SFF Application Form Check Sheet

Please ensure you complete this form

Name of Applicant Group:	**High Country Accord Trust**
Short title of Project:	**Can biodiversity conservation and economic production be compatible activities in the high country?**

What stage is your project at, with securing cash contributions from other parties? Please indicate below with a tick in the appropriate column.

Project cash contributions are:

Contribution:	**Confirmed**	**Pending**	**In discussion**	**Not yet discussed**
High Country Accord Trust	✔			
Merino Inc	✔			
High Country Section Federated Farmers	✔			

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Full budget information cash/in-kind contributions clearly provided:

Yes ☐ **No** ☐

Accept application for Assessment:

Yes ☐ **No** ☐

Application for Project Grant: 2004/2005

1. Name of Applicant Group:

High Country Accord Trust

2. Applicant Group Profile (who are you?):

The High Country Accord Trust was established to assist high country farming communities respond to the changing circumstances that have resulted from the Crown Pastoral Land Act 1998 and the Governments complementary (2003) objectives for the South Island high country. The Trust was set up from a number of groups that represent high country farming communities and has wide membership from throughout the high country. The primary focus of the Trust is tenure review and in particular on ensuring that this is undertaken in a manner that results in the long-term sustainability of all aspects of the high country, including economic, social and environmental components. The Trust is also committed to working with the farming community to make sure they have a good understanding of the tenure review process.

3. Address:

High Country Accord Trust
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Christchurch 8008

4. Contact Person: Rodney Patterson

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5. Short title of the project:

Can biodiversity conservation and economic production be compatible activities in the high country?

6. What is the problem/opportunity the project will address?

Nature conservation and economic production are often seen as conflicting activities that cannot occur in the same place. However, there is a growing recognition that long-term sustainability is dependent on maintaining a variety of values within the same landscape through integrated land management. Conflict over managing nature conservation values on rural land has been heightened by processes such as RMA Section 6(c) assessments, and tenure review under the Crown Pastoral Land Act. Rural communities have seen these, and regulatory tools more generally, as isolating areas with conservation values from the rest of the rural landscape. However, rural landscapes are not “black and white”, with large areas having a mix of values that are not easy to allocate solely to conservation or production. This is especially so in the high country, where tenure review as presently implemented is seen by many farmers as threatening the viability of their farming activities, especially merino wool production. In particular, loss opf summer grazing threatens overall property sustainability.Voluntary approaches to nature conservation such as covenants have, however, been viewed more positively, although covenants have mainly focused on parts of properties with particular values (e.g., a wetland). Covenants do, however, have the potential to be applied at the whole-property scale to enable a diverse range of values to be managed. This project will explore the potential for integrating nature conservation and economic production on high country farms and the role that covenants can play in ensuring that this management is sustainable in the future. Such an integrated approach provides the opportunity to maintain high country industries such as merino wool at a sufficient size to be viable. Specifically this project will:

1. Quantify the economic and conservation costs and benefits of different land management strategies at a whole property scale for at least two representative high country properties.
2. Determine the optimum way to include an integrated approach to sustainable land management within a whole farm covenant.
3. Disseminate the results of this work through the farming community.

7. What previously completed work is relevant to this proposal?

The research proposed here is new in that there has been little previous work undertaken on both the economic and biodiversity consequences of different land management options in rural New Zealand, although such research has been proposed for both plantation forest and agricultural systems (Norton 1998, Norton & Miller 2001). Spatial modelling tools have been used in North America to optimize timber harvesting while meeting biodiversity conservation goals (Bettinger *et al.* 1997; Snyder and ReVelle 1997) and similar approaches have been used in Norton America, Scotland and Australia to optimise biodiversity conservation within agricultural systems (Forman & Collinge 1997, Matthews et al. 1999, Lambeck et al. 2000). In New Zealand, McElrea (2002) has investigated the biodiversity and economic costs and benefits of different rotation lengths in plantation forests and Werntze (research in progress) is currently expanding on this research by evaluating the costs and benefits for biodiversity and timber production of different clear-cutting patterns at a landscape scale utilising spatial GIS models similar to those that we will use. The research proposed here will build upon these and other studies.

An important focus of our research will be on the biodiversity values within high country properties. We will undertake our own surveys of the study properties using standard ecological assessment methods similar to those used elsewhere in the high country. Our interpretations of the likely future condition of these ecosystems will build on the considerable body of information on both the historical ecology of high country environments (e.g., Molloy et al. 1963, Connor 1964, O'Connor 1982, McGlone 2001) and the effects of pastoralism (e.g., research reviewed by Ewans 2004).

One specific component of our proposed research will investigate the way in which merino sheep utilise high country landscapes. A key gap in our knowledge relating to sustaining indigenous biodiversity within agricultural systems relates to the way in which livestock utilise native biodiversity within the often heterogeneous environments that characterise the high country. For example, much of the summer grazing country that merino weathers utilise comprises a mixture of grassland, shrubland, forest and wetland habitats, each with different biodiversity values and different vulnerability to grazing. Our research will build on the earlier work of Harris & O'Connor (1980) and others who did not have the advantage of GPS technology to allow them to continuous monitor sheep movements, instead relying on visual observations.

A key component of our research will explore the manner in which covenants and easements can be used to facilitate biodiversity conservation, and public access, within a production agricultural environment. This research will be developed within the context of the large body of international research on incentives for biodiversity conservation in agricultural landscapes (e.g., Binning 1997, Gunningham & Young 1998) as well as research focusing specifically on the roles of easements and covenants (e.g., Gustanski and Squires 2000). In addition we will build on the considerable body of practical experience with covenanting both in New Zealand (e.g., by the QEII National Trust – see articles in 'Open Space') and internationally (e.g., American Farmland Trust 2003).

Our proposed research has some overlap with a current ARGOS research project considering environmentally-enhanced primary production systems in New Zealand. However, our approach is more focused than in the ARGOS project, which is undertaking a broader-spectrum study across a much wider range of agricultural systems than we are (e.g., kiwi fruit as well as sheep and beef farms, and contrasting organic with conventional agriculture). We have, however, been in contact with researchers involved in the ARGOS project and have agreed to share information and where possible collaborate to minimise overlap and maximise research knowledge gains.

References to literature cited here, and elsewhere in this application, are listed at the end of the description of our research methods appended to this application.

8. What work do you propose to do in the project? How will this work build on the previous work? How will it help to solve the problem or take advantage of the opportunity?

A full description of the methods that we propose to use for this project is attached to this application. The following notes summarise these methods.

In summary we are going to use at least two high country properties as case studies to quantify the economic and biodiversity costs and benefits of different management options (e.g., different grazing regimes) at a whole-property scale in order to identify what management options offer the "best" outcome for long-term sustainability. Based on this, we will then assess how such an approach could be included within a whole-property covenant, and how this might ensure long-term sustainability of these different values.

The project will involve eight components:
Selection of study properties – here we will select properties based on (1) a need to cover as much of this range as possible, (2) the willingness of the land owner/manager to freely participate in the project, including provision of economic information, (3) merino farming comprising at least 50% of the economic return to the property on average, and (4) the relative ease of access to and around the property.
Assessment of changes in land cover over the last 50-years – this will involve using aerial photos, knowledge of the land owner/manager and historical information determine the relative change in the area of major vegetation types (forest, shrubland, tall-tussock grassland, pasture, etc) over the last 50-years.
Current and potential biodiversity values – we will initially divide each property into a number of smaller landscape units reflecting major patterns of landform, soils, vegetation and economic use. This will then be used as a basis for determining the current biodiversity pattern on each property based primarily on vegetation and threatened species. Published literature will be used to determine likely future vegetation condition under different management scenarios and the values that can be ascribed to different states of vegetation development.
Stock habitat use – we will use GPS collars on sheep to determine the manner in which they utilise habitat, especially for areas with a substantial native component. Collars will go onto animals as they are put out into their summer grazing blocks and will be recovered when they are mustered back later in the summer. We will determine habitat usage by overlaying the animal position information with our biodiversity data using GIS.
Current and potential economic values - for each landscape unit, the current economic value will be determined (e.g., based on stock units per ha) by in-depth interviews with the farmer, as well as information on the potential value under different future management scenarios (e.g., with and without aerial oversowing and topdressing).
Spatial modelling - the biodiversity and economic information will then be integrated within a GIS-based model that allows us to explore biodiversity and economic costs and benefits of different spatial arrangements of a variety of land use activities within the study properties (sheep versus cattle grazing, controlled grazing, removal of grazing from some areas and more intensive management in others). Our basic approach is to answer a series of "what if" questions about how different components of the landscape might be rearranged (in terms of how they are managed) and the affects this will have on biodiversity and economic values.
Application of covenants - here we will explore the best methods to provide for both biodiversity conservation and economic production within a covenant, focusing in particular on the way that goals, methods and monitoring might be incorporated into the covenant at the scale of the landscape units used earlier in this study. In this nwork we will draw on experience with covenanting outside of New Zealand (e.g., conservation easements and agricultural conservation easements in the United States).
Dissemination of project results – the results of the project will be disseminated to the rural community through articles newsletters and a web site, workshops and articles in farming publications (these are discussed further in both the appended methods and in Section 15 of this application). A key feature of this proposal will be the close involvement of the applicant group (who are high country farmers) in all aspects of the project including study design and dissemination of the results.

9. Milestone Table

Describe the major stages/milestones of the project showing the planned completion date for each milestone and the criteria for verifying that the milestones have been reached. All tangible outputs for the project should be listed as milestones.

Milestone	Description	Date Expected (month/year)
1	Milestone: Produce and circulate 6-monthly newsletters (first in July 2004) Indicator of success: Newsletters produced and circulated	**Oct 2004 onwards**
2	Milestone: Establish web page Indicator of success: Web page established	**Oct 2004**
3	Milestone: Select properties to undertake research on Indicator of success: Report prepared for project group	**Nov 2004**
4	Milestone: Assessment of changes in land cover over the last 50-years Indicator of success: Report prepared for project group	**June 2005**
5	Milestone: Analysis of sheep habitat use Indicator of success: Report prepared for project group	**June 2005**
6	Milestone: Assessment of current and potential biodiversity values Indicator of success: Report prepared for project group	**Dec 2005**
7	Milestone: Assessment of current and potential economic values Indicator of success: Report prepared for project group	**Dec 2005**
8	Milestone: Complete GIS scenario modelling Indicator of success: Report prepared for project group	**April 2006**
9	Milestone: Assessment of application of covenants Indicator of success: Report prepared for project group	**April 2006**
10	Milestone: Run workshops in Cromwell and Christchurch Indicator of success: Workshops completed	**June 2006**
11	Milestone: Submit articles to at least two farming magazines/newspapers on project Indicator of success: Articles submitted	**June 2006**

10. The name of the project manager and members of the applicant group:

Project Manager: Rodney Patterson (Project Manger High Country Accord)

	Designation:
Member 1 Richard Burdon	Director, Merino Inc
Member 2 Ben Todhunter	Vice Chairman South Island High Country Section, Federated Farmers
Member 3 Assoc. Prof. David Norton	Associate Professor, University of Canterbury (principal researcher)

11. Proposed start date:	**12. Proposed completion date:**
1 July 2004	30 June 2006

13. Project work locations:

To be determined during first part of project (see under Sections 8 and 9 of this application)

14. Monitoring and evaluation:

Monitoring of project progress will be undertaken at several levels. The project group will meet at 3-month intervals to review the project and 3-monthly reports will be prepared for both these meetings and for the Sustainable Farming Fund. The second level of monitoring will be through completion of the milestone activities (mainly reports) on time as outlined in Section 9. Finally, the overall success of the project will be assessed through feedback from attendees at the two workshops that will be held at the end of the project. It is proposed that all attendees will be provided with a simple evaluation form to fill in at the end of the workshop. The results of this will be incorporated into the final newsletter arising from the project.

15. Sharing outputs:

The results of this project will be disseminated through the rural community as follows:

1. Six monthly newsletters summarising progress to date and future plans will be produced and distributed to High Country Accord, Merino Inc and High Country Federated Farmers members
2. A web page will be developed and will include copies of all reports and other items arising from the project.
3. Two full-day workshops open to farmers and to other key groups (e.g., councils, DOC, LINZ, MAF, MfE) will be held presenting the results of the project and involving interactive sessions on implementation.
4. A seminar will be given in Wellington to inform policy staff in key agencies on the outcomes of the project.
5. A report summarising the results of the project will be produced (and disseminated as above).
6. Two articles on the project will be submitted to New Zealand farming magazines/newspapers.

In addition, at least one scientific paper summarising the results of research will be submitted for publication in the peer-reviewed scientific literature.

16. Has funding for this project been requested from any other fund, at any time? State "yes" or "no". If "yes" please give the name of the fund, the year the request was made and if it was accepted, declined or pending.

No

17. The names and contact details of two independent referees who can comment on the application:

Name: Dr Brian Molloy	**Name:** Dr Richard Duncan
Address: 20 Darvel Street	**Address:** Ecology and Entomology Group
Riccarton, Christchurch	Po Box 84, Lincoln University, Canterbury
Telephone No. 03-348-1077	**Telephone No.** 03-325-2811

Additional information on methods
The following notes provide a more detailed overview of the methods that are proposed for the project "Can biodiversity conservation and economic production be compatible activities in the high country?"

Selection of study properties
The high country comprises a diverse range of environments and it is proposed that the properties selected for study represent some of this range. Four main groups of high country property can be identified:

1. Upper river properties ("Gorge runs") located close to the Southern Alps and as a result having relatively high rainfalls and most with greywacke geology.
2. Lake properties located adjacent to and between Lakes Wakatipu, Wanaka and Hawera, with moderate rainfalls and similar landforms and underlying schist geology.
3. Eastern basin and mountain properties located well east of the Southern Alps and experiencing relatively low rainfalls but often extending to high altitudes on the predominantly greywacke mountain ranges.
4. Block mountain properties of Central Otago experiencing relatively low rainfalls, with distinctive schist block mountain landforms.

Selection of properties for study will be based on (1) a need to cover as much of this range as possible, (2) the willingness of the land owner/manager to freely participate in the project, including provision of economic information, (3) merino farming comprising at least 50% of the economic return to the property on average, and (4) the relative ease of access to and around the property. It is likely that all selected properties will include pastoral leasehold land.

This part of the project will be primarily undertaken by Norton and Patterson, in consultation with the project group and the high country farming community.

Assessment of changes in land cover over the last 50-years
As a basis for determining potential future ecosystem development, change in land cover on the study properties for the last 50 years will be assessed based on analysis of aerial photos and the knowledge of the land owner/manager. Aerial photo coverage extends back to the 1940s or 1950s for most of New Zealand and will be accessed form archival sources. In order to track change since then, additional photos at 10-20 year intervals will also be obtained from archival sources, while a combination of recent aerial photos and the Land Cover Data Base Version II (LCDB) satellite imagery and resultant vegetation maps will be used to determine current land cover (backed up by the field surveys described in the next section). The different photographic images will be scanned and analysed using a Geographical Information System (GIS) in order to determine relative change in the area of major vegetation types (forest, shrubland, tall-tussock grassland, pasture, etc) over the last 50-years. In addition, information from the farmers and from historical records will be used to confirm the patterns detected and, where possible, extend the assessment further back in time.

This part of the project will be primarily undertaken by Cochrane and Norton, in consultation with farmers.

Current and potential biodiversity values
A key part of the study will involve a detailed survey of each property to determine the current and potential biodiversity values of the property. This work will involve three phases. Initially the property will be divided into a number of smaller landscape units reflecting major patterns of landform, soils, vegetation and economic use. These units will be similar to the landform classification units used in the Protected Natural Areas Programme (PNAP) surveys, and will be derived from a combination of the Land Environments of New Zealand (LENZ) classification (Leathwick et al. 2003), soil mapping from the Land Resources Inventory (LRI), and field assessments of each property. The objective of this classification is to identify landscape units (e.g., fans, valley bottoms, lower hill slopes) that are internally

homogeneous but distinct from adjacent units. For subsequent modeling purposes each unit will be treated as a distinct entity, even if the same landscape occurs elsewhere on the property.

This part of the project will be primarily undertaken by Norton in consultation with farmers.

This ecosystem classification will then be used as a basis for determining the current ecosystem pattern on each property. This will involve detailed surveys of each property focusing on the current ecosystem pattern within each landscape unit. Vegetation will be used as the primary method to define ecosystem pattern because (1) it is relatively easy to measure in the field, (2) it has been the primary focus of other assessments (e.g., PNAP), (3) it provides habitat for native animal species, and (4) the biodiversity impacts of pastoral management are best quantified for vegetation. Field work will involve detailed surveys of each ecosystem unit to determine what the current vegetation condition is. As part of this work, specific surveys for threatened species (*sensu* Molloy et al. 2003) will be undertaken within each landscape unit depending on the experience of the survey team and other input that may be available.

This part of the project will be primarily undertaken by the summer survey team working under the supervision of Norton.

In the third component, the published literature (e.g., literature cited in Ewans 2004) will be used as a basis for determining likely future vegetation condition under different management scenarios (e.g., no grazing, restricted grazing or heavy grazing) and the values that can be ascribed to different states of vegetation development. This assessment is important as it will provide key input information for the subsequent GIS modeling. While there is considerable debate on the feasibility and options for ascribing economic value to indigenous biodiversity, it is possible to determine relative value for particular conditions (e.g., degraded versus not-degraded). This part of the project will explore methods for doing this based on international literature and will then apply these methods to the study properties.

This part of the project will be primarily undertaken by Norton.

Sheep habitat use

Previous research on habitat use by merinos and their impact on native biodiversity have been based on detailed visual monitoring of animals and diet studies (e.g., Harris & O'Connor 1980). However, these approaches are limited by logistical difficulties associated with tracking animals over several months in large summer-grazing blocks (often over 1000 ha in size). We will utilise recently developed technology that enables us to use Global Positioning System (GPS) collars fitted to sheep to track their movements at regular intervals for the whole of their summer grazing. The collars will be recovered when the animals are mustered in at the end of the summer. We will then download the collars and use a Geographical Information System (GIS) to overlay habitat position information for each collared sheep on our biodiversity information for the property. Unfortunately the collars are expensive and we only have six available, so will be restricted to analysing habitat use for one or perhaps two properties. The regularity of the GPS fixes will depend on the length the animals will be out between musters, as the collars are only able to store a finite number of observations, but fixes are likely to be every 1-2 hours.

This part of the project will be primarily undertaken by Cochrane and Norton, with assistance from farmers.

Current and potential economic values

Equally as important as the biodiversity information, is the acquisition of good information on the economic values associated with the property. It is proposed to utilize the ecosystem classification described above as the basis for determining economic values. For each landscape unit, the current economic value will be determined (e.g., based on stock units per ha and the resultant value of the wool clip) by in-depth interviews with the farmer. At the same time, the potential value of each landscape unit

will also be assessed for a range of different management scenarios (e.g., with and without aerial oversowing and topdressing, or for tourism). This information will again be critical for the subsequent GIS modeling as it will allow for determination of the relative costs and benefits of different management scenarios).

This part of the project will be primarily undertaken by Patterson.

Spatial modelling

The results from the biodiversity and economic assessments will then be integrated within a GIS-based model that allows us to explore the costs and benefits of different approaches to land management. A number of approaches towards land use optimisation have been used elsewhere including a guideline-based land allocation approach in Australia (Lambeck et al. 2000), a land-allocation decision support system in Scotland (Matthews et al. 1999) and spatially explicit modelling in North America (Bettinger et al. 1997). These and other approaches use GIS to optimise the spatial arrangement of different land uses based on a series of rules. We will initially assess the suitability of these different approaches to modelling high country landscapes and will then use the chosen method to assess the biodiversity and economic consequences of different spatial arrangements of a variety of land use activities within the study properties (sheep versus cattle grazing, controlled grazing, removal of grazing from some areas and more intensive management in others). Our basic approach is to answer a series of "what if" questions about how different components of the landscape might be rearranged (in terms of how they are managed) and the affects this will have on biodiversity and economic values (cf. Norton & Miller 2000).

This part of the project will be undertaken by Manley, Norton and Patterson in consultation with the project group and farmers.

Application of covenants

In this part of the project, the potential of using covenants to provide for both biodiversity conservation and economic production of the study properties will be investigated. The most widely used covenant in New Zealand is through the QEII National Trust. However, these covenants have not been used previously to provide for both economic production and biodiversity conservation at a whole property scale. In this part of the project we will use the case study properties as the basis for exploring the best methods to provide for both biodiversity conservation and economic production within a covenant. This will likely involve the development of management statements for each property including specific goals for biodiversity conservation and economic production for the landscape unit identified above, methods for meeting these goals, and manner in which monitoring can be used to determine the success in meeting goals and for adapting future management. This part of the project will draw on experience with covenanting outside of New Zealand (e.g., conservation easements and agricultural conservation easements in the United States).

This part of the project will be primarily undertaken by Norton, in consultation with the project group and the high country farming community.

Dissemination of project results

A key component of this project involves making the results widely available to the farming community, especially the high country farming community. We propose to do this through a range of methods.

1. Six monthly newsletters outlining the progress with the project will be sent to all members of the High Country Accord Trust, Merino Inc and the High Country Section of Federated Farmers (which covers almost all high country farmers), as well as other interested parties (e.g., relevant territorial local authorities).
2. A web page will be established, with direct links from other web pages (e.g., High Country Accord, Federated Farmers, MAF) that includes copies of the project proposal, newsletters, reports and

contact details for project members. The intention of this web page is to allow people not directly involved in the project to be able to readily access information about it.

3. At the end of the project a summary report of the projects findings will be sent to this same group.
4. Two workshops will be run (Cromwell and Christchurch) at the end of the project that present the results of the project and will include interactive sessions exploring the options for applying these results to individual properties.
5. At least two articles will be written for farming newspapers/magazines (such as Straight Furrow) that summarise the study results and provide links to the web page so that farmers outside the high country can obtain more information on the results.

This part of the project will be primarily undertaken by Norton and Patterson, in consultation with the project group.

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