

TTP-05 SUPPORTING EVIDENCE

TITLE*: Optimising land use based on land type classification: Southern Alps

TTP-05 Objective 4

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Author*

- Company: AgFirst Consultants
- Name: Karl Barclay and Judy Miller
- Contact details: Tel: 03 448 8028, karl.barclay@agfirst.co.nz and judymiller@xtra.co.nz, PO Box 253, Alexandra

Introductory paragraph*

Richard and Sarah Burdon of Glen Dene Station have increased the sustainability of their farming system through developing an understanding of their resources and subsequent potential use in a challenging environment.

Key points* (approx. 6)

1. The Burdon's aim to achieve long term sustainability through balancing environmental, economic and social issues in their farming business.
2. Identifying land management units based on land classification has increased sustainability
3. Tenure review was fundamental in the process of considering the land according to its capability for long term production
4. Glen Dene Ltd has diversified into enterprises more suited to the land capability that are equally or more profitable than traditional high country farm revenues
5. Conservation and environmental values have been enhanced through consideration of land use capability
6. There have been significant social benefits to the community and region through public access, protection of conservation values and culturally significant areas

Interviewee details*

- Name: Richard & Sarah Burdon
- Contact details: tel: 03 443 1554, mb: 027 226 0983, email: burdonrg@xtra.co.nz, Glen Dene Ltd, Private Bag 9001, Wanaka 9343
- www.glendeneadventures.co.nz
- Location: Wanaka / Otago

Business background

- Business type description:

Glen Dene Ltd is a high country property that currently carries around 15,000 stock units comprising mainly Merino sheep along with deer and cattle (54:18:28 sheep:cattle:deer). Of these, around 10,500 stock units are run on Glen Dene itself and the balance of the stock units (mainly finishing stock and some dairy grazing) are carried on the lease blocks (Appendix 1).

Sheep

The flock currently includes 3670 Merino ewes (average lambing of 85%), 174 Finn Merino cross ewes and 945 crossbred ewes (average lambing of 130%). Lambing percentage ranges from 85% in the merinos to 130% in the crossbreds, breeding own replacements. The Burdon's are in the process of moving from a traditional merino farming system to crossbreds.

Cattle

A breeding herd of 210 predominantly Angus/Hereford cross mixed age cows. Glen Dene breeds its own replacements (68 R1 heifers mated as yearlings, 90 R2 heifers) with the balance of calves being sold or finished on the lease blocks. Bull calves are sold each year as yearlings into the dairy industry, steers are either finished and sent to the works or sold to the Five Star Feed Lot. Heifers are taken through and sold local or export as R2YR heifers.

Deer

Approximately 650 breeding hinds (Reds) and breeding own replacements (120 R1 breeding hinds, 95 R2 breeding hinds, mated). 210 mixed age stags for velvetting (producing around 4.5kg velvet per stag) and some stags for trophy hunting.

The farm is run as a company, Glen Dene Ltd and is effectively held by a family trust. Richard and Sarah Burdon manage the property and are in charge of all day-to-day decisions.

There are six full time staff with considerable use made of part-time people with experience relevant to specific tasks.

- Size:

Glen Dene 5974 ha freehold and 463 ha leasehold at Hawea Flat & Maungawera - 15 minutes drive away

Only 460 ha (7%) of Glen Dene is flat to rolling land along the lake shore. The balance is split between oversown and topdressed moderately steep, mid altitude hill country (2505 ha, 42%) and steep, high altitude, native tussock grassland (2730 ha, 46%) that is protected by conservation covenant and only extensively grazed for 3 months in the summer.

Soils are dominated by low to medium fertility upland and high country yellow-brown earths (Maude, Arrow and Dunstan) which are characterised by higher rainfalls and therefore strongly leached. Sulphur and phosphorous deficiencies are common in these soils as is the tendency for the soils to be generally more acidic and require lime.

- Background details

How long have you been farming? What is your farming history?

George Burdon, Richard's grandfather, purchased the original property Mt Burke station in 1929. At this time, the main road at Lake Hawea was also started which is now State Highway 6 that goes through to Haast. Glen Dene as it is known today is the northern

portion of the original Mt Burke Station. It became an independent property in 1979 after a decision was made to split the property into two farms. Richard's parents, Lesley and Jerry Burdon with their 3 children moved in on 29th November 1979. At this time, the farm was unfenced on both sides of the State Highway, as it was the undeveloped side of the original station. Richard and Sarah moved into the homestead in June 2003 to become the third generation to farm the property.

Prior to this Richard managed Wilkin Vale farm at Makarora (for Glen Dene) after gaining experience through shepherding in Australia, the Hawke's Bay and overseas whilst travelling.

The property is bound by Lake Hawea on the east, Lake Wanaka on the West, the Neck to the north and Mt Maude and Lake Hawea Motor Camp to the south. Lake Hawea was raised about 21 metres in 1958 resulting in loss of much of the lower country.

The Highest point on the farm is Isthmus Peak at the Northern end being 1386 metres high while the homestead is about 370 metres above sea level. Average rainfall at the wool shed is 900 millimetres per year. The climate is typically drier in the summer with moist, wet winters with snow expected.

In 2007, the Burdon's completed tenure review which resulted in them retaining 5974ha freehold and returning 2194ha to the Crown for conservation. Of the freehold land, approximately 2000ha is subject to conservation covenant. (Appendix 3 – Glen Dene Tenure Review Proposed Designations).

In 2008, Glen Dene Station was the supreme winner of the Otago Balance Farm Environment Awards. The judges were impressed with the way the large high country station is managed and the great scope and planning for further enhancement. They commended the Burdons on their ability to farm economically in this difficult landscape in association with conservation values.

In 2009 they won the Minister of Agriculture Scholarship to study farm ownership structures on New Zealand sheep, beef and deer farms.

How would you describe your farming business, financial situation, productivity, technological capability, starting point?

Mission statement – "to maintain control and management of the land with continual improvement of the soil, water, vegetation and saleable commodities, showing profitable returns and successful business management"

The Burdon's operate a reasonably diverse high country farming business that is integrated by managing products from breeding through to finishing. The intention is to control and manage products to market and this has been strengthened with the addition of lease blocks where they have the ability to finish young stock.

They aim to develop a long term sustainable farming unit that interacts with conservation and recreation.

The farm has only been developed since the early 1980's and so some parts are relatively in the early development phase. There is potential to improve production and efficiency in conjunction with sustainable land management. In 2008/09, 330 hectares of heavy bracken fern country was sprayed, burnt and oversown with new grass and a capital dressing of fertiliser. Glen Dene believe they will take this country from around 2.5 stock units per hectare to 4 stock units per hectare.

Richard attributes much of the farm's success to his parents Jerry and Lesley and Glen Dene staff. Their efforts have allowed him to take an active role in Federated Farmers and other industry organisations. As well as being a past member of the High Country section, past Otago provincial president and also a shareholder and director of Landward Management Ltd, a Dunedin based valuation and consultancy business.

Context / Drivers of change

What motivated you to change / adopt new practices?

Tenure review and the resulting outcome in 2007 was fundamental in the process of considering the land according to its capability for long-term production, based on its physical limitations and site-specific management needs, to promote sustainable land management. It resulted primarily in 2194 ha of Class VII and VIII land being retired due to limitations of extreme potential erosion, very steep slopes combined with severe climatic and soil fertility limitations. It was deemed that this land was more suited to erosion control, water management and conservation of flora and fauna. A further 2000 ha of Class VII and VIII was freeholded subject to conservation covenant (See Appendix 3 – Glen Dene Tenure Review Proposed Designations). Monitoring is being undertaken by DOC and Canterbury University in this area to determine the future grazing opportunities.

This meant a change in farming away from the traditional practice of running merino wethers in this country for 9-10 months of the year.

Richard believes that “the tenure review result was very positive. There is good public access outcomes, wetland areas have been fenced off, areas of significant importance to Maori have been identified, and it has provided enormous recreation benefits to the community”.

The process has been a driver of enhancing sustainability on the property. “It was a very public process, everything was scrutinised by the many stakeholders that were interested in particular values on the property”. As a result Richard and Sarah have an increased awareness and commitment to managing these values to improve the sustainability of their farming operation.

Richard was also involved in the MAF Sustainable Farming Fund Project 04/063 – “Guidelines for preparing whole property management plans for high country farms” (2 March 2008).

Another driver of sustainability has been the increasing volatility in the income traditionally derived from merino wool. Traditional high country properties that have been dependent on wool as their primary source of income have had to diversify to be financially sustainable. The value in sheep farming is now in meat with wool (in a crossbred situation) being a cost to the business. Diversification is difficult on a high country farm where the majority of the farm is steeper hill country. Richard has been able to achieve this through the development of land classes that support deer farming integrated with sheep and beef farming, the addition of lease blocks for finishing, and through enhancing the natural environment that will increase recreation and tourism opportunities.

What do you think a changing climate will mean for you? Is/will a changing climate make a difference to the way you do business?

“Where you have a growing agricultural business with increasing stock units the financial impact will be enormous in terms of mitigating carbon emissions”. It will require farmers to develop a better understanding of their underlying land capabilities to ensure they optimise their land use to meet agricultural production and emission mitigation objectives.

“The New Zealand government’s management of climate change is critical to maintaining economically viable farming units. There are many aspects of the RMA that are now affecting how farmers can change their business and many activities now require resource consent, e.g. planting of trees, tracks for access. Many councils have changed farming from being a permitted activity to a controlled activity under their district plan which limits what farmers are economically able to achieve”.

Richard believes that at 10% of total land area, South Island high country lands “will have a significant influence in balancing emissions, for New Zealand”. Therefore, more information is needed on the amount of carbon stored in tussock grasslands or potential management actions to increase carbon storage. There is a need for more research into the effect of native tussock grasslands and forest in emission trading.

What opportunities or challenges does a changing climate present to you?

A changing climate and the potential challenge of increased costs to agriculture in balancing emissions has led the Burdon’s to consider other income revenues. Farming in an area that has outstanding landscape and conservation values means there are many opportunities to capitalise on ecological tourism. Richard is very open to diversifying from the traditional core agricultural revenue streams and developing the farm in areas that will enhance recreation and tourism opportunities.

“The challenge for pastoral lease farmers will be being able to get an affordable recreational permit that allows them to integrate tourism and farming together”. Richard believes that ability of NZ hill and high country properties to integrate tourism and farming is what will allow many to remain economically viable.

Actions *(talk about the now and being prepared for the future. It is ok if they don’t know the results)*

What new technology / adaptation practices have you adopted? When and how did you make the decision to adopt these? What did you do? / What did the change involve and what methods were used? How long did this take and what did it cost? How well did the methods work?

Glen Dene has been classified into land management units (LMUs) based on land use capability (LUC). These management units are fairly self-evident, reflecting a combination of environmental units (e.g. rolling downs, hill slopes and steep hill) and management (cultivated, over-sown and top-dressed and native). More information on the LUC is detailed in the property map (Appendix 2) from the ‘New Zealand Land Resource Worksheets’. This map provides a description of the land resource (rock type, soil unit, slope, erosion degree and type, and vegetation) and the land use capability (an assessment of the land’s capacity for sustained productive use, taking into account physical limitations, soil conservation needs and management requirements).

The LMUs on Glen Dene are outlined in Table 1.

This strategic approach enables increasing protection of fragile ecosystems, selective safeguarding of existing pastoral production areas and selective development of new areas. Increasingly the objective is to improve production efficiency and sustainability and not necessarily overall production. Using less land more efficiently will enable more ecosystems to be kept in their natural state for other non-agricultural land uses, while still maintaining a viable agricultural industry (Floate, M, 1992).

Table 1: Summary of Land Management Unit characteristics and qualities for Glen Dene

Land Management Unit (LMU)	Description	Strengths	Weaknesses	Uses & Management	Stock classes run		
					Sheep	Beef	Deer
1. Glen Dene Paddocks (140 ha) LUC – IVe10	Rolling surfaces with low fertility soils on schist, alluvium and glacial till. Maude soils - silt loam on sand, very well drained, some stones. Bisected by the State Highway. Woolshed/ yards and farm buildings located in this area	<ul style="list-style-type: none"> • Moderately deep and well drained soils • Mostly cultivatable • Responsive to fertiliser • Well subdivided • New grasses • Good shelter • Reticulated water • Irrigation on about 40 ha – responds well, no ponding or pugging 	<ul style="list-style-type: none"> • Low natural fertility • Sulphur and phosphorous deficiencies • Acidic subsoils – still requires lime to reach optimum levels • Some lower producing uncultivable areas • Snow may lie in winter for short periods • Some stock access to natural water • Woolshed and amenities at one end of the farm – a long way from the rest of the farm (up to 24km) 	<ul style="list-style-type: none"> • Mostly renewed pastures since 1999 • Used for winter crops - 20-30 ha (Yr1 - spray, direct drill turnips, Yr2 – cultivate, drill kale, Yr3 – new grass) • Lucerne silage and hay production (24 ha). 1st cut (15th Nov) silage production. 2nd & 3rd cut – lucerne hay • Pasture silage (30-40 ha) -closed 1 Dec – made into silage 10 Jan • Identified some of wetter areas and fenced off • 60 tonnes barley introduced for winter feeding • Wintering of sheep and calves, first calving heifers • Set stocked with ewes for lambing and from weaning rotated round for rest of year • Reasonably critical to management due to woolshed/amenities - increases stock pressure at certain times in this area • <i>Pine plantations for GHG mitigation in uncultivable areas?</i> 	70%	30%	
2. Glen Dene Deer (55 ha) LUC – IVe10	Rolling surfaces with moderately fertile soils on schist, alluvium and glacial till. Maude soils - silt loam on sand, very well drained, some stones. On the lake side of the	<ul style="list-style-type: none"> • Well subdivided - all deer fences (was the original deer unit) • New grasses • Reticulated water • 16 ha irrigated – responds well, no ponding or pugging • Fenced around lake 	<ul style="list-style-type: none"> • Lacks scale as a deer unit – has become isolated • Big Swamp area uncultivable • Runoff risk to lake 	<ul style="list-style-type: none"> • Currently runs 200 mixed age stags for velvetting • Reasonably intensive and high performing • Winter crops - 5ha of turnips/kale • Pasture silage on irrigated part • Cattle grazing (around 15% of year) to maintain pasture quality • <i>Sediment pond below Big Swamp to</i> 	15%		85%

Land Management Unit (LMU)	Description	Strengths	Weaknesses	Uses & Management	Stock classes run		
					Sheep	Beef	Deer
	State Highway	<p>margin</p> <ul style="list-style-type: none"> • Shelterbelts – exotic • Natural shelter in Big Swamp paddock – ideal for stags 		<p><i>prevent sediment flow from deer wallowing into lake?</i></p> <ul style="list-style-type: none"> • <i>Add flaxes between fence and lake to filter water?</i> 			
<p>3. Oversown Hill Country (2505 ha)</p> <p>LUC – Vle22</p>	<p>Moderately steep to steep slopes.</p> <p>Mid to high-altitude (up to approximately 1100m in places) sunny and shady faces</p> <p>Arrow soils – steepland soils related to yellow-grey earths on schist rock.</p> <p>Vegetation - bracken fern, short tussock assns, low producing or native grassland and some matagouri.</p> <p>Oversown and topdressed (OSTD).</p>	<ul style="list-style-type: none"> • Naturally sheltered • Good rainfall zone (>900mm p.a) • Warm aspect • Natural water • Responds well to OSTD • Where possible and practical – major waterways fenced off (Dinner Creek, Stewarts Creek, Hall Creek, Ewe creek) • Due to locality to the lake – less prone to frosts • A large area with development potential (development only started in 1980s) 	<ul style="list-style-type: none"> • Low temperatures, short growing season (5-6 growing season) • Northerly aspect can produce summer dry • Low production from native species • Occasional snow risk. However, on lake faces the snow is always 500ft higher than it would be inland • High input costs (\$350-\$400 per hectare for development) & \$80-\$100 for maintenance • Increase in bracken fern and woody species due to o/s and t/d – very competitive for P 	<ul style="list-style-type: none"> • 810ha deer fenced for running breeding hinds – from 1 Sept – 30 June • Breeding cows from weaning (mid-April) to spring (1 Sept). Lightly stocked for calving until Nov (when brought down for mating) • Ewe grazing from mating (1 May) to end of June and for lambing (1 Sept) until weaning (20 Jan) • OSTD of introduced grasses and legumes to inter-tussock sward enables retention of native tussock grasses that are essential for maintaining ecological stability in this environment • Bracken fern control to increase economic sustainability (spraying 200ha per year followed by seed and super application) • Maintenance of S and P levels • Aim to increase stocking rate from 3 to 5 s.u per ha • Currently running merinos – moving to crossbreds due to increasing DM production through development (more suited to crossbreds – animal health problems associated with merinos) • No deer breeding run as 100% due to lack of flexibility (if dry or becomes wet – not easily moved) • <i>Recreational and conservational opportunities in this area (e.g. 1.5 m</i> 	35%	15%	50%

Land Management Unit (LMU)	Description	Strengths	Weaknesses	Uses & Management	Stock classes run		
					Sheep	Beef	Deer
				<p><i>cycle/walking tracks and integrating that with farming system)?</i></p> <ul style="list-style-type: none"> • Increase deer fencing – another 160ha? • Add improved laneway systems? 			
<p>4. Dinner Flat Paddocks (110 ha)</p> <p>LUC – VIs12</p>	<p>Very shallow, stony terraces, fans & moraines. Soils are moderate fertility.</p> <p>Maude soils – upland & high country yellow-brown earths.</p> <p>Bounded by State Highway and the lake.</p>	<ul style="list-style-type: none"> • Cultivable • Well subdivided • Well drained and resistant to pugging • Some reticulated water 	<ul style="list-style-type: none"> • Wetlands • Exposed to the northwest winds • Can become dry • Lack of shelterbelts • Stock have access to some natural water • Lake margin fenced in some areas • Stoniness creates cultivation difficulties • Runoff risk 	<ul style="list-style-type: none"> • Wintering merino ewes (Jul-Sept) on crop • Set stock ewes for lambing, the rotate around from 1st Dec • Lamb grazing from weaning to Autumn • Flushing in Autumn for ewes • Winter rotation (3 times approx every 30 days) • Some cows calving in Sept – Jan • Around 20ha in kale or turnips • Approximately 8ha baleage made in summer • Consent for irrigation approved - 40ha proposed out of Stewarts, Dinner and Ewe creek – on gravity K-line system (est. 4-5 s.u increase). Providing an investment return of approx 21% (cost \$85K) • Enhancement of wetland areas through plantings – currently unfenced • <i>Fence off wetland areas</i> • <i>Increase reticulated water?</i> • <i>Fence lake margin and amenity planting between fence and lake?</i> • <i>Extend wetland planting?</i> 	80%	20%	
<p>5. Dinner Flat Deer (156 ha)</p> <p>LUC – VIs12</p>	<p>Very shallow, stony terraces, fans & moraines. Soils are moderate fertility.</p> <p>Maude soils – upland &</p>	<ul style="list-style-type: none"> • Cultivable and partially OSTD • Deer fenced • Well subdivided • Resistant to pugging 	<ul style="list-style-type: none"> • Wet areas • Exposed to the northwest winds • Can become dry • Lack of shelterbelts 	<ul style="list-style-type: none"> • Weaner deer June through to October and then transfer to Maungawera lease block • MA Hinds June to 1st Sept • Some cows calving from Sept to Jan • Sheep lambing from Oct – Jan 	30%	10%	60%

Land Management Unit (LMU)	Description	Strengths	Weaknesses	Uses & Management	Stock classes run		
					Sheep	Beef	Deer
	<p>high country yellow-brown earths.</p> <p>Location of main deer shed.</p> <p>Bounded by State Highway.</p>	<ul style="list-style-type: none"> • Reticulated water 	<ul style="list-style-type: none"> • Stoniness creates cultivation difficulties • Stock have access to some natural water 	<ul style="list-style-type: none"> • Lambs & hoggets – Feb - May • Crops or hay/silage?? • Enhancement of wetland areas through plantings (currently unfenced) • <i>Further wetland enhancement and fencing</i> • <i>Conservation fencing - two small areas of beech forest need fencing</i> • <i>Native shelter for aesthetics (some soil conservation, habitat creation, biodiversity enhancement)</i> 			
<p>6. Native tussock grassland (2730 ha)</p> <p>LUC – VIIIe9 & VIIe21</p>	<p>Undeveloped open tops. Dominated by snow-grass (tall tussock) associations, and fragile ecosystems.</p> <p>Steep to very steep slopes above 1100m. Highest point – 1386m.</p> <p>Dunstan soils - shallow sandy loam on steep (>25°) – hill & steepland soil, related to upland & high-country yellow-brown earths</p>	<ul style="list-style-type: none"> • Holds on through summer – can provide valuable late summer feed • Relatively ‘untouched’ with high conservation values and biodiversity • Good existing access • Weed free • Clean in terms of animal health 	<ul style="list-style-type: none"> • High altitude and therefore cool temperatures and snow risk • Moderate erosion risk • Low quality native forage 	<ul style="list-style-type: none"> • Extensive grazing with merino/crossbred ewes in summer (Feb to April) at low stocking rate • Conservation – this area is protected by 2 covenants (CC1 and CC2 – monitored by DOC and Canterbury University) • No burning or tracking development • Provision of public access to particular native biodiversity values • Eco-tourism – Hawea-Wanaka Ridge Ride • <i>Potential for more tourism?</i> • Monitoring will identify future grazing opportunities. <i>Retire completely from stocking?</i> • <i>Carbon credits from tussock grasslands?</i> 	100%		
<p>7. Native bush (214 ha)</p> <p>LUC – some large areas of bush in VIIe12</p>	<p>Scattered bush fragments with some large areas within gorges and steep sided gullies. Natural boundaries not requiring fencing in places.</p>	<ul style="list-style-type: none"> • Erosion control • Aesthetics • Ecological corridor • Shade and shelter 	<ul style="list-style-type: none"> • Possum refuge 	<ul style="list-style-type: none"> • Fenced off and protected in Dinner Creek • Possum control monitored through AHB programme • Conservation values monitored by DOC and Canterbury University • Walking tracks – Dinner Creek (fenced) 	-	-	-

Land Management Unit (LMU)	Description	Strengths	Weaknesses	Uses & Management	Stock classes run		
					Sheep	Beef	Deer
	Dinner Creek bush area fenced.			and Long Valley • Eco-tourism opportunities			
8. Pine plantations (38 ha)	On lower country.	<ul style="list-style-type: none"> • Valuable shelter from prevailing northerlies • Soil conservation 	<ul style="list-style-type: none"> • Ongoing maintenance • Wilding tree problem reasonably low threat • Weak market 	<ul style="list-style-type: none"> • Shelter • <i>Aim to plant 1000 trees per year in unproductive areas (i.e. uncultivable areas within LMU 1 & 2, 4 &5)</i> • Potential for carbon credit benefit 	-	-	-

The above analysis of identifying LMUs based on LUC, enables the Burdon's to integrate objectives relating to stocking, pasture improvement, animal and plant pest control, recreational management, and native biodiversity. Analysis of the strengths and weaknesses of each LMU, has meant that other potential management options to improve sustainability can be considered.

1. Development of Oversown Hill Country (LMU 3)

The moderately steep to steep slopes and associated natural vegetation present in this unit lend it towards use as a deer breeding block. Deer produce the most favourable gross margin per stock unit in this LMU. As a result, the last 8 years has seen Glen Dene increase economic sustainability by undertaking a large amount of capital development in this unit. They have increased the amount of deer fencing by 67km since 2000 (average price of this fencing is \$18 per metre). However, sheep and cattle are still run in this area as part of an integrated system that gives flexibility between LMUs in changeable conditions. The other stock classes also help retain pasture quality. There is potential to add an additional 160km of deer fencing and improve laneway systems.

As this area represents 42% of the freehold land area, and responds well to oversowing and topdressing, the Burdon's have identified that it can be developed further through bracken fern control to increase productivity. Bracken fern is dominant in this area and increases with phosphate application – it is estimated that around 2000 ha (80%) of the 2505 ha in this unit is currently covered in bracken fern. It is the most limiting factor to production in this unit after slope (?)

The Burdon's intend to control 200 ha per year over the next 10 years through initial spraying and burn control followed up with seed and super.

2. Conservation

Consideration of the native tussock grassland (LMU 6) based on its land use capability in tenure review led to it becoming freeholded subject to conservation covenant. Consisting entirely of Class VII and Class VIII land that is relatively 'untouched' with high conservation values and biodiversity, it was deemed that it could be grazed extensively with sheep in summer subject to ongoing monitoring that will determine the future grazing opportunities.

Conservation and landscape values associated with this LMU, combined with existing well developed access, provide a large potential for recreational and ecological tourism.

The Burdon's already run an annual event the "Hawea-Wanaka Ridge ride" (a 35km trail bike loop ride) on the property that traverses this area.

3. Increase area of irrigation

As identified in the analysis above, the Dinner Flat Paddocks (LMU 4) are susceptible to drying out in the summer months. To increase the dry matter production in this area, the Burdon's have gained consent to irrigate 40 ha on a gravity K-line system fed from the Stewarts, Ewe and Dinner creeks.

4. Plantings for aesthetics and to balance carbon emissions

During their management of the property, Richard's parents, Jerry and Lesley, established pockets of forestry and began planting pine and lawsonia shelter belts in the 1980s. Building on these efforts, Richard and Sarah are planting about 1000 trees, including native plants such as flaxes and Pittosporums, each year in areas less suited to grazing. This is mainly in the un-cultivable gullies of the lower land and along the lake margin. Records of these plantings are to be kept with a view to the possibility of using these plantings to meet or benefit from carbon credits.

Regulations in the district plan of the Queenstown Lakes District council regarding pine plantations make this more challenging. The Burdon's however, are keen "to develop a

landscape that reflects the areas natural beauty” and aim to plant as many natives as they can to achieve this.

Where there is exposure to northwest winds in Dinner Flat Paddocks (LMU 4) and Dinner Flat Deer (LMU 5) the intention is to establish shelterbelts of native and exotic species to help conserve soil moisture and reduce wind erosion.

Where it has been identified that there are wetland areas in LMU 4 and 5, the Burdon’s have been planting native species. They intend to fence off these areas and continue plantings and hope to encourage an increase of wild fowl. This will contribute to sustainability of the farming operation by mitigating problems associated with stock access and will enhance the conservation values of the property.

5. Preservation of native bush

Areas of native bush have been identified and subsequently fenced off where possible (i.e. Dinner Creek). Most areas of native bush are located in steep gullies and protect the land from erosion. Some are included within the conservation covenant set up through tenure review and are monitored as a result. There is public access (in the form of walking tracks defined as a result of tenure review) through the native bush at Dinner Creek and Craig Burn. The Burdon’s see this as an important part of the environmental and social sustainability of their property that provides economic benefits through potential diversification into recreation and tourism.

6. A change to crossbreds

Glen Dene is in the process of changing to crossbred sheep (Headwater composite – ¼ Perendale, ¼ Texel, ¼ Romney, ¼ Finn). This aims to better utilise the increase in dry matter resulting from the development of the oversown hill country (LMU 3) and also overcome current production losses associated with merinos from footrot and lower lambing percentages.

7. Nutrient balance

As part of the development programme, and to maintain optimum nutrient levels, a well planned, strategic soil testing plan is carried out. Soil monitoring records stretch back to 1984 (Appendix 4 – Fertiliser Test Results Glen Dene)

Challenges / Opportunities

What have been /are some of your biggest challenges, if any?

Restrictions from the Queenstown Lakes District Council (QLDC) in the district plan in regard to permitted activities and controlled activities – resource consent is required to plant more than 4 ha of trees or trees between a road and a main view. This is due to issues around protecting landscape values in this region and wilding conifer spread.

Resource consent is also required for bracken fern control by burning after spraying.

The process of obtaining resource consent for development can be frustrating and time consuming and comes at a cost to the business.

How have/will you be managing these risks and challenges?

“It is important to play an active role in the council decision making process. I also employ more staff to deal with all the other issues so that I am able to understand and manage some of the risks to the business.”

Where resource consent is obtained for planting exotic species that have the potential to spread, these plantations are planned for the un-cultivable gullies of LMU 1 & 2, 4 & 5 (flat to rolling land along the lake edge) rather than planting on wind prone tops and ridges. In these LMUs they will be surrounded by intensive grazing and it will also be easy to control outlier trees before coning.

Richard and Sarah understand and demonstrate the importance of communicating and ensuring good information flow to the community around the outcomes of proposed developments that will impact on the region and its values.

What opportunities have there been, if any?

However, farming in the QLDC and being near the popular, internationally acclaimed Wanaka and Queenstown creates huge potential to integrate farming with quality recreational and tourism pursuits. As well as providing an enjoyable challenge, such new ventures and the alternative income streams they create only add to the long term sustainability of the family's farming business.

The Burdon's already operate a growing trophy stag hunting operation. Glen Dene's natural lake boundaries and imposed limitations on helicopter and vehicle access ensure paying clients a unique 'big game' experience. The trophy hunting season begins in mid March and runs through until mid June. Clients spend four to seven days with professional hunting guides stalking deer, pigs, Fallow and Chamois on Glen Dene. Due to the location of the property they are also within distance of opportunities to hunt Thar in the MacKenzie country or Fallow deer in the Blue Mountains. There is also the option of trout or salmon fishing in Lakes Hawea and Wanaka.

"We have looked at leasing or buying more farm land to improve our economies of scale. We have plans to develop more eco-tourism with mountain biking and walking in the future as well as building on our trail ride business."

Outcomes (*outcomes and outlook may crossover a bit*)

How has adopting this new practice changed your financial, environmental and social outcomes/success?

The process of considering land use based on land type balances sustainability of all three aspects. To neglect any one of these diminishes the success of the other two.

Financial – It has meant that the Burdon's have diversified into enterprises more suited to the land capability that are equally or more profitable than traditional high country revenues. The business of Glen Dene Ltd, which is no longer just a farming business has grown its income 2.2 times in the last three years.

Environmental – Conservation and environmental values have been greatly enhanced on Glen Dene through consideration of land use capability. The conservation covenants resulting from tenure review and ongoing efforts of the Burdons to enhance and protect environmental values will continue to ensure environmental sustainability remains a high priority.

Social – The consideration of Glen Dene's land use capability through the tenure review process had a very positive result for the community and region. Public consultation enabled interested stakeholders to have input into the process. This intense scrutiny resulted in the development and identification of conservation areas, public access easements and culturally significant areas.

Outlook

How will the new practice be managed / maintained in future?

The Burdon's have a comprehensive business plan that details objectives for key areas of the year and the goals to be achieved each month. It is updated monthly. Their staff are encouraged to contribute their ideas. They are also aware of the goals and results achieved in their areas of responsibility.

Each aspect of the business's operation is broken down into management systems and easily analysed.

What opportunities or risks / challenges do you foresee in the future?

Richard believes that there will be increasing opportunities for tourism to be incorporated into the Glen Dene business. Visitor numbers to Westland National Park in 1996 were 276,000 compared with 379,000 in 2008. Glen Dene is ideally located on State Highway 6 which is the only route through to the National Park from the southern end of the South Island.

What are your plans for the future / next steps?

The Burdon's intend to expand on recreation and tourism opportunities that the outstanding landscape within which they farm provides. Their recent purchase in October 2009 of the Lake Hawea Holiday Park is an investment that will support this development through providing accommodation and a hub for activities in the area.

The ongoing development on their property takes into consideration any infrastructure required to expand into such activities (e.g. walking tracks and access) and also continual enhancement of the conservation and environmental values that add to the experience.

Advice / Handy hints

What advice would you give to those considering change?

- Get good advice, the risks involved with farming are high – climate, volatility of product price, political risks
- Be open to ideas that may challenge traditional thinking
- Diversify on farm through understanding your land resource to maximise financial sustainability whilst maintaining environmental and social sustainability
- Diversify off-farm so that farming is not the sole provider of your income and time
- Development of a Land and Environmental Plan provides a good framework for considering land resource and future opportunities
- Understand government policy and the RMA – as this will have a big impact on your business

What feedback would you give to instigators / promoters of the change (e.g. govt)?

- Work with the farming community in developing strategies rather than giving them the outcome
- Communication is vital as many farmers still don't understand climate change
- Encourage more research into the effect of tussock grasslands and vegetation on carbon mitigation and the potential management actions that can be undertaken in these areas to increase carbon storage

What are some key lessons learnt?

- A day in the office setting up good systems doesn't ever beat a day on the hill mustering. However, it is vital to making your business systems work for you and is important for maintaining good records and reports and allows you to plan for the future

Looking back, would you have done anything differently?

- No, we are pretty happy with what we are doing.

Communications checklist

- Photographs (for human interest and to illustrate key points)
 - Thomas features merino 22.jpg – **“Richard, Sarah and family”** – photograph taken by Michael Thomas
 - Thomas features merino 9.jpg – **“The rolling Dinner Flat blocks at the northern end of Lake Hawea”** – photograph by Michael Thomas
 - Glen Dene 019.jpg or Glen Dene 020.jpg – **“Contrast between land management units”**
 - Glen Dene 014.jpg – **“Looking south to the Glen Dene Paddocks and Glen Dene deer blocks along the lake”**
 - Glen Dene 021.jpg – **“Oversown hill country (LMU 3) with bracken fern”**
 - Glen Dene 023.jpg – **“Landscape values present recreation opportunities”**
 - Glen Dene 024.jpg – **“Red Deer at Glen Dene”**
 - Thomas features merino 4.jpg – **“Merino ewes and lambs”** – photograph taken by Michael Thomas
- Completed and signed permissions forms - will send via post

Further information

Detailed farm / technology / practice methodology information including data / graphs / tables

- Appendix 1 - Glen Dene Stock Units – Livestock on hand as at May 2009
- Appendix 2 – Glen Dene classified by Land Use Capability
- Appendix 3 – Glen Dene Tenure Review Proposed Designations
- Appendix 4 – Fertiliser Test Results Glen Dene
- Output from OVERSEER
 - RBurdonA.ovp - Current farming scenario

Reference and resource list

- New Zealand Land Resource Inventory Worksheets (maps of land use capability) – available from Otago Regional Council, Alexandra. Tel: 03 448 8063
- Guidelines for Preparing Whole Property Management Plans for High Country Farms – Sustainable Farming Fund Project 04/063 (2 March 2008) David A Norton
- Guide to Tussock Grassland Farming, AgResearch, Invermay 1992, edited by Mike Floate
- Meat and Wool New Zealand, Land and Environment Planning Tool Kit (version 1.00)
- High Country Carbon Project C09/027 – a MAF Sustainable Farming Fund Project currently underway. Jim Morris (03 438 9458, ben.avon@xtra.co.nz)

Links to relevant websites and/or resources on websites

- Otago Regional Council website www.orc.govt.nz – growOTAGO maps – for soil and climate information
- www.landcareresearch.co.nz – Land Use Capability handbook - A New Zealand handbook for the classification of land, 3rd edition
- Land Information New Zealand website, www.lin.govt.nz – for information on pastoral land/tenure review
- www.carbonfarming.co.nz
- <http://www.lincoln.ac.nz/carboncalculator/>