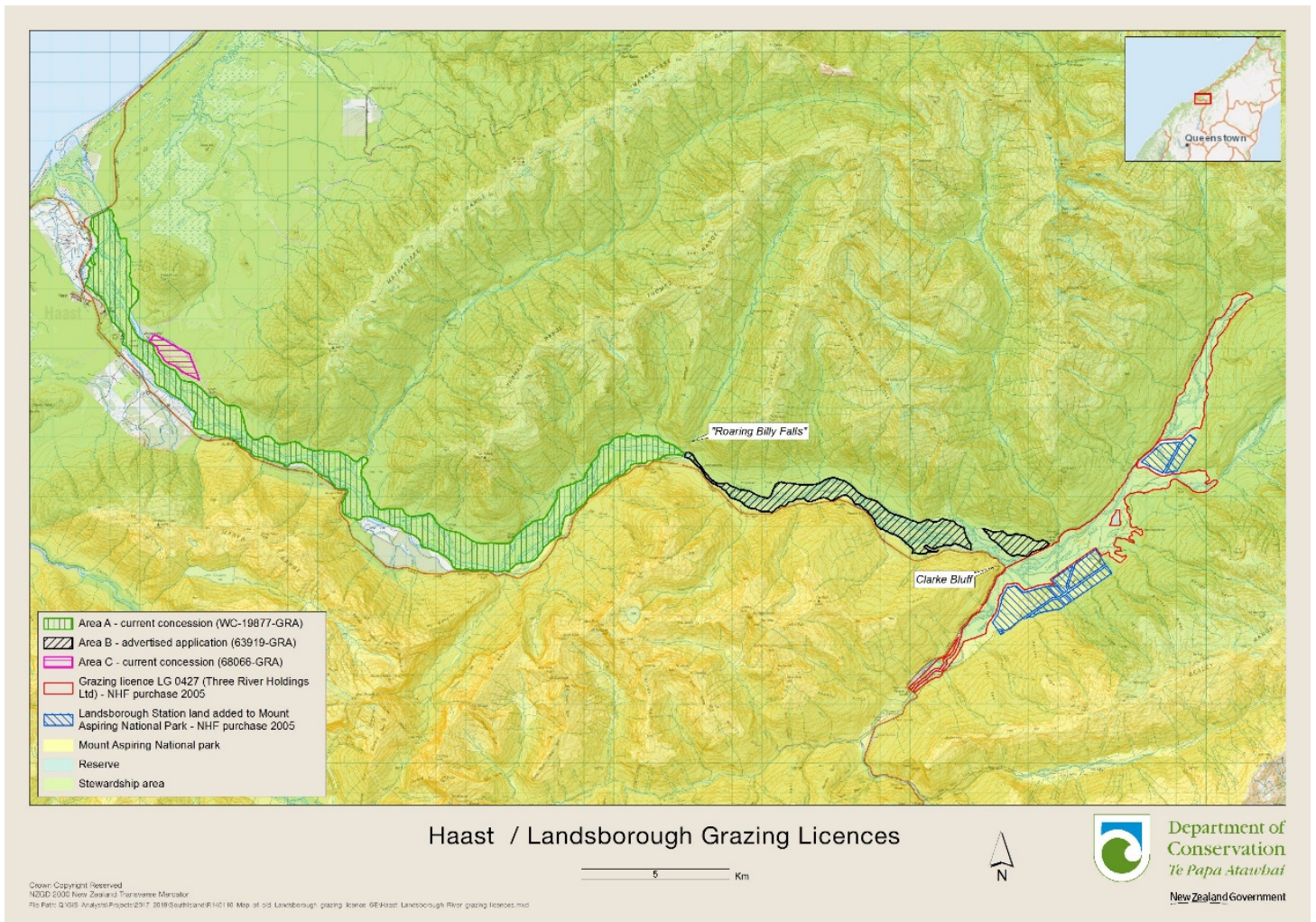


Figure 1. Tenure and grazing licences in the Haast valley.

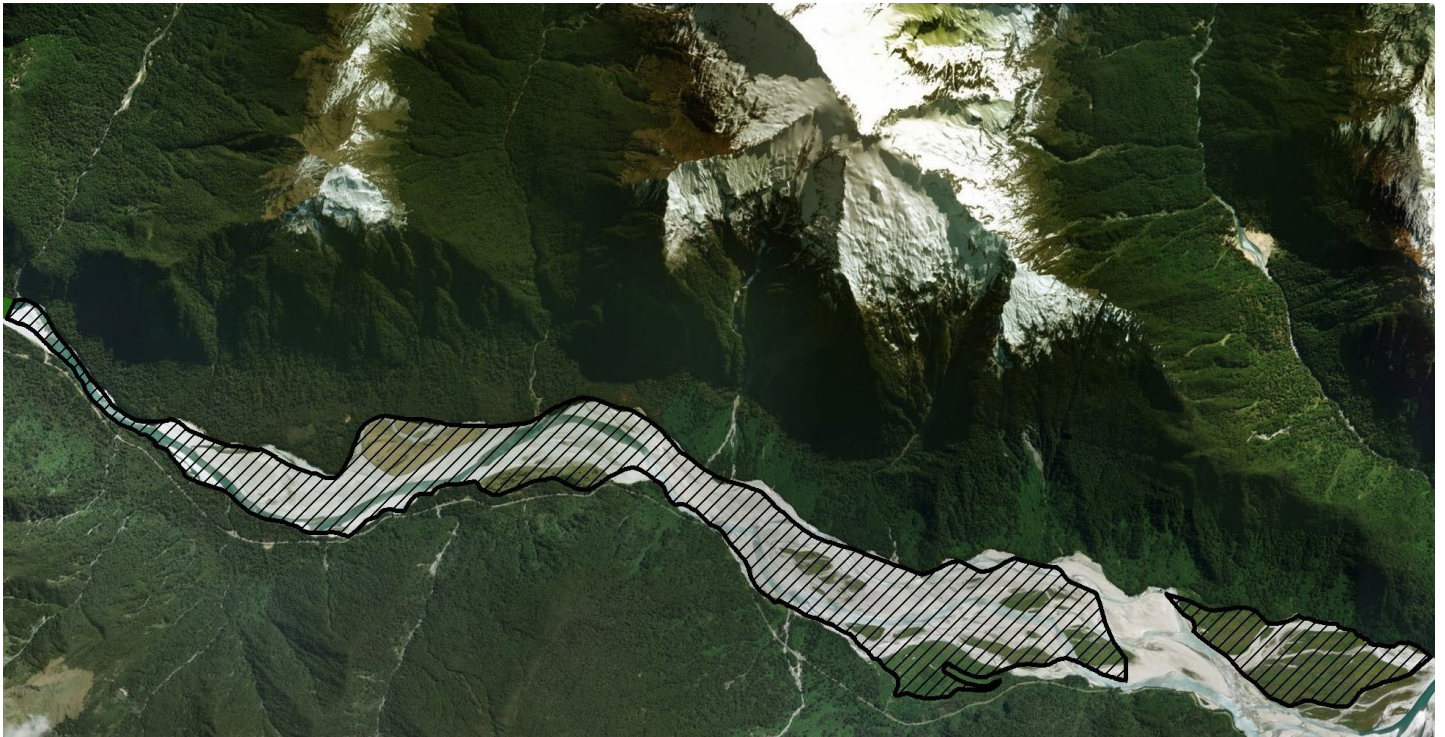


Figure 2 a and b: a) detail of licence area described by red line and b) with aerial imagery

A field trip was undertaken on Thursday and Friday August 23rd and 24th by West Coast Operations and Technical Biodiversity staff (Figure 3), in good weather.

Terrestrial ecosystem, vegetation and flora values

Conservation objectives for the licence area

In many cases there are no clearly identified conservation objectives for public conservation lands with grazing concessions. In the absence of clear guidance, the following basic ecological objectives have been identified (Knightbridge et al 2000):

- For sites which clearly have conservation values of low significance e.g. the site is dominated by introduced grasses and is not contiguous with other protected areas use this objective: *Maintain the conservation land in its current state.*
- For sites where forest adjacent to grassed areas the objective should be to *protect the forest canopy, the forest understorey, and the forest margin and its expansion* (i.e. ensure natural forest processes can go on while acknowledging that the presence of introduced pest species will be altering these processes).
- For wetlands within grazing licences that are still functioning naturally (i.e. have not been drained) the objective should be to *protect the functioning wetland system.*
- If a threatened species is present, the minimum objective will be to *remove the threat to the threatened species at this site.* e.g. regeneration of the threatened shrub *Melicytus flexuosus* is prevented by stock access to the site. Part of the solution is to prevent stock access. Active management of resultant grass growth, or planting of seedlings may also be necessary.

Ecosystem attributes in Licence Area B

The licence area lies at the boundary of the Landsborough, Okuru and Mataketake Ecological Districts (ED), all within the Aspiring Ecological Region (E.R.). The geology of the licence is best described by characteristics of the Okuru E.D.; flat valley floors with recent soils, sand and silt. The area has a montane climate characterised by high rainfall (5600mm-8000mm per annum) (McEwan, 1987). The gravel deposits forming terraces and floodplains are dominated by poorly to well sorted gravel with lesser amounts of sand and mud and include lenses of silt and sand spread throughout. Holocene peat swamps are also common in the lower gradients of the rivers (Rattenbury et al 2010). The licence area is generally very stony, with small areas of alluvial soils on the river flats.

Most of the licence area falls into land environment M2.1. (Leathwick et al 2003). The M2.1 environments are defined by their soils, humidity deficits and landforms. There is very little of this land environment in the E.D, only 1.5% of the total area. Approximately 47% of this land environment type within the E.D is within public conservation land with native vegetation. Indigenous forest is well represented in public conservation lands in the E.D. (LCDB4), however the forest association dominated by lowland ribbon wood, *Plagianthus regius* has become less common in Westland.

Although the licence is 765ha, functionally there is approximately 225ha of rough pasture within the licence boundary.

Vegetation and flora values

Forest associations

Variation in forest composition within and immediately adjacent to the grazing licence reflected the catena of topography from colluvial hillslopes to stable islands in the river bed, from well to poorly draining surfaces with differing fertilities and histories of human development. There is no terrace or hillslope forest included in the grazing licence area

however the lack of practical fencing opportunities allows cattle to enter and graze these contiguous areas.

Podocarp- beech/broadleaf forest dominates the area with silver beech (*Lophozonia menzeisii*) the most common canopy species in the valley, the less fertile fans and valley walls. The Podocarps include, kahikatea (*Dacrycarpus darydioides*), rimu (*Dacrydium cupressinum*), totara (*Podocarpus laetus*), matai (*Prumnopitys taxifolia*), and miro (*Prumnopitys ferruginaea*) on the stable fertile river terraces, interspersed with stands of ribbonwood (*Plagianthus regius*) (Fig. 3 Waypoint 2) and a diverse suite of *Coprosma* species on more recently disturbed fertile fans and terraces.

Other common elements of the forest sub-canopy are kamahi (*Weinmannia racemosa*), *Neomyrtus pedunculata*, peppertree (*Pseudowintera colorata*) and tree ferns. Other reasonably common tree species included large *Griselinia littoralis*, makomako (*Aristolelia serrata*) and its congener *A. fruticosa*, putaputaweta (*Carpodetus serratus*) and kaikomako (*Pennantia corymbosa*). Fuchsia (*Fuchsia excorticata*) was reasonably common but mahoe occurred only occasionally on the forest edge as did *Coriaria arborea*.

Prickly shield fern (*Polystichum vestitum*) is the dominant groundcover species in the undergrowth of ribbonwood forest (it accounted for approx. 80% of the ground cover) (Photo1). *Leptopteris hymenophyloides* was noted occasionally; bush rice grass was a common component of the understory; one *Astelia grandis* was noted on the bank of the forest terrace on the true right of the river as was a single *Chionochloa conspicua*. Exotic blackberry (*Rubus fruticosus*) is widespread in the forested areas of Sunny flat, but uncommon across the whole licence area.

The forest in the western most part of Sunny Flat, within the Mount Aspiring National Park was characterised by old growth and emergent podocarps. The forest patch and forest fringe east of the cattle yards was generally dominated by even aged lowland ribbonwood with a mix of broadleaved species in the subcanopy including numerous old *Coprosma wallii*. The fringe of forest around the fenced areas on Sunny Flat, between the State Highway and the Stewardship land, was a mix of well-established regenerating forest and old growth, podocarp forest which included large and sapling matai, kahikatea and seedlings and saplings and a range of common understory species. Opposite Douglas Bluff the understory of the forest adjacent to the licence was depauperate and typical for grazed forest.

Knightbridge et al (2000) identify the composition and diversity of native plants as an important value. The field assessment identified the species mentioned above, but also identified many species which were notable by their absence or at least seen only rarely: these species are palatable and include *Schefflera digitata*, *Asplenium bulbiferum*, sapling *Griselinia littoralis*, *Astelia fragrans*, *Astelia grandis*, *Blechnum novae zelandiae*, and *Chionochloa conspicua*, *C.rubra* (red tussock) *Austroderia richardii* (toetoe).

Some forest trees extend out from the hillsides on to the grassy flats; species such as silver beech, marble leaf and kaikomako, this pattern is indicative of the potential for forest expansion. The process of forest expansion onto the low river terraces, fans and more stable islands within the river braids, is slow (Buxton, 2011) and interrupted naturally by periodic flooding events; and this process has been identified as a key conservation value in the river valleys of the West Coast (Knightbridge et al 2000).

Grassy river flats, fans and islands

The plant composition on the grassy areas of the licence changed between the upper and lower parts of the licence area (pers. obs). The abundance and diversity of native grass species, woody sub shrubs, and non-vascular species on the grassy flats on the true right of the river decreased going down stream (Photos 2 3 and 4) from Canoe Cape to the Roaring Billy. The grassy flats on the true right of the Haast River at Canoe Cape support a mix of exotic and native monocots and forbes, with abundant non-vascular species cover (60-70%) in the ground cover. Approximately 50% of the vascular ground cover species were native, and 50% exotic with an estimated 20% bare ground (pers.obs.). Further down the licence on the last flats the exotic dominance of the ground cover was much greater (approx. 90% exotic).

The common exotics here, and on the rest of the licence, include *Anthoxanthum odoratum*, *Holcus lanatus*, *Agrostis capillaris*, the ubiquitous catsears, lotus and hairy chickweed. The more common native species included *Carex comans*, *C. coriacea*, *Poa cita* and toetoe; bryophytes and lichen; the small fern *Blechnum penna marina* and small shrubs such as patotara (*Leucopogen frasesri*), *Muehlenbeckia axillaris*, *Coprosma brunnea*, *Coriaria sarmentosa* and *Pimelea prostrata*. Amongst the non-vascular species are *Sphagnum* and *Racomitrium* spp.

The grassy areas support scattered remnants of small trees and shrubs, mainly mikimiki (*Coprosma propinqua* and *C. rugosa*) and kaikomako (*Pennantia corymbosa*) but also including the at risk *Coprosma wallii* and lowland ribbonwood. Noticeable by their near total absence, were the native tussocks (1 large specimen observed of *C. rubra*, at Canoe Cape grassland)

The grasslands on the true right of the river just upstream of Prospector Flat are dominated by exotic grass and forb species as listed above, including exotic *Juncus* species (*J. tenuis*) with only scattered native *Carex* species: *C. comans*, *C. gaudichaudiana*, and *C. coriacea*. The wetland on this island showed negative effects of cattle. The shrubs are predominantly *Coprosma propinqua* and *C. rotundifolia*.

The Sunny Flat grasslands extended beyond a small stream, Solitude Stream, which follows the contour line at the edge of the National Park boundary (Photo 5). The exotic grasses dominated the flats with occasional *Carex comans* and toetoe. Remnant stands of lowland ribbonwood with *Coprosma wallii* in the understory persist, with the largest still functionally connected to the forest edge adjacent to the licence. Mounds of *Polystichum vestitum* are common adjacent to the forest and shrubs, but less common further towards the river. Sunny Flat is a heavily grazed area of the licence and predictably has greater exotic grass cover.

Wetland vegetation occurs on several areas down stream of Canoe Cape on both the true right and true left of the river. The grassy island upstream of Prospectors Flat was poorly drained and included an oxbow wetland with shallow open pools of water with little movement. *Carex secta*, *C. coriacea* and *C. virgata*, were the common native species around the wetland margin with some toetoe (Photos 6 and 7).

The largest open water wetland on Sunny Flat consists of two large pools of permanent water with typical riparian vegetation of harakeke, *Carex virgata*, and *C. secta* and *Coprosma propinqua* and *C. wallii*. The wetland is within Mount Aspiring National Park and is surrounded by forest to the south with the pasture of the licence on Stewardship land to the north. (Photo 8). The riparian vegetation is in good condition and little cattle sign was seen

in proximity. Solitude Stream runs parallel to the edge of the National Park and flows into the Haast River. This stream has some aquatic vascular plants, but little riparian vegetation.

Sunny Flat also has a second oxbow wetland which is adjacent to the remnant patch of forest which extends into the licence area from the forest within the National Park (Photo 9). This open pool of water did not support the expected range of native species on its margin; there were few *Carex secta*, no harakeke, and few woody shrubs around most of its margins, this is likely to be the result of grazing and associated developments over time.

There are few ponds and/or lakes within Okuru ED (111 hectares) and over 90% of this habitat is on public conservation land. Herbaceous freshwater vegetation is, concurrently, also only represented by small areas within the Okuru ED (61 ha), but this is 75% of the entire ecological regions herbaceous freshwater vegetation. This vegetation type on M2.1 land environment (the better draining more fertile soils) makes up a small proportion of the E.D. (33ha) and it is almost all on public conservation land. The open water wetlands at Sunny Flat are an example of this habitat with native vegetation on public conservation land.

Riverbed

There are large areas of un-vegetated riverbed within the lease area, but some riverbed areas, (depending on time since the last disturbance event) have scattered vegetation, mainly native herbs, such as *Raoulia tenuicaulis*. and *Epilobium* species, followed by small shrubs, *Pimelea prostrata*, *Veronica* sp. (hebes). and *Coprosma brunnea*. Braided rivers and wetlands are both naturally uncommon ecosystems (Williams et al 2007) and as such are recommended for protection (DOC and Mfe 2007). Approximately 23% of New Zealand's braided rivers are protected in public conservation land. This ecosystem type is classified as endangered (Holdaway et al 2012).

Flora values of interest

Threatened and At-Risk vascular plant species (de Lange et. al, 2018) identified in the licence area include:

- *Coprosma brunnea*- Data deficient- common in upper open river flats of Area B
- *Coprosma wallii* - At Risk-Declining, good populations in upper half of Area B, mainly sunny flat and flats by McFarlane Creek.
- *Metrosideros diffusa* -Threatened- Nationally Vulnerable- scattered throughout Area B
- *Metrosideros fulgens* -Threatened- Nationally Vulnerable- scattered throughout Area B
- *Metrosideros perforata* -Threatened- Nationally Vulnerable- uncommon throughout Area B
- *Metrosideros umbellata* -Threatened-Nationally Vulnerable- uncommon throughout Area B
- *Neomyrtus pedunculatus* -Threatened- Nationally critical- common throughout Area B, especially in damp beech and podocarp forest.

Other Threatened or At-Risk species which are likely to occur on the grazing licence include *e Deschampsia caespitosa* (At risk- Declining) likely on open river flats in upper part of the Licence area, and *Coprosma pedicellata* (At -risk Declining) on the wetter soils around Sunny Flat.

The population of *Coprosma wallii* found around Sunny Flat includes numerous large old individuals growing mainly in association with lowland ribbonwood along the edge of the grassed river terrace, but also scattered along Solitude Stream which dissects the National Park and the Stewardship land. There are around 100 plants associated with the Canoe Cape

grasslands and forest edge downstream to the next vegetated island including those found in the terrace areas of lowland ribbonwood. There is some regeneration of *C. wallii* where short specimens are surviving amongst mounds of *Polystichum vestitum*, blackberry and other small shrubs.

The largest vegetated island at Canoe Cape contains a very large population (many hundreds of plants) of *Coprosma brunnea*. Due to its large size this population is a potentially regionally important, if not nationally important for the species. This site also contains a large population (hundreds of plants) of *Pimelea prostrata*, which is potentially important habitat for the Nationally Critical Pimelea moth and Pimelea bug. Threatened species and habitats for threatened species are key values to protect in grazing licences (Knightbridge et al 2000).

Bird species

The riverbed area is important habitat for birds such as the Banded dotterel (*Charadrius bicinctus*), South Island pied oystercatcher (*Haematopus finschi*), and Wrybill (*Anarhynchus frontalis*) which have been observed breeding the valley (Stephens and Walker 2018).

Important habitats and vegetation associations

Some fine and accessible examples of old growth lowland podocarp forest are present within the grazing licence and adjacent National Park, especially around Sunny flat on the true left of the river where kahikatea, matai and miro were amongst the emergent species. Kahikatea dominated forest was observed at Cuttance Creek, on the true right.

Ribbonwood (*Plagianthus regius*) forest, and associated *Coprosma wallii* forms a significant component of the bush both within and adjacent to 'Area B'. and is likely to have been cleared from parts of the valley already (Allen, 1980).

Riparian, oxbow lakes, and back-terrace wetlands, and associated plants are present within the area, on Sunny and Douglas bluff flats (true left bank) and on the true right of the river opposite Douglas Creek. Most are on the open flats within 'Area B', but a few are within forest adjacent to the lease area. These are important as they provide habitat for native wetland plant species, fish and water birds, and are part of the nationally rare, due to farming practices across much of the lowlands of New Zealand. Wetland protection in grazing licences was identified in Knightbridge et al (2005) as a key objective.

Assessment of the effects of the activity on terrestrial flora and proposed mitigation

Effects of stock on vegetation

Various reports (Buxton et. al., 2001, 2008, Buxton, 2011; Miller and Wells; 2003; Timmens, 2002) have looked at the effects of cattle grazing on the forest, shrubby ecotone and grasslands communities in South Westland rivers. The higher shrub frequency and stem recruitment, coupled with the greater abundance of palatable species in the enclosures, suggest that stock grazing is having a negative effect on native biodiversity within the woody vegetation at all sites except perhaps at a swamp site (Buxton 2011). This is also backed up by Timmens (2002), who states that only a few non-palatable species such as *Pseudowintera colorata* are resilient to grazing. The research also showed that removing cattle may facilitate the process of forest expansion to occur, albeit very slowly, into the grassland in two of the four river valleys in the study, but that this process is likely affected by other biotic and abiotic impacts as well (Buxton 2011).

Buxton et al (2008) showed that removal of cattle from the grasslands results initially in the dominance of a few, mostly exotic herbaceous species which reduces the frequency and diversity of both native and exotic grazing tolerant or low growing herbs.

Observations of cattle sign; both the amount and age of scat, tracks and vegetation impact increased going down-stream, from the Canoe Cape grassland, on the true right of the river. Little deer sign (scat or hoofprints) was observed during the site visit to the licence area, with only slightly more seen on the true left side of the river than the true right. This would indicate that deer impacts are ubiquitous through the licence area. It was also noted during the site visit that both the nature of some of the browse seen, and the species being browsed were not consistent with known deer browse indicators seen elsewhere (such as size of woody material browsed, and species (RH-W pers. obs)).

The effects of grazing on native vegetation were common through the licence. Many of the native species that occur on the river flats, such as *Poa cita*, *Austroderia richardii*, *Chionochloa rubra* and *Coriaria sarmentosa*, which promote sediment accumulation on the flats are being heavily browsed in the Haast river valley but would potentially become more common if grazing pressure was reduced or eliminated. Some grazing of the small shrubs e.g. *Pimelea*, *Coprosma brunnea*, and *Muehlenbeckia* on the upper grassy flats was attributable to hares. A large stand of approximately 100 toetoe at the western end of Sunny Flat, in the grassland area were very heavily grazed and many mounds around them suggest others have already succumbed to too much disturbance.

Trampling and suppression of forest floor species was common in the forest edges and coincided with obvious cattle sign. The understory of the ribbonwood forest was particularly depauperate on the true right of the river and noticeably so at Sunny Flat. There was no sign of recent regeneration of the palatable woody species in these camp-like areas. Individual trees of *Coprosma wallii*, lowland ribbonwood and silver beech were affected by cattle rubbing and broken limbs of *C. wallii* are apparent (Photo 10). A small remnant of ribbonwood trees within the fenced area of Sunny Flat are all now dead, and the evidence that they were ever there will eventually decompose. Hedging of all shrubs and small trees is obvious at Sunny Flat where all the animal sign was attributable to cattle or hares.

The wetland on the grassy island upstream of Prospectors Flat, was significantly impacted by cattle (Photo 5). The *Carex secta* and *C. virgata* were heavily grazed, hoof prints were obvious in and around the standing water and mounds, most likely remnants of dead *Carex* and toe toe, now covered in Yorkshire fog were obvious. Of the two the lagoon wetlands at Sunny Flat one was significantly impacted by cattle whilst the other, within the National Park had little sign of cattle damage.

Cattle are known to have a wider palate than deer (Buxton et al 2001) and species in the licence area such as Blackberry, *Aristotelia serrata*, *Coriaria arborea*, *Dacrycarpus darydioides*, and *Cyathea smithii* are not generally targeted by red deer (RH-W pers. obs) but were noticeably browsed within the area accessible to cattle. Species such as pate (*Schefflera digitata*), hen and chicken fern (*Asplenium bulbiferum*), *Astelia fragrans*, *Ascarina lucida* and *Blechnum novae zelandiae* were common in cattle free areas on the southern side of the State Highway, which are directly opposite areas with cattle, but not in the grazing licence area.

The research and field observations are consistent with the conclusion that cattle, at the current numbers, are having an overall negative affect on the forest composition and regeneration of rare plant species within and adjacent to the licence. The grasslands in the upper part of the licence, where there was less cattle sign, support a greater diversity and

abundance of low stature native sub shrubs and non-vascular species than those at Sunny flat or further down the licence at Prospector Flat where there was concurrently more and fresher sign of cattle. Some level of grazing is likely to be enhancing the diversity of herbs in the grasslands (Buxton et al 2008).

Effects of proposed weed control on vegetation

The applicant has proposed weed control as part of the lease negotiation. Most of the weeds likely to be controlled are weeds of open areas, such as gorse, blackberry, thistles and ragwort. These weeds are not necessarily damaging in a forest landscape setting such the Haast Valley, as native forest species would eventually gain dominance over them but may be a problem in the more open riverbed areas. Blackberry was common throughout, but it was noted that in some areas blackberry was often protecting native vegetation from browse by cattle so was potentially beneficial for regeneration in some places. The control of weed species in areas of woody vegetation may inhibit forest regeneration through loss of the many native plants growing in conjunction with the weeds, and as a result have a negative ecological impact rather than a positive one.

Stock containment

Fencing to exclude cattle from areas outside of the licence is impracticable due to regular natural disturbance events (floods and storms) in the valley and the necessity of clearing vegetation to establish the fencing.

Proposed Mitigation measures

The proposed mitigation measures of weed control does not address the negative effects of cattle grazing in the licence area.

Conclusion

The Haast valley has significant vegetation and habit values within and adjacent to Licence Area B. Cattle are having a negative impact on forest composition, regeneration of common forest species in areas adjacent to the licence and of aging populations of an indigenous shrub at risk of extinction. There are negative effects on the quality of many of the wetlands on the licence area. Some level of grazing is reported to maintain a higher diversity of native herbs and grasses in the grassland systems (Buxton et al 2008), however the most heavily used downstream grasslands in the licence area, appeared to have less diversity of native shrubs and sub shrubs and non-vascular species than those upstream.

Retaining the status quo is likely to result in further degradation of the area, especially the forest and wetland habitats, causing a reduction of significant habitat values, reduction in the resilience of local rare plant species populations, loss of species diversity in the forest areas adjacent to the grazing licence, and loss of plants which are important in maintaining soil deposition. Maintaining some grazing pressure will ensure a greater native and exotic herb diversity within the grassland areas, in the short term (Buxton et al 2008).

Reducing the pressure from cattle grazing on the licence, is likely to reduce the rate of decline in the important biodiversity values. However, where species preferred by cattle are already reduced in abundance, lowering cattle numbers may not be sufficient to result in their recovery. Reducing cattle grazing may have little impact on the diversity of native species on the grasslands. Reducing numbers will not eliminate the weed spread.

Removing cattle from the licence area will result in the recovery of native species diversity within the remnant and adjacent forests and would facilitate the expansion of forest into the

exotic grass dominated river flats. It is likely to result in the increased resilience of local populations of *Coprosma wallii* and other native woody species. It will likely result in the recovery of freshwater and wetland values across the licence. It will reduce significantly the opportunity for cattle to enter Mount Aspiring National Park, but not remove that possibility entirely. It may in the short term promote the dominance of exotic grasses in the grasslands.

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Figure 3: GPS track and waypoint from the field assessment. Numbers referenced in photos.



Photo 1: depauperate undergrowth and dominant *Polystichum vestitum* in lowland ribbonwood association. location 2



Photo 2. Looking downstream from Canoe Cape Flat Location 1.



Photo 3: native sub shrub *Pimelea prostrata* and bryophyte diversity in the upper licence. location 1



Photo 4: Exotic species dominance in the lower part of the licence. location 5



Photo 5 Cattle damage of flats adjacent to Aspiring National Park and Solitude Stream location 6



Photo 6 Wetland upstream of Prospectors flat. Location 5



Photo 7: detail of above wetland pool.



Photo 8: The intact wetland adjacent to SH 6 within National Park



Photo 9. The smaller lagoon wetland on Sunny Flat in the middle of the flat. Location 7



Photo 10 – broken *C. wallii* limbs – attributable to cattle. Location 7

