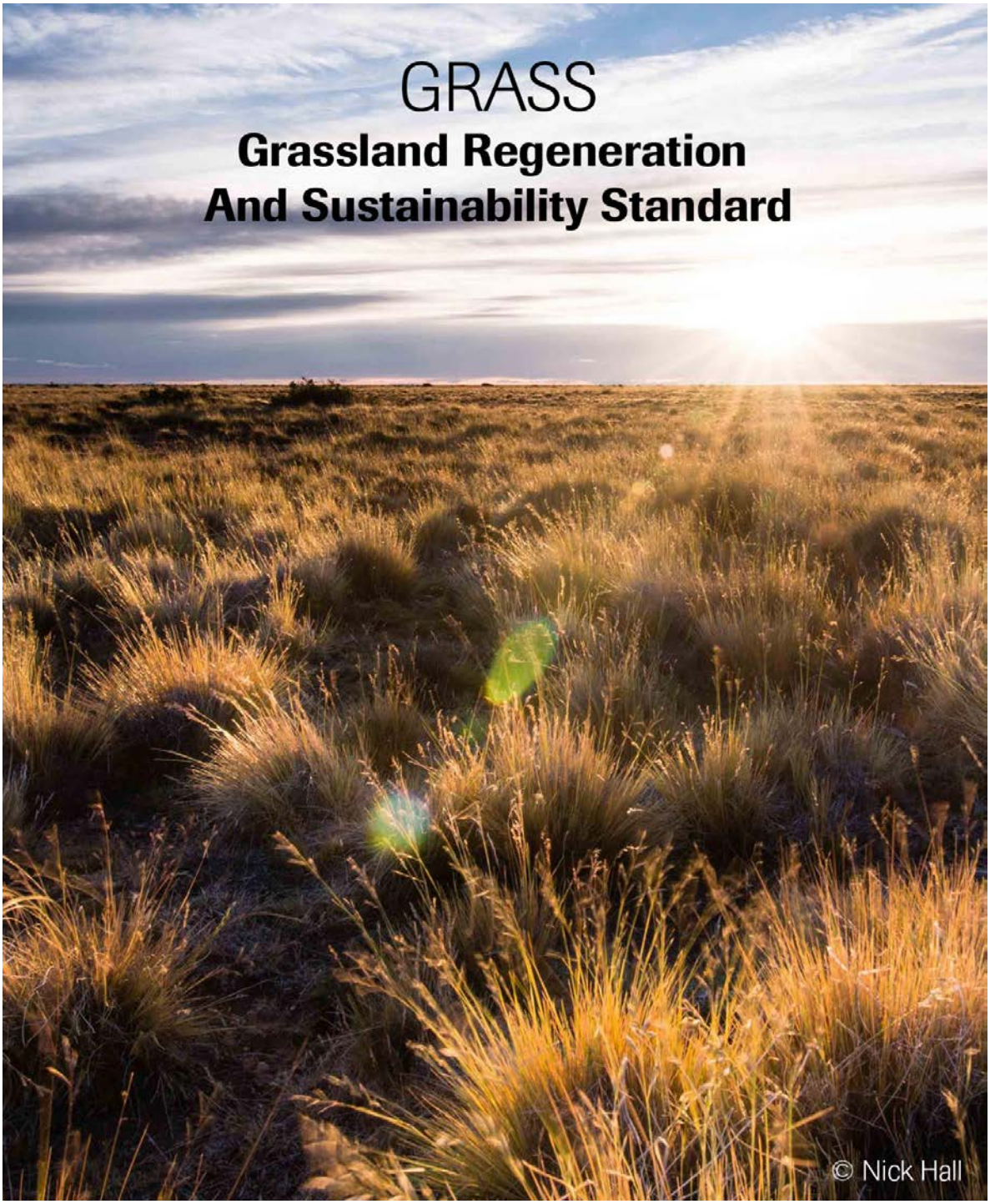

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OVIS 21
Regeneración y Rentabilidad

GRASS

Grassland Regeneration and Sustainability Standard

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Chapter 1: About GRASS

Introduction

Patagonia's 400 million acres of temperate grasslands support a unique biological and cultural heritage. The vast, sparsely inhabited region provides important benefits to nature and people worldwide, including clean air and water, forage for livestock, sequestration of carbon, and habitats for wildlife.

The threats to this priceless habitat are many, resulting in habitat loss and increasing levels of desertification. Most land is privately owned and remains in large and relatively undivided estates. Sheep ranching for wool and meat is by far the most prevalent land-use in Patagonia, and poorly managed ranching is a strong driver of desertification. As such, it comprises both a threat and an opportunity to ensure grassland conservation in Patagonia.

The Patagonia Grassland Regeneration and Sustainability Standard (GRASS) is a groundbreaking collaboration between the private sector, a conservation non-profit organization and a network of ranchers in the Argentinian and Chilean Patagonia to produce wool and meat in a sustainable manner that will maintain and restore the health of Patagonia's temperate grasslands. It incorporates conservation science, planning and monitoring into the management plans of wool producers, and provides market incentives to encourage voluntary and widespread adoption of a production model aimed at maintaining and restoring the health of the Patagonian grasslands in the context of a working landscape.

The GRASS effort engages the end-consumer in purchasing conservation friendly products and revolutionizes the outdoor apparel industry that allows key market players to achieve a stronger positive impact of the natural resources on which the fiber they use to build their products is produced. The result is a globally credible certification system that retailers and end-buyers can access and understand.

Goals of the Standard

GRASS is intended to help achieve certain general goals for people, wildlife and grasslands. These goals include:

1. Protection and restoration of Patagonia's grasslands and its unique and fragile environments.

2. Maintenance of viable populations of key native wildlife, including puma, red fox, rhea, and guanaco.

3. Supply of stable markets for high-quality grassland products, including wool and meat. Given the changing market conditions, these markets will provide to the greatest degree possible, pricing that sustains the economic viability of qualifying farms and reflects reasonable costs of production associated with producing the

highest quality wool and meat and protecting and restoring native grasslands and wildlife

The goal of the project is to have 4.0 million hectares under certified sustainable grazing management by June 2015.

How Does the Standard and Protocol Work?

1. **Farm Management.**
    a. Each participating farm shall have an approved management plan consistent with guidance in the GRASS protocol. The farm management plan must include specific on-the-ground conservation, rangeland and grazing management and restoration activities to be conducted according to a timeline identified in the plan.
    b. Each farm shall conduct annual assessments and monitoring as directed in the GRASS protocol that will enable the farm and external auditors to assess the farm's progress in meeting the goals identified in the farm plan.

2. **Rangeland Conditions.**
    a. Each farm shall meet program requirements for the following Landscape Functionality Indices: site stability, water cycle, nutrient cycle and community dynamics. Scores for each index shall be sufficient to enable each qualifying farm to receive "Full" certification status under the GRASS protocol.
    b. Each farm shall agree to maintain the area converted to non-native species to an agreed upon level.

3. **Unique and High Value Areas.**
    a. Each farm shall have a plan documenting the location and condition of unique and high value areas and identifying a specific plan for protection of those areas.
    b. Implementation of these plans and effective management of these unique and high value areas shall be confirmed by ongoing audits.

4. **Wildlife.**
    a. Each farm shall have a plan documenting its approach to conserving and minimizing conflicts and take of key native wildlife species.
    b. Implementation of the wildlife plan shall be confirmed by ongoing audits.

5. **Farm reviews and auditing**
    a. Each year, there shall be a review of farm assessments and monitoring and an evaluation of each farm's progress towards its goals. A failure to satisfy these requirements AND to demonstrate progress towards farm goals may lead to denial of certification.
    b. External audits of each farm's compliance with GRASS and on-the-ground progress towards meeting the goals of the farm management plan shall be conducted no less than every four years.

History

The Grassland Regeneration and Sustainable Standard for Patagonian Grasslands is a product of the collaboration between The Nature Conservancy and Ovis XXI, under the framework provided by the Memorandum of Understanding between the two parties and Patagonia Inc, signed on November 17th of 2011.

Ovis XXI developed a prior version of this Standard in 2003. That version was, in turn, an improved procedure of INTA's Extensive Management Technology[1], released in the early 90's and published in 2001.

The Holistic management framework developed by Allan Savory[2] added new ideas about decision making on grassland management and the possibility of improving fundamental aspects of biodiversity and landscape function through better grazing practices. Many of these ideas are incorporated in these standards.

This latest version of the standards has incorporated experiences and knowledge coming from different sources. An action conservation approach was a primary contribution of The Nature Conservancy science team, including more comprehensive biodiversity along with freshwater aspects.

This version aims to set a quality assurance system for Sustainable Grazing in Patagonia, by defining not just guidelines and procedures, but also validation and audit processes in the field. GRASS will be reviewed at least every 2 years and revised as necessary.

Figure 1. summarizes the continuous process that sustains the accountability of GRASS. As the figure suggests, the Sustainable Grazing Standard is a key instrument to stop and even reverse land degradation and biodiversity loss in Patagonia.

Key Stakeholders in GRASS and Governance

Governance

The application of GRASS is a continuous process that involves different stages (as shown in Figure 1.) and different stakeholders. The role of each stakeholder as currently envisioned is described briefly below.

[1] Borrelli,P y Oliva, G. 2001.: Ganadería Ovina Sustentable en la Patagonia Austral. Borrelli P. y Oliva, G. Ed. INTA Reg. Pat. Sur. 269pp.
[2] Butterfield, J.; Bingham,S and Savory A. 2006. Holistic Management Handbook: Healthy Land and Healthy profits. Island Press.

The Nature Conservancy (TNC)

The main roles that involve TNC in the implementation of GRASS are:

a) To organize and lead the Conservation Action Planning Events at different natural environments.
b) To provide scientific expertise to sustain the contents and procedures of GRASS and future updates made by the Scientific Committee.
c) To perform validation procedures as a member of the Scientific Committee, like the GIS Database, the use of remote sensing and the independent Audits.

Scientific Committee

The Scientific Committee will have some important roles that have to do with scientific soundness and validation of GRASS application and environmental outcomes. The Scientific Committee will:

a) Review and approve GRASS, and any further modification.
b) Review and validate findings of the monitoring and certification of the farms applying the protocol and under consideration for certification.
c) The findings will be presented to the core in writing.
d) Collaborate with TNC and other stakeholders by providing information and where appropriate, participating in regional CAP workshops for the different natural environments.
e) Make recommendations to the executive committee for other potential science committee members in the future, and
f) Seek to represent the following key topical areas (new topical areas may be added with agreement of the executive committee:
    a. Grasslands conservation
    b. Patagonian grasslands experts
    c. Livestock grazing ecology/practice
    d. Wildlife (potentially including herbivores, predators, special status wildlife, etc.)
    e. Freshwater ecology
g) Standing committee members: The Nature Conservancy and Ovis XXI.

The Initial Scientific Committee will be composed of the following members:

2 TNC standing committee members and conservation biology: Chris Pague (TNC) and Stephan Halloy (TNC)
2 Ovis XXI standing committee members: Ing. Pablo Borelli, Ing. Federico Boggio.
2 Patagonian Grasslands experts: to be confirmed
1 Grassland/Grazing Ecology: Dr. Richard Teague (Texas A&M)
2 Wildlife experts: to be confirmed
1 Freshwater Ecology: to be confirmed
2 Scientists from CONICET or Universities: Dr. Juan Anchorena

The Scientific Committee may invite some other temporary members to improve its function. In addition, the Science Committee may form advisory groups of scientists, practitioners, and conservation organizations to assist in the review and further refinement of important concepts and practices that are considered fundamental to this project's success.

Committee terms will be at least one year, renewable up to 5 consecutive years. After serving for 5 years, a committee member must wait at least one year before serving another term.

After the initial committee terms expire or are terminated by the committee member, the following process will be used to fill committee positions:

1. The Science committee will seek nominees to fill specific positions. Such positions will address gaps in the topical areas above. Candidates for science committee membership may be obtained from current or past members of the science committee, members of the executive committee, experts in the desired fields, partner organizations, etc.
2. A formal recommendation will be made to the Science committee by a current committee member and will include a letter that identifies the candidate, their professional affiliation, a resume, and a few references.
3. The Science committee will review all of the recommendations, checking references as needed.
4. The candidate will be reviewed by the current science committee members who will decide on final candidates by consensus.
5. Final candidates will then be interviewed by one or more Science committee members. The results of the interview(s) will be reported to the entire Science committee members who will have a formal vote, making final decisions by consensus. Upon a consensus decision, a formal invitation will be sent to the candidate science committee member.
6. Upon receipt of a letter of acceptance, the candidate is officially designated as a science committee member.

In the first session, members will nominate its own authorities, and determine the working procedure (Proposed to be one formal annual meeting and phone calls).

Accredited Farmers

Ovis XXI will keep an updated record of the farmers that have committed to GRASS and are complying with its procedures.

Accredited farmers are the key to the success, as they have the power to make decisions that affect the land. They are the decision makers, and the land stewards of their properties. The main roles of the Farmers are:

- Stewardship of their grassland (property).
- GRASS compliance.

- Follow recommended measures from Land Audits.
- To install a continual learning process about conservation and sustainable production issues. Pioneer a cultural change (current & future generations).
- Participate as desired in CAP processes pertaining to his/her region.

Accredited Grassland Managers

Grassland Managers may be independent professionals that supply services to the farmers or may be farmers themselves. All of them need to go through a training and accreditation procedure. Ovis XXI will keep an updated record of accredited grassland managers.

The main roles of Grassland Managers are:

- To train & coach the farmer, developing his knowledge and skills to understand biological processes and improve his decision making process.
- To help the farmer to define his Holistic Goal.
- To perform grassland and wildlife evaluations and ground monitoring according to GRASS procedures.
- To evaluate the conservation status of the farm and help the farmer implement adequate measures.
- To help the farmer to make grazing plans according to GRASS and recommendations and strategies suggested at the Regional CAP.
- To help in sharing experiences to sustain a continuous learning process.
- To participate in the CAP process of his region as applicable.

Ovis XXI

Ovis XXI is responsible for the quality assurance of GRASS. Its general role is to coordinate the different stakeholders and to protect the reputation of the Standard. The value of GRASS and its branding depends on serious implementation and accountability.

The specific roles of Ovis XXI (Central Node) are the following:

- Manage the Network to keep the connection between its members.
- Provide Training courses and accreditation of grassland managers and farmers.
- Technical support for land management decisions.
- Perform Environmental Audit at every farm, and define its conservation status (Full or Restore).
- Centralize and process monitoring data.
- Generate innovation & share information.
- Marketing of branded products.

Intellectual Property

GRASS is a joint product of Ovis XXI and The Nature Conservancy, under the framework provided by the Memorandum of Understanding between the two parties and Patagonia Inc, signed on November 17th of 2011.
The contents of this standard are open to the public, and can be copied with explicit mention of the source. The use of the name and procedures of GRASS to brand grassland products is restricted to authorized certification Agencies.

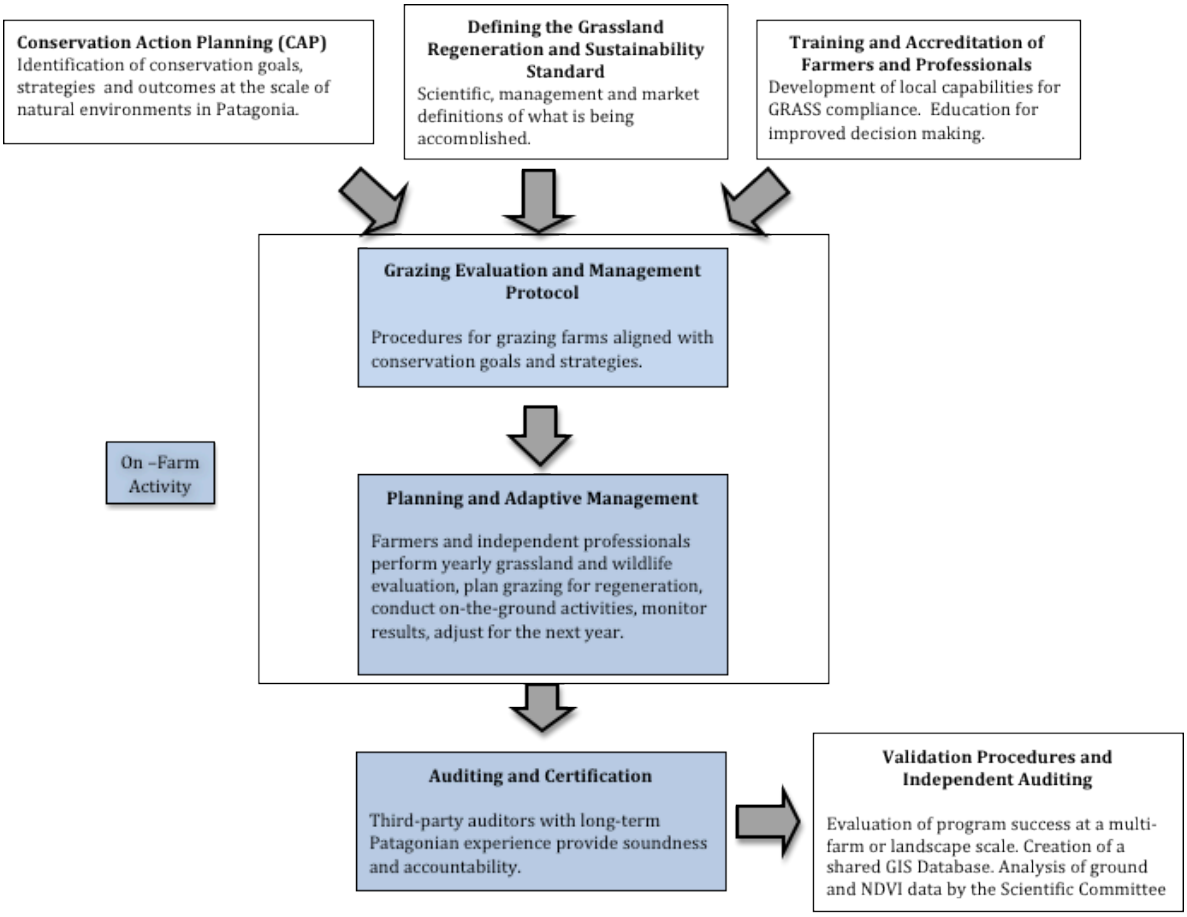

Figure 1: The GRASS Protocol

Process stage	Capabilities required	Key Participants	Notes
Regional CAP	CAP Expertise Scientific Knowledge Local Knowledge	TNC Ovis / Scientists/ Farmers	One per Natural Environment every 5 years or as needed.
Sustainable grazing Protocol	Scientific Knowledge Practical experience	Scientific Committee (Ovis/TNC /others)	Review every 2 years
Training and accreditation	Training skills Accreditation System	OVIS XXI TNC/Scientists	
Planning and Adaptive Management at farm level	Long term commitment Land evaluation, planning and monitoring skills	Farmers Accredited technicians	
Auditing and certification at farm level	Land Auditing expertise Certification Skills (Traceability and Records)	OVIS XXI	Other certification agencies will be authorized in the future
Independent monitoring and scientific auditing at multi-farm or landscape level	Remote Sensing tools Grasslands ecology knowledge	Scientific Committee Auditing Team	Process is to be determined in first year of the scientific committee

Table 1: Stages, capabilities and key participants

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Chapter 2: Conservation Action Planning at Ecological Areas Level

Procedure 1: Conservation Action Planning

Introduction

The dominant land use in the arid Patagonia is farms with their livestock grazing. As such, the future of the area's biodiversity will be determined by the land managers. The principles of holistic management that are presented in this protocol will restore key ecological processes and result in improved habitat conditions for the natural communities and species on the farm. More specific guidance on how to manage lands and water for the remarkable species and ecosystems that occur in Patagonia can come from additional conservation planning. In fact, it is known that the specific requirements of some species and habitats require that additional information be available to the land managers and conservation practitioners.

Conservation planning has advanced greatly in the past 20 years and recognizes some key questions or steps that should be addressed in the development of plans that will address the full suite of conservation elements. The Nature Conservancy and partners have developed and tested standards and methods in more than 2,000 places worldwide to implement such conservation planning. Conservation Action Planning[3] (CAP) is the most commonly used framework developed by The Nature Conservancy[4] for the participatory design, implementation and measurement of conservation projects. It is based on Adaptive Management, focused on prioritized conservation objects. (Figure 2).

Conservation planning can and should apply at all scales. It should include the best information available at the time of the planning effort or any later revisions, including information from larger and smaller scales in any plan as appropriate. At a minimum, conservation planning should address the following fundamental conservation questions:

1. What are the species and vegetation types that occur in the planning area?
2. What goals (explicit) do you want or need to achieve for the key plants, animals, and vegetation types?
3. What is the current condition or status of the conservation targets?
4. What are the things, conditions or issues that need to be addressed to achieve the goals?
5. What are the most appropriate or feasible strategies or activities that can be done to address the issues discovered in #4?
6. How will you know if you have restored or successfully conserved the conservation target/object?

[3] Granizo, Tarsicio et al. 2006. Manual de Planificación para la Conservación de Áreas, PCA. Quito: TNC y USAID.

[4] www.nature.org

These questions can and should be addressed not only with guidance from an ecological area level plan, but also at the farm level. By establishing explicit goals or outcomes for the species and vegetation types most in need of conservation or management attention, the manager can evaluate progress and when satisfactory results have been achieved. Progress alone without the context of what is an explicit goal is often inadequate conservation. Truly sustainable or holistic farming should include wherever possible the sustenance of all elements of nature.

The Nature Conservancy launched a program in Patagonia that aims to promote sustainable grazing practices to achieve improved conservation of the regional fauna and flora. CAP methodology could be of great value to define at ecological area level the conservation objects, the pressures that affect them, the sources of these pressures, and according to this analysis, define the strategies and measures that will be applied to achieve the objectives. As part of the method, a monitoring strategy is defined to evaluate the effectiveness of the measures taken.

The CAP project at ecological area level will contribute greatly to the development of conservation measures at the farm level. As a result of the CAP process, an evaluation and conservation matrix will be available for each ecological area. This output would be revised and considered by farmers and consultants to plan land use at farm level. By doing this, each farm plan contributes to the objectives and strategies agreed for its ecological area, assuring that all life forms and the ecological services they provide will continue to thrive in Patagonia.

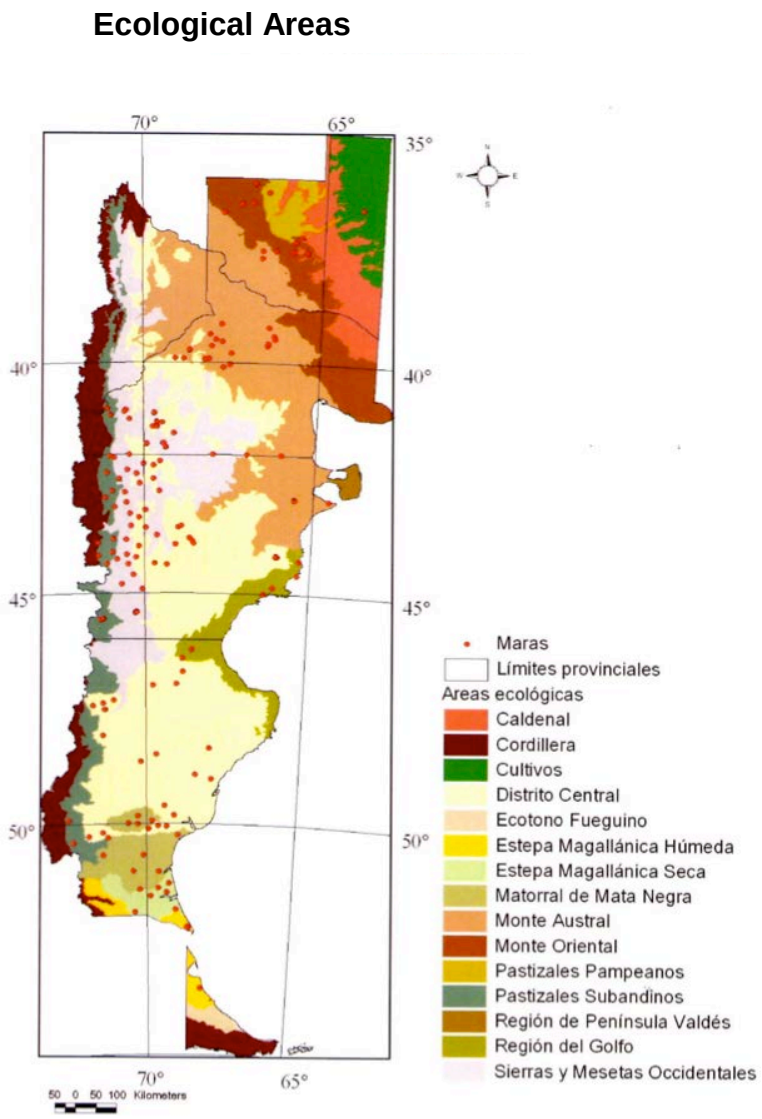
Figure 2: CAP framework scheme

The CAP process will incorporate scientific knowledge, practical experience and the information from different stakeholders such as scientists of different disciplines, policy makers, environmental groups, farmers and farm consultants. Conservation plans at the NE scale that include the best information available from many sources would be a powerful tool to align the decision making process at farm scale. Successful conservation and sustainable farming are inseparable practices in Patagonia.

Initial information is available from CAPs conducted in the Subandean Grasslands and Occidental District ecological areas, and will be revised in the future to address the specific needs of this initiative. CAPs for other Patagonia ecological areas will be developed in the near future. In the short term, the CAP procedure, or other process that addressed the key elements of conservation planning (see above) is recommended but not mandatory to certify products under this Standard. However, it is mandatory to incorporate some regional species that are known to need specific conservation attention. These species or species groups include the guanaco, Lesser Rhea (choique), Andean Condor (where applicable), and the large predators. Each of these species or species groups is both iconic and a keystone, i.e., they play important ecological roles in the ecosystems in which a ranch occurs. Therefore, these species or groups will be addressed in farm planning. As the CAP Projects become available for each ecological area, the incorporation of other species and vegetation types that occur on farms will be required.

Map 1: Ecological Areas (INTA 2011)

Code	Description
	Caldenal (Xerophytic woodland)
	Andean Mountains
	Cropped area
	Central District
	Fuegian Ecotone
	Humid Magellan Steppe
	Dry Magellan Steppe
	Mata Negra Shrubland
	Southern Monte (Shrubland)
	Eastern Monte (Shrubland)
	Pampean Grasslands
	Subandean Grasslands
	Peninsula of Valdes
	Gulf District
	Occidental District



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Chapter 3: Training and Accreditation of Grassland Managers

The GRASS Protocol is designed by experts with extensive field experience. Training and accreditation are critical to assuring that the best conservation and restoration results will be achieved. Equally as important is that certification must be done by accredited trainers, assuring the highest quality of work and outcomes but also assuring that all participants in the buyers' chain will be confident that the products have actually met the standards.

Accredited Grassland Managers must be able to:

- Understand the process of adaptive management and GRASS standards
- Understand the main ecological processes of grasslands and "read" rangeland health indicators
- Perform the field work on Step 2 independent and consistently
- Process field data and interpret the results
- Calculate grassland receptivity using different methods
- Perform a basic grazing program (Step 3.a.) with supervision.

Additional training may be required for long term monitoring, wildlife evaluation and Holistic Management Planning procedures.

The main roles of Grassland Managers are:

- To train & coach the farmer, developing its knowledge and skills to understand biological processes and improve his decision making process.
- To help the farmer to define his Holistic Goal.
- To perform grassland and wildlife evaluations and ground monitoring according to GRASS procedures.
- To evaluate the conservation status of the farm and help the farmer implement adequate measures.
- To help the farmer make grazing plans according to GRASS, and recommendations and strategies suggested at the Regional CAP.
- To help in sharing experiences to sustain a continuous learning process
- To participate in the CAP process of his region as applicable.

The application of the procedures described in Chapter 4 requires well trained people. A grassland manager needs specific knowledge and skills to be able to perform GRASS procedures. Accredited Grassland Managers will be trained and deemed proficient in the topics indicated in Table 3.

The training and accreditation scheme has the following objectives:

a) Train professional grassland managers who, upon completion of this training program, will then be authorized to work with farmers to apply GRASS methodologies as part of the GRASS certification process.
b) Assure the quality of GRASS application in every place of Patagonia.
c) Train farmers and grassland professionals to be able to evaluate grasslands and wildlife, plan regenerative grazing and special measures for conservation targets, and monitor the results in a structured way.
d) Create a learning environment and share experiences and results.
e) Develop the grassland manager career, with recognition of capability developments and results on the ground.
f) Protect inexperienced grassland managers from doing tasks they are not prepared to perform.

The quantity of accredited managers and the quality of the education process are key strategies if wide adoption of GRASS protocols is promoted and expected.

Ovis XXI is responsible for training and accreditation for GRASS standards. Other trainers may be used for specific topics and elements of the training. Such trainers may include (but are not limited to) the Savory Institute for accreditation for Holistic Management and The Nature Conservancy for training in conservation planning and monitoring for species and ecological systems that are identified as priority conservation objects.

Training Courses for Grassland Managers

1.1. Grassland Evaluation and Basic Planning (40 hours)

Objectives:

By the end of the training the attendants will have the following skills:

- See grassland management as a holistic approach and understand adaptive management.
- Cartography and remote sensing: how to collect field data for site and grassland mapping at farm level.
- How to design and perform a sampling plan on a farm using Santa Cruz Method.
- Indicators of Rangeland Health and how to read ecosystem state and function.
- Botanical Identification of the most important species.
- How to process field data and make receptivity estimations.
- How to make a basic grazing plan.
- Introduction to Grazing Planning.
- Introduction to Conservation Planning
- How to report grazing studies.

This training course is oriented to professionals and farmers. Normally it is held at farms, with groups of 10-15 attendants. It covers the basic knowledge and skills for Steps 2 and 3(a), and introduces Step 3(b).

Although the program varies according to the audiences and ecological areas, the basic structure is like follows:

Day	Time	Subject	Mode
1	09.00	Holistic Vision of Grassland Management	Lecture
	10.00	Theorical basis of Santa Cruz Method and Botanal	Lecture
	11.00	Statistic principles for rangeland sampling	Lect/group practice
	14.00	Site identification, species, state and health indicators	Field practice
		Sampling practice- Use of GPS	Field practice
2	07.00	Sampling practice of the farm	Field practice
3	07.00	Sampling practice of the farm	Field practice
	12.00	Use enquiry practice	Group practice
	14.00	Effects of grazing and rest on grasslands	Lecture
	15.00	Tools available to manage grasslands	Lecture
	17.00	Ingestive behaviour and animal nutrition	Lecture
	18.00	Grazing planning: theoretical basis	Lecture
4	08.00	Data processing	Group practice
	09.00	Receptivity estimation and interpretation of results	Group practice
	16.00	Basic Grazing Plan	Group practice
	17.00	Grassland Evaluation Reports	Group practice
		Consultas	
5	08.00	Exercise of Holistic Grazing Planning	Group practice
	14.00	Evaluation	Exam

1.2. Grassland Monitoring (24 hours)

Monitoring of the animals, the grasslands, and the wildlife is critical to success in every aspect of farm management. A good knowledge of monitoring design, implementation, analysis and adaptive management thinking are required in this protocol. The following program is established as a requirement for grasslands managers using this protocol.

Objectives:

Develop skills for installing and reading photopoints and simplified transects. (Step 4)

Attendees must have previous grassland management professional accreditation.

This 3-day training session is focused on the field procedures that must be conducted as part of GRASS. While the process is the same for each region, the details will be specific to the ecological areas in which the monitoring occurs.

The structure of the training course is as follows:

Day	Time	Subject	Mode
1	09.00	Importance of long term monitoring in adaptive management	Lecture
	10.00	Procedure 4: aims and methods	Lecture
	11.00	Design of a monitoring plan	Lect/group practice
	14.00	Instalation and reading of simplified Transects	Field practice
2		Instalation and reading of simplified Transects	Field practice
3	08.00	Instalation and reading of simplified Transects	Field practice
	14.00	Data processing -Reports and Data management	Group Practice

1.3. Wildlife Evaluation (16 hours)

Evaluation of the priority or sensitive wildlife species of a farm is essential to conservation management. The results will inform the managers as to the presence, conservation goals, baseline numbers and conditions, the types of management needed, and the effects of any management actions. A basic knowledge of identifying the priority wildlife, estimating numbers and distribution, and monitoring the numbers and condition of the wildlife on the farm are required in this protocol. The following program is established as a requirement for grasslands managers using this protocol and farmers.

Objectives:

Develop skills for identifying priority wildlife species, their habitat, and understanding their behavior.

Understand how to establish a sampling transect (or other means of counting)

Attendees will attain the skills of censusing or counting wildlife species along with the collection and management of data.

Develop basic skills in analysis of information and data, including scoring for the GRASS Protocol.

This 2-day training session is focused on the concepts and field procedures that must be conducted as the wildlife portion of GRASS. While the process is the same for each species or region, the details will be specific to the ecological areas in which the monitoring occurs.

The required elements and structure of the training course is as follows:

Day	Time	Subject	Mode
1	09.00	Overview of Wildlife Evaluation: Reasons, Objectives, Basic Principles	Lecture
	10.00	Establishing the question	
	10.30	Setting up a method and sampling transect	
	11.30	Collecting and managing the data/information; field notes	
	14.00	Evaluating the data and scoring the results	
	15.00	Adaptation in censusing	
	16.00	Generating protocols for new species from CAPs	
2	09.00	Practicum in the field – actually conducting evaluations	
	15.00	Questions and discussion – practice adaptation	

1.4. Optional -- Introduction to Holistic Management (2 sessions of 16 hours)

This optional but recommended course is designed to introduce farmers, managers, and scientists to the theory and practice of Holistic Management. It is held in two sessions of two days. It does not generate accreditation for work, but helps farm managers and advisors to understand the principles of holistic management, the opportunities that it provides, and how to implement the procedures with the aid of HM practitioners or certified Educators. Key to the successful application of holistic management is good planning, monitoring, and adaptation.

Attendants will experience the planning procedures of Holistic Management, in the context of real case studies, and will have access to the theory and principles that sustain them.

The training program is as follows:

Session 1

Day	Time	Subject	Mode
1	09.00	Introduction to holism and decision making The four missing keys The foundational blocks:ecosystem processes Tools for ecosystem management	Lecture
	14.00	Field practice: receptivity estimation, biological indicators	Field practice
	17.00	Results from HM application in Patagonia	Lecture
2	08.00	Definition of Holistic goal Testing Decisions guidelines	Group practice
	14.00	Holistic Finantial Planning: case study	Group practice

Session 2

Day	Time	Subject	Mode
1	09.00	Review of principles of HM Fundamentals of Holistic Management Grazing Planning	Lecture
	11.00	HM grazing planning: setting the chart	Group practice
	14.00	Field practice: receptivity estimation, land monitoring	Field practice
	16.00	HM grazing planning: Closed plan	Group practice
2	08.00	HM grazing planning:Open plan	Group practice
	14.00	HM Land Planning	Group practice
	17.00	HM implementation in Patagonia: how to start	Plenary session

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Chapter 4:
Grazing Evaluation and Management Protocol

The most effective way to develop a farm's management plan is with a structured approach. The approach presented here is modified from several highly tested approaches including the Santa Cruz Method, CAP, wildlife monitoring techniques, and elements of Proper Functioning Condition evaluations. The procedures that are required for the protocol are also those known to produce the best results and those that can demonstrate the progress and success of the practices to markets, conservationists, and the manager. In addition, the information gained from the application of these practices is fundamental to the practice of adaptive management.

This chapter describes 5 steps that will provide key information for on-the-ground planning and management for the farm. It will call for information from the conservation planning process (which is step 1) described in Chapter 2 and for the acquisition of information from the land and water that will be managed. Key to this adaptive management process, the manager will begin the process of recording data and observations from the farm. Far too often in land management the information is not recorded in a way that allows comparisons at different times and after planned treatments. Rigorous applications of these procedures provide the best opportunity to achieve sustainable land management and to be able to respond quickly to unexpected findings or events.

The procedures to be used are:

Procedure 1: Conservation Planning (see Chapter 2).

Procedure 2: Grasslands and Wildlife Evaluation – This procedure describes the actions needed to inventory the natural resources under farm management. The inventory will provide a preliminary baseline to for use in designing management strategies and goals.

Procedure 3: Development of a farm plan (this may take one of two forms)

a. Basic Planning for Grazing, Wildlife Management and Freshwater Protection
b. Holistic Resource Management

Procedure 4: Long Term Monitoring

Procedure 5: Management of Exotic Species

Procedure 6: Predator Control and Hunting Procedures for Wildlife Management

The following procedures have to be followed by accredited farmers or accredited grassland managers with the support of independent grassland professionals and

Holistic Management Educators. Table 2 shows the procedures, ecological area attributes evaluated and methodologies used for each step over a period of the first five years.

Procedure	Attributes evaluated	Method	Who can do it	Year 1	Year 2	Year 3	Year 4	Year 5
2.1 Initial Evaluation	Farm cartography	Digital processing of Lansat TM images	Image Processing lab					
	Rangeland Health Index	Modified Rangeland Health	Accredited Grassland Manager					
	Forage Availability and intensity of use	Santa Cruz Method AD Squares	Accredited Grassland Manager					
	Wildlife Evaluation	Index of Abundance or Distance according to abundance	Accredited Grassland Manager					
	Situation Analysis	This Standard	Accredited Grassland Manager					
2.2 Grassland Check	Rangeland Health Index	Modified Rangeland Health	Accredited Grassland Manager					
	Forage availability and intensity of use	Santa Cruz Method	Accredited Grassland Manager					
	Wildlife Evaluation	Index of Abundance or Distance according to abundance	Accredited Grassland Manager					
	Situation Analysis	This Standard	Accredited Grassland Manager					
3.a. Basic Planning for grazing, wildlife management and Freshwater protection	Grazing planning, stocking rate, animal allocation, wildlife management, strategic rest	Santa Cruz Method	Accredited Grassland Manager					
3.b. Holistic Grazing Planning (optional, replaces step 3.a above)	Grazing planning to be at the right place, for the right time and for the right reasons	Holistic Management	Certified HM Educator					
4. Long term biological monitoring	Soil and vegetation cover Vegetation Biodiversity	Point and Flexible Area (PAF)	Accredited Grassland Manager					
	Soil surface conditions and health indicators	Soil Transect (This Standard)	Accredited Grasslands Manager					
	Structural Change	Photopoints	Accredited Grasslands Manager					

Table 2: Summary of procedures and timeline for application of Adaptive Management for GRASS compliance at Farm level

NOTE: All the forms cited in the text are presented in Annex II.

Procedure 2: Vegetation and Wildlife Evaluation

Procedure 2.1. Initial Evaluation

General Description:

The Initial Evaluation of grasslands, other vegetation types, freshwater systems, and wildlife consists of an inventory of the natural resources that are under farm management. Note that guidance for evaluation of freshwater resources will be provided in future editions of this protocol. It describes the whole area and allows the evaluation of its situation from the grassland conservation point of view, and the key variables to optimize animal production and conservation outcomes. In that sense, is an unavoidable tool to start an Adaptive Management process.

Initial Evaluations are based on a modified version of the Santa Cruz Method.[5]

Required equipment, materials, and supplies:

Previous Information

1. Ganadería Ovina Sustentable en la Patagonia Austral[1]
2. State and Transition Catalog for Patagonian Grasslands[6]
3. Holistic Resource Management. Allan Savory[7]
4. Conservation Action Planning documents of the Ecological Area (if available)
5. Expert knowledge of the local flora, fauna, and ecology of the area as available

Cartography

1. Satellite Imagery of the zone in digital format
2. Software for processing geopositioned data

Software

Latest version of Grasslands Model (IP). Xls
Breeding Plan.xls (For use inquiry)
Initial Grassland Evaluation.doc (Template)

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[5] Borrelli,P y Oliva, G. 2001. Evaluación de Pastizales. Cap.6. pp 161-182. En: Ganadería Ovina Sustentable en la Patagonia Austral. Borrelli P. y Oliva, G. Ed. INTA Reg. Pat. Sur. 269pp

[6] Paruelo,J, M. Bertiller, T. Schlichter and F. Coronato (1993) Secuencias de deterioro en distintos ambientes patagónicos. Su caracterización mediante el modelo de estados y transiciones. Convenio INTA –GTZ – 110 pp.

[7] Savory, A. y Butterfield S. 1999. Holistic Management. A new Framework for decision making. 2nd. Ed. Island Press.

Equipment and Supplies

1. Pickup (Optional, can be made using customer vehicle)
2. Motorcycle (Optional)
3. Base Map
4. Global Position System (GPS)
5. Evaluation Matrix (Scorecard) for the Natural Environment.
6. Metal Frames (0,1; 0,2 y 0,3 m2)
7. Scissors
8. Plastic Bags
9. Paper labels
10. Plastic ruler (mm)
11. Pencil
12. Digital Camera
13. Binoculars

14. Digital Telemeter
15. Form EP 1 Grassland Evaluation
16. Form EP 2 BOTANAL Record Sheet
17. Form FA 1 Guanaco Record Sheet
18. Form FA 2 Predator Capture Book
19. Forage Drying oven
20. Precision Scale (0,1 g)
21. PC
22. Printer

Work Sequence

Experience has shown that a specific sequence of steps is the most efficient way to complete the Initial Vegetation and Wildlife Evaluation. It is important to allow sufficient time to conduct this evaluation well since the results create the foundation for successful management.

Step	Description	Activities	Responsible
1	Preliminary Meeting with Farmer	• Know customer expectations Define objectives and expected products of the work Define Budget and proposed date for initial evaluation If budget is approved, define farm boundaries and position on map or satellite imagery.	1. Professional 2. Executive
2	Farm Geopositioning	▪ GPS of paddock corners, reference points, houses and facilities, windmills and gates.	Professional /Novice

3	Prepare Base Map	• Send email with waypoints • Buy image if needed • Image processing (Non-supervised classification) • Overlay fences and other waypoints, indicating names and codes for paddocks • Print Maps	Professional Satellite Imagery Lab
4	Design Sampling Plan	▪ Define method, number, and location of sampling stations and sample numbers.	Professional / Executive
5	Prepare materials for field survey	▪ Check Material and Supplies Kit list	Professional / Novice
6	Field Survey	▪ Calibrate Rangeland Health Index parameters at the closest reference area ▪ Collect grassland data according to the sampling plan using Forms EP 1 and EP 2 and scorecard. ▪ Record Guanaco and Rhea numbers. Record on Form FA 1 ▪ Take all the waypoints required to make the final Farm Map	Professional/ Novice
7	Use Inquiry	▪ Record the grazing that each paddock had in the last 12 months directly on the Grassland Model. ▪ Record farm productivity indicators, the longest series as possible ▪ Record Predator captures and sheep losses attributed to predation (Form FA 2) ▪ Record observations of wildlife number trends, concentration areas, seasonality of use. Also record any major changes in vegetation communities or habitats.	Professional/ Novice

8	Sample and data Processing	▪ Dry and weigh samples ▪ Process data, according to methodology using IP files. ▪ Process of animal production indexes ▪ Process estimates of wildlife abundance and population trend ▪ Acquire and analyze precipitation data	Professional/ Novice
9	Final Maps and Area matrix by paddock and sites.	▪ Send Base Map to Lab with new GPS points, corrections and additional information. ▪ Print corrected maps ▪ Compute area by paddock, site and state ▪ Map condor habitat and nesting sites (if apply) and any other known sensitive sites including those that support high priority plant and wildlife species (from the CAP or other sources) or the locations of irreplaceable species.	Professional / Executive Satellite Imagery Lab
10	Estimate receptivity per paddock	• Use Grassland Model. Estimate stocking rates to achieve desired biomass residue • Map locations of any sensitive or priority species locations or habitats as identified in regional conservation plans (CAPs).	Professional
12	Situation analysis	• Data interpretation. Identify status of the grassland, animal production, wildlife and other conservation objects/production issues.	Professional / Executive

Table 3: Work Sequence

Work Sequence:

Detailed description of methodology can be found in Borrelli and Oliva (2001)[1]. The following paragraphs detail some modifications made to the original method and comments about quality criteria.

1. Preliminary Meeting with Farmer

A preliminary meeting with the Farmer will establish customer expectations, define the objectives and work products. It is also an opportunity to develop a budget and schedule for initial evaluation and, if approved, define farm boundaries, map position or satellite imagery.

2. Farm Geopositioning

A new generation GPS will be used. The data collection can be done on bike, foot, or horseback. This information will provide the key information for a precise Base Map of the farm and for the field survey. Such a map will include infrastructure, fences, key biological features (as they are known), and property boundaries.

Transit ability and access conditions are assessed for each paddock and recorded. This is a very important factor since the paddocks are a key unit of management and monitoring. Access to survey points in paddocks will largely determine how long the field survey will take.

GPS data will be sent to Image Processing Lab, using the waypoint codification specified by them.

3. Prepare Base Map

To prepare a Base Map the Image Processing Lab needs the GPS data and all the references that could be supplied. A good base map will save a lot of time at the field survey and later on.

The Lab will process the image and supply two Base Maps: one with false color image, with roads, paddocks and other references, the other with a non-supervised digital classification. The Lab, according to previous experiences on the region, will define the number of classes unless the Executive in charge makes some specific instructions. The Map files will be sent to the Business Unit for printing. The farmer or other party familiar with the property should preview the map to assure that it is correct prior to the field survey.

4. Design Sampling Plan

A good survey always starts with good planning at the office. Quality criteria for a sampling plan are:

- Correct definition of the survey route to be taken to minimize double counting or overlapping observations.
- Correct definition of the number and location of sampling stations.
- Get at least the minimal sample number to reduce sampling error to acceptable values.
- Choose the survey methodology that is to be used for rheas and guanacos so that the most appropriate survey route can be taken. Once the sampling stations for vegetation have been established, the wildlife transects can be established and recorded.

A criterion for designing grassland sampling is described in Ganadería Ovina Sustentable en la Patagonia Austral[1] (pp 164-168). The sampling plan must take into account special attention for a) irreplaceable areas b) Riparian and freshwater areas c) Other conservation targets defined in the CAP corresponding to the ecological areas.

The segment from one sampling station to the other will be considered a transect for wildlife evaluation. Guanaco population estimates will require that at least 10% of each different site is crossed by transects. If the land is very homogeneous transects must take into account water supply, haven, and escaping ways of the guanaco groups.

5. Prepare materials for field survey

Print Base Map and mount it on a chart. Multiple copies of the map(s) may be useful.

Check the material list and load the vehicle.

6. Field Survey

Sampling stations:

Field data will be obtained according to the sampling plan and the methodology. Form EP 1 will be used to record all field information and measurements of sampling stations. Procedure for field work is described in Ganadería Ovina Sustentable en la Patagonia Austral[1] (pp. 169-174).

The largest modification of the published method is the Rangeland Health Index evaluation. Several indicators were added (litter incorporation, dung decomposition, shrub condition and biomass production, and wildlife). For more detailed description of the biological indicators see Chapter 6. The score system is based on the evaluation matrix (scorecard) that is used for environmental audit.

The Santa Cruz Method is recommended to evaluate most of the grassland types of Patagonia, with the exception of meadows, seeded pastures and productive prairies that have productivity values higher than 1-2 tons DM/hectare. In these cases biomass

estimates can be obtained by means of total clipping, BOTANAL[8] (recommended) or electronic devices as pasture plate meter.

Forage availability can also be estimated using field estimates of the area required for an animal for a day.[9] This method may be reasonably accurate with experienced observers.

Guanaco Evaluation Method Selection.

We recommend three possible methods of assessing the number of guanacos on a farm. A total count of all guanacos on a property at any time is the most desirable method and also the most time-consuming. The time and resources needed to make such a count are often not available to most operations (airplane, drives, etc.). Driving through a ranch rarely provides the opportunity to see every guanaco or is done in such a manner that double-counting is likely. In most cases a method that samples the guanacos using the farm will be appropriate. Whatever methodology is chosen, it is important to avoid double counting of guanacos to the degree possible. It is also important to know the degree to which the entire ranch is suitable for guanaco use.

Irrespective of the method chosen, wildlife evaluation will always require two observers, and at least one of them must be a trained and accredited farmer or professional. If transects are made while driving vehicles, speed must not exceed 40 km/hour.

1. **Index of abundance**. If the farm is well roaded, then a simple count of all animals observed in a pre-determined road network will create a rough index of animals observed on the farm. This method would be the first choice in places where guanaco populations are significantly smaller than the population goal set for the species (low guanaco density). While only rough trends can be assessed, this will be considered the minimum standard for evaluating guanacos. It is important that the driving counts be done at approximately the same time each year, preferably after young (newborns or chulengos) are visible. The actual route taken can or even should vary between sampling times. The number of driving censuses taken per year is left to the accredited farmer or professional. Conducting multiple surveys during a year will provide more useful information. The number of guanacos observed during each sampling of the roads will be compared to create a very rough indicator of changes in guanaco numbers. However, one can only use the numbers as a minimum number of guanacos on the property. If guanaco population estimates require more precision and statistical soundness, it would be appropriate to change to the other methods of estimating density or population size.

2. **Measuring crude density of guanacos on the farm**. We recommend estimating the guanaco density on the farm by determining a crude density, number of

[8] Tothill, J.C., Hargreaves, J. N. G. and Jones, R. M. (1978). "BOTANAL – A comprehensive sampling and computing procedure for estimating pasture yield and composition. 1. Field Sampling". Tropical Agronomy Technical Memorandum Nº 8. CSIRO. Australia.
[9] Butterfield, J., Bingham, S. and Savory, A. 2006. Holistic Management Handbook. Healthy Land, Healthy Profits. Island Press. 248 pp.

guanaco/sqkm or hectare. To do this, the same methods are used to drive through the ranch, but guanacos are only counted if they are within a fixed distance from the road (called a belt or strip transect). It is important to count every individual within the strip transect and to not count any animal twice. We recommend that the presence of animals in or out of the strip transect be determined with a range finder or digital telemeter. If paddocks are sufficiently large, then it may be desired to conduct these counts within each paddock, calculating the crude density for each paddock, comparing use or guanaco presence among paddocks.

3. **Determine population size or density.** If guanaco populations are expected to be above the guanaco population goals, or whenever a more precise estimation of population size or density is needed, the Distance Sampling Method[10] will be prescribed. The sampling is done in carefully selected transects. At every encounter, the position of the animal or group is registered, individuals counted and the distance from transect or road is measured with the aid of a digital telemeter (Range Finder). One can create an index of abundance or can calculate the population size of the sampled area, extending it to all comparable habitats. Distance analyses are complex but highly accurate.

Rhea

Monitoring of rheas can be done using the same methods as for Guanacos. It is recommended that to the degree possible, counts should be done after the breeding season and the young birds are large enough to be easily observed and therefore counted. If such timing cannot be achieved, then be sure to record whether the rheas observed were adults or young.

Andean Condor

Methods.

1. Identify key habitat features of condors on the farm. In many cases these features or at least some of them are already known.
2. Map the locations and incorporate these features in the farm plan and base map so that these features are not disturbed at sensitive times of year. Features used by condors are usually in rugged and remote sites and so are easily avoided.
3. Monitor the features for use and numbers of condors using them.
4. Specific methods to accomplish this monitoring will be developed during 2012-2013.

[10] S. T. Buckland, D. R. Anderson, K. P. Burnham, J. L. Laake, D. L. Borchers, and L. Thomas. Introduction to distance sampling estimating abundance of biological populations. Oxford University Press., New York., 2001

Key Predators

Monitoring methods

Predator trapping and shooting are standard methods used in Patagonia to reduce populations of predators. However, there are rarely any records of the offtake to assess the effectiveness of the controls or of the status of the predator population. A Holistic Farm keeps records of its predator control activity, including when it occurs, where it occurs, how it was done, and what was removed. Trapping and shooting results are the major data that need to be recorded and analyzed.

FA 2 is a monitoring form that should be completed each year.

Quality Criteria for fieldwork:

The field inventory is a critical point of the work. Some quality criteria:

- **Consistency:** the same care from the first sample to the last.
- **Good rhythm but no rush:** It is very important to keep a good working pace to allow a good amount of samples per day. Concentration is critical to organize the routes properly, avoid time losses and make good use of daylight. High anxiety for doing the job fast reduces quality by increasing mistakes and unreliable data.
- **Paying attention to the whole:** It is very important to pay attention to all the indicators and details that can be perceived about the land, the stock, the fences, the water facilities and farm management. Wildlife observations often indicate habitat conditions, historical management, or special areas for consideration. The field survey is a learning moment. If the evaluator is just picking samples according to a protocol he is not taking complete advantage of the experience. Without careful observation it is difficult to integrate the results of the sampling with the rest of the information required to plan the farm.
- **Responsible behavior at the farm:** Grassland evaluators must keep in mind at all times that they are representing a Business Unit and the whole Network. We are trying to solve problems, not to create them. Evaluators must behave using the principles of respect and coexistence. This includes a kind relationship with all farm members irrespective of their relative position, how they care for their vehicles and horses, or any other factors. Avoid dangerous maneuvers, keep gates closed, beware of causing fire, do not use firearms, do not leave trash or any signal of our presence, and collaborate with the farmer in case of need.

7. Use Inquiry

If a PC or a laptop computer is not available, collect this info on printed forms.

The use inquiry must include:

a) Grazing record of every paddock during the last grazing season. This means to record number of animals, stock class, and season of use of each paddock. This is recorded in the Grassland Model (IP) in sheet Tablas, in the table correspondent to each paddock, in the section "Previous year". Sheet Tablas makes a monthly balance of forage biomass, which is adequate for paddocks of steppe, with yearlong grazing or long seasonal use. If the paddocks have a mix of steppes and meadows it is advisable to use a sheet per paddock, using the daily balance model.

Save the file with the following code:

IP *Name of the farm Year*.xls

If the daily model is used, the file will be saved with the code IP *Name of the farm Year Production*.xls. The previous use of every paddock will be recorded.

For farmers that do Holistic Management, the Grazing Chart acts as a record. The actual use is recorded with ink and AD/ha are calculated for each grazing period. The sum of all the grazing periods is the Total AD/ha yielded by the paddock.

b) Animal production expressed by critical productive variables. Critical variables are:

Total sheep at shearing
Total Greasy Wool (Kg)
Average Fiber Diameter (Micron)
Average Yield %
Clean Fleece Weight per head
Advanced Wool % (Ultimate Merino + Supra)
Lambs marked %
Total head sold by class
Extraction Rate (%): Total heads sold / Total heads at joining
Carcass weight per class

c) Predator Captures Book Record. The farmer will complete this book. Every capture of predators will be registered. (Form FA 3)
d) Observations from farmers or other experts on recent wildlife use, especially for rheas and guanacos. Key information would include changes in numbers over time, recent observations of numbers of these animals, locations of regular use, and the seasonal patterns of their use.

Breeding Plan.xls will be used to input the farm production statistics. Record as long as possible.

8. Data and sample processing

Vegetation data and samples will be processed according to Ganadería Ovina Sustentable en la Patagonia Austral[9] . Field data will be loaded on IP.xls, at sheet Data Processing, which is programmed to make most of the required calculations.

Unless there are inescapable reasons, samples will be dried and weighed immediately after the field survey. In every case, samples will be frozen from the moment they arrive from the field, until they are dried in the oven.

Wildlife evaluation data and observations will be recorded on forms and analyzed. The results will be incorporated into the situation report.

IP sheet "Situation Report" summarizes the grassland evaluation results, and will be required as evidence of the grassland evaluation.

9. Final Maps and Area matrix by paddock and sites

The waypoints will be downloaded and sent to the Image Processing Lab, with all the comments and instructions for the Lab. (See Image Processing Lab Protocol)

The Lab will send draft versions of the maps until there is agreement about the map classes and the precision of the inventory. Then the Lab will send final maps and the area matrix, which computes the area of each map class (which are sites and/or grassland states) by paddock. This matrix will be added to the respective IP file. The area figures will be loaded into the Situation Report Sheet and into the individual Sheets per Paddock of the daily model.

10. Estimate receptivity per paddock

Once step 7 and 9 are done, the IP model allows the calculation of the current stocking rate, expressed in terms of Sheep Equivalents per Hectare per year or in Animal Days per Hectare per year.

If the IP model was filled in Table Sheet, the impact of current management can be evaluated by copying the stocking rate from the Previous Year (Use Inquiry) at Proposed Stocking Rate of the same paddock. The chart shows the predicted biomass evolution of short grasses if last's year management was repeated.
If the IP model was filled using daily model, the charts allow visualization of the modeled evolution of short grasses biomass in steppes and meadows throughout the year.
Paddock receptivity will be estimated using IP models. This procedure can be substituted by estimation of AD/Ha derived from AD squares, following the procedure described in the Holistic Management Handbook. Substitution will be allowed by Executive or Mentor Professional when the assessment skills are well developed.

<u>Simple paddocks:</u>

We call simple paddocks those that are homogeneous in terms of land productivity. Generally they are either steppe or meadow dominated. In this case, Table Model, which has a monthly biomass balance, can be used. It must be verified that the area of the paddock is fully grazeable (deducting lagoons, wasteland, inaccessible areas, etc). Receptivity is estimated by trial and error, using the model to assess which is the animal numbers that allow achieving the target biomass residue of short grasses at the end of the grazing period or at the end of the winter.

The target biomass residue depends on biozone and management objectives. There is general guidance on management objectives for biomass residue that are derived from experience with management in the biozone. However, experience at the farm level, establishing good ecological understanding using reference conditions, and following a good monitoring protocol will aid in the development of more precise objectives. See Text Box 1.

General Guidance for Determination of the Biomass Residue Objectives:

As a general rule, Do not graze below 100 KgDM/ha in steppes and 600 KgDM/ha in meadows and seeded pastures.

In Humid Magellan Steppe and Fuegian Ecotone the recommended residue in steppes is close to 200 Kg DM Kg/ha.

In farms where starting biomass is below 100 KgDM/ha or close to that figure, the criteria will be to consume an amount of forage that implies at least maintaining short grasses biomass, or (desirable) start an accumulation process.

For example: if a paddock has 40 KgDM/ha in January, run the model until you find a stocking rate that at least allows an expected short grasses biomass of 40 Kg in the next January. To promote land regeneration, a target of 60 kg would be preferred. Careful monitoring over a 5 year period will inform the farmer about the best amount of residue to optimize the restoration process and production as well as respond to wildlife needs.

Text Box 1

Executive supervision is required.

Mixed paddocks:

For paddocks that combine meadows and steppes, receptivity can be estimated by using the daily simulation Model (IP excel). This model simulates biomass growth and consumption for paddocks that combine contrasting sites. Model parameters correspond to the Humid Magellan Steppe. Instructions for model use are available in

the Excel File. As with the simple paddocks, careful attention to monitoring and other farm goals will guide the farmer through adaptive management and the development of the most efficient objectives and practices.

11. Situation Analysis

The diagnosis of the farm management is made using a Control Chart sheet, included in IP files. This chart shows an integrated summary of: a) forage availability and the current stocking rate/estimated receptivity ratio; b) Ecological Evaluation (site integrity and function, conservation issues); and c) Productive Indices. Table 4 shows the Control chart to make a diagnosis of the farm:

Forage evaluation	Situation	Ecological Evaluation	Situation	Animal Production	Situation
Expected nutritional level		Predominant state		Compare flock production with:	
Intensity of current grazing		Rangeland Health Score		Normative production for the region	
Current Stocking rate/Estimated Receptivity ratio, including wildlife		Fragile areas or focal points requiring special attention		Historical records of the farm.	
		Situation of Conservation Objects (According to Biozone CAP)		Indicators: % weaning rate; Kg lamb per ewe; Clean Fleece weight	
Whole Analysis: check coherence between indicators					

Table 4: Scoring chart for farm diagnoses or evaluations.

Procedure 2.2. Grassland and Wildlife checks

Checking the grasslands and wildlife populations at least yearly after the initial evaluation is an essential procedure of adaptive management. The main reasons for this are: a) to have short-term feedback of the responses of grasslands and other conservation objects to the management decisions implemented. We need to assume that we might be wrong and be ready to replan and correct; b) to deal with weather fluctuations, mainly droughts. The earlier we can determine that we will have a forage shortage, the sooner we can take measures, and the lesser the cost. Years above average also may deserve special decisions, which are more likely to be taken if there is an organized effort to assess what is happening with the grasslands, wetlands, and wildlife; and c) to assess progress toward management goals.

This procedure does not replace other checks on the farm that are identified in the management plan. These checks are formal evaluations of the state of the vegetation and key wildlife.

The yearly grassland and wildlife check procedure is similar to the Initial Evaluation, except for the following aspects:

a) No cartographic work is needed, except for new paddocks.
b) Sampling plan is reduced to fixed stations (2 to 4, according to paddock size). Stations are geopositioned and marked with metal stakes. Sampling is repeated yearly on the same areas, to reduce the variability due to sampling station location.
c) Fixed stations are selected based on representativeness and access criteria. Using Initial evaluation data it is feasible to determine which places are representative of the major sites and use intensity. If the paddocks have contrasting sites, the stations should keep proportionality with the area of each site.
d) Photographs will be taken at each stake for further comparison.
e) Wildlife transects are already established although minor changes may be necessary after the initial evaluation experience.
f) Additional conservation objects that are identified over time may need to have an initial evaluation even while ongoing evaluations are done for the main farm.

The Santa Cruz Method is prescribed to do the grassland or other vegetation checks, with the following exceptions:

Holistic Management:

Holistic management concepts have demonstrated success in evaluation using a combination of methodologies. Double sampling is recommended in HM: Santa Cruz Method and Animal Day Squares.[3] The latter can replace the former whenever the Mentor or Executive Grassland Manager involved considers that the skills for Animal Day plots estimation have been developed.

Grasslands with low short grass cover

Grasslands with sparse cover of short grasses will have small yearly fluctuations in terms of biomass. Once the starting receptivity is calculated, it is advisable to evaluate grazing intensity using key species stubble height or residue class, and adjust management according to these figures and in relation to the management objectives of the paddock.

Repeat short grass clipping at least every three years.

In paddocks where 70% or more of the forage comes from meadows, and steppes have less than 100 KgMS/ha; we recommend focusing on meadow evaluation using BOTANAL procedure. Steppes should have a simplified sampling for rangeland health and grazing intensity. This will allow cutting evaluation costs.

Procedure 3: Planning for grazing, wildlife management and Freshwater protection

Procedure 3.1 Basic Planning

We define Basic Planning as the definition of goals and grazing strategy based on stocking rate adjustments and animal allocation strategies, continuous grazing periods. In addition, the basic planning will incorporate the needs of the priority conservation objects that occur on the farm. Initially, the conservation objects are considered to be rheas, guanacos, Andean condors, and the larger predators of the ranch. As CAPs are completed for the appropriate biozones, additional conservation objects that are known or found to occur on the farm for which the plan is being developed will be incorporated into the plan.

Flexible, moderate stocking rates have been recommended for several decades throughout Patagonia as on all grasslands of the world. Basic Planning will provide the basis to stop intense continuous grazing, which is known to be the main cause of desertification. Moderate to light continuous grazing has proved to optimize individual animal production and to stop or at least slow down degradation processes. After more than 20 years of experience of grassland management we have found that in less brittle environments (like the Magellan steppe) light stocking rates (25 to 30% below recommended stocking rates) can produce land regeneration, expressed as an increase in vegetation ground cover, biodiversity, and ecosystem function. The Rangeland Health Index (RHI) can go from negative to positive values, and in a relatively short period of time. In more brittle areas like the Central District, stocking rate adjustment has never been enough to promote visible regeneration and change in RHI values, confirming the claim of one of the most important scientific groups of the country.[11] Basic Planning provides the means of a new paradigm in grazing management of the Patagonian steppe.

Holistic Management has shown the potential to produce regeneration of grasslands in many natural environments. However, the key to successful natural resource management is to manage for sustainable outcomes for people and nature, making the specific tools available but not mandatory. With such a commitment and an understanding of how each natural system works, each manager will apply adaptive management principles and test new tools as needed until the outcomes are achieved or results of monitoring indicate that the farmer is on a predictable course to achievement of management objectives. For now, until more local information is available, and more farmers are prepared to make deep changes in their decision making process, Holistic management will be a recommended optional procedure. The commitment to sustainable grassland outcomes, including conservation outcomes, promises to make significant changes in the status of the farms on the Patagonian steppe.

Setting goals for Wildlife

Holisitic management recognizes all species as part of the farm. Many wildlife species play important roles in the ecosystem or are highly valued by Patagonian residents or people from other parts of the world. Such species and their habitats should be identified and observed as part of a holistic plan. Some species are rare or imperiled and may only survive through strategic management planning and implementation in an

[11] J. Paruelo, R. Golluscio, E. Jobbágy, M. Canevari y M. R. AguiarI.2005. Situación Ambiental en la esteps patagónica. In: Situación Ambiental de la República Argentina. Fundación Vida Silvestre.pp 302-313

adaptive way. A holistic farm is responsible for the wildlife that depends on that particular farm and should be a part of the property's management plan.

While all species are important and have an ecological role, some may pose management challenges for farmers to achieve a triple bottom line, where social and human, ecological, and economical aspects are considered together. In such cases, setting conservation goals, clear management strategies, and a consistent monitoring program are especially important.

A holistic goal for the ranch is a critical step in the process. That goal should include wildlife, the native plants, rare natural communities, and animals, as a part of that holistic goal. The information needed to identify the key species for which the farmer should consider in planning will come from multiple sources. First, the farmer and farmer family may identify key wildlife species that they want to thrive on the family farm. Second, the preliminary standards for wildlife on certified farms will incorporate guanacos, rheas, condors, and key predators. The species were determined in planning efforts led by TNC and experts as important and widespread within the region and in need of conservation attention.

Finally, the Conservation Plans that will be developed over the next 2-3 years will identify in more detail those species of plants and animals that are high priorities for conservation action in Patagonia. Some of these species are very rare and local, others are more widespread, often having declined significantly over time. All are considered by regional experts to be a high priority. Some of these species dwell on public lands such as national and regional parks. But in most cases their futures will depend on farm management – on private lands. Initial standards and protocols for establishing objectives for the 4 species/groups are presented below. Standards and protocols for additional species identified in the regional conservation plans will become available as those plans are completed. New methods may be developed or recommended as needs change.

The methods suggested here are known to be useful for managing a farm or wildlife. They are replicable, mostly simple, and useful. However, they may not be the best methods available for a more rigorous inquiry. We suggest a flexible set of methodologies from very simple to more sophisticated, to be used according with the need of statistical soundness. New methods of monitoring are developed often and may be suggested as they become available.

Guanaco

The guanaco is indigenous to southern South America. While still common in some areas and commonly observed throughout much of the region, the species has declined significantly from historical levels and is considered a species of least concern, but dependent on management (e.g., IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on **13 July 2012**.). Guanacos hold strong values to Patagonian people as well as to people throughout the world. The largest remaining numbers live in Patagonia. Their abundance in some areas, particular

those areas that are degraded, causes management challenges for livestock producers. This protocol is designed to aid in the establishment of conservation goals and assess the distribution and abundance of this species on the farm. From these results, the farmer can apply holistic management practices and acceptable species practices to maintain the grasslands and shrublands in good ecological condition and at the same time make important contributions to guanaco conservation in the region.

Setting guanaco goals.

Due to their importance to many sectors of society and their ecological role in the Patagonian Steppe, the farm should support as many guanacos as possible while also being able to achieve other farm goals. As a starting point, we recommend that each farm manage their farms so that at least 10% of their receptivity expressed as animal units/year are allocated to guanacos. Applying monitoring and adaptive management carefully on the farm will determine the degree to which this number is achievable and whether it can be increased.

For example: if a farm has an overall receptivity of 3000 sheep AD/year, the grazing plan should allocate at least 10% for guanacos, say 300 AD/year. Using 2 AD/guanaco, this gives a reserve for at least 150 resident guanacos or the proportional temporary herd size.

If the actual population estimates are below this goal, the guanaco herd should be protected from hunting or other population control activities. If guanaco population estimates exceed the goal, and there is no evidence of damage on ecological or economical sustainability, the farmer may decide to maintain greater populations of guanacos. Conversely, if the size of the guanaco herd causes damage of the grassland or forces significant destocking of sheep, the farm may need a plan to control population size, in coordination with wildlife authorities.

Andean Condor

The Condor is indigenous to the Andes and surrounding areas of South America. The species has declined dramatically in much of its range, particularly the northern Andes. However, Patagonian populations appear to be thriving although still warrant careful observation and management of key features of their habitat. The species feeds almost exclusively on carrion, historically guanacos, rheas, or even marine mammals.

Condors require rocky outcrops to provide nesting and roosting habitat and areas with strong uplifting winds which they use to soar from place to place. As such they are most common in western Patagonia, becoming more uncommon with increasing distance from the mountains. The species is of conservation concern and ranked as near threatened according to criteria of IUCN (IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on **13 July 2012**.. Condors held (and hold) special significance to indigenous people of South America and remain a popular bird today. Tourists seek out views of condors and are in awe when first observed closely.

This protocol is designed to aid in the establishment of conservation goals and assess the distribution and abundance of this species on the farm. From these results the farmer can apply holistic management practices and acceptable species practices to maintain the grasslands and shrublands in good ecological condition and at the same time make important contributions to condor conservation in the region.

Setting condor goals.

Due to their importance to many sectors of society and their ecological role in the Patagonian Steppe, the farm should identify and protect the key habitats of the Andean Condor. In this case, rather than set a goal for condor numbers, we recommend that the goal be established for any key habitat features that occur on the farm, e.g., roosts and nesting sites. This species is highly sensitive to disturbance of these important sites and they are generally used for many years. Actual use of these areas may be spotty over time, i.e., they have alternate roosts and may use them one day and not the next.

Key Predators

Most larger predators around the world occur in much lower numbers or are in decline. In Patagonia, we have two widespread, larger and important predators of sheep, the puma (mountain lion) the red fox. The gray fox is also a predator of sheep but has a restricted distribution. These species are important predators on native wildlife including guanacos, rheas, maras, native deer, and armadillos, playing key ecological roles. Most people understand the important role that predators play in the ecosystems in which they occur. However, with the changes that humans have made in our ecosystems by concentrating herds of livestock in relatively small areas, the predators in an area can be in apparent or real conflict with some farm goals. In short, predators do kill some livestock on Patagonian farms (Bellati, J. J. von Thungen. 1990. Lamb predation in Patagonian ranches. Proc 14th Vertebrate Pest Conf 1990. Paper 6). Holistic management considers these wildlife species like others as an important part of the holistic farm. We suggest that farm goals should be to maintain predators on the farm in numbers that allow them to perform their ecological services, but also in numbers that are not inflated due to abundant livestock. This lofty goal is difficult to quantify.

To accomplish this goal, farmers need to decide if they are going to manage predators and how they are going to do it in the context of a holistic farm. If the predators are to be managed, then the protocol for monitoring those predators is simply to monitor the offtake of predators from the farm. We make the assumption that until better information is available that management of predators that results in a nearly constant number of removals year after year will indicate that predators are present and performing their ecological role. If predator numbers drop significantly without stabilizing, it is an indication that predators may have been depleted and may be unable to perform their natural functions.

Required equipment, materials, and supplies:

Previous information

1. Ganadería Ovina Sustentable en la Patagonia Austral[1]
2. Holistic Resource Management, by Allan Savory[3]
3. Conservation Action Planning documents for the Natural Environment
4. Expert knowledge of the local flora, fauna, and ecology of the area as available.

Cartography

Farm maps: composite image and supervised classified map, with area matrix.

Software

Latest version of Grasslands Model (IP).xls
Breeding Plan.xls (For use inquiry)
Initial Grassland Evaluation.doc (Template)

Work Sequence

Step	Description	Activities	Responsible
1	Define the objectives	Open discussion: what do we want to achieve with the grasslands/vegetation, the wildlife, water, the flock and the people?	Farmer Professional/ Executive
2	Analyze relevant information (facts) for planning	• CAP conservation objects and strategies. • Make a list of things that may influence decisions or have to be taken into account • Identify actions that are required for conservation of species and irreplaceable or fragile areas. • Analyze grassland evaluation results for each paddock • Analyze sheep and guanaco populations and their relationship with forage on offer. • List animal groups and define the number of heads to be allocated.	Farmer Professional/ Executive

3	Design a grazing plan	• Rank Paddocks by quality and animal groups by nutritional priority. • Allocate animal groups per paddock • Outline grazing strategy. • Define amount of heads and grazing time • Define conservation measures and fragile area rehabilitation actions. • Define sustainable management of guanaco and other wildlife species • Verify expected forage residues on grassland model (IP)	Executive - Professional Farmer
4	Write the report	• Complete forms, charts and text.	Professional
5	Check the report and Cartography	• Report and map checking.	Executive

Table 5: Work Sequence

The report is a critical document that will serve as the farm management plan. In addition to the part of the report called the grazing management plan, it will, at a minimum, include:

1. A list of specific conservation objects that are conservation objects for the farm.
2. Statements or numbers that represent meaningful objectives or outcomes for each conservation object
3. The actions that will be taken to achieve the objectives, and
4. A description of the monitoring that will be done to evaluate progress or when success has been achieved.

The report is a "living document" that will change as new information becomes available or as situations change. The report, including the grazing plan, should guide all management activities on the farm or estancia.

Procedure 3.2 Holistic Management

Holistic Management may be used as an alternative to Basic Planning. Holistic Management has to be done by the farmer or farm manager, with the assistance of an Accredited HM Educator.

The Educator role is to help the farmer to go through different planning steps, taking care that no step is missed, and share his experience and scientific knowledge for strategy discussion and decision-making.

The objective of his participation is to train the farmer and be part of a common learning process.

As HM is new in Patagonia and several adjustments are taking place, every HM process must have an Executive level grassland manager or a TAFE Accredited Practitioner as a member of the planning team.

The HM planning procedure will be performed according to the HM Handbook[12]. This decision-making framework stands for a triple bottom line where social and human, ecological, and economical aspects are considered as a whole. The procedure description in the Handbook Aide Memoire is detailed and precise, so this Protocol refers completely to it. The Handbook provides space for recording the findings, decisions, and results of the planning. This forms the basis of the report or farm plan.

Work Sequence

Step	Description	Activities	Responsible
1	Define the Whole	Define Decision Makers Resource Base: People, Land, Stock, Money	Farmer Professional/ Executive
2	Define The Holistic Goal	Define: Quality of Life;Forms of Production and Future Resource Base	Farmer Professional/ Executive
3	Financial Planning	• Follow Financial Planning Aide Memoir	Farmer Professional/ Executive
4	Grazing Planning	• Follow Grazing Planning Aide Memoir	Farmer Professional/ Executive
5	Land Planning	• Follow Land Planning Aide Memoir.	Farmer Professional/ Executive

Table 6 : Work Sequence

See the HM Handbook for step descriptions.

A written report is required for Procedure 3. In addition to the critical steps within the HM planning process the report, it will, at a minimum, include:

1. A list of specific conservation objects that are conservation objects for the farm.
2. Statements or numbers that represent meaningful objectives or outcomes for each conservation object
3. The actions that will be taken to achieve the objectives, and

[12] Butterfield, J.; Bingham,S and Savory A. 2006. Holistic Management Handbook: Healthy Land and Healthy profits. Island Press

4. A description of the monitoring that will be done to evaluate progress or when success has been achieved.

The report is a "living document" that will change as new information becomes available or as situations change. The almost constant evaluation of conditions, progress, and results demanded by HM result in a report that will change regularly. The report, including the grazing plan, should guide all management activities on the farm or estancia.

Procedure 4: Long Term Monitoring

Long term monitoring is important to detect structural changes of the grasslands and other vegetation. Such changes cannot be described by the short-term attributes that are evaluated in the grassland check (forage availability and height). These traits fluctuate with weather and use and may not reflect important changes in the conservation/regeneration status of the farm. RHI estimates are useful to this purpose, but as a quick, qualitative appraisal they are not recommended for long term monitoring.[13]

As we manage grasslands to achieve a future resource base, which has a defined structure and ecosystem function, we need to obtain objective information to know if we are progressing towards our desired goal. That is the primary role of long term monitoring. Monitoring is also the foundation for the adaptive management process and a critical means of demonstrating to other the effects of implementation of the plan and management of the farm.

We aim to have an adequate number of long term monitoring points inside the farms that will support the certification of farm products with the Sustainable Grazing Standard. This is to (a) have objective information that is capable of detecting changes in critical variables, (b) track the progress of ecosystem variables as a response to prescribed management changes, and (c)have an early warning system that allows to make corrections if the farm is not moving in the right direction.

Three complexity levels are proposed for long term monitoring. These vary in terms of cost, time requirement and quality of the information. In each case, the Executive Grassland Consultant will define an appropriate combination of monitoring stations and methods to match the farm's objectives and available resources.

[13] Pellant,M; Shaver,P;Pyke, D; and J. Herrick. 2005. Interpreting indicators of rangeland Health, version 4. Technical Reference 1734-6 US Department of Interior, Bureau of Land Management, National Science and Technology Center, Denver CO, BLM/WO/ST-00/001+1734/REV05 122pp

Types of Monitoring

Complexity	Monitor Type	Time required per monitor	Information obtained
Minimal	Photographic Plot	20 minutes x 2 people	Visual information about structural change
Medium	Simplified Transect	2,5 hours x 2 people	Visual (Photographic Plot) Point and Flexible Area measurement (200 points) Soil surface Analysis Invasive and decreaser species frequency. Soil Samples
Maximal	MARAS	4 hours x 3-4 people	Visual (Photographic Plot) Ground cover and basal cover by species (400 points) Patches and Interpatches dynamics Soil surface Analysis Soil Samples

Table 7: Types of Monitoring

The importance of monitoring In Argentine Patagonia is demonstrated by the development of environmental monitoring at the regional scale. There is an ongoing project of environmental monitoring funded by the United Nations Development Program – Global Environmental Fund (PNUD –GEF)[14] that will establish monitoring stations throughout the region. The project has a well-defined method for long term monitoring named MARAS. The method was developed by INTA[15], based on previous literature and Landscape Functionality Analysis (LFA), developed by Tongway and Hindley[13] for Australian rangelands.

Selection of the Long Term Monitoring Method

We recommend **MARAS** as the first option where it can be included in the GEF Project monitoring effort. MARAS should also be the first choice where resources are not too limited. Maras provides the greatest rigor and provides information on important factors that are not readily sampled by other methods.

The MARAS Method was standardized for the whole region and there are trained staff that can install, conduct, and interpret the results from this type of monitoring. The project focuses on monitoring desertification at the regional scale, and has not included

[14] http://gefpatagonia.ambiente.gov.ar/

[15] G. Oliva, J. Gaitán, D. Bran, V. Nakamatsu, J. Salomone, G. Buono, J. Escobar, F. Frank, D. Ferrante, G. Humano, G. Ciari, D. Suarez y W. Opazo. Manual para la instalación y lectura de monitores MARAS. Monitoreo Ambiental para Regiones Áridas y Semiáridas INTA Proyecto PNUD GEF 07/35

monitoring at farm level. Nevertheless, the method has been tested and found adequate for that purpose.

Simplified Transects may be the best alternative when:

- High cover grasslands are predominant (humid Magellan steppe, for example). In this case the patch dynamics analysis of the MARAS has lesser significance.
- Whenever it is necessary to maximize the information/cost of monitoring ratio.

The information derived from the simplified transects will yield high quality information that will inform managers and evaluators of the state of the vegetation and its long term trend. In addition, the process is readily repeated in the event that there is a reason or request for validation of results.

Photographic plots are cheap, easy to install and generate valuable information to track structural changes in soil and vegetation. We repeat that while this is an acceptable minimum standard, quantitative monitoring is highly desirable.

The minimum requirements of the protocol are to have a formal **Monitoring Plan** and an adequate monitoring effort. The minimum monitoring effort at this stage of the project is to install three photographic plots for every area less than 5000 hectares, adding one monitoring station every 5000 additional hectares.
This example will assist the planner and farmer in developing the minimum number of monitoring stations relative to the size of the farm.

Farm Total Area (hectares)	Minimum No. Monitoring Stations
2500	3
10000	4
20000	6
60000	14

Table 8.

Work Sequence

The following work sequence has been shown to be an efficient and effective way to implement the long term monitoring procedure.

Step	Description	Activities	Responsible
1	Design a Monitoring Plan	• Define number, type and location of monitoring stations/transects and interpretation plan.	Farmer Executive Professional
2	Install and read monitors	• Photographic Plots • Basal cover transects using Form MO1 • Soil surface transects using Form MO 2 • Do Soil Carbon Monitorin Plot (Optional) (Form MO 3)	Executive Professional
3	Data processing and report writing	▪ Photographic Folder ▪ Calculate averages and indexes using "Plantilla Monitores" excel file ▪ Prepare a report using the excel file. ▪ Send results to farmer and discussion	Executive Professional
4	Monitor Database	▪ Send report and field data to Central Node ▪ Input monitor database ▪ Produce reports at farm and regional level	Ovis XXI Central Node

Table 9: Work Sequence

Equipment Tool Kit (For simplified transects)

3 Steel tapes (preferred) or nylon rope with marks every 0,25 m
80 m rope
Wooden ruler
Optic square
Compass
Digital Camara 10 MP, 50mm lens
Whiteboard for photographs (A4 Size)
Whiteboard marker
Soil core sampler
Soil Bulk Density Core Sampler
Voucher for plant collections
10kg Hammer
Photographic posts
Metal Stakes
1 T Steel post 2.0 m 1 ½" x 1 ½" x 3" (per monitor)
14 T steel stakes 0,5 m painted white or orange (per monitor)
9 Plastic pipe tubes 1m x 2"
Plastic bags for soil samples.
Form MO 1
Form MO 2
Form MO 3

Descriptions:

Step 1. Design a Monitoring Plan
Monitoring Plan Criteria

Monitor Intensity

The smallest number of Photographic Plots that are required is proportional to the area of the farm. Table 7 shows how to determine the minimum number of plots.
The amount of monitoring with quantitative data collection (MARAS or Simplified Transects) depends on the objectives and the availability of financial resources and time to do them. Our recommendation would be to have at least 30% of the monitoring points with quantitative evaluation.

Locating the Monitoring Stations

The locations of monitoring stations or sites are a very important element of monitoring. A standard monitoring station is placed in an area that represents a more widespread vegetation. There are important considerations in their placement so that they are truly representing the area of interest.

Another type of location for a monitoring station is for areas that are known or believed to be sensitive or highly important for a variety of reasons. For example, a monitoring station might be established in a heavily degraded area, in an area being invaded by weeds, or in wetland and riparian areas. The purpose for choosing the monitoring location may vary, but the purpose is the same – to detect change in a an area of particular interest different than representing the paddock or ranch's primary ecosystem. In general when a monitoring station is established for this purpose, the information gained is meaningful only to that location.

Finally, it is important that monitoring stations should be established in reference areas, areas that are known or believed to represent a desired state or at least the best state of a specific vegetation type. Such plots may not be on the farm being evaluated. These locations are highly important for calibration and development of conservation and management objectives. Text Box 2 provides summaries of the 3 categories of key monitoring locations.

Text Box 2:

Three different criteria define monitor location:

Key Area: Reflect the general situation of a paddock. The criterion is representativeness in terms of area. Only larger, average situations are monitored.

Critical Area: These places do not necessarily have an important area, but it may reflect important changes for the farm, for example, a patch where invasive species are taking over, or a fragile spot where there are active erosive processes.

Reference Area: These monitors are selected as representative of the best state and trend of the site. It may not be inside the farm. Reference Areas are a benchmark point for the rest of the monitors. Allow distinguishing climate effects from management impact.

As criteria for monitor allocation we suggest the following:

Total of monitors	Key Area	Critical Area	Reference Area
1	1		
2	1	1	
3	2	1	
5	3	2	
8	5	2	1
12	8	3	1
15	9	4	2

Table 10: This table describes a recommended distribution of monitoring stations by category.

The final decision of how and where to allocate the monitoring stations will depend on the farmer and the grassland consultant. The farm monitoring plan will be defined and documented on Form. MO 1. The spreadsheet helps to calculate a theoretical distribution of monitoring stations that can be reassigned manually.

Form MO 1

Farm: Area: 20000
CODE:

Minimal Amount of Monitors: 6

Theoretical distribution

	MARA 0R SIMPL.TRANS		Photo	TOTAL
Key Area		1	3	4
Critical Area		1	1	2
Reference Area				0
TOTAL		**2**	**4**	**6**

Planned distribution (Manually)

	MARA	Simpl.Tr	Photo	TOTAL
Key Area				0
Critical Area				0
Reference Area				0
TOTAL	**0**	**0**	**0**	**0**

Monitor List

Code	Paddock	Type	Criteria

Form MO1: Monitoring plan.

Step 2: Install and read Monitors

MARAS
Follow MARAS Handbook[11]

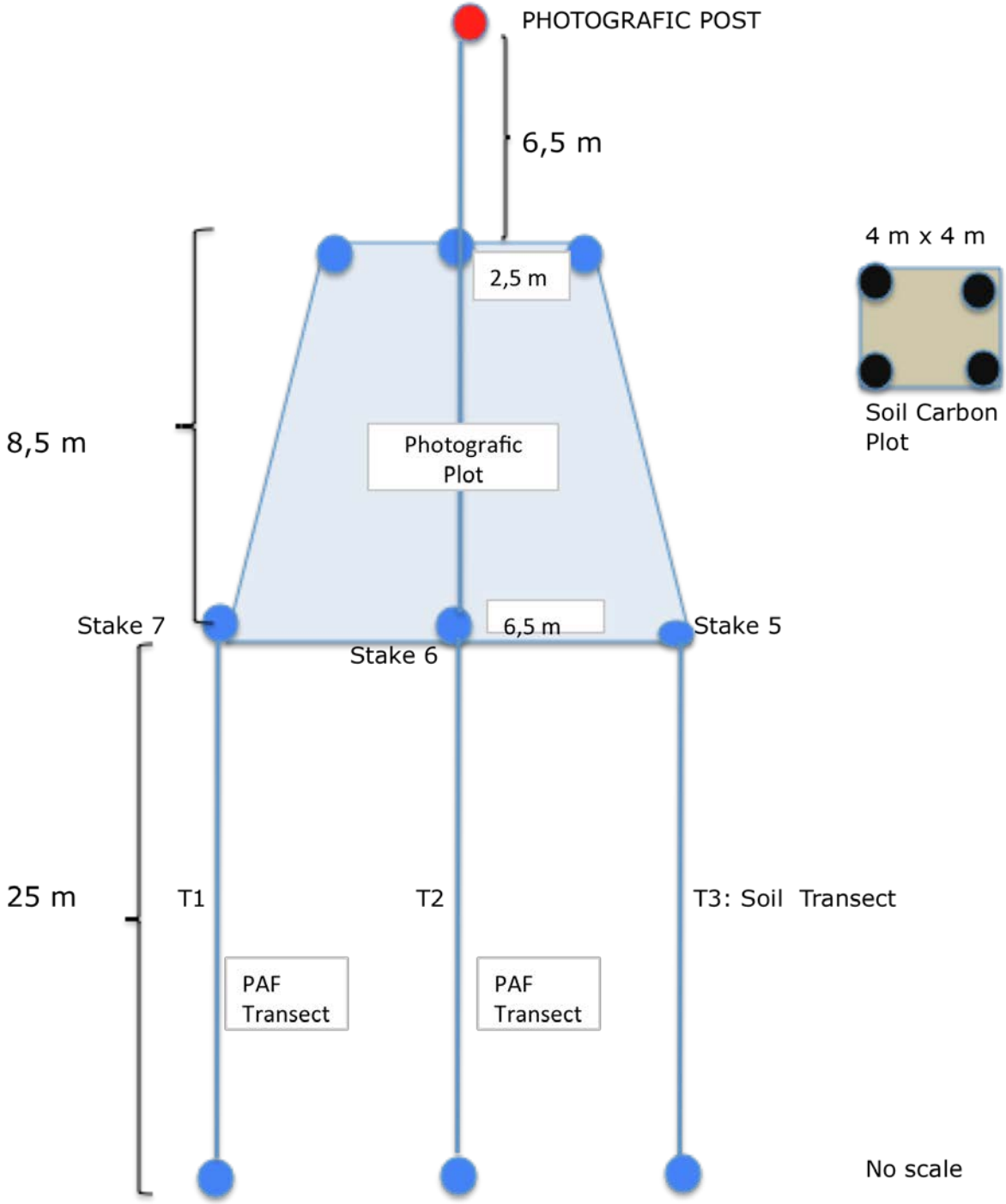

Figure 3: MARAS Diagram. This structure will be used for all types of monitors. Please note that dimensions are slightly changed from original MARAS.

Photographic Plots

Proceed as indicated in MARAS Handbook [11] for plot installing and photography.

Simplified Transect (Simplified MARA)

The Simplified Transect is based on the same spatial arrangement of a MARAS station. The main difference is in the kind and number of observation (points) for the basal cover transects, and in the kind of data gathered in the soil transect.

Vegetation Biodiversity: The Point and Flexible Area Method[16] will be used to assess basal cover and vegetation biodiversity. The point and flexible area sampling method for rapid inventories of biodiversity status (PAF) combines classical methods of point intercepts with quadrat sampling areas. The method registers points along a line (point intercept method), and in addition samples an area of one to several meters (flexible quadrat) on each side of this line to provide a quantitative assessment of the rarer species. Such a combination resolves the tension between the objectivity of cover evaluation vs. the need to include rarer species.

Two line point transects of 25m long, points spaced every 0,25 m. (100 points in each transect) Total: 200 points, with a variable area of 1-2 m on each side (50 to 100 m^2 each). Form MO 2 will be used for this purpose.

The third transect (from stake 7 to 8) will be used for observation in 10 50 x 50 cm quadrats, spaced 2 m. (Form MO 3)

In each quadrant Rangeland Health indicators will be evaluated using a table that has been adapted from Tongway and Hindley[17], to be compatible with the information obtained in soil transects of MARAS.

[16] Halloy, S.; Ibañez, M, and Yager, K. 2011 Point and flexible area sampling for rapid inventories of biodiversity status. Ecología en Bolivia 46(1) 46-56

[17] Tongway D.J. y Hindley N.L. 2004. Landscape Function Analysis: procedures for monitoring and assessing landscapes with special reference to Minesite and Rangelands. CSIRO Australia, 80 pp.

Soil Carbon Monitoring Plot - Optional

As an additional option, soil carbon monitoring plot may be installed and sampled according to Peter Donovan [18](2011). A4 x 4 m plot will be marked permanently with metal stakes. Eight 0-30 cm core samples plus two bulk density samples will be taken. The soil samples will be analyzed individually for total carbon, to have an estimate of variance. A composite sample (average of eight) will be used for pH and conductivity estimations.

Total carbon will be estimated using dry combustion procedure, and as a second option, Walkley-Black organic matter estimates. The first is preferred as it accounts for total carbon, while the second misses charcoal, inorganic carbon and some fraction of organic compounds.

Procedure 5: Management of exotic species

General concept:

The conservation of Patagonian grasslands implies ensuring the integrity of the soil, the conservation of habitats and ecosystem functions, and maintaining and enhancing flora and fauna that represent the native biodiversity.

From this perspective, grassland replacement by exotic woody or herbaceous species is a practice that may simplify the ecosystem and in some cases cause accelerated soil erosion. Therefore this activity is something that needs to be limited in area, justified in economic and ecological terms, and done using the best knowledge available.

The following guidelines set the conditions for introduction of exotic species.

2. Area limitation

The total area converted to exotic species must not exceed 10% of the total farm area. Exceptions would be farms that have a higher percentage already. In such cases, the farmer would commit to not increase that area.

3. Conditions for exotic species

Exotic species will be used only if there is enough evidence to assure that the introduced species do not behave as invasive species in the ecological area. This is to prevent undesired dissemination of the species out of the planting area.

[18] Donovan, P. 2011. Measuring Soil Carbon Change. A flexible, practical, local method. In. www.soilcarboncoalition.com

4. Justified use of exotic species

a) Land reclamation, to generate perennial ground cover in degraded land when native species cannot be established to accomplish the same purpose.
b) Complementary use. Exotic pastures can be used during spring and allow recovery of the native grassland.
c) To reach strategic nutritional targets that cannot be achieved with native species, for example weaning pastures.
d) To produce forage for winter emergencies.

5. Best Management practices.

All introductions and management of non-native vegetation must be made using best practices. This means avoiding unnecessary soil movement (tilling, grading). Direct sowing practices will be preferred. Introductions will not be made in areas known to be of special significant including but not limited to locations known to be critical to rare or imperiled species or natural communities or areas that are best representations of vegetation in the area.

It will be mandatory that use of fertilizers, herbicides and other chemical treatments will be limited to rational use.

Procedure 6: Predator control and hunting procedures for wildlife extraction.

General concept:

Predators play a critical role in ecosystems and therefore are an important subject for planning for the restoration of ecosystems and management for sustainability. Through predation the populations of prey species or the competitors of prey species and are impacted in numbers, frequency of diseases, behavior. The biological community of an area may be strongly dependent or at least correlated with predators and their impacts.

Historical attitudes about predators have focused on strong control or elimination of the species known or perceived to be predators. It is clear that some predators capitalize on the introduction and maintenance of livestock in their habitat. In general, livestock are not as prepared to dissuade predators as are the wildlife of the area. However, estimates of the actual losses from predation are sometimes exaggerated and results in staggering losses of predators. Today, as noted previously, most of the large predators of the world terrestrial and marine) appear to be in decline (see various IUCN Red Lists). Therefore many predator species are of conservation concern and warrant attention in planning for sustainable ranches.

While the number of losses to predators is often exaggerated, losses are real and need to be considered in farm planning. A holistically managed farm recognizes the benefits of predation and predators and manages for their sustainability. A sustainable ranch also

may, after consideration, need to manage predators to reduce losses while maintaining their ecological benefits. Careful planning and monitoring of predators is a necessary procedure in a sustainably managed farm.

The following guidelines set the conditions for protection, planning, management and monitoring of predators:

1. Planning for predators
    a. Understand the true impacts of predators on the farm. Patagonian studies of predation on sheep demonstrated that losses by other causes than predation were very high. The true cause of lamb and sheep losses (as well as other livestock) should be evaluated prior to establishing goals. The CAP methodology may be appropriate for evaluating the causes of predation.
    b. Establish goals for predators on the farm (see section on goal-setting for predators). While quantitative goals are desirable, the information needed to generate such goals is almost always lacking. Qualitative goals are suitable, for such wide-ranging species when numbers are not available. For example a goal could state that the entire predator community will persist on the farm. Some farmers may want to protect predators, a goal that would call for strong management of the livestock to assure that predator losses were not unacceptable.
    c. Total elimination of predators is almost never appropriate for a sustainable farm.
2. Management actions.
    a. Consider all options for predator management including domestic dogs, changes in livestock herd management, limited lethal control, control in parts of the farm while not controlling in others, other non-lethal forms of management, or combinations.
3. Conditions for predator control
    a. Predator control is allowed only after developing a management plan with goals and objectives, identified management actions (that follow guidance below) and monitoring.
    b. Where predator control has been ongoing, it may be continued as long as the monitoring protocol is followed and the results support continued actions. It is assumed that changes in predator management will be in support of predator persistence (i.e., not eliminated), achievement of management objectives, and farm sustainability objectives.
4. Justified use of predator management. In the event that large carnivores become a real threat to human life or health, their management is warranted.
5. Best Management practices. All predator management must be made using best practices. This means taking action only when needed, managing only the things that need management, avoiding impacts to non-target species, and using information to make decisions.
    a. Manage for specific outcomes identified in the farm plan.
    b. Base management decisions on data and the best information available to minimize mistaken needs for control and wasting time and money.

c. Select control methods that are target specific, i.e., is not expected to harm non-target organisms.
d. Hawks, falcons, harriers, and other predatory birds are not known to be significant predators on livestock in Argentina (Bellati and von Thungen (1990) and so should be protected from harm in any actions associate with predator management.
e. Maximize the use of livestock management to minimize impacts from predators. Frequent movement is considered an appropriate tool.
f. Avoid the use of toxins that are known to harm other wildlife and people or persist in the environment for long times.
g. Maintain records of all predators taken (see previous discussions on monitoring of predators). Evaluate the records to assure that farm objectives are being met. Evaluate at least annually.
h. Adapt the management plan/farm plan as often as needed.

It is mandatory that any use of pesticides and firearms will be limited to rational use.

Back to Index.

Chapter 5: Adaptive Management at Farm Level

Adaptive management is a key concept in the GRASS protocol and in achieving sustainability. It is essential for good farm management. Figure 3 describes the key steps in an adaptive management framework and the GRASS protocol. This chapter emphasizes the steps of execution and record keeping as critical components of adaptive management and the certification process.

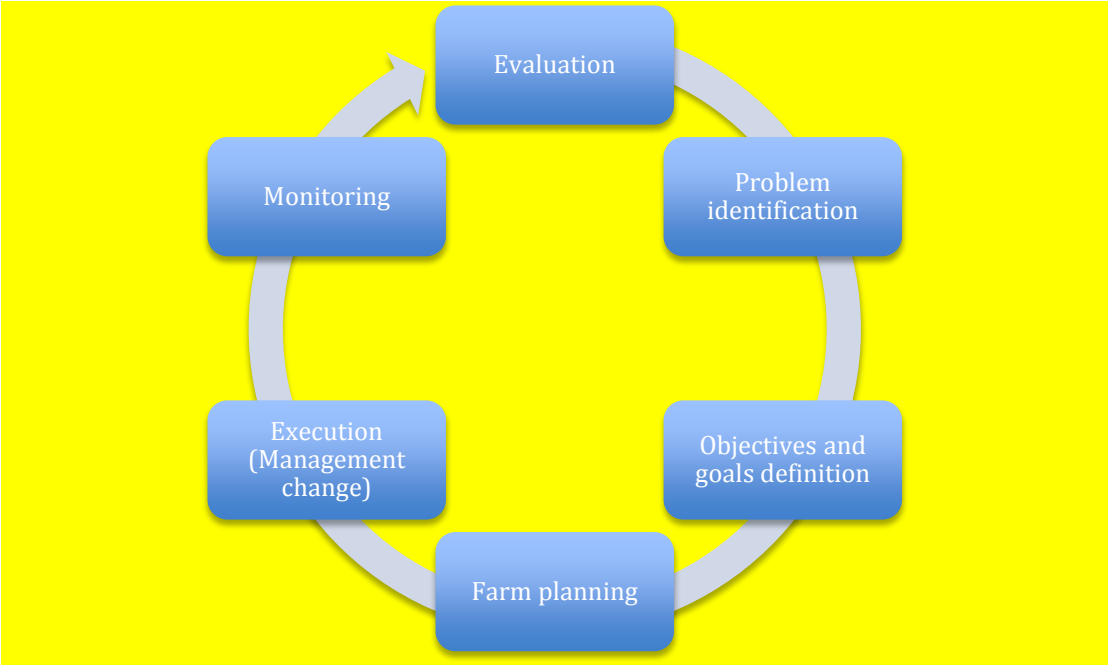

Figure 4. The execution of an Adaptive Management process is the key strategy of GRASS. The diagram shows the activities involved in the process.

The preceding chapters describe the procedures that are essential to make sound decisions, leading to sustainability in the farm's economy, ecology, sociology and human well-being. These procedures have been tested in many locations in Patagonia and other parts of the world and if carefully implemented can predictably make positive changes to the land and its inhabitants. But a good plan is useless if it is poorly implemented or not implemented at all.

The network of technical experts, trainers, managers, and scientists that support this protocol is a key strength in this effort. However, the most important part of this network is the farmer. Execution of a farm's plan is the responsibility of the farmer. The farmer's commitment and skills are the primary reasons behind any achievements in land regeneration and conservation outcomes.

Even a committed and skilled farmer with a good plan needs to keep records. Records allow the farmer to compare observations and outcomes to predicted outcomes and to justify changes in goals, management or other key factors. This should be justification enough to keep good records. However, in this protocol

and to be certified, keeping records and documentation of implementation and results is required.

Proper records allow the farmer and auditors to track progress toward documented goals and objectives, to compare planned actions to the actual execution of them. In addition, if management changes are made between planning and evaluation, those records are critical to the understanding of monitoring results. Some records need to be kept to a) demonstrate that the evaluations and planning were done and executed; and b) to monitor the environmental, productive, economic and social outcomes of the plan. Monitoring will allow the correction of wrong strategies or assumptions and improvements in strategies that are proving useful but not optimal.

In addition to keeping good requirements, as part of the GRASS standard, farmers must be prepared to provide access to their farm records to auditors at their request within a reasonable amount of time. These records will be used by the auditors to determine whether certification is appropriate. A farm without good records cannot be certified and receive the benefits of certification.

Procedure 7: Farm Records

The farmer should organize the paperwork that must be kept for inclusion into the certification process to assure that they are easily found and used in the entire process. Table 10 shows the records and what type of format to keep them. It is important to remember that these records, forms and images are required in the GRASS protocol.

Table 11. shows the records that must be kept by any farm

Num.	Record	Type
1	Maps	Image
2	Initial Grassland and Wildlife Evaluation, including grazing plan.	Paper or electronic
3	Grassland and Wildlife check Reports including grazing plan.	Paper or electronic
4	Long Term Monitoring Reports	Paper or electronic
5	Land Audit Reports	Paper or Electronic
6	Yearly Production Report	Paper or Electronic (Form EP 3)

Table 11. Records that are required at farm level.

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Chapter 6. Auditing and certification at Farm Level

Procedure 8. Reference Area Description

A Reference Area describes the status of each biological indicator for the Reference State.

The Reference State is the state where the ecosystem function capabilities, expressed by soil/site stability/ hydrological function/ nutrient cycling and biotic integrity show an optimum level for that environment (Pellant, et al. 2005). In other words, it is the state that represents the best estimate of a management objective for that site. It may not coincide with the least altered state from a successional point of view.

The region of Patagonia lacks an official database or a benchmark system based on reference areas. Therefore Ovis XXI or agreed upon parties will do the identification and description of reference areas.

Following Pellant et al. the steps for describing reference areas are as follows:

1. To gather a group of experts that has extensive knowledge of the ecological site.
2. To supply the group with available sources of information.
3. Define the functional/structural groups and associated species that characterize the reference state.
4. To visit one or more potential reference areas. Information sources for the selection of reference areas would be: Satellite imagery analysis; areas with high trend ratings from previous grassland studies, long term exclosures, roadsides, etc.
5. Describe the status of each indicator in the reference state. Corresponds to the None to Slight Departure from the expected for the site in the Evaluation Matrix. Form. AR 1 Reference Sheet will be used.

Reference Area description will be done exclusively by Executive or Mentor Grassland Consultants. The Reference Area Description will be saved in digital and paper format in the Business Unit and the Central Node, with corresponding photographs. The Central Node will input the information in a Shared Database and produce communication material (brochures, charts, evaluation matrix) for all the interested parties.

Reference Areas will have the same code as those of the Monitors:

A three-letter code for farm or place.
Correlative numbers.

Example:

BVB 001 Means Bella Vista Bitsch 001

The Rangeland Health Assessment cannot be done properly without a reference area to benchmark the biological indicators.

Rangeland Health Analysis.

The following procedures refer to qualitative, repeatable assessment of Rangeland Health. This protocol is based on the method proposed by the U.S. Bureau of Land Management[19]. That report describes the basic proposal. We adapted some indicators according to several contributions. The Santa Cruz Method[20] proposed indicators that were locally tested in Southern Patagonia and a weighed score for an integrated evaluation of the Rangeland Health status. Living organisms, dung decomposition and litter incorporation are indicators proposed by Gadzia and Graham,[21] who were inspired by Holistic Management. Scores for soil stability indicators follow those proposed by Tongway and Hindley,[1] in Landscape Function Analysis.[22] The purpose was to make this evaluation compatible with MARAS monitors.

Biological Indicators

The following biological indicators have been selected due to their ability to represent the status of the ecosystem function and processes. Table 12 shows the indicators and the ecological processes that they describe. Table 13 shows the range of absolute values that correspond to each indicator class. The final score that is achieved in Rangeland Health Evaluation depends on each environment, and it is reflected in the scorecard.

ECOLOGICAL PROCESS			
SOIL STABILITY	WATER CYCLE	NUTRIENT CYCLE	COMMUNITY DYNAMICS
Litter Cover	Litter Cover	Litter cover	Tussock
Vegetation Cover	Vegetation Cover	Litter incorporation	Key species
Soil surface resistance	Soil surface resistance	Biological crust	Decreasers
Wind erosion	Wind erosion	Dung Decomposition	Shrubs
Water erosion	Water erosion	Living organisms	Invasive species
Biological crust			Production

Table 12: Biological indicators used in the GRASS protocol scoring system.

19 Pellant,M; Shaver,P;Pyke, D; and J. Herrick. 2005. Interpreting indicators of rangeland Health, version 4. Technical Reference 1734-6 US Department of Interior, Bureau of Land Management, National Science and Technology Center, Denver CO, BLM/WO/ST-00/001+1734/REV05 122pp

20 Borrelli,P y Oliva, G. 2001. Evaluación de Pastizales. Cap.6. pp 161-182. En: Ganadería Ovina Sustentable en la Patagonia Austral. Borrelli P. y Oliva, G. Ed. INTA Reg. Pat. Sur. 269pp

21 Gadzia,K and Graham,T. 2009 Bullseye. Targeting your rangeland Health objectives. The Quivira coalition. 64pp

22 Tongway D.J. y Hindley N.L. 2004. Landscape Function Analysis: procedures for monitoring and assessing landscapes with special reference to Minesite and Rangelands. CSIRO Australia, 80 pp

Table 13a: Indicators value range and description

NUM.	ATRIBUTE	PROCESS INDICATOR		MAX			MIN		Source
1	LITTER ABUNDANCE	COVER	Class	5	4	3	2	1	
			Description	>50%	25-50%	10-25%	1-10%	<1%	MARAS
2	VEGETATION COVER	BASAL COVER %	Class	5	4	3	2	1	
			Description	>80%	60-80%	40-60%	20-40%	<20%	PELLANT ET AL
3	SOIL SURFACE RESISTANCE	CRUST HARDINESS	Class	4	3	2	1		
			Description	Very Hard	Hard	Weak	Loose		MARAS
4	WIND EROSION	BLOWOUT/DEPOSITION	Class	4	3	2	1		
			Description	None	< 10%	10-50 %	> 50%		MARAS
		ACTIVE PEDESTALS	Class	4	3	2	1		
			Description	None	<5 cm	5-10 cm	> 10 cm		MARAS
5	WATER EROSION	ACTIVE RILL							
		ACTIVE WATER FLOW PATTERNS	Class	4	3	2	1		
			Description	None	< 2 cm	2-10 cm	> 10 cm		MARAS
		ACTIVE GULLIES							
6	BIOLOGICAL CRUST	COVER	Class	4	3	2	1	0	
			Description	> 10%	5-10%	1-5%	<1%	No hay	MARAS
7	LITTER INCORPORATION	LITTER/SOIL CONTACT	Class	4	3	2	1	0	
			Description	High	Mid/high	Medium	Low	Nil	GADZIA & GRAHAM

NUM.	ATRIBUTE	PROCESS INDICATOR		MAX			MIN		Source
8	LIVING ORGANISMS	MICROFAUNA EVIDENCE	Class	2	1	0	0	0	
			Description	Abundant	Present	None	None	None	GADZIA & GRAHAM
9	DUNG DECOMPOSITION	DUNG DISSAPEARANCE RATE	Class	2	1	0	0	0	
			Description	Fast	Fair	Slow	Slow	Slow	GADZIA & GRAHAM
10	TUSSOCK	REPRODUCTIVE RATE & VIGOUR Rating for individual plants	Class	5	4	3	2	1	
			Description	Excellent	Good	Fair	Poor	Very poor	BORRELLI & OLIVA
11	DECREASERS	Frequency	Class	5	4	3	2	1	
			Description	Abundant	Present	Few	Rare	None	BORRELLI & OLIVA
12	KEY SPECIES	REPRODUCTIVE RATE & VIGOUR Rating for individual plants	Class	5	4	3	2	1	
			Description	Excellent	Good	Fair	Poor	Very poor	BORRELLI & OLIVA
13	SHRUBS	REPRODUCTIVE RATE & VIGOUR Rating for individual plants	Class	5	4	3	2	1	
			Description	Excellent	Good	Fair	Poor	Very poor	BORRELLI & OLIVA
14	INVASIVE SP		Class	0	0	0	-5	-10	
		Abundance of invasive species	Description	None	None	Rare	Present	Abundant	BORRELLI & OLIVA
15	PRODUCTION	TOTAL BIOMASS PRODUCTION	Class	5	4	3	2	1	PELLANT ET AL
		Related TO SITE POTENTIAL	Description	>80%	60-80%	40-60%	20-40%	<20%	

Table 13b: Absolute scores for each indicator class

Procedure 9. Development of Scorecard (Evaluation Matrix)

The following procedure is proposed by Pellant and colleagues to develop the biological indicator matrix for a specific site or ecological area:

1. For each indicator, copy the summary of the Reference Sheet in the None to Slight box. This summary will include a range of values that account for the spatial and temporal variability expected within an ecological site.

2. Write a description for "Extreme" or modify the generic descriptor. Extreme is defined as Extreme to Total departure from the narrative found in the None to Slight box. The range included in this departure category varies among ecological sites and is relative to disturbance events. Different Sites may have a similar description of the None to Slight box, and different descriptions of the Extreme box.

3. Write or modify descriptors for Slight to Moderate; Moderate and Moderate to Extreme.

Indicators of soil/site stability are particularly likely to require these changes due to the inherently higher erosion potential on certain ecological sites. An example of Evaluation Matrix is showed in the following table 14.

Indicator	None to Slight	Slight to Moderate	Moderate	Moderateto Extreme	Extreme to Total
Vegetation Cover	**Reference Sheet**: 70-80% Veg.Cover. Bare patches should be less than 8-10 inches diameter and non-connected. Larger bare patches also associated with ants and small mammal disturbances	55-70% Veg.Cover Bare spaces greater than 12" diameter and rarely connected. Bare areas associated with surface disturbance are larger (> 15") and may be connected to other bare patches	60-40% Vegetation cover. Bare ground with much connectivity especially associated with surface disturbance. Individual bare spaces are large and dominate the area	25-40% Veg.Cover. Bare patches are large (>24") and connected. Surface disturbance areas becoming connected to one another. Connectivity of bare ground broken occasionally.	Less than 25% Veg.Cover, with entire area of bare ground connected. Only occasional areas where ground cover is contiguous mostly patchy and sparse.
Generic descriptor	Vegetation cover matchs what is expected for the site	Slightly to moderate less than expected for the site. Bare areas are small and rarely connected	Moderately less than expected for the site. Bare areas are of moderate size and sporadically connected	Moderate to much less than expected for the site. Bare areas are large and occasionally connected	Much less than expected for the site. Bare areas are large and usually interconnected

Table 14: Comparison of a specific evaluation matrix and generic descriptors

Executive and Mentor Grassland Consultants will develop the evaluation Matrix. They will be periodically updated and accessible through the Central Node Database, as the Reference Area information. An Evaluation Matrix with generic descriptors is shown in Annex II.

Scorecards will be used for qualitative appraisal of Rangeland Health in rangeland evaluations. Long Term monitor information can be translated into RHI using scorecard. Finally, scorecards are the basis for Environmental Audits.

Procedure 10. Environmental Audit

In order to qualify for GRASS certification, each farm shall undergo an auditing and certification process at the farm level. The process provides a transparent means of assuring that the products from the farm are produced according to the GRASS protocol. Additionally, it is a credible interpretation of the indicators on the farm as compared to one or more reference areas.

Work Sequence:

Step	Description	Activities	Responsible
1	Evaluation of available information	• Verify compliance of Adaptive Management. See documents. • Complete Form. AA1	Auditor
2	Define Sampling Plan of the Farm	• Define paddock transect according to maps and existing roads. • Define Station number and representativeness	Auditor
3	Evaluation of Biological Indicators (Rangeland Health)	▪ Farm transects and field assessment in several stations- FormAA2	Auditor
4	Calculate Score and Class	▪ Add indicators by station and average farm score	Auditor
5	Prepare Auditor Report	▪ Preparation and presentation of Audit Report. Form. AA3	Auditor
6	Input Farm Audit Database	▪ Input Audit Results in Audit Database and Farm Folder. ▪ Check for pending issues and recommendations.	Ovis XXI Central Node

Table 15: Work sequence for Environmental Audits

1: Evaluation of Available Information

To determine that a farm is meeting the GRASS standards we must assess whether a farm is performing Adaptive Management, including all of the steps in this protocol. If so, they will be applying a continuous cycle of Evaluation-Planning-Execution-Monitoring is in place. See Figure 4. and Table 11 in Chapter 5. Such applications allow for auditors and farmers to readily assess the status of the process and the status of the land.

The Auditor will require that the farm manager provide all the reports corresponding to steps of the GRASS process (Initial Grassland Evaluation, grassland checks, Basic Farm Planning; Holistic Management Planning, and long term monitoring). The auditor will analyze farm problems already identified, will evaluate the progress of management plans, and will assess if Adaptive Management is taking place and all the aspects to consider before going to the field.

Table 16 shows the minimal frequency of each procedure at farm level.

Procedure	Biological Indicators		VERIFICATION
	FULL	RESTORE	
Initial Evaluation	Santa Cruz Method - During the first 12 months		Report - Maps
Grassland Check	At least every 2 years	At least yearly	Report
Grazing Plan Basic Holistic	Yearly Every six months	Yearly Every six months	Grazing Plan Grazin Chart
Long Term Monitoring	Min: 3 monitor /year	Min: 3 monitor /year	Photos, Report
Environmental Audit	At least every 3 years	At least every 2 years	Audit Report

Table 16: Minimal procedure frequency and verification instruments.

The auditor will verify the Adaptive Management procedures, and fill the Form AA1. Form AA1 will be copied to the Business Unit and the Central Node of Ovis XXI.

Farmers that require certification will need to comply with required procedures before the end of the season (June 30th).If there is any failure in the above-mentioned procedures, the Auditor will notify the farmer of the failure. If a failure is repeated in the following year it will lead to rejection of the certification application.

2. Define Sampling Plan of the Farm

An audit of a farm is not a repeat of all evaluation steps. Instead it is a sampling of the farms environmental conditions to compare the results with those of the farmer. Environmental Audit parameters for farm sampling are the following:

2.1 Diagram:

A transect will be designed in order to cross the greater amount of paddocks during a maximum time of one day. The transect will cross environmental gradients to have a complete assessment of the conservation status of the different landscape units and sites.

The audit will have planned assessment stations, but the auditor will stop and make notes of any element that attract his attention: erosion sites, sand dunes, meadows, camping sites, etc. The audit also will include fragile areas that need special attention, and aspects that need to be considered in future plans.

Beyond having a general positive evaluation, a sustainable farm must plan and execute prevention or regeneration measures for conservation objects that require it.

2.2 Number of stations:

The number of stations will not be less than five in any case. The total number will be equivalent to 50% of the total amount of paddocks. The stations must be located in different paddocks along the transect. For example, a farm with six paddocks: 5 stations; a farm with 20 paddocks, 10 stations.

Meadows, riparian areas, and freshwater conservation objects must have at least 20% of the planned station audits, although they may be subject to audit notes and recommendations at any part of the transect.

2.3 Criteria for station location:

Stations for Rangeland Health Evaluation will be located with representativeness criteria. This means: to identify the bigger paddocks, and within them sites and states of major areas.

The Audit's aim is to assess the conservation status of the average farm. Small area sites, or even spots that have high departure from the farm mean (better or worse), will be noted in the Audit report and, if they require special attention, will have explicit recommendations to the land manager in the report.

3. Evaluation of Biological Indicators (Rangeland Health)

To conduct field audits, the auditor will follow the sampling plan, proceeding to the sampling station. Once the station is located, the auditor will proceed to walk around the area. Observations should be made in a square big enough to contain the spatial variability (micro topography, and patchiness). This depends of inherent variability of the site, but usually will not be less than 1600 square m (40 m x 40 m).

The auditor will rank the fifteen biological indicators, using Evaluation Sheet (Form. AA 2) and the Evaluation Matrix developed for the site. If the Specific Evaluation Matrix is not available, a Generic Descriptor matrix can be used. For each indicator, the auditor will assess the degree of departure from the reference area that corresponds to the site, and assign a score. This procedure will be repeated for all stations identified in the sampling plan.

Each station will be named with a three-letter code of the farm and correlative numbers. The auditor will position the station using a GPS and will take at least two photographs: a panoramic and a close-up with details of vegetation and soil surface. For description and use guide of the indicators we recommend the the auditors follow the cited work of Pellant et al., and Gadzia (see a description of the Rangeland Health Analysis at the end of this chapter).

4. Calculate Score and Class

Once the evaluations of all stations have been completed, the auditor will calculate the farm scores and class. The final score for each assessment station comes from summing up the individual scores of each indicator.

4.1 Calculation of the Score:

Landscape Functionality Indices (LFI) have been adapted from those proposed by Tongway and Hindley.[23] These indices provide a better interpretation of the results, and put together the information that comes from different indicators. Its calculation is as follows:

LFI= 1-((Max.Score – Observed Score)/(Max.Score – Lesser Score))

Each Index is expressed as a percentage of the maximum score possible. Maximum score is computed by adding the individual scores of the indicators that relate to different ecological processes. Table 17 defines the Landscape Functionality Indexes and which Indicators are related to them.

Site Stability Index SSI	Water Cycle Index WCI	Nutrient Cycle Index NCI	Community dynamics CDI
Litter	Litter	Litter	Tussock
Vegetation Cover	Vegetation Cover	Biological Crust	Decreaser Species
Soil Surface Resistance	Soil Surface Resistance	Litter incorporation	Key Forage Species
Wind Erosion	Wind Erosion	Dung Decomposition	Shrubs
Water Erosion	Water Erosion	Living Organisms	Invasive species
Biological Crust			Biomass production

Table 17: Landscape Functionality indices

Data from Form AA 2 will be input in the spreadsheet "Audit Processing." That is prepared to perform the calculations and corresponding indexes.

[23] Tongway D.J. and Hindley N.L. 2004. Landscape Function Analysis: procedures for monitoring and assessing landscapes with special reference to Minesite and Rangelands. CSIRO Australia, 80 pp

4.2 Determination of the Farm Class:

FULL Class recognition will be given to farms whose Average Score is equal or above zero. If a farm has 30% or more of the Audit stations with Site Stability Index (SSI) lower than 40%, it will be a RESTORE farm irrespective of the average score. RESTORE class will be assigned to those farms with negative scores or positive score but 30% of the stations with IIS < 40%.

Class Assignment:

1. The main procedure to determine the Farm Class will be the Land Audit. This will be made with the frequency determined in the Land Audit Procedure (Every two or three years according to the farm class).
2. If the farm has not performed a Land Audit, it will be assigned to a Restore or Full Class according to the results of the last Grassland Evaluation. The Land Auditor will review this.
3. A farm may request a special Land Audit to review the Class of the farm, if they consider that things have changed from the last Audit.

5: Prepare an Audit Report and Farm Class Definition

After the field audit has been conducted and all scores and classes assigned, an Audit Report will be made using Form. AA 3. Audit reports on zonal sites and riparian & wetland areas will be reported separately.

6. Audit Report Database

The storage and management of audit information is another critical step in the protocol. A central database will be maintained by Ovis XXI. Additional data storage and management systems are under development but are not currently available. The auditors will be responsible for sending the Original Audit Report to the client in a prompt timeframe. A copy of the Report, the Audit processing spreadsheet and the photographic material of all the stations, plus interest points observed while travelling the transect will be sent to the Ovis XXI Central Node and to the GIS Database.

This database will allow monitoring of the progress observed on each farm and calculation of the number of hectares that achieve the FULL Class each year. While the audit is specific to the farms in the network, the compilation of data from all farms will inform all participants of the impacts that these practices are having on the restoration within the region. The Central Node will have electronic and paper back up of Audit Data.

Procedure 11: Product Certification

After completion of the audit report, the farms are officially classified as to whether they are FULL or RESTORE farms. In either case, the farms that follow the protocol are certified. Certification includes several classes of farms.

Classes of Farms for Sustainable Branding

The Ovis XXI Sustainable brand distinguishes four classes of farms, according to their current rangeland health status and the standards complied by the farm. (Table 18)

	RANGELAND HEALTH SCORE	
STANDARDS COMPLIED	RESTORE (-)	FULL (+)
Sustainable Grazing Standard	Patagonian Grassroots Sustainable Grazing Standard RESTORE	Patagonian Grassroots Sustainable Grazing Standard FULL
Sustainable Grazing Standard +Genetic Improvement +Advanced Wool Classing	recupera restore Ovis XXI www.ovis21.com recupera restore	Sustainable Ovis XXI Sustainable www.ovis21.com

Table 18: Certification options according with standards complied and rangeland health status

FULL: Products identified with Full Brand come from farms that apply Adaptive Management and have positive biological indicators. This means that the integrity and functionality of the ecosystem are close to the potential of the environment and degradation processes have been minimized.

RESTORE: Products identified with Restore Brand come from farms that apply Adaptive Management and are in process of rehabilitation or regeneration. Biological indicators still score negative, due to the inertia of previous management or the slowness of certain environments to recover their functional processes and biodiversity

Products coming from FULL and RESTORE farms will be blended, when volume is necessary. In terms of reversing desertification, the amount of hectares that get into RESTORE class every year is a key performance indicator and a significant change in the conservation status of the land.

Certification

Certificate Issuance

Certificates will be issued by Ovis XXI S.A. They will be numbered correlatively, and signed by an authorized personnel. In case of Wool Certification, Ovis XXI will issue a certificate for the farm, that assures traceability and quality of the wool supplied by that farm, and another certificate for the Top exported. Certificates will be maintained on the bales of wool when sold until they are processed.

Records

The Certificates will be printed on three copies of paper: one for the vendor of either wool or top, one for the buyer, and a third copy to be filed by Ovis XXI. Each certificate will have the backup information filed and maintained in the central databases.

Certificate Type	Form.	Back up Documents	Destination
GRASS	QA 1	Maps IP excel files – Planning report Grazing chart Monitors Land Audit Reports	The Nature Conservancy Topmaker
Wool production Farm	QA2	Wool Classer Specification. Wool Tests	Topmaker
Top	QA3	Farm Certificates List of batch contents (Processor)	Yarn maker, and further

Table 19: Certificate Types

Ovis XXI will keep a physical file of Farm and Top Certificates, and an electronic folder as well.

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Chapter 7: Validation procedures and Independent Auditing

Procedure 12: Processing and evaluation of monitoring data: GIS Database

Introduction

This chapter is in development now. We include some definitions that came out after two meetings held at Bariloche, in August 2011 and January 2012, between The Nature Conservancy, Ovis XXI and INTA. The technical team will define the design and operation of the GIS Database further.

The GIS Database

A GIS Database will be developed with the support of the three parties.

Objectives

- Store and process information about grassland changes at the farms under certification.
- Validate the sustainability of land Management.
- Benchmark different management strategies and their environmental outcomes.
- Facilitate and increase the learning experience of land managers and grassland scientists

Changes we want to monitor

- Biodiversity
- State transitions (structural change)
- Landscape function analysis (soil stability, nutrient cycling, water cycling)
- Rangeland Health Index
- Soil carbon (carbon sequestration and storage)
- Patch structure

Information sources

The GIS Database will process georeferenciated information from the following sources (Table 20)

Source of information	Traits	Format	Responsible
Reference Areas	• Vegetation Biodiversity • Rangeland Health • Landscape function analysis • Soil Carbon	Excel file Waypoint Images Multitemporal	Ovis XXI – Central Node INTA
Monitoring points (MARAS and Simplified Transects)	• Vegetation Biodiversity • Rangeland Health • Landscape function analysis • Soil Carbon	Excel file Waypoints Images Multitemporal	Farmer/Grassland manager INTA
Monitoring Points (Photografic)	• Vegetation state and condition	Images Waypoints Multitemporal	Farmer/Grassland manager
Land Audit Reports	• Rangeland Health Index	Excel file Multitemporal	Ovis XXI – Central Node
Grassland Evaluations At farm level	• Maps • Receptivity estimates • Stocks and production • Wildlife population (guanaco,rhea) • Wildlife biodiversity • Predator captures • Rangeland Health Index • Satellite imagery (Landsat, SPOT, MODIS)	Poligons (Raster) Waypoints Excel files Multitemporal	Farmer/Grassland Manager
Irreplaceable Sites	Polygons	Raster	TNC
Special species (Based on CAP results)	• Points • Polygons	Waypoints Raster files	TNC

Table 20: GIS Database information sources

Main Hypothesis about grassland change

The hypotheses to be tested relate with the expected responses to the prescribed adaptive management and the tools available with respect to environmental and sustainability outcomes.
The main hypothesis we want to validate are the following:

a) Farms following the standard will maintain or increase biodiversity and primary production.
b) Farms following the standard will increase soil stability and improve ecological function. Rangeland Health Index will increase accordingly (water and nutrient cycle, energy flow, carbon sequestration at soil level).
c) Holistically Managed farms will promote regeneration processes (structural and functional improvement) in all environments. Light to moderate continuous grazing will promote regeneration in the most humid (less brittle) Patagonian environments.
d) Healthy grasslands (High RHI values) will be more stable than degrading grassland, performing better under drought conditions.
e) Healthy grasslands will tend to grow for a longer time (start earlier and stop later).
f) Healthy grasslands will show smaller changes in distribution of biological indicators relative to predicted values.[24]

GIS Database Management

The GIS Database will be managed in agreement between TNC and Ovis XXI.
The main information will come from Grassland Managers working on certified farms and from Ovis XXI land Audits. Confidentiality and property issues will be clearly defined.

The GIS Database will have online access. Some information will be public. Authorized users will have access to the whole database.

The GIS Database will produce individual farm reports and also a yearly regional report.

The Scientific Committee will organize a yearly workshop to present the results, innovations and discuss the validation of the objectives.

[24] Halloy, S. and Barrat B.2007., Patterns of abundance and morphology as indicators of ecosystem status: A meta-analysis. Ecological Complexity 4 (2007) 128–147.

Procedure 13: Remote sensing monitoring and analysis

The use of satellite imagery can be useful and cost efficient in terms of monitoring grassland change.

Satellite imagery has been used since 1993 to make grassland inventories. Classification procedures allow separating sites and most of the states of the grasslands, as states reflect structural changes in vegetation and soil. Multitemporal analysis has allowed to detect long term transitions in the Magellan Steppe (Rivera, com. Pers).

Different vegetation indexes have been used to estimate photosynthesis, and derivated calculations of biomass production.[25] The IFEVA Institute from the University of Buenos Aires have developed a service that provides NDVI and productivity values at paddock scale on a weekly basis.

INTA has developed Early Warning Regional Systems using MODIS imagery, to determine the NDVI deviation from the mean on a regional basis[26] [27]. This procedure is used to define objectively the growing conditions for vegetation compared with the average. This identifies drought situations and rate the yearly conditions.

The use of these tools to monitor the grasslands changes that we require is something to be determined. Main challenges are:

- NDVI values can reflect total energy capture, but this will not tell what are the species that are producing that process. There are several transitions in grasslands that may involve biodiversity loss and at the same time maintain or even increase NDVI values.
- Soil surface processes related to water and nutrient cycle may not be detected at all.
- Correlation between vegetation indexes and forage production has been low to moderate in some environments.[28]

We propose to make a collaborative effort between INTA, TNC and Ovis XXI to

a) Define the scope of remote sensing technologies to monitor grassland changes in properties under this Standard Certification.
b) Define a procedure to be included in this Standard as an objective validation and learning tool.

[25] http://www.agro.uba.ar/laboratorios/lart
[26] http://www.inta.gov.ar/region/pas/sipas2
[27] www.inta.gov.ar/bariloche/ssd/monitoreo/imagenes/imagenes/imagenes.htm
[28] Paredes, P. 2011. Caracterización funcional de la Estepa Magallánica y su transición a Matorral de Mata Negra (Patagonia Austral) a partir de imágenes de resolución espacial intermedia. Tesis Magister, UBA.

c) Set and manage an independent monitoring system based on remote sensing data.

This will be implemented with a working agreement and the corresponding action plan.

Procedure 14: Scientific Committee Independent Audit

The Scientific Committee will perform an independent audit of certified farms to evaluate the compliance and results of the implementation of this Standard.

Integration

The Auditing team will be designed by the Scientific Committee and may be integrated by themselves or any other scientist that they consider relevant to the task.

Ovis XXI members of the Scientific Committee will not be part of the Auditing Team.

Frequency

The Scientific Committee will define the frequency of Independent Audits. Typically independent audits would be performed every two or three years.

Preliminar information analysis

The Auditing Team will have access to the following information and what ever they ask from Ovis XXI.

- Location of each farm, and reference areas for each natural environment.
- CAP Documents for the natural environment, if available.
- Evaluation matrix for each natural environment.
- Reports from the GIS Database, at farm and consolidated level.
- Remote Sensing reports (if available).

Audit Plan

The Auditing Team will elaborate an Audit Plan that will define an agenda and itinerary.
The auditing intensity will be defined by the Auditing team.

By default, a proposed Auditing scheme would be:

a) Define the geographic area (may be the whole region or part of it).
b) Define the auditing universe (number and location of certified farms).

c) Define the number of farms to be audited. With high farm numbers, a fixed percentage or an algorithm can be used. Typically, the square root of the total numbers of farms would be the total numbers of farms to audit.
d) Select the farms to Audit according to an agreed procedure. As an example: 50% of the farms will be audited based on the GIS Data Report (picking those that are outstanding in a positive and negative way), and 50% would be at random.
e) Once the plan is made, the Auditing Team will communicate the decision to Ovis XXI to organize the logistics of the auditing.

Audit Procedure

The Auditing Team may choose to perform the Farm Audit according to Step 3 of Chapter 6, or may define its own procedure.

Reports

The Auditing Team will produce a Report in a time frame no longer than 3 months.

The Report will include:

- An individual report for each farm and a global evaluation of:

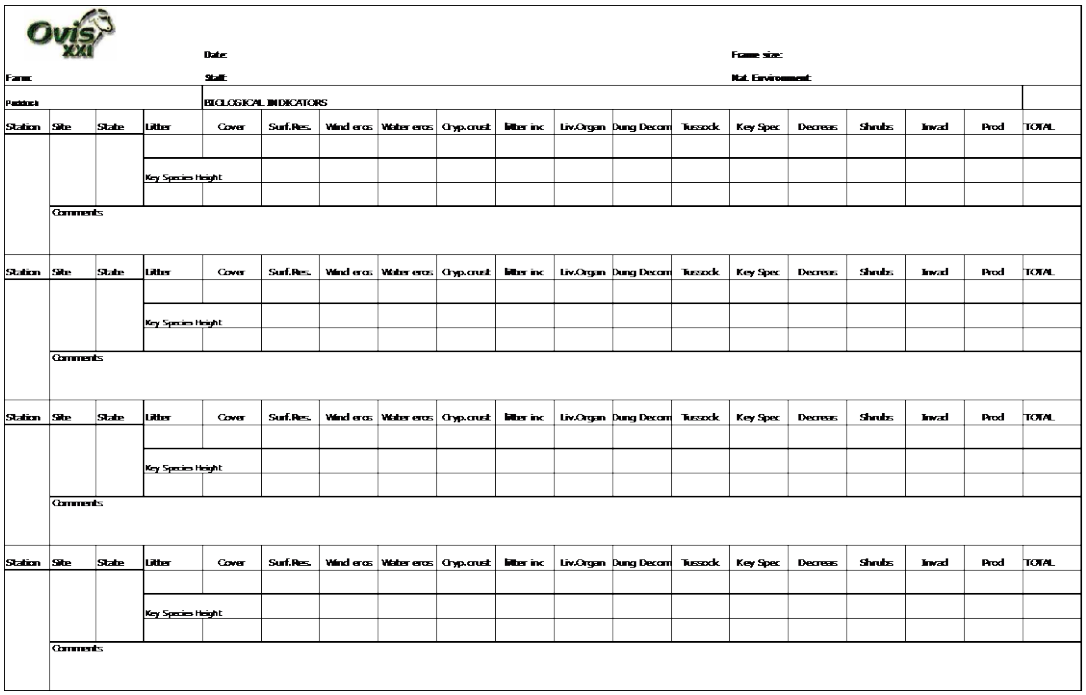
  - Farmers commitment
  - Adaptive Management Compliance
  - Environmental outcomes
  - Non satisfactions
  - Recommendations

Independent Audit Reports will be filed at Ovis XXI Central Node and at the GIS Database, being a public accessed document.

Back to Index.

APPENDIX I

Forms for Procedure 1:
Grassland and Wildlife Evaluation



Farm:

Date:

Staff:

Frame size:

Nat. Environment:

Paddock

BIOLOGICAL INDICATORS

Station	Site	State	Litter	Cover	Surf.Res.	Wind eros	Water eros	Cryp.crust	litter inc	Liv.Organ	Dung Decom	Tussock	Key Spec	Decreas	Shrubs	Invad	Prod	TOTAL
			Key Species Height															
	Comments																	
Station	Site	State	Litter	Cover	Surf.Res.	Wind eros	Water eros	Cryp.crust	litter inc	Liv.Organ	Dung Decom	Tussock	Key Spec	Decreas	Shrubs	Invad	Prod	TOTAL
			Key Species Height															
	Comments																	
Station	Site	State	Litter	Cover	Surf.Res.	Wind eros	Water eros	Cryp.crust	litter inc	Liv.Organ	Dung Decom	Tussock	Key Spec	Decreas	Shrubs	Invad	Prod	TOTAL
			Key Species Height															
	Comments																	
Station	Site	State	Litter	Cover	Surf.Res.	Wind eros	Water eros	Cryp.crust	litter inc	Liv.Organ	Dung Decom	Tussock	Key Spec	Decreas	Shrubs	Invad	Prod	TOTAL
			Key Species Height															
	Comments																	

Form EP 1: Grassland Evaluation Form

Farm:		Paddock	
Date:		Observer	
Frame Size:			

Site	Transect	Nº	BOT CLASS	Tussock	Grasses	Juncus	CAREX	Clover	Others

BIOMASS RANK TO ESTIMATE DRY WEIGHT COMPOSITION

5	> 75% available biomass
4	50-75% of available biomass
3	25-50% of available biomass
2	10-25% of available biomass
1	1-10% of available biomass
+	< 1%of biomass (Presence)

Note: Total rank per sample add more than 6 and less than 8

Form EP2: BOTANAL Field form

FARM NAME							1		PERIOD				
CLASS	OPENING INVENTORY	HEADS SHEARED			Lambs marked	Lambs weaned	Class changes	Purchases	Sales	Loss	Deaths	Consumption	Close Inventory
		Shearing	Other dates	TOTAL									
Ewes													
Lambs													
Ewe hoggets													
Wether hogts													
Wethers													
Ram hoggets													
Teasers													
Rams													
TotaL HEADS	0	0	0	0	0	0	0	0	0	0	0	0	0

Population indicators:		% REPLACEMENT 1:		% Ewes culled	% LOSSES	
Breeding plan Type		% REPLACEMENT 2:		% Hoggets joined	% REPLACEMENT MALES	

CLASS	Kilos	Micron	Yield	Price/kg	TOTAL
UM Hogget					
UM Adults					
Supra Hogg					
Supra Adults					
Comm.Hogg					
Comm Adults					
Tot/Avge					
% UM+SUPRA					
Non Fleece					
Total Wool Kgs					

WOOL INDICATORS

CFW/head W/D3

MEAT INDICATORS WEANING WEIGHT

% WEANING = LAMBS WEANED X 100 / TOTAL EWES AT WEANING

KG WEANED PER EWE = % WEANING X WEANING WEIGHT

EXTRACTION RATE = (HEADS SOLD-PURCHASES +/- INVENTORY DIFF X 100) / TOTAL HEADS SHEARED

Form EP 3: Sheep production yearly report

		Steppes					Meadows	
Paddock Code	Paddock Name	Steppe Area	Forage Availability	Key Species Height	% CV Height	Average RHI	Meadow Area	Weighed Forage Availability

Form EP4: Grassland Evaluation Results (In IP Excel File)

SUMMARY OF RECEPTIVITY ESTIMATES PER PADDOCK

FARM:

Paddock code	Paddock Name	Area	Days Closed plan	Method CODE	Recept .Parameter	AD/Ha	Total AD
FARM TOTAL							

Method code	CODE	PARAM
AD SQUARES	SQU	AREA PER AD
SIMULATION MODEL	MOD	MINIMAL FORAGE AVAILABILITY
FORAGE ALLOWANCE	ALL	YEARLY ALLOWANCE/AD
OTHER	OTH	

FORM EP 5: Summary of receptivity estimates per paddock

Wildlife Monitoring Form **Form FA 1**

Species being monitored _____ Observer (s): _____

Transect Number: Date: _____ Weather _____
Mode of transportation: _____ Farm size (suitable hectares): _____
Method: _____
Line transect: _____ Belt Transect: _____ Distance: _____
Time of observations:
Period 1: _____ Period II: _____ Period III: _____
Map of farm/paddock and sampling route taken (attach to form)
Start and stop point for each segment: _____

Location of Observation GPS waypoint	Paddock name	Total number of animals	Number Adult Males	Number Adult Females	Number of young	Distance from transect	Comments

Form FA 1: Wildlife Evaluation Form

Form FA 2

Predator Monitoring Form

Date	Species	Adult Male	Adult Female	Juvenile	Total Length	Weight
! " #$%	&' ($					
	) *+,-".					
	/0*1,2".					
	3#4*05					

Form. FA 2: Predator Monitoring Form

Forms for Procedure 2:
Basic Grazing Plan

BASIC GRAZING PLAN **YEAR:**

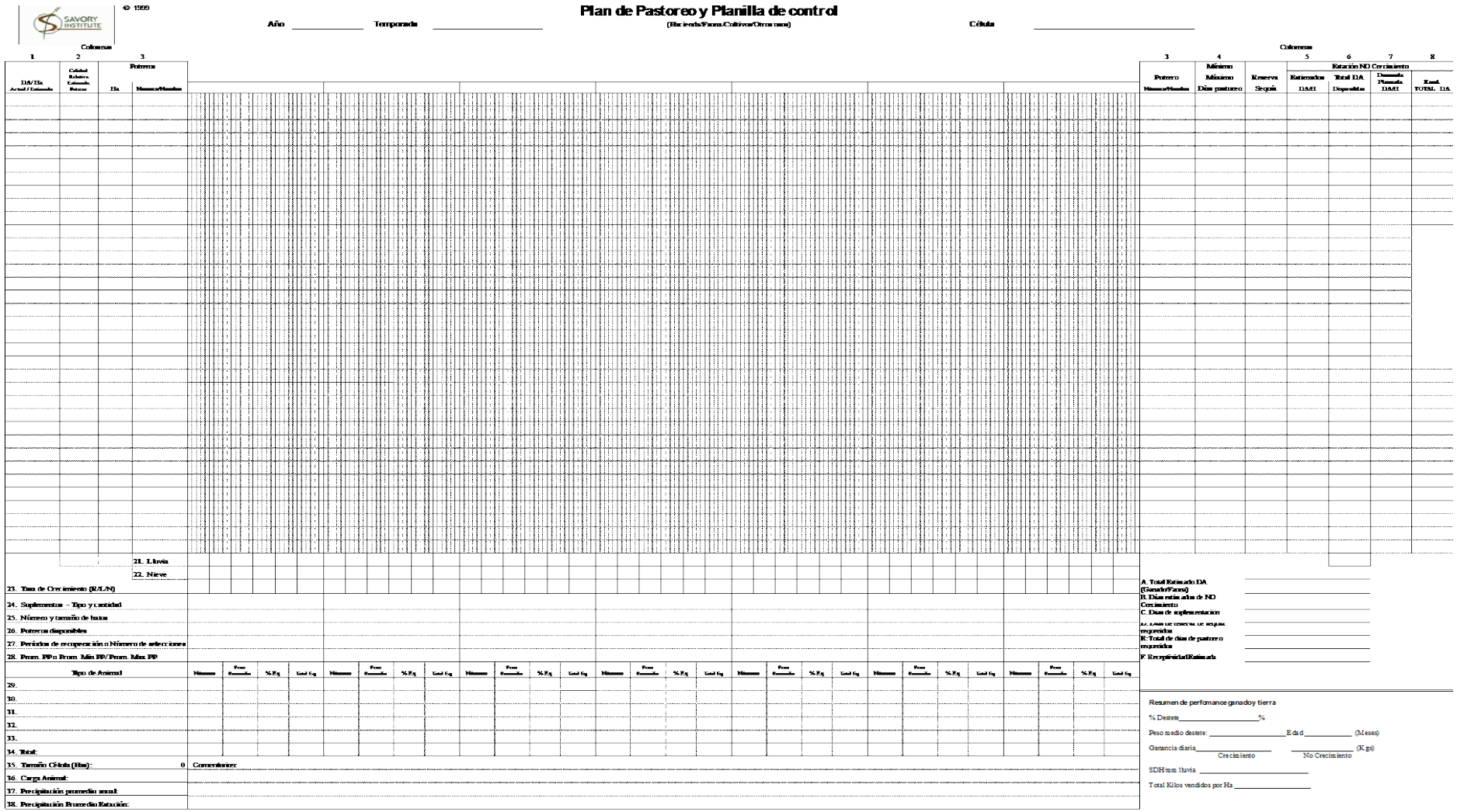
					Dates	
Paddock code	Paddock Name	Recept. Estimate	Number Heads	Stock Class	In	Out

Management concerns:

Conservation Targets requiring special atention:

Form PP 1: Basic Grazing Plan

Forms for Procedure 3:
Holistic Grazing Plan



Form HM 1 Holistic Management Grazing Chart

Forms for Procedure 4:
Long Term Monitoring

Form MO 1

Farm Name: _____ Area: ☐

Farm Code: _____

Minimal number of monitorin points: ☐

Theoretical Distribution

	MARA or SIMPLIFIED TRANS		PHOTOPOINT	TOTAL
Key Area		0,0	0	0
Critical Area		0	0	0
Reference Area				0
TOTAL		**0**	**0**	**0**

Programmed Distribution (Fill Mannually)

	MARA	SIMPL-TRANS	PHOTOPOINT	TOTAL
Key Area				0
Critical Area				0
Reference Area				0
TOTAL	**0**	**0**	**0**	**0**

MONITOR LIST

				Position	
Code	Paddock	Type	Criteria	Lat.	Long

Form MO 1: Long Term Monitoring Plan

Absolute Scores for Biological Indicators (To be used in Simplified Transects)

NUM.	ATRIBUTE	PROCESS INDICATOR		MAX				MIN	ECOLOGICAL PROCESS			
									STAB	WATER	NUT	DYNAM
1	LITTER ABUNDANCE	COVER	Class	5	4	3	2	1	■	■	■	
			Description	>50%	25-50%	10-25%	1-10%	<1%				
2	VEGETATION COVER	BASAL COVER %	Class	5	4	3	2	1	■	■		
			Description	40-50%	30-40%	10-20%	5-10%	<5%				
3	SOIL SURFACE RESISTANCE	CRUST HARDINESS	Class	4	3	2	1		■	■		
			Description	Very Hard	Hard	Weak	Loose					
4	WIND EROSION	BLOWOUT/DEPOSITION	Class	4	3	2	1		■	■		
			Description	None	< 10%	10-50 %	> 50%					
		ACTIVE PEDESTALS	Class	4	3	2	1					
			Description	None	<5 cm	5-10 cm	> 10 cm					
5	WATER EROSION	ACTIVE RILL							■	■		
		ACTIVE WATER FLOW PATTERNS	Class	4	3	2	1					
			Description	None	< 2 cm	2-10 cm	> 10 cm					
		ACTIVE GULLIES										
6	BIOLOGICAL CRUST	COVER	Class	4	3	2	1	0	■		■	
			Description	> 10%	5-10%	1-5%	<1%	No hay				
7	LITTER INCORPORATION	LITTER/SOIL CONTACT	Class	4	3	2	1	0			■	
			Description	High	Mid/high	Medium	Low	Nil				

NUM.	ATRIBUTE	PROCESS INDICATOR		MAX				MIN	ECOLOGICAL PROCESS			
									STAB	WATER	NUT	DYNAM
8	LIVING ORGANISMS	MICROFAUNA EVIDENCE	Class	2	1	0	0	0			■	■
			Description	Abundant	Present	None	None	None				
9	DUNG DECOMPOSITION	DUNG DISSAPEARANCE RATE	Class	2	1	0	0	0			■	
			Description	Fast	Fair	Slow	Slow	Slow				
10	TUSSOCK		Class	5	4	3	2	1				■
		Vigorous, with seedstalks, green	Description	> 50%	25-50%	10-25%	<10%	<10%				
		Decadent, oxidized, no seedstalks		< 10%	<10%	10-20%	20-50%	>50% decad				
11	DECREASERS	Frequency	Class	5	4	3	2	1				■
			Description	Abundant	Present	Few	Rare	None				
12	KEY SPECIES		Class	5	4	3	2	1				■
		Vigorous, with seedstalks, green	Description	> 50%	25-50%	10-25%	<10%	<10%				
		Decadent, oxidized, no seedstalks		< 10%	<10%	10-20%	20-50%	>50% decad				
13	SHRUBS		Class	5	4	3	2	1				■
		Vigorous, with flowers, green sprouts	Description	> 50%	25-50%	10-25%	<10%	<10%				
		Decadent, deformed, no flowers		< 10%	<10%	10-20%	20-50%	>50% decad				
14	INVASIVE SP		Class	0	0	0	-5	-10				■
		Abundance of invasive species	Description	None	None	Rare	Present	Abundant				
15	PRODUCTION	TOTAL BIOMASS PRODUCTION	Class	5	4	3	2	1				■
		Related TO SITE POTENTIAL	Description	>80%	60-80%	40-60%	20-40%	<20%				

Farm:	Transect:	Lat:
Date:		Long:

	Line Points			
Attribute	Points Young	Points Young	Points decadent	TOTAL
Bare Ground				
Litter				
Standing Dead				
Eros.Pavement				
Criptogams				
Ephemeral				

Site:

Altitude:

Relief

Slope/Facing

Year precip

PAF

Species	Num	Area	Distance

Form MO 2: Point and Flexible Area Field Form

SOIL SURFACE/ RANGELAND HEALTH

Ovis XXI

Form. MO 3

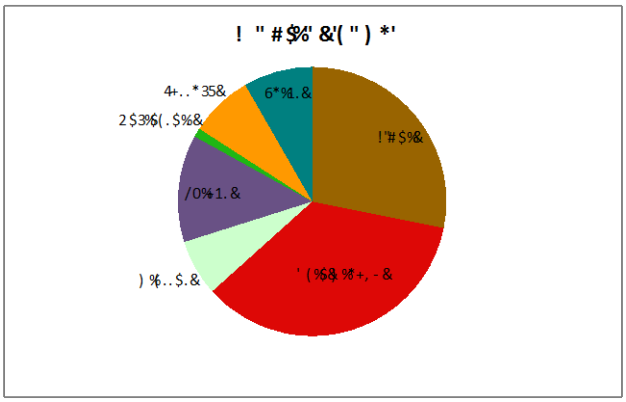
MONITOR: **DATE:**

ATRIBUTE	PROCESS INDICATOR	FRAME 1	2	3	4	5	6	7	8	9	10	TOTAL
SURFACE RESIST	Grade											
WIND EROSION	Evidence/severity											
WATER EROSION	Evidence/severity											
LITTER INCORPORAT	Grade											
DUNG DECOMPOS	Presence/age											
TUSSOCK	Score											
KEY FORAGE SP	Score											
DECREASER SP	Frecuency											
SHRUBS	Score											
PRODUCTION	KG MS/HA											
PHOTO N												

COMMENTS

Form MO 3: Soil Surface and Rangeland Health Field Form

Form MO 4



REFERENCES

CODE	COLOUR	FUNCTIONAL GROUP
C		Tussock
G		Grasses
GD		Decreaser grasses
J		Graminoids
L		Legumes
H		Forbs
A		Shrubs
S		Dwarf Shrubs
K		Suculents
E		Ephemeral
M		Litter + Standing dead
SD		Bare Ground + Eros.Pav

GROUND COVER BY FUNCTIONAL GROUPS	% Cover
Bare Ground + Erosion Pavement	
Litter + Standing dead	
Tussock	
Grasses	
Decreaser grasses	
Graminoids	
Legumes	
Forbs	
Shrubs	
Dwarf Shrubs	
Suculents	
Ephemeral	

BIODIVERSITY INDICATORS

SPECIES RICHNESS	
SHANNON-WEAVER INDEX	
DELTA L	

Form MO 4: PAF Summary of results

Forms for Procedure 9:
Reference Area Description

Ovis XXI

REFERENCE SHEET

N

Author(s)/participants:							
Contact for Lead Author:							
Date:		Site:			State:		
Biozone:				Province:			
State and Transition Catalog:			Author:				
Farm Name:		Paddock:					
Pos. GPS	Lat:	Photo N					
	Long:						

Ecological Site must be verified based on landscape units, soils and climate. Current plant community cannot be used to identify the site.

Indicators: For each indicator, describe the potential for the site. Where possible: (1)use numbers (2) include expected range of values for above- and below-average years and natural disturbance regimes for each community within the reference state, when appropiate and (3) cite data. Continue descriptions on separate sheet

1. Litter Abundance:

2. Vegetation Cover:

3. Soil surface resistance:

4. Wind Erosion

ACTIVE BLOWOUT/DEPOSITION PROCESSES:

ACTIVE PEDESTALS:

5. Water Erosion

PRESENCE AND SIZE OF ACTIVE RILLS:

PRESENCE AND SIZE OF WATER FLOW PATTERNS:

ACTIVE GULLIES:

6. Biological crust % Cover:

7. Litter incorporation

Form. AR 1. Reference Sheet (front)

8. Evidence of living organisms

9.Dung decomposition

DUNG AGE

10. Tussock

REPRODUCTIVE CAPABILITY:

PLANT VIGOUR/MORTALITY/DECADENCE:

11. Key Forage Species

REPRODUCTIVE CAPABILITY:

PLANT VIGOUR/MORTALITY/DECADENCE:

12. Decreaser species:

FREQUENCY:

13. Shrubs:

REPRODUCTIVE CAPABILITY:

PLANT VIGOUR/MORTALITY/DECADENCE:

14. Potential Invasive species (including noxious)

FREQUENCY OF YOUNG INDIVIDUALS:

REPRODUCTIVE CAPABILITY:

15. Total Biomass productivity:

KG MS/HA:

Comments:

Form AR 1: Reference Sheet (back)

Forms for Procedure 10:
Development of Scorecard (Evaluation Matrix)

EVALUATION MATRIX

BIOLOGICAL INDICATORS

Generic descriptors

Ecological Site: **Authors:**

Revision Date:

				DEPARTURE FROM REFERENCE SHEET				
NUM.	**ATRIBUTE**	**PROCESS INDICATOR**	**SCORE**	**N-S**	**S-M**	**M**	**M-E**	**E-T**
1	LITTER	%COVER	0 TO 10	Amount is what is expected for the site potential and weather	Slightly more or less relative to site potential and weather	Moderately more or less relative to site potential and weather	Greatly reduced or increased relative to site potential and weather	Largely absent or dominant relative to site potential and weather
				10	5	0	0	0
2	VEGETATION COVER	% VEGETATION COVER	-10 TO +10	Amount and size of bare areas match what expected for the site	Slightly to moderate higher than expected for the site. Bare areas are small and rarely connected	Moderately higher than expected for the site. Bare areas are of moderate size and sporadically connected	Moderate to much higher than expected for the site. Bare areas are large and occcasionally connected	Much higher than expected for the site. Bare areas are large and usually interconnected
				10	5	0	-5	-10
3	CAPPING	SURFACE SOIL RESISTANCE	-10 TO +10	Matches that expected for the site. Surface soil is stabilized by organic matter decomposition products or a biological crust	Some reduction in soil surface stability. Stabilizing agents reduced below expected	Significantly reduced in at least half of the plant canopy interspaces or some hard impermeable crusts	Significantly reduced in most plant canopy interspaces. Stabilizing agents presents only in patches; or impermeable hard crust on most of bare areas.	Extremely reduced throughout the site. Loose soil without stabilization agents including organic matter and biological crusts; or hard, resistant, impermeable crust.
				10	5	0	-5	-10
4	WIND EROSION	ACTIVE BLOWOUT/DEPOSITION PROCESSES	0 TO -20	Matches what expected for site	Unfrequent or rare	Occasionally present	Common	Extensive
		ACTIVE PEDESTALS		Amount of pedestals and terracettes match what expected for the site. In no case erosion processes are active.	Active pedestalling or terracettes formation is rare.some evidence of past pedestal formation, specially in water flow patterns on exposed slopes	Slight active pedestalling; most pedestals are in flow paths and interspaces and/or on exposed slopes. Occassional terracettes present.	Moderate Active pedestalling.Terracettes common.Some rocks and plants are pedestalled with occassional exposed roots	Abundant active pedestalling and numerous terracettes. Many rocks and plants are pedestalled, exposed plant roots are common.
		LITTER MOVEMENT		Matches that expected for the site with a fairly uniform distribution of litter	Slight more litter movement than expected, with only small size classes of litter being displaced	Moderate movement of smaller size classes in scattered concentrations around obstructions and in depressions	Moderate to extreme; loosely concentrated near obstructions. Moderate to small classes of litter have been displaced	Extreme; concentrated around obstructions.Most size classes of litter have been displaced
		TOTAL		0	0	0	-10	-20

Form ME 1: Evaluation Matrix (Scorecard) – Generic Descriptors

				DEPARTURE FROM REFERENCE SHEET				
NUM.	ATRIBUTE	PROCESS INDICATOR	SCORE	N-S	S-M	M	M-E	E-T
5	WATER EROSION	ACTIVE RILLS	0 A -20	Current or past formation of rills as expected for the site	No recent formation of rills; old rills have blunted or muted features	Active rill formation is slight at infrequent intervals;mostly in exposed areas	Rill formation is moderately active and well defined throughout most of the site	Rill formation is severe and well defined throughout most of the site
		ACTIVE WATER FLOWS		Matches what is expected for the site: minimal evidence of past or current soil deposition or erosion	Number and length of water flow patterns match what is expected for the site;Flow patterns are stable and short	Number and length of water flow patterns nearly match what is expected for the site; erosion is minor with some instability and deposition	Water flow patterns more numerous and extensive than expected; occasionally connected	Water flow patterns extensive and numerous; unstable with active erosion; ussually connected
		ACTIVE GULLIES		Match what is expected for the site.Drainages are represented as natural stable channels;vegetation common and no signs of erosion	Uncommon; vegetation is stabilizing the bed and slopes; no signs of active headcuts; nickpoints or bed erosion	Moderate in number with indications of active erosion;vegetation is intermittent on slopes and/or bed. Occassional headcuts may be present	Moderate in number to common with indications of active erosion;vegetation is intermittent on slopes and/or bed. Headcuts are active; downcutting is not apparent	Common with indications of active erosion and downcutting; vegetation is infrequent on slopes and/or bed. Nickpoints and headcuts are numerous and active
		TOTAL		0	0	0	-10	-20
6	BIOLOGICAL CRUST	COVER	0 TO 10	Generally intact and matching what is expected for the site	Evident but discontinuous all over the place	Only in protected areas and with a minor component in plant interspaces	Largely absent, just visible in protected areas	Only in protected areas. A very limited combination of functional groups
				10	5	0	0	0
7	LITTER INCORPORATION	LITTER/SOIL CONTACT	0 TO 10	Litter is mixing well with soil, resulting in a faster mineral cycle.	Litter mixed well with soil in parts, and is non attached in others. Mineral cycle not so fast.	Some soil-litter mix. Litter amount may be excessive or scarce. Slower mineral cycle.	Litter is not mixing with soil. Amount may be excessive or scarce. Slow mineral cycle.	Litter is not mixing with soil. Amount may be excessive or scarce. Slow mineral cycle.
				10	5	0	0	0
8	LIVING ORGANISMS	EVIDENCE OF MICROFAUNA	-10 A 10	Non plant life signs are coherent with site maximum potential	Slight to moderate reduction to non plant life	Moderate reduction of non-plant life. Some component missing	Little abundance of non plant life related to site potential.	Next to no sign of non plant life. Components of the ecosystem are clearly missing.
				10	5	0	-5	-10

Form ME 1: Evaluation Matrix (Scorecard) – Generic Descriptors

				DEPARTURE FROM REFERENCE SHEET				
NUM.	ATRIBUTE	PROCESS INDICATOR	SCORE	N-S	S-M	M	M-E	E-T
9	DUNG DECOMPOSITION	DUNG AGE STRUCTURE	0 TO 10	Dung decomposes fast, most dung pellets age is less than one year. High insect activity	Dung decomposes slightly slower, but old dung pellets are relatively few. Moderate insect activity	Some decomposition, but most of dung pellets are older than 2 years. Few insects.	Very slow decomposition, dung pellets older than 2 years. Few to negligible insect activity.	Very slow decomposition, dung pellets older than 2 years. Few to negligible insect activity.
				10	5	0	0	0
10	TUSSOCK	REPRODUCTIVE CAPABILITY	-10 TO 10	Amount of floral stems and young tussock plants matches site and year potential.	Amount of floral stems and young tussock plants is slightly lower than site and year potential.	The tussock maintains a moderate amount of flower stems and young plants	Stand reproduction is significantly reduced. Minimal amount of flower stems. Young plans unfrequent	Tussock stand does not exhibit flower stems or young plants
		VIGOUR/MORTALITY/DECADENCE		Tussock plants show vigour and amount of green leaves that matches the expected for the site and the year.	Tussock plants show vigour and amount of green leaves that is slightly below the expected for the site and the year.	Moderate loss of vigour and increase of % standing dead. Few decadent or dead plants	High frequency of plants with poor growth and high standing dead percentage. High percentage of plants with dead centers	Decadent or dead plants are the most common. Abundant standing dead material
				10	5	0	-5	-10
11	DECREASER SP.	FREQUENCY	0 TO 10	Decreaser species frequency is the maximum expected for the site and the year.	Decreaser species frequency is lower than expected for the site, but still abundant.	Minimal frequency of decreaser species. Hard to find.	Decreaser species only in protected areas.	Decreaser species only in protected areas.
				10	5	0	0	0
12	KEY FORAGE SP.	REPRODUCTIVE CAPABILITY	-20 to 20	Amount of floral stems and young key forage species plants matches site and year potential.	Amount of floral stems and young key forage plants is slightly lower than site and year potential.	The key forage species maintains a moderate amount of flower stems and young plants.	Stand reproduction is significantly reduced. Minimal amount of flower stems. Young plans unfrequent.	Key forage species stand does not exhibit flower stems or young plants.
		VIGOUR/MORTALITY/DECADENCE		Key forage species show the expected vigour for the site and year. Exposed roots and dead center plants not present.	Key forage species vigour is slightly below that expected, but the stand still looks strong. Ocassional presence of root exposed and center dead plants.	The key forage plant stand is maintaining, but shows a moderate impact over plant vigour and plant mortality	Many individuals of the key forage species show dead center symptoms or even dead plants, and exposed roots. Population decreasing	Most individuals of the key forage species show dead center symptoms or dead plants, and exposed roots. The population is fastly decreasing
				20	10	0	-10	-20
13	SHRUBS	REPRODUCTIVE CAPABILITY	-10 to 10	Shrubs have a normal seed production and the amount of young individuals matches with that expected for the site.	Shrubs show a seed production and amount of young individuals slightly below than expected for the site.	Shrubs show a seed production and amount of young individuals moderately higher or lower than expected for the site.	Shrubs show a seed production and amount of young individuals higher or lower than expected for the site.	Shrubs show a seed production and amount of young individuals much higher or lower than expected for the site.
		VIGOUR/MORTALITY/DECADENCE		Shrubs show a mortality rate that matches what expected for the site.	Shrubs show a mortality rate that is slightly higher than what expected for the site.	Shrubs show decadence and mortality symptoms occasionally, moderately above than expected for the site.	Decadence and mortality of shrubs is higher than expected for the site	Most of the shrub population looks decadent. Dead individuals and poor vigour plants are abundant.
				10	5	0	-5	-10
14	INVASIVE SP.	ABUNDANCE	0 to -20	The abundance of invasive species matches what expected for the site	Amount of invasive species is slightly higher than expected for the site	Amount of invasive species is moderately higher than expected for the site	Invasive species codominate the site	Invasive species dominate the site
		REPRODUCTIVE CAPABILITY		Frequency of young plants of invasive species is minimal	Frequency of young plants of invasive species is minimal	Frecuency of young plants of invasive species is moderately higher than expected	Frecuency of young plants of invasive species is high. Invasive species are increasing.	Invasive species show a high frequency of young plants, a fast transicion is happening.
				0	0	0	-10	-20
15	BIOMASS PRODUCTION	KG MS/HA	-10 to 10	Exceeds 80% of potential site production based on recent climate. Maximum photosynthesis	60-80% of site production potential based on recent climate	40-60% of site production potential based on recent climate	20-40% of site production potential based on recent climate	Less than 20% of site production potential based on recent climate. Minimal photosynthesis
				10	5	0	-5	-10
				130	65	0	-65	-130

Forms for Procedure 11:
Environmental Audit

Ovis XXI

ADAPTIVE MANAGEMENT

FORM AA 1

FARM		CITY	
MANAGER		HECTARES	
DATE		AUDITOR:	
SCORE			
CATEGORÍA:	FULL	RECUPERA	

PROCEDURE	DATE	PROFESIONAL	OK
Initial Evaluation			
Grassland Check			
Management Plan Basic Holistic			
Long Term Monitoring			
Environmental Audit			

RECOMMENDATIONS

NON CONFORMITIES

Signature and name of Auditor

Form AA 1: Adaptive Management Compliance

Ovis XXI

EVALUATION SHEET Form AA2

Paddock: _____ Farm Name: _____ Province: _____

Site Name: _____ Landscape Unit: _____

Site description Available: Yes / No Author: _____

Observers: _____ Date: _____

Position by GPS: Lat: _____ Long: _____ Photos: Yes/ No

Soil/site Verification

Surface texture: _____

Depth: Very Shallow: ☐ Shallow: ☐ Moderate: ☐ Deep: ☐

Parent Material: _____ Slope (%) _____ Elevation (m) _____ Topographic position: _____

Aspect: _____ Av. Annual Precipitation (mm) _____ Seasonal distribution: _____

Recent Weather (Last 2 years) Drought ☐ Normal ☐ Wet: ☐

Wildlife use, livestock use (intensity and season) and recent disturbances:

Off Site influences on evaluation area:

Criteria used to select this particular area as REPRESENTATIVE

Other remarks (Continue on back if necessary)

Reference: Reference Sheet N: Author: Creation Date:

Form AA 2: Evaluation Sheet (Front)

Departure from expected	Code	Total Score	Instructions for Evaluation Sheet
None to slight:	N-L	66 to 130 pts	Assign Codes to each indicator
Slight to Moderate:	L-M	10 to 65 pts	If the indicator does not apply, write N/A
Moderate:	M	10 to -10 pts	Calculate the score for each indicator
Moderate to Extreme:	M-E	-10 to -65 pts	Calculate total score
Extreme to Total:	E-T	-65 to -130 pts	Justify each atribute rating in writing

NUM.	ATRIBUTE	PROCESS INDICATOR	SCORE RANGE	DEPARTURE	SCORE	COMMENTS
1	LITTER	COVER %	0 to 10			
2	VEGETATION COVER	% VEGETATION COVER	-10 to +10			
3	CAPPING	SURFACE SOIL RESISTANCE	-10 to +10			
4	WIND EROSION	ACTIVE BLOWOUT/DEPOSITION PROCESSES	0 to -20			
		ACTIVE PEDESTALS				
		LITTER MOVEMENT				
5	WATER EROSION	ACTIVE RILLS	0 to -20			
		ACTIVE WATER FLOWS				
		ACTIVE GULLIES				
6	BIOLOGICAL CRUST	% COVER	0 to 10			
7	LITTER INCORPORATION	SOIL/LITTER CONTACT	0 to 10			
8	LIVING ORGANISMS	EVIDENCE OF MICROFAUNA	-10 A 10			
9	DUNG DECOMPOSITION	DUNG AGE	10			
10	TUSSOCK	REPRODUCTIVE CAPABILITY	-10 A 10			
		VIGOUR, MORTALITY,DECADENCE				
11	DECREASER SPECIES	FRECUENCY	10			
12	KEY SPECIES	REPRODUCTIVE CAPABILITY	-20 A 20			
		VIGOUR, MORTALITY,DECADENCE				
13	SHRUBS	REPRODUCTIVE CAPABILITY	-10 A 10			
		VIGOUR, MORTALITY,DECADENCE				
14	INVADER SPECIES	ABUNDANCE	0 a -10			
		VIGOUR, MORTALITY,DECADENCE				
15	PRODUCTION	KG MS/HA	-10 A 10			
	TOTAL					

Form AA 2 Evaluation Sheet (Back)

Form AA 3

ENVIRONMENTAL AUDIT REPORT -ZONAL AREAS N

Farm Name: Date:

Auditor:

Total Hectares Total Paddocks

Total Audit Stations:

Previous Evaluations:

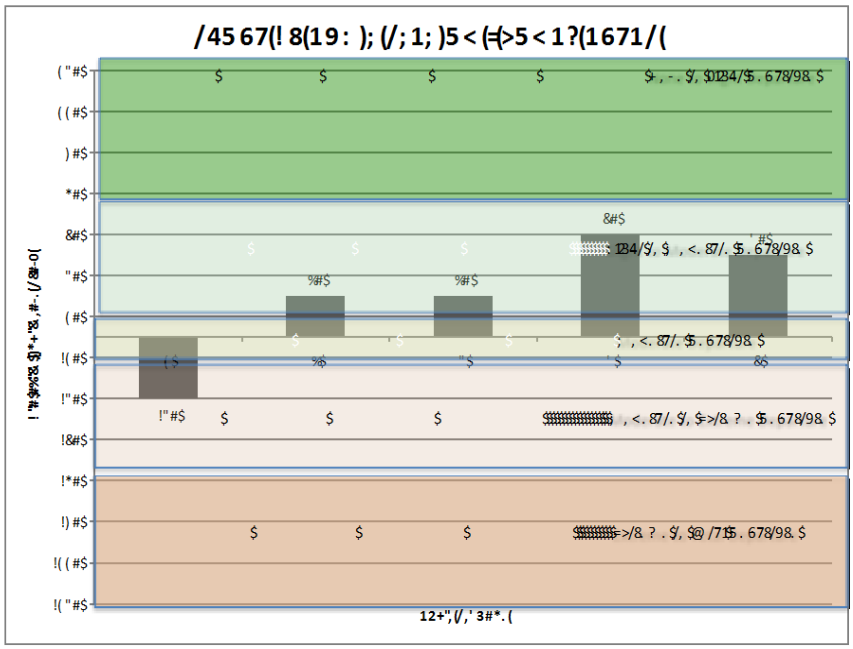
Date	Average Score

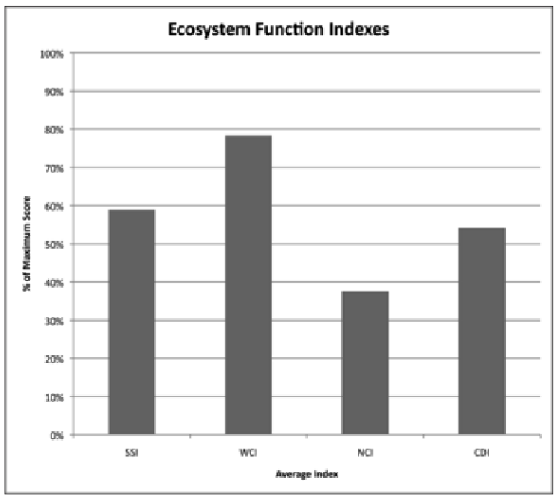
Average Score:

20

CONSERVATION STATE:

Slight to moderate departure from expected





SSI	SOIL STABILITY INDEX
WCI	WATER CYCLE INDEX
NCI	NUTRIENT CYCLE INDEX
CDI	COMMUNITY DYNAMICS INDEX

OVIS XXI SUSTAINABLE CLASS

FULL

FULL = Score >= 0; less than 30% of audit stations with SSI < 40%.
RESTORE: Score < 0; or > 0 but more than 30% of audit stations with SSI < 40%.

Form AA 3: Environmental Audit Report (Front)

Fragile Areas and Conservation Objects

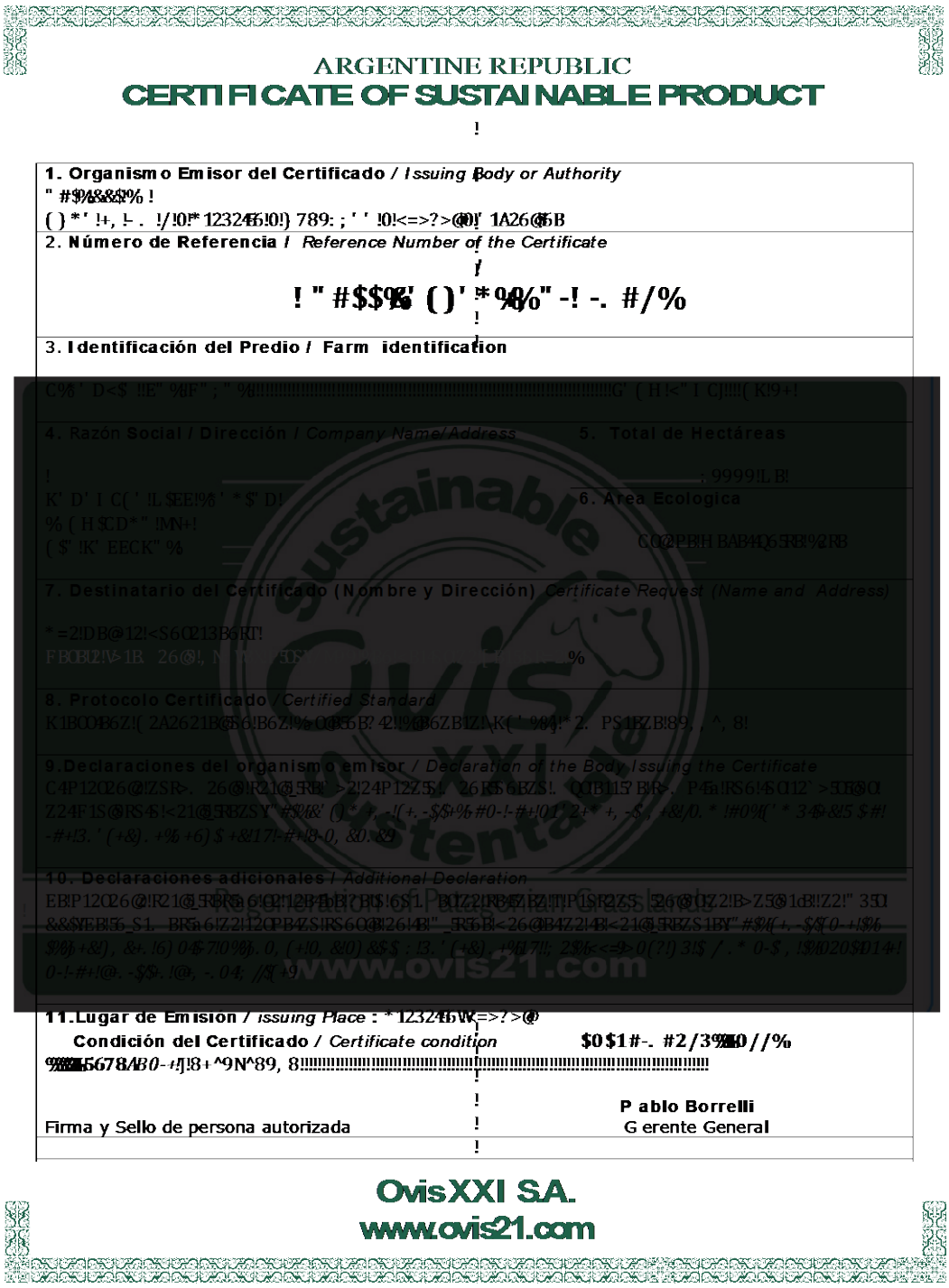
Num	Location	Recommendation

Comments, non conformities and suggestions

Sign and name of Auditor

Form AA 3: Environmental Audit Report (Back)

Forms for Procedure 12:
Product Certification



ARGENTINE REPUBLIC

CERTIFICATE OF SUSTAINABLE PRODUCT

1. Organismo Emisor del Certificado / *Issuing Body or Authority*

2. Número de Referencia / *Reference Number of the Certificate*

3. Identificación del Predio / Farm identification

4. Razón Social / Dirección / *Company Name/Address*

5. Total de Hectáreas

6. Area Ecologica

7. Destinatario del Certificado (Nombre y Dirección) *Certificate Request (Name and Address)*

8. Protocolo Certificado / *Certified Standard*

9.Declaraciones del organismo emisor / *Declaration of the Body Issuing the Certificate*

10. Declaraciones adicionales / *Additional Declaration*

11.Lugar de Emision / *Issuing Place* :

Condición del Certificado / *Certificate condition*

Firma y Sello de persona autorizada

P ablo Borrelli
G erente General

OvisXXI S.A.
www.ovis21.com

GRASS Certificate

Back to Index.

About The Nature Conservancy
The Nature Conservancy is a leading conservation organization working around the world to protect ecologically important lands and waters for nature and people. The Conservancy and its more than 1 million members have protected nearly 120 million acres worldwide. Visit The Nature Conservancy on the Web at http://www.nature.org/argentina

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About Ovis XXI
Ovis XXI the network currently works in Argentina, Chile and Uruguay sheep producing areas where over 140 farmers, more than 60 accredited independent service providers, NGOS and other partners are collaborating. The network is structured around values (collaboration for innovation and learning), and quality standards that every member has to commit.
Ovis XXI the company was created to “Improve the economic, ecological, social and human sustainability of the value chains based on sheep and other fiber producing animals.” The company provides networking services, development of quality standards, training and education, and research and development. It also provides Auditing and Accreditation, Process and Product Certification and Supply Chain Management. Ovis XXI is a Certified B Corporation. Visit OVIS XXI at http://ovis21.com/

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