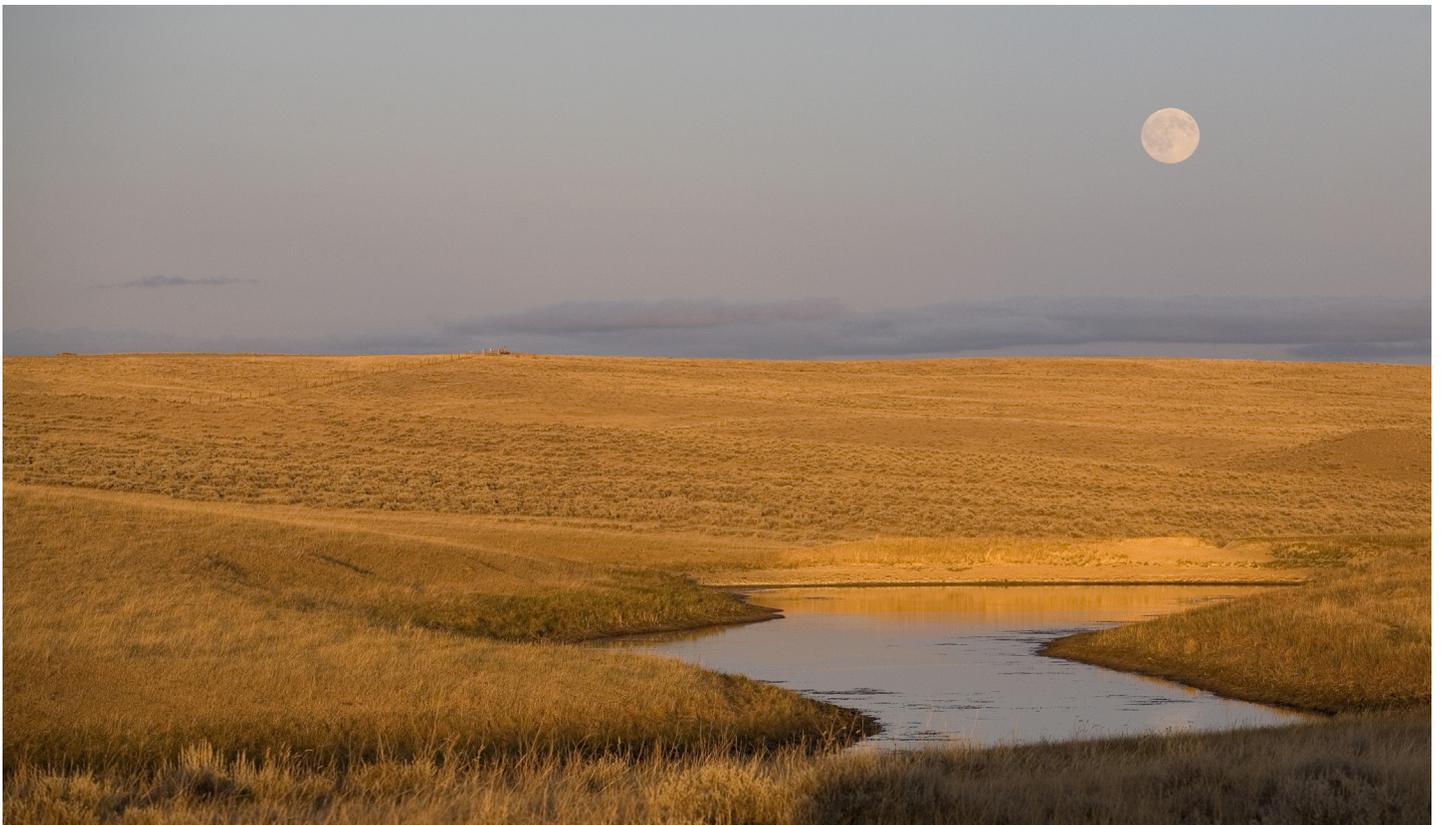


# Sustainable Ranch Management

ASSESSMENT GUIDEBOOK

Do you know whether  
your ranch is sustainable?



A COMMUNICATION TOOL FOR RANCHERS, TECHNICAL SERVICE PROVIDERS, AND AGENCIES  
Version 2

 UNIVERSITY  
OF WYOMING  
EXTENSION

B-1216  
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## Sustainable Rangelands Roundtable Mission Statement

The Sustainable Rangelands Roundtable promotes social, ecological, and economic sustainability of rangelands through development and widespread use of the criteria and indicators for rangeland assessments, and by providing a forum for dialogue on rangeland sustainability.

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## What is the Sustainable Rangelands Roundtable?



The Sustainable Rangelands Roundtable (SRR) is a collaborative partnership process involving federal land management and research agencies, tribal, state, and local governments, non-governmental organizations (NGOs), scientific societies, academic institutions, and interested individuals.

The SRR operates as an inclusive, open partnership with all interested representatives having an equal voice. Participants include rangeland scientists and managers, ecologists, sociologists, economists, statisticians, policy and legal experts, environmental advocates, and industry representatives from more than 50 organizations. The Roundtable:

- Focuses on the development and use of social, ecological, and economic indicators of rangeland sustainability. A set of 64 national indicators can be found on the SRR website (<http://sustainableangelands.org>). You may find other indicators that you would like to adapt to your situation.
- Promotes understanding among diverse interest groups and private and public organizations and agencies.
- Includes representatives from non-governmental organizations, public and private land management professionals, rangeland scientists, university researchers, and producers.
- Meets frequently to identify and develop indicators and models of Rangeland Sustainability for implementation and on-the-ground applications at multiple spatial scales.
- Welcomes new participants and stakeholders interested in Sustainable Rangelands.

For more information, see website <<http://sustainableangelands.org>> or contact:

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# Executive Summary



## Purpose.

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The purpose of this guidebook is to help you, the rancher and/or land manager, use integrated business planning and ecological monitoring to ensure your ranch or land is managed in a sustainable manner.

## Business planning for ranchers.

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There are many useful guides to help develop a business plan for your ranch. In this guidebook, we frequently reference the Wyoming Business Council (WBC) handbook entitled *Sustaining Western Rural Landscapes, Lifestyles, and Livelihoods*, which contains detailed guidance for development of a business plan.

Another source of assistance that is more widely available is the SCORE program <<http://www.score.org/>> of the U.S. Small Business Administration. The program offers technical assistance and information about business planning, especially financial planning. Local Mentors are available almost everywhere. Templates and other tools are available to help the rancher develop or refine the business plan of a financial report needed by the business. According to the WBC, there are several key areas that a business plan must address. Worksheets included in the WBC guide help you gather, summarize, and evaluate information from all areas. Information categories include family (owners) objectives, personal and family values and goals, business values and goals, available human resource knowledge, skills, and abilities, business assets, and inventories of soil, water, plants, and animals on the ranch.

## Financial and ecological monitoring for ranchers.

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A comprehensive business and rangeland monitoring program can be a useful tool in making sound business decisions. Generally, all ranchers monitor at least one element – everyone wants to know whether their decisions are profitable. However, the ability to turn a profit is directly linked to the land, lifestyle choices, and business operating decisions.

Time and effort spent monitoring the current condition of ranch land and its associated natural resources can help you decide whether and when to make management changes that will im-

prove operations. Similarly, monitoring the ranch business operations through a well thought out (designed) accounting program will show the current status of each enterprise and suggest ways to improve profitability. Monitoring all aspects of the operation helps you evaluate the long-term sustainability of all aspects of your ranch business.

If you want to manage land and natural resources effectively, you must measure changes that occur, evaluate the results, and revise activities, as needed, to move toward desired outcomes. *If you don't measure carefully, you can't manage effectively.* What to monitor depends upon regulatory requirements, resource issues, ranch goals and objectives, and action items set out in your conservation plan or business plan. Make a written plan for monitoring. Check it regularly, and revise it at least annually or as needed.

Consistent information about social, ecological, and economic aspects of rangeland management is necessary to provide a foundation for a business planning approach to family ranching. As ranchers endeavor to stay on the land and adapt their business practices to changing markets and demands for various goods and services, monitoring data to track trends in elements elaborated in their individual business plan goals will become increasingly important to the long-term sustainability of their ranch operations.

## Assessment of ranch management.

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The careful collection and use of monitoring information about social, economic, and ecological aspects of a ranch business can provide the information you need to make sound business decisions.

More information on sustainable rangelands and business planning, respectively, may be found at <<http://sustainableangelands.org>>, <<http://www.wyomingbusiness.org>>, and the SCORE Program <<http://www.score.org/>>) of the U.S. Small Business Administration.



# Chapter 1: Sustainable Ranch Management



## An introduction to sustainable ranch management.

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Our purpose here is to help you understand how the social, economic, and ecological aspects of your ranch business affect the long-term sustainability of the ranch. You already know that nearly every action taken has consequences on your life, family, land, and business.

There are *ecological consequences* to your business when the soil, water, plant, and animal resources associated with the land become degraded or abused. There are *economic consequences* to your business when ranch assets (including land and resource assets) are expended ineffectively or wasted. And, there are *social consequences* for your family and the community when opportunities are not recognized or are passed over due to lack of interest.

In upcoming chapters, basic information and resources are outlined to assist in developing a business plan and an integrated monitoring strategy for your ranch. A business plan represents your desired mix of economic, ecological, and social benefits to be provided by the ranching operation. Assessing your operation from all aspects can help determine what needs to be monitored through time.

Monitoring provides information that allows you to see if your ranch is achieving goals defined through the business planning process. Banks and other financial institutions now often require the kinds of information outlined in a business plan before they will qualify ranchers for loans and credit. Incorporating a resource monitoring system into a business plan strengthens your credibility by showing intent to document progress toward business goals and objectives.

Moreover, as you, or your neighbors, confront legal disputes over resource use, availability of quantified, consistently collected, and science-based information provides a solid platform for productive discussions. The presence of supporting and site-specific information helps provide a fact-based foundation for discussions and occasional debate.

Monitoring information also informs and helps guide the use of leased lands and public land grazing allotments, especially when monitoring takes place through cooperation with agency

personnel. These lands may have additional use requirements identified through lease or permit terms and conditions. Many of these terms and conditions are the result of legislation such as the National Environmental Policy Act (NEPA), the Clean Water Act, and the Endangered Species Act – and may not be subject to change (or negotiation) except under a formal appeal process.

## Federal and state lands: ranching on lands managed by public agencies.

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If you live in the West, your ranch business may be dependent on the use of federal and state lands to round out their operation. To be successful, the business plans of public land ranches must collectively consider both kinds of land. Management changes and effects upon one part of the overall operation often have consequences and effects on the other lands. To be successful, you must work with agency partners within the laws and rules that bind each of you. Monitoring works best when it, too, is integrated across all lands the ranch uses.

Today's ranchers face many challenges beyond just raising forage and livestock, including wild-fire, noxious weeds, energy development, and demand to develop the land. They may need to deal with compliance issues related to the Clean Water Act and/or the Endangered Species Act, or respond to economic or social pressures. These issues are even more difficult because land managers, ranchers, and the public are often presented with conflicting information on land uses and resource conditions and trends.

Effectively addressing these complex issues requires well-conceived goals and objectives. Monitoring is a key component to help identify effective management actions and measure progress toward achieving associated goals and objectives.

The capacity to show how management decisions may or may not lead towards desired outcomes is important, but it becomes critical when needed to show compliance with legal requirements. The indicators developed by the Sustainable Rangelands Roundtable (SRR) can be used by ranchers and federal land managers to monitor and evaluate management effectiveness. Most of the ecological indicators can be monitored using existing agency-approved methods.

Dealing with renewals of federal grazing permits requires cooperation and coordination between the rancher and agency personnel. Cooperative monitoring of all lands identified in a ranch management plan allows the rancher and the agencies involved to work together to better understand how well shared goals are being reached. Working together and communicating is a critical part of this process.

To be useful, monitoring information must be collected by trained individuals, following accepted methods, and must be timely to the decision-making process. This doesn't mean that data collection needs to be complex or difficult. The key is for you, the operator, and the public land manager to work together to determine what needs to be collected, how it needs to be collected, when it needs to be collected, and the specific sites where it will be collected.

## Ranch planning with the USDA NRCS conservation planning process.

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Ranching is a historical land use on rangelands throughout the United States. It is also an occupation, a family home, an investment, and a way-of-life desired by many. The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) offers a conservation planning process and voluntary conservation programs that consider grazing and other ranching activities as a land use.

The purpose of the conservation planning process on a ranch is to:

- Help the client to understand basic ecological principals for managing land and maintaining future options for use of the soil, water, plant, animal, and air resource.
- Transfer effective, science-based technologies and tools for assessment, management, and conservation.
- Determine the objectives of the landowner.
- Inventory, measure, and organize the facts about land and natural resource conditions on the privately-owned ranch lands.
- Establish the relationship of the ranch with associated federal, state, and private leased and permitted lands.

More importantly, the planning process helps identify and implement effective management actions to maintain or improve the quality and use of available resources.

Conservation plans focus upon management, based on a ranch's goals and resources. The scope of the ranch conservation plan is the ranch, including any associated federal or state lands, as managed in accordance with a specific set of conservation practices. Any conservation plan that includes other land owners should be coordinated with them.

Initial conservation planning goals can be identified in a short time, but attaining them may require many years. The time lag is not because of inconsistent effort. It is because the proper time to implement a practice may only come once a year, and the ability to nudge environmental forces in the desired direction can be a slow process. Monitoring to detect a trend in conditions often provides the timeliest information about how the resource is responding to management.

To meet specific land and resource management goals, a landowner may select one or more conservation practices from the NRCS National Handbook of Conservation Practices. The information contained in the conservation plan may provide a portion of the baseline information needed for the business planning effort. All practices are supported by details in the National Planning Procedures Handbook and the National Range and Pasture Handbook.

See references # 8 and 9 in Appendix 3.





## Chapter 2: Is Your Ranch Sustainable?



### How do you know whether your ranch is sustainable?

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You probably suspected that you wouldn't get through this guidebook without taking a quiz. Please complete it before going any further.

The purpose of filling out the assessment questionnaire is to gain insight about yourself, your family, your ranch, and your business. Along the way, you should also gain insight into relationships with neighbors, agency conservationists, and the natural resource and financial advisers with whom you consult on the business of managing your ranch. We encourage you to communicate with appropriate federal and state agencies and other technical sources.

This assessment will help you determine whether your ranch business is being managed in a sustainable manner. It should also help identify parts of your operation that need attention.

The questionnaire loosely follows the format presented in the WBC business planning guide. It incorporates the 21 indicators developed by SRR to help monitor the financial and natural resources available to your business. The questionnaire asks for your opinion on various aspects of your operation such as land, forage, enterprises (profit and loss centers), income, costs, and family and outside relationships. It also asks for goals and objectives.

Answer the questions directly. There are no penalties for wrong answers, but you can't improve your business if you don't know where you are headed, where the problems lie, and how to fix them. The assessment should encourage your interest in sustainable ranch management and provide confidence to delve into the business planning and monitoring programs described in this guidebook.

The first time through these questions, it should take no more than an hour. The purpose is to "get a feel" for how your ranch fits into the quest for a sustainable ranching business in all three sustainability elements – economic, social, and ecological. Some questions may provoke considerable thought about current activities, and you will want to revisit them after more deliberation. With any luck, the process will help you decide to use some of the many valuable tools available to make your ranch successful and sustainable.

CHAPTER 2: IS YOUR RANCH SUSTAINABLE?

So let’s get started with a brief assessment of your ranch. The questions ask for a “Yes,” “No,” or “Undecided or Don’t Know” answer, but we encourage you to write down your thoughts as you go through the questions.

ASSESSMENT QUESTIONS	No	Undecided or Don't Know	Yes
<b>Part 1: Family resources.</b>			
1. Does your ranch family appear to have a personal (family) standard of living comparable to other families in your community?			
2. Do family members need to work at outside jobs to maintain your desired standard of living?			
3. Has your ranch family collectively explored and documented personal and family values as they relate to your ranch business?			
4. Has your ranch family collectively developed a set of written goals and objectives that describe the desired future state of your family and ranch business?			
5. Have you inventoried the relevant personal knowledge, skills, and abilities of your family and the non-family members of the ranch management team?			
6. Do you regularly utilize technical and financial assistance that is available from public and private resources?			
Notes:			
<b>Part 2: Ranch management programs and practices.</b>			
1. Do you, family members, or employees have formal college level education or training in fields relevant to the ranch business?			
2. Do you, family members, or employees utilize continuing education opportunities to stay current on business and ranching knowledge?			
3. Have you completed an inventory of the land, natural resources, and property improvements associated with your ranch business?			
4. Does your ranch business operate under a legally sufficient form such as a sole proprietorship, partnership, co-operative, corporation, etc., formally established under state law?			
5. Does your ranch business operate under an existing business plan?			
6. Do you make final decisions about the business?			
7. Does your ranch business have a well-thought-out, agreed-upon plan for leadership and management succession that moves the generations through the leadership positions in a timely manner?			

ASSESSMENT QUESTIONS	No	Undecided or Don't Know	Yes
8. Have you consulted with estate planners (accountants, lawyers) about the best ways to protect and transfer your ranch's assets to chosen beneficiaries?			
9. Do you devote human and financial resources to measuring and monitoring changes in the condition of your ranch's rangelands?			
10. Do you manage, monitor, and periodically review the human resource assets (education, training, salaries and wages, health benefits, retirement benefits, succession planning, and other employment practices) of your ranch business?			
Notes:			
<b>Part 3: Land management relationships and partnerships.</b>			
1. Are you active in the governmental, business, and social activities of your community (and county)?			
2. Do you participate on county boards and committees?			
3. Are you familiar with local land-use plan and zoning regulations – especially ranch related – in your county?			
4. If any local organization (private, town, or county) has conducted a county or community assessment, does it address ranching as an important part of the local business community?			
5. Are all of your ranch enterprises supported by your county and community?			
6. Do you know, and visit periodically, local representatives of the state agriculture department, the state economic development agencies, the USDA Rural Development, the U.S. Small Business Administration, and other state and federal agencies that provide educational, technical, or financial services?			
7. Do you have a working relationship with the local, state, and national conservation and environmental organizations operating in your area? Are they supportive of local ranching operations?			
Notes:			

ASSESSMENT QUESTIONS	No	Undecided or Don't Know	Yes
<b>Part 4: Adjunct lands – private, state, and federal – rented, leased, and permitted lands.</b>			
1. Do you incorporate land that is rented, leased, or used under permit in your ranch operation?			
2. Do you know, and visit regularly, with the local representatives of the U.S. Forest Service (USFS), U.S. Bureau of Land Management (BLM), NRCS, and other agencies associated with your ranch?			
3. Do you currently have a cordial working relationship with each of the federal, state, tribal, and private entities that own land that you utilize under lease or permit?			
4. In the past, has your relationship with any of the lessor or permittor entities resulted in a negative impact on your ranch operation, e.g., temporary loss of a permit, increased rent or improvement costs, etc.?			
5. Do you work cooperatively with conservation groups and other organizations on programs or activities that affect your ranch?			
6. Are you engaged in the public participation processes related to the land management planning when such opportunities are available?			
7. Do you work cooperatively with any land and water protection programs your agency partners are directed to implement on your leased and permitted lands?			
8. Do you work cooperatively with your agency partners on the periodic range-related planning, assessment, and policy review activities they are directed to perform?			
9. Do you incorporate useful information from such activities into your ranch operation?			
10. Are your federal grazing permits covered by current and up-to-date environmental planning (e.g., National Environmental Policy Act)?			
Notes:			
<b>Part 5: Soils, soil erosion, and soil management.</b>			
1. Do you have up-to-date soil maps and aerial photography for each of your land units (pastures, fields, etc.)?			
2. If not, do you know how to obtain up-to-date maps and aerial photography, etc.?			
3. Have you had your local NRCS conservationist, Cooperative Extension Service (CES) specialist, and/or conservation district employee on your ranch for consultation?			
4. Are there areas within fields or pastures where soils appear to be limiting productivity?			

ASSESSMENT QUESTIONS	No	Undecided or Don't Know	Yes
5. Have you taken any steps to evaluate what soil characteristics may be causing this limitation?			
6. Are there areas in the fields or pastures on your ranch that have had perceptible changes in bare ground not attributable to drought in the past 10-20 years?			
7. Have you taken any action to mitigate any increases in bare ground on your ranch?			
8. Are there significant areas of accelerated soil erosion (gullies, head cuts, blowouts, etc.) in any of the pastures and fields on your ranch?			
9. Have you taken any action to mitigate accelerated erosion on your ranch during the past five years?			
10. Are your ranch's riparian zones used heavily by livestock at the same time every year?			
11. Do you think that soil erosion has adversely affected the land and soils on your ranch?			
12. Do you think that soil erosion has adversely affected the water quality of the ponds, lakes, streams, or rivers on your ranch?			
13. Do you think that soil erosion has adversely affected the profit margin of your ranch?			
Notes:			
<b>Part 6: Water availability – quantity, duration, and quality.</b>			
1. Do you have adequate water supply (legal water rights, allocations, etc.) from rivers, streams, springs, and wells to meet all of your water needs throughout the year – including both water for grazing distribution and water for irrigation?			
2. Has there been a noticeable change in the frequency or duration of surface no-flow periods in streams or springs on your ranch during the past five years? Which way?			
3. Has there been a noticeable change in the depth to the groundwater table under your ranch during the past five years? Which way?			
4. Has there been a noticeable change in the amount of groundwater you can pump during the past five years? Which way?			
5. Do the streams, springs, ponds, or reservoirs on your ranch that dry up in mid-to-late summer adversely affect your operation?			
6. Are you aware of any significant deterioration in the water quality (chemical, biological, or physical) properties of the lakes, ponds, reservoirs, rivers, and streams on your ranch during the past five years?			
7. Do you think that poor water quality adversely affects ranch enterprises or the profitability of your ranch?			

ASSESSMENT QUESTIONS	No	Undecided or Don't Know	Yes
Notes:			
<b>Part 7: Plant communities, wetlands, invasive species, threatened and endangered species, wildfire, and prescribed fire.</b>			
1. Do you have a current (within last five years) range inventory of the existing plant communities on your ranch?			
2. Do you know both the existing plant communities and the potential plant communities for the rangeland units on your ranch?			
3. Do you know the location, and area in acres, of "wetlands" on your ranch? Use a broad definition – specifically identify those wetlands that fall under Section 404 of the Clean Water Act, but also include other wetland areas that may be important but do not fall under the "404" definition.			
4. Do you actively manage wetlands to support conservation of wildlife (including waterfowl) and water resources?			
5. Have you identified the areas on your ranch infested with invasive species?			
6. Have you visited with your neighbors about the presence of invasive species on their property?			
7. Do you aggressively work to eradicate invasive species on your ranch, wherever practicable?			
8. Do you believe that invasive species on your ranch adversely affect your ranching operation and your profit margin?			
9. Do you know the location of threatened and endangered (T&E) plant species, and any plant species of special concern on your ranch?			
10. Do you actively incorporate appropriate Best Management Practices (BMPs) to minimize adverse impacts on T&E plant species on your ranch?			
11. Have you mapped the locations and acreages of land on your ranch operation that have burned, either by natural or prescribed fire, each year, for the past 10 years?			
12. Do you use prescribed burning as a vegetation management tool on your ranch?			
13. Is the use of prescribed burning as a vegetation management tool threatened by smoke management concerns within your community?			
Notes:			

ASSESSMENT QUESTIONS	No	Undecided or Don't Know	Yes
<b>Part 8: Wildlife species of economic interest; threatened and endangered wildlife species.</b>			
1. Do you know what species of wildlife of economic interest to you spend time on your ranch?			
2. Do you know the habitat requirements for species of wildlife, of economic interest to you, that spend time on your ranch?			
3. Do you know where species of wildlife, of economic interest to you, spend their time when on your ranch?			
4. Do you know the approximate population status of each species of wildlife, of economic interest to you, on your ranch?			
5. Do you actively manage for any priority animal species on your ranch?			
6. Are there any T&E species of animals or fish, or any animal or fish species of special concern, on your ranch?			
7. Do you actively incorporate appropriate BMPs to minimize adverse impacts on T&E animal and fish species on your ranch?			
Notes:			
<b>Part 9: Productive capacity.</b>			
1. Do you estimate the total forage production, by pasture and season, on your ranch each year?			
2. Do you monitor forage utilization as part of your grazing management plan on your ranch?			
3. Do you grow enough grass/forage and hay on your ranch to meet your livestock needs throughout the year?			
Notes:			

CHAPTER 2: IS YOUR RANCH SUSTAINABLE?

ASSESSMENT QUESTIONS	No	Undecided or Don't Know	Yes
<b>Part 10: Ranch enterprises – forage and non-forage plants; minerals and forest products; and, livestock, wildlife, guide services, and lodging.</b>			
1. Do you raise livestock (cattle, sheep, etc.) as a revenue-producing enterprise?			
2. Do you grow and sell native hay (over and above the amount needed for your livestock operation) as a revenue-producing enterprise?			
3. Do you grow and sell crops (wheat, etc.) as a revenue-producing enterprise?			
4. Do you harvest and sell landscaping plants and products as a revenue-producing enterprise?			
5. Do you harvest and sell non-forage plants such as herbs, edible or medicinal plants, or other similar non-agricultural products as a revenue-producing enterprise?			
6. Do you “mine” and sell minerals, decorative stone, sand and gravel, oil and gas, or other products as a revenue-producing enterprise?			
7. Do you harvest and sell timber and other woodland products to others as a revenue-producing enterprise?			
8. Do you offer big game hunting (elk, deer, antelope, feral pigs, big horn sheep, etc.) as a revenue-producing enterprise?			
9. Do you offer sport fishing (salmon, trout, bass, crappie, catfish, etc.) as a revenue-producing enterprise?			
10. Do you offer game bird hunting (pheasant, quail, chukar, dove, waterfowl, etc.) as a revenue-producing enterprise?			
11. Do you offer bird watching and/or observation of wild animals (songbirds, raptors, small animals/watchable wildlife, etc.) as a revenue-producing enterprise?			
12. Do you offer guided hunting, fishing, or wildlife watching services as a revenue-producing enterprise?			
13. Do you operate cabins, a lodge, or other accommodations for rent to clients as a revenue-producing enterprise?			
14. Have you explored developing niche markets for any of your existing products?			
Notes:			

ASSESSMENT QUESTIONS	No	Undecided or Don't Know	Yes
<b>Part 11: Ranch enterprises – financial considerations</b>			
1. Do you monitor the financial aspects of your business using a set of generally accepted financial indicators?			
2. Do you use the financial information you collect and analyze from your ranch business, and each of its enterprises or profit/loss centers, to prepare cash flow statements, income statements, and balance sheets for your operations – and determine unit costs and revenue of production, break-even points, and rates of return for your various enterprises?			
3. Does the sum of your ranch enterprise incomes ever fail to cover the sum of your ranch enterprise expenses? How often?			
4. If unit cost of production falls below return per unit, do you know how often that occurs?			
5. Do you modify your business operations based on financial information you collect and analyze?			
6. Do you periodically review and upgrade existing ranch enterprises and search for new revenue-producing enterprises suitable for your operation?			
7. Do you practice adaptive management, changing management practices based upon information gained from financial and ecological monitoring programs? (A discussion of adaptive management is provided in Chapter 5.)			
8. Do you receive federal, state, or non-governmental financial assistance or cost-sharing for restoration activities to control erosion, enhance habitat, etc.?			
Notes:			
<b>Part 12: Legal and institutional issues – scenic vistas; historic, cultural, and religious sites; ecological, social, scientific educational, and research sites; and conservation and sustainable management of rangelands.</b>			
1. Do you have areas with significant scenic places on, or visible from, your ranch – including those that are formally designated under federal law?			
2. Do you showcase such scenic places (panoramic views, rugged canyons, etc.) as revenue-producing enterprises?			
3. Are there resources on your ranch that include scenic vistas; historic, cultural, and religious sites (Oregon Trail, early town sites, artifacts, petroglyphs, cave drawings, etc.) associated with early settlers or American Indians; ecological, social, scientific educational, and/or research sites that may qualify as “protected areas?” Such sites may or may not be designated under federal or state law (National Historic Preservation Act, federal Antiquities Act, etc.).			
4. Does the management of these sites affect the operation of your ranch?			

ASSESSMENT QUESTIONS	No	Undecided or Don't Know	Yes
5. Do you allow public access to such sites?			
6. Are there identifiable threats to or pressures on the integrity of the resources identified in the question above?			
7. Do you have areas of your deeded ranch lands that are permanently protected under conservation easements – or similar legal instruments that protect or conserve land and natural resources?			
8. Do you have areas of your deeded ranch lands that are temporarily protected under social or environmental programs that conserve land and natural resources such as the Grassland Reserve Program or the Conservation Reserve Program?			
9. Do you participate in any research and development programs that affect the conservation and sustainable management of rangelands?			
10. Do you have a federal grazing permit that you believe is threatened by social, legal, or institutional factors; e.g., Endangered Species Act, Wild Horse and Burro Act, recreation, or other land uses?			
Notes:			

## So, what are the results?

The most important part of this questionnaire is that you answered all of the questions honestly, and to the best of your knowledge.

As you worked through the various sections of this questionnaire, did you notice that the questions probed for gaps in knowledge of your operations and, perhaps more significantly, areas where it is known that problems exist for whatever reason? Lastly, your answers point in directions to obtain outside help and assistance to remedy problems and move your ranch business toward long-term sustainability.

You will have to determine the answer to the question as to whether your ranch is being managed in a sustainable manner. Your opinion matters, but consult with other people who are knowledgeable about sustainable ranching and sustainable land and natural resource management before drawing conclusions and making changes.

Just because a business plan and monitoring plan might be in place does not automatically mean the ranch is being managed sustainably. The plans may be outdated, flawed or incomplete. The goals of the business plan may be to take as much money out of the business as possible – at the expense of land and natural resource sustainability. Further, if changes are made to the management plan just to make changes, you may not be improving your business or making it more sustainable.

The key to managing a ranch business sustainably is to subscribe to the principles of sustainability and apply them in good faith, to the best of your ability, and within the resources you have available. That includes managing to provide the needs of the present generation without compromising the ability of future generations to meet their own needs.

Complete definitions of “Sustainable Development” and “Sustainable Ranch Management” can be found in Appendix 1.

Consider the following statements with regard to those questions, concepts, and best management practices. If all or most of the tests are met, you are actively working to manage your ranch, and its financial and ecological resources, in a sustainable manner.

- Do you manage, monitor, and periodically review the human resource assets (education, training, salaries and wages, health benefits, retirement benefits, succession planning, and other employment practices) of your ranch business so as to optimize productivity?
- Do you operate under a formal, written business plan?
- Do you manage the land to conserve soils and soil stability through maintenance of effective plant cover and use of appropriate management or restoration practices to prevent soil erosion and maintain productive plant communities?
- Do you periodically review and upgrade existing enterprises and search for new revenue-producing enterprises suitable for your operation?
- Do you monitor the financial aspects of your business using a well-designed suite of generally accepted financial indicators?
- Do you monitor the ecological resources associated with your ranch (the land, the soils, the water, the plants, and the animals)?
- Do you practice adaptive management, changing management practices based upon information gained from well designed and implemented financial and ecological monitoring programs?

If the questionnaire was completed, you are interested in your ranch business, and you are interested in knowing if the concepts described in the Sustainable Ranch Management Assessment Guidebook can help you improve the management of your ranch business. This is a starting point. The rest is up to you!





## Chapter 3: Ranch Business Planning



### How do you get started?

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You start by reading this guidebook. It contains information about how to develop a business plan and a monitoring plan for your ranch business using the idea that ecologically sound management is also economically profitable and socially acceptable management, i.e., sustainable ranch management. A note of caution: there is no guarantee that any newly created ranch business plan will be immediately profitable. Startup costs may prove to be a drain on ranch cash reserves and must be considered during the planning stage so as to create a workable plan. Economic and financial planning should be part of your management strategy.

There are many good information sources that can be used to learn about the business planning process. If you live in Wyoming, an excellent source is the basic business planning manual produced by the Wyoming Business Council to help ranchers develop goals and implementation strategies for their ranch business. Additionally, technical assistance is available from the WBC staff on a time-available basis. There may be similar resources available in your state.

If you do not live in Wyoming, another source of assistance that is readily available is the SCORE program (<http://www.score.org/>) of the U.S. Small Business Administration. The program offers technical assistance and information about business planning, especially financial planning. Local Mentors are available almost everywhere. Templates and other tools are available to help the rancher develop or refine the business plan of a financial report needed by the business.

A drawback to the SCORE Program is that it does not specialize in helping ranch businesses. Most of the information available under the program is more general in nature and does not provide the highly detailed ranch inventory and natural resource information gathering recording sheets available in the Wyoming program. A good business plan with a financial tracking component coupled with a practical, easy-to-use natural resource monitoring program can help you improve and maintain both the business and associated land base assets at productive levels. This, in turn, will help lead to profitability and long-term sustainability of the business.

There are also several good sources of information about monitoring programs (these are detailed in Chapter 4) that can help track land and natural resource conditions on your ranch.

Any of these programs will help you develop a systematic process for collecting and evaluating information to assess the extent and impact of the current condition of soil erosion, soil structure, water quantity, invasive plants, production of livestock and other products, wildlife species, and economic outcomes of ranch activities.

Development of an effective monitoring program requires effort on your part and some outside help from people familiar with you and your business. As a starting point, the nationally active Sustainable Rangelands Roundtable (SRR) has developed a suite of 21 indicators that collectively provide guidance about what to monitor on a family ranch operation.

These indicators relate to soils, water, plants, animals, productive capacity, the socio-economic aspects of a ranch, and the legal/institutional framework in which the ranch operates. SRR recommends that you select and monitor whichever indicators from the suite are relevant to your ranch operation.

Development and implementation of a business plan and monitoring plan on private land is completely voluntary on your part. Inclusion of leased private or state land or federal land does bring in partners who will have some say over what you do and how you do it. After all, they are partners with ownership control over the lands they own or manage.

This guidebook serves as a basis for conversation and identification of monitoring and business planning goals and objectives. The business planning approach works best with technical advice and assistance from an array of professional advisers including bankers, extension agents and other educators, land management agency resource managers, other successful ranchers, and other community specialists.

*No financial or land resource monitoring information relating to private lands leaves your possession unless you voluntarily agree to provide it to the requestor.*

## Creating a framework for making decisions.

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Ranchers and farmers are continually challenged to remain economically sustainable, especially with the marginal profitability of traditional commodities. Having a framework to assess the business component of your ranching operation is paramount to identifying opportunities to enhance revenues and/or reduce expenditures. A well thought out business plan will provide this structure.

A business plan is simply a document that summarizes the operational and financial objectives of a ranch and contains detailed plans and budgets detailing how objectives can be reached. Many ranchers already have an informal business plan that can provide the basis for developing a more comprehensive one.

Many ranchers, too, have already added one or more enterprises to their operation to increase profitability and diversity of income sources. For example, it is not uncommon to find a ranch that has added hunting, fishing, bed and breakfast, or dude ranching components to the operation.

Whether diversifying the ranch operation or making a simple adjustment to current management (like transitioning to retaining yearlings from a cow/calf operation), it is important to develop a plan that will guide in the decision-making process. A good business plan is a useful tool for making many business decisions because it contains detailed financial projections, forecasts about a business's performance, requirements for permits or licenses, and a marketing plan.

It is critical to evaluate the current ranch operation in terms of achieving the owner's objectives before making changes. If all of the owner's goals are being met, there is no need for change. That is why identifying values, goals, knowledge, skills, interests, and abilities of all family members and key employees is an important first step in developing the business plan.

This includes:

- Exploring personal and family values;
- Developing personal, family, and operational goals;
- Evaluating personal business skills and traits for each family member including his or her lifestyle and financial management expertise;
- Completing an inventory of all resources associated with the ranch; and
- Evaluating personal, natural, and community resources and knowledge.

## Identifying values and setting goals.

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Personal values are one's standards and convictions. Examining family values involves communicating each family member's personal values and then comparing them. Values that are shared by all can provide a focal point for setting goals, and these goals ultimately provide a framework for decision making. Communicating personal goals will help establish family goals and the goals for the entire operation. Once identified, goals should be written down. They should be specific, measurable, attainable, relevant, and have a deadline for accomplishment.

In family ranching operations, it is imperative that all of the major participants –family members, other owners, managers, and key longtime employees – involved in the ranching operation be included in the assessment and business plan development. Identifying which values are shared by family members will provide a focal point for setting family goals and ultimately the goals of the ranching operation.

It is significant to note that maximizing profit is not necessarily the key criterion for running a sustainable ranching operation. Perhaps, having all family members work on the ranch is more important than increasing profit.

## Assessing skills and traits.

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Assessing individual skills and traits is critical when developing a business plan. This process will identify internal strengths and weaknesses and levels of proficiency in important traits, skills, or abilities. The following assessment forms can be found in the workbook, "Sustaining western rural landscapes, lifestyles, and livelihoods" (Wyoming Business Council 2003):

- **Personal traits and characteristics assessment** – This worksheet is designed to help identify your traits (attitudes, habits, motivation) and skills that are relevant to running a business;
- **Lifestyle and family traits assessment** – This worksheet will identify areas of current or potential conflicts within the family system and the level of family unity and strength.
- **Family financial management assessment** – The purpose of assessing family financial management is to give a family an opportunity to review basic financial practices or habits and determine financial plans.

- **Business skills and traits assessment** – This worksheet identifies individual strengths and weaknesses of different family members who are necessary to run the business.
- **Natural resources awareness assessment** – This assessment will help identify your awareness of the role of natural resources in the current operation and which natural resources have potential to provide additional income.
- **Community resources awareness assessment** – This worksheet identifies your knowledge of the resources available in your community and your involvement and participation in the community.

Compiling the information generated in the previous steps will lead to development of an overall analysis of the **Strengths, Weaknesses, Opportunities, and Threats** (a “SWOT” analysis) for the ranching operation. Private landowners, as well as those with leased or permitted lands, should find a completed business plan a valuable tool in making management decisions

## Components of a business plan (Wyoming Business Council).

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**Executive summary** – The executive summary is an overview of the plan. It consists of one to two pages, highlighting the important points. Oftentimes, it is easier to prepare this section after the other sections of the business plan have been written.

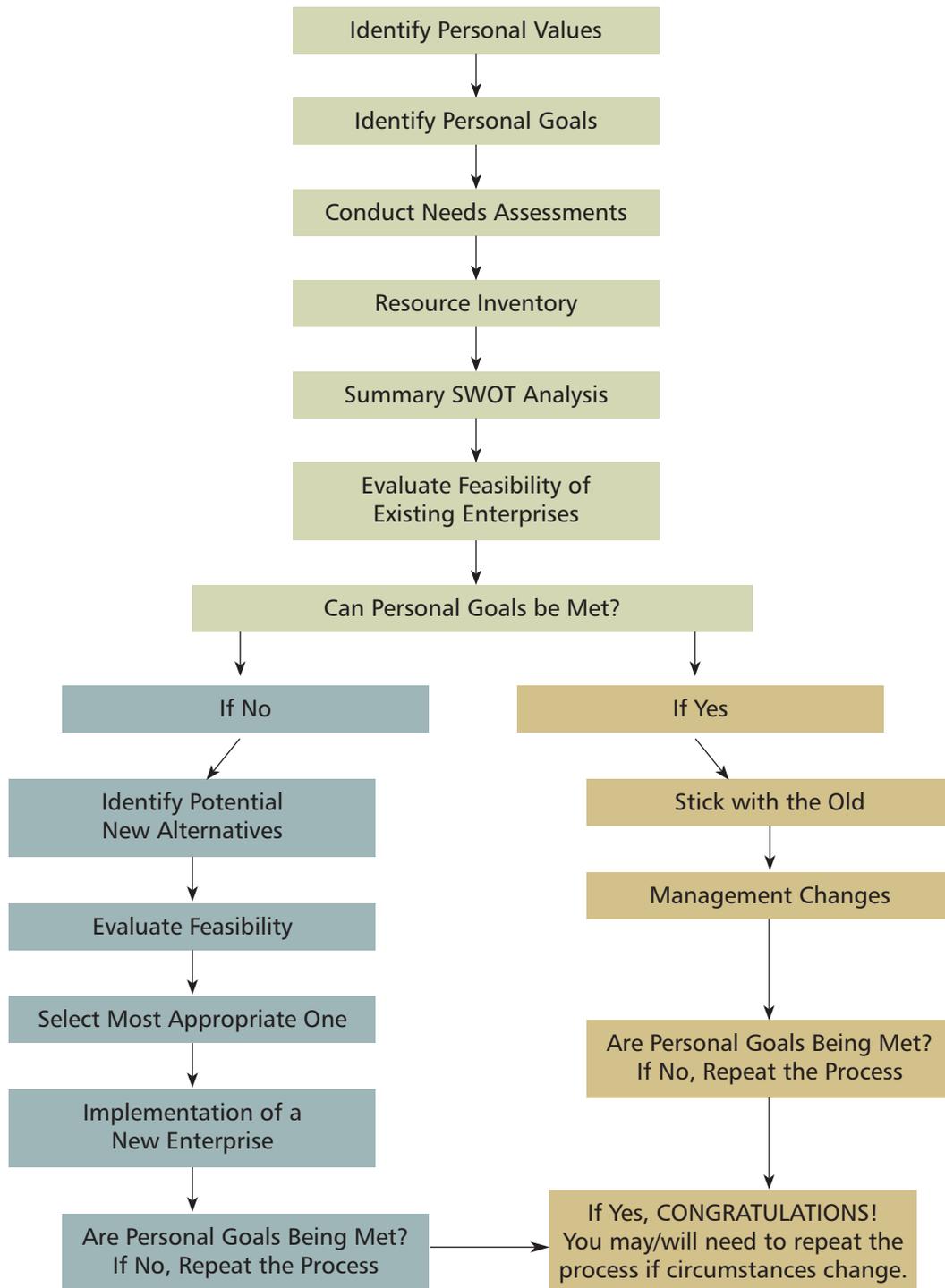
**Overview of the industry and business** – This section should contain information about the overall ranching operation in general. It includes the current status and trends of the industry, potential new markets, and a description of the ranching operation and how it fits into the industry overall. An important element to consider is where the business should focus its market activities – i.e., local, regional, national, or international. The methods and required resources are fundamentally different at each level, and the costs vary widely.

**Market analysis** – This section presents the opportunities that will be pursued. Components in this section include the products or services that are being provided as well as the features and benefits; a customer analysis; an analysis of the competition; the competitive advantage of your ranching operation; market size and trends; and market potential.

**Market plan** – The market plan is the overall marketing strategy that is developed for the ranch, whether you are selling beef to a feedlot or a hunting experience to a client. Include the product (what will be sold), the placement or distribution (how does the product get to the customer); and the price, and promotion.

**Management team** – This section includes detailed resumes of key persons in the business (including family members and other employees) as well as other additional resources such as accountant, attorney, and other key advisers. For producers utilizing federal or state grazing lands, it could also include a range conservationist and other agency personnel.

**Financial plan** – The financial plan includes *pro forma* or projected financial statements (*pro forma* accounting is a statement of the company’s financial activities while excluding “unusual and nonrecurring transactions”). This section represents the best estimate of future operations for financial stability. This includes profit and loss projections, cash flow projections, and *pro forma* balance sheets.



**Figure 1.** Business planning flow chart (Wyoming Business Council) shows how the business planning process works to develop a business plan for your ranch. An important part of the process is a feedback loop that takes you back to an earlier place in the process whenever some factor changes.

**Break-even analysis** – This is a quick way to look at whether it is realistic to change management strategies or develop a new ranch enterprise. In general, it is the point at which the total costs equal the total income, i.e., where net income or profit begin.

**Appendix** – This section should include any supporting documents that will support the plan, including maps, job descriptions, pictures and drawings, resource inventories, infrastructure inventories (buildings, fences, equipment, water supplies, etc.), and so on. Once the business plan is developed, proposed management changes can be plugged into the business plan to evaluate the impact the change would have on the profitability of the operation. This is a powerful tool that can be utilized to make key business decisions.

## Ranch ownership and management succession planning.

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One of the most important parts of any ranch management plan is the ownership and management succession plan – how will the business move into the future considering the many disparate visions, goals, and objectives of the owners and managers. The sections set out earlier in this chapter – “Identifying values and setting goals” and “Assessing skills and traits” set the stage for the development of a succession plan for your business.

Most businesses, regardless of size, have one person who is responsible for major decisions that guide the organization in day-to-day and long-term operations. That person may be the owner or a hired manager – the chief executive officer (CEO) – guided by a family council, partnership directorate, or a board of directors. Frequently in family businesses, the CEO is the family patriarch, matriarch, or an eldest child. In any case, the CEO must be a trusted leader with a good track record for making sound decisions and keeping the business profitable.

In the fast paced and competitive world of today’s agricultural businesses, a ranch CEO must have all of the attributes of any successful small businessperson, including:

- Experience in successful ranch business management;
- Training in business management skills including accounting, book keeping, and decision making;
- Leadership skills;
- People management skills;
- Good health;
- Openness and transparency with the other owners and managers about business decisions and the condition of the business;
- A willingness to develop and groom a successor(s);
- A willingness to step aside at the right time and not meddle in the new CEO’s duties unless asked for advice. The chairman of the board can have just as much fun as the CEO without all the headaches of overseeing day-to-day operations.

Nothing is quite as tragic as watching a 70- or 80-year-old ranch owner continue to hold all of the management duties to himself or herself rather than allow a son or daughter to take up the reins for the good of the future business.

It is not that the older generation is incompetent or incapable of doing a good job. Rather, it is es-

sential to train, mentor, and prepare (build confidence and self-esteem) a successor to take over in the event something happens to the current CEO. A 50-year-old son or daughter living and working on the ranch he or she will someday inherit should not be excluded from management duties and operational responsibility.

Another issue of considerable importance to a single-family or multi-family ranch is the matter of ownership succession. When a young couple buys a ranch and starts their own business, succession is often the furthest thing from their thoughts. They are busy – there is so much to do – there just isn't time to worry about what might happen to the ranch if something happens to one or both of them.

Suddenly, there are young children. Now what happens if there is a tragedy? Then the kids are teenagers – headed for college or already in college. Then they are young adults, perhaps with a spouse and children.

What do the original owners do about ownership succession? Some of the kids want to stay on the ranch. Some do not. How would management and operational duties and responsibilities be parceled out among the younger folks? How would the ownership interests be divided among all the children? The questions quickly become difficult to answer. Professional advice will probably be needed to clarify and ensure that the owner or owners' wishes are carried out. That may be particularly true if the owners want to ensure that the ranch continues as a business with multiple owners and an effective management structure with one CEO.

Consideration of succession issues is not for the faint of heart, but it is important to the future of any family ranch business. It is the responsibility of management of any organization to develop potential successors for all key positions in the organization – from a multi-national conglomerate to a family ranch. As your ranch business is developed, keep the succession issues in mind, and do what you can to resolve them. It may not be an easy task, but a successful resolution is important to well-being and peace of mind.

## More information on management succession and estate planning.

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There are many sources of information and guidance about succession planning. See references # 4, 5, and 6 in Appendix 3.





## Chapter 4: Monitoring of financial and natural resource indicators



### Why monitor?

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The business planning process was discussed in the previous chapter. This chapter focuses on the monitoring process for land and natural resources, and why it is important.

As a rancher, you have encountered situations where you needed information you did not have. All ranchers have been in that situation. It may have been in a meeting with your accountant, a federal or state land management agency, an environmental group, or a group of other ranchers trying to coordinate land management or marketing projects.

Invariably, if the information is available, it is not in a format that you can present clearly and quickly. If you do not have useable information, your participation is greatly reduced. Knowing this should prompt you to find ways to collect, organize, and summarize information so you can be more knowledgeable about your business and the land and associated natural resources which are the mainstays of your ranch operation.

Consistent monitoring can help:

- Establish financial and ecological benchmarks (baseline conditions) for your ranch business;
- Identify changes in baseline conditions that result from *natural changes* in the environment, such as drought;
- Identify changes in baseline conditions that result from *management actions*, including restoration activities;
- Evaluate and respond to changes in *legal and political conditions* that affect your ranch;
- Predict future changes in financial and ecological aspects of the business;
- Measure progress toward goals;
- Evaluate the effectiveness of your management plan;
- Identify, and implement, needed changes in your management program to improve the business; and,
- Help you communicate with family members, bankers, agency partners, etc., about the financial and ecological aspects of your ranch operation, as needed.

## What should we monitor – using criteria and indicators?

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If you want to manage land and natural resources effectively, you must measure the changes that occur, evaluate the results, and revise your activities, as needed, to move toward desired outcomes. *If you don't measure carefully, you can't manage effectively.*

What to monitor depends upon resources available, ranch goals and objectives, and action items set out in your conservation plan or business plan. Make a written plan for monitoring. Check it regularly, and revise it as needed.

Consistent information about social, ecological, and economic aspects of rangeland management is necessary to provide a foundation for a business planning approach to family ranching. As ranchers endeavor to stay on the land and adapt their business practices to changing markets and demands for various goods and services, monitoring data to track trends in elements elaborated in their business plan goals will become increasingly important to the long-term sustainability of their ranch operations. For example, environmental issues, government policies, urban and exurban sprawl, and increased recreation demand can reduce the land available for livestock forage production.

A monitoring approach encompassing social, economic, and ecological aspects of a ranch facilitates adaptive management techniques.

As part of the business planning process, SRR has identified 21 indicators suitable for ranch-level monitoring. As has been mentioned, most ranchers will not choose to start monitoring all 21 variables, at least initially. In fact, some operations may start out with only two or three.

## Focusing on methods and indicators.

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This section describes the indicators SRR recommends for assessing the sustainability of a ranch business and its human and natural resources. The Ranch Assessment indicators recommended here for use in ranch planning and assessment were selected with three characteristics in mind:

- The measure for an indicator is quantifiable;
- The indicator should support the business plan to allow ranchers to track progress toward individual ranch goals and objectives (and provide a link with federal or state leased or permitted operations); and
- The indicator is monitored at the ranch scale, measurable by ranchers and/or technical specialists and can be readily evaluated and interpreted by ranchers or their advisers.

An important overall goal is being able to adjust management to help ensure sustainability of the operation. The established management objectives for your ranch business help determine the indicators selected for use. Monitoring is best viewed in a holistic framework. Monitoring has proven to be an effective tool for guiding management of grazing use, evaluating ecological status of grazing lands, determining the most effective and profitable livestock management strategies, and addressing social and economic aspects of your ranch.

The 21 SRR indicators presented here include ecological, economic, and social attributes. The indicator suite is not inclusive, nor does it limit the user from making modifications or using other indicators that better fit the objectives of the operation. Appendix 2 describes recommended methods and protocols for measuring each indicator.

### Soil Indicators.

1. *Bare ground* – This indicator measures percent bare ground as a function of the potential for water and wind erosion.
2. *Soil Aggregate Stability* – This indicator measures the degree to which soil aggregates retain their structural integrity when exposed to a water bath (a small cup where soil and water are mixed and observed for a set period of time) and is an indirect indicator of erosion potential.

### Water Indicators.

3. *Frequency or duration of surface water* – This indicator addresses the season and length of time that reliable quantities of water are available on your ranch, and how that timing relates to needs for the desired uses. This is a companion indicator with the other water indicator (amount), and the two should be evaluated together.
4. *Volume of water available (amount)* – This indicator measures the quantities of water available across a pasture or operation and relates it to existing or projected needs – including the needs of water for maintaining aquatic and riparian resources over time.

### Plant Indicators.

5. *Key species/life form cover and abundance change* – This indicator measures the abundance and distribution of key plant species a rancher wants to manage for forage or ground cover, or that are sensitive to livestock management.
6. *Extent of invasive plants* – This indicator measures the presence and extent of invasive species such as knapweeds, leafy spurge, cheatgrass, and exotic thistles.
7. *Extent of wildfire and prescribed fires (by year)* – This indicator measures the impacts of wildfire and prescribed fire on vegetative communities by tracking fire locations and extent (maps), by year, for various management purposes, including restoration, erosion control, and grazing management.
8. *Extent and condition of riparian areas* – This indicator measures the location, extent, and health of riparian areas, wetlands, and lentic systems (lakes, ponds, reservoirs, etc.) located on the ranch – lands characterized by “water loving” plants like sedges and willows.

### Animal Indicators (includes fish).

9. *Population estimates of fish and wildlife (or feral) species important to the rancher* – This indicator measures trends in specific key wildlife population levels (abundance) of species (upland game birds, song birds, large ungulates, game fish), with population measured in terms of general trends. Monitored species will be those of interest to the rancher as part of a ranch enterprise – or for reasons of personal interest. These measurements will be general trends obtained through annual counts on spotlight or day-time transects done at the same time each year, on the same route, with the same weather conditions.

### **Productive Capacity Indicators.**

10. *Forage utilization* – This indicator measures forage use levels or residual forage in pastures on the ranch. In the short-term, utilization of forages, i.e., use levels, stubble height, or residual forage across the landscape in key areas, represents the general adequacy of management of animal numbers, distribution of grazing, provision of forage for alternative species and soil surface protection.
11. *Livestock products* – This indicator measures the outputs of ranch enterprises that produce meat and other products from beef cattle, sheep, bison, goats, and other similar activities.
12. *Quantity of non-livestock harvestable materials produced* – This indicator measures the output of non-livestock products that are produced on the ranch including hay, seeds, nuts, wood, and other plant materials. Alternative profit centers may be of particular value when viewed in the context (i.e., as a percentage) of all sources of income for a ranch operation.

### **Socio-Economic Indicators.**

13. *Cost of livestock production* – This indicator measures the production costs of products produced on the ranch such as the cost of purchased and raised feed for livestock – generally one of the largest expenses for ranchers. All costs, including opportunity costs (replacement costs, i.e. what would you have to pay to buy the same amount of hay or lease pasture), for hay and grazed forages should be determined and documented. Components of the cost analysis such as amortized cost of haying equipment in addition to direct costs should be calculated.
14. *Itemized income/expense of each product produced* – This indicator measures the cost per unit of production, a very effective interpretive tool, which can then be used to generate a break-even price. The difference between this cost and the return per unit represents the return to the operator. All enterprises (livestock, forage, hay, labor, hunting, bird-watching, rock hounds, facilities, etc.) should receive a separate analysis. The percentage of the operation's net return from each enterprise may be useful in allocating time and other resources to various profit centers. Pounds of harvestable materials (hay, seed, nuts, wood, and other plant materials) produced may be included in calculation of this indicator. Alternative profit centers may be of particular value when viewed in the context of all sources of income for a ranch operation.
15. *Visitor use information for appropriate enterprises* -- This indicator measures the number of visitor use days associated with enterprises that allow people to visit a ranch for a price based on a particular activity such as hunting, bird-watching, rock collecting, etc. It is useful to document the number of visitors and the fees they pay to access the ranch, in order to calculate and document dollars per visitor and the number of visitor days on an annual or seasonal basis. In addition, cost trends would be useful in determining efficacy of non-consumptive land use enterprises.

## Legal and Institutional Indicators.

16. *Continuing education and technical assistance* – This indicator measures the use of technical assistance and continuing education (Cooperative Extension Service, Grazing Lands Conservation Initiative (GLCI), NRCS programs, land trusts etc.) by members of the ranch family and management team. How frequently a rancher seeks technical assistance and continuing education may be an indicator of a mindset that fosters ongoing assessment and improvement in an operation. A thorough approach includes setting educational/training goals, scheduling periodic assessment of goals, and then setting new educational/training goals.
17. *Protection of special values* – This indicator helps identify and monitor special values that may be non-economic or perhaps even costly to maintain. This could include historical sites such as cabins, old wagon trails, fire lookouts, cultural areas like old cemeteries or Native American ceremonial sites, and other areas of significance to the family and the community. Once the sites and their values are identified, goals are established and documented to deal with these special values. Periodic review of the goals, as well as an assessment of the results of management activities is recommended.
18. *Land planning and policy review* – This indicator provides a framework for monitoring the interaction of the ranch business plan and the federal grazing permits and state grazing leases associated with the ranch. All federal grazing permits and state grazing leases come with their own set of limiting conditions on grazing use which may change from time to time. These conditions are a controlling factor on the use of the land and may have major impacts on the ranch business and its business plan. Because grazing permits and leases and associated land and resource management plans are affected by social and legal factors, particularly the National Environmental Policy Act (NEPA) and other federal and state laws, monitoring trends in permit and lease status can provide useful information concerning a ranch's strengths, weaknesses, opportunities, and threats (SWOT).

## Weather Related Indicators.

These are general purpose indicators that should be monitored by ranchers because of the profound effects weather-related phenomena can have on a ranching business. They provide context for interpreting the other indicators.

19. *Temperature* – This indicator measures the temperature range at selected points on your ranch on a regular, systematic (perhaps weekly) basis over the entire year. You may want to correlate temperature measurements with other events and conditions on your ranch.
20. *Precipitation* – This indicator measures rainfall and snowfall amounts at selected sites on your ranch on a regular, systematic (at least monthly) basis over the entire year. You may want to correlate precipitation measurements with other events and conditions on your ranch.
21. *Drought* – This indicator measures drought conditions on your ranch. Drought levels can be identified using information obtained from data collected, assessed, and presented in useable form by government agencies and other sources. You may want to correlate drought condition reports with other events and conditions on your ranch.

## How do you develop a monitoring plan?

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The first step in developing a monitoring plan is to establish, or verify, your goals and objectives for the ranch or parcel of land being managed. Additionally, indicators should also be selected to address ecological, economic, and social concerns that are currently evident, or which are likely to become important in the near future. Examples of goals and issues used to select indicators might include:

- An *ecological goal* to gather adequate data to support the renewal of a grazing permit on a federal allotment;
- A *social goal* to gather information that helps you explain how your ranching operation uses land and resources to support your family and community; and,
- An *economic goal* to gather sufficient data to show the financial health of the ranch.

The steps to establish an effective monitoring program are the same for all three components of the ranching operation (economic, ecological, and social).

1. Identify what you think you need to monitor to be able to detect and describe trends in the health of your rangeland, the vitality of your business, and the goals of your family and community.
2. Consult with professionals (private or public agency) – accountants, bankers, marketing specialists, range management specialists, animal husbandry specialists, small business specialists, wildlife experts, and any others you think can help you.
3. This process may be time consuming at first, but need not be expensive as there are low cost, or free, sources of information available. If you have a ranching operation that holds federal or state permits or leases, it will be essential for you to closely coordinate with the agency personnel to understand the monitoring needs and process that they employ – cooperation and coordination are critical.
4. Develop a plan for the actual monitoring process – information gathering and summarization.
5. Develop a calendar of ranch activities by month before you start to monitor. Reserve time for monitoring activities – do not try to fit monitoring into time periods when you are going to be busy with critical activities such as baling hay or gathering cattle. Some items will need to be monitored early in the season, others at the end. Fit monitoring into your present management system but do not relegate it to a low priority. Make it a must-do priority.
6. Set aside time to examine the information you collect. The time spent collecting information is wasted if you do not spend the time organizing and evaluating the findings to determine what it tells you and if changes in management activities are warranted.
7. Use the data you have collected when making adaptive changes to management. Trends in the state of indicators should help you understand specifically what changes, if any, might help you reach your goals. These changes may be needed to improve the quality and

productivity of your land and natural resources or to make your business better. Do not fail to make necessary changes just because you would like a little more data or more time for analysis.

## How do you effectively organize, analyze, and present monitoring data?

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Monitoring is the process of measuring various indicators over time to identify changes and trends – then using the information to modify your management practices or objectives. Information derived from monitoring allows you to evaluate your business planning goals and provides an objective basis for making adjustments when needed.

Similarly, if analysis and review of monitoring data does not adequately inform the management questions being addressed, then the set of indicators being monitored may need to be revised, or the sampling methods modified, in order to provide better information. Sometimes, however, it is not possible to collect adequate data to decide whether management needs to be changed. For example, it may take many years to understand whether changes in vegetation are being caused by management practices or climatic fluctuations.

Data summarization should be done in a manner that is timely to the decision-making process. Don't be disappointed if answers are not immediately apparent. Remember, that for ecological indicators especially, trend may be the only way to identify changes – and sometimes trends are not apparent for a number of years.

## Interpretation of indicators.

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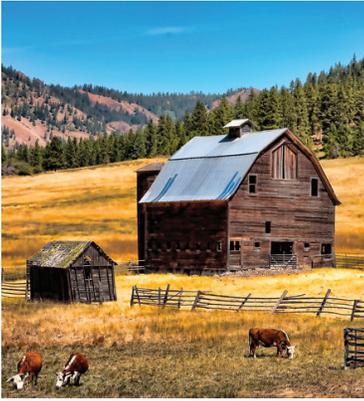
Interpretation of indicators is best considered in the context of trend, e.g., movement in a direction from a known starting point. Monitoring should focus on tracking changes in the values embodied in business plan goals for ranching operations. Simply put, you need to know if your management is making satisfactory progress toward goals to allow you to adjust operations to stay on track.

At times, however, it is difficult to determine whether a trend is actually occurring, or whether the indicator is merely fluctuating in response to variables such as weather patterns or the stock market. As a ranch manager, you can only use your best judgment when making decisions based upon uncertain information. Hopefully, such indicators will be more determinate as the monitoring program continues.

Keep in mind that the above set of Indicators is designed to provide a basic understanding of values key to most ranch operations. However, because an operation will have its own unique set of goals, objectives, resources, operations, etc., plan on selecting from this indicator list for your monitoring program. You may also choose to add other indicators important to operational success from other sources.

Ultimately, decision making is an individual process in which all relevant factors, including those not necessarily captured by monitoring, are considered. The process of strategic change is called “adaptive management” and is described in the next chapter.





## Chapter 5: Assessing Ranch Sustainability



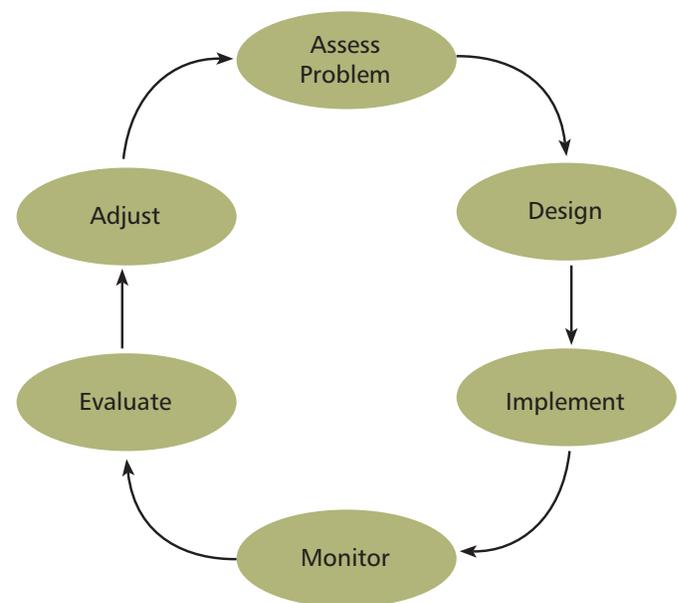
A ranch sustainability assessment process involves more than developing a business plan and carrying out monitoring. The entire process is cyclical in nature.

First, the ranch family identifies values and goals; gathers information about their operation including all resources associated with it; identifies strengths, weaknesses, opportunities, and threats; then develops a business plan and monitoring programs for both financial and natural resources.

Periodically, the entire process needs to be repeated, although not all elements need to be reviewed at the same time. Frequently, updating the original information is all that is required.

As part of the planning process, business and rangeland management specialists (Cooperative Extension Service, conservation districts, private sector consultants, and NRCS and other agency specialists) may need to be consulted. Professional advisers can help identify the indicators needed to monitor, and set up the necessary tracking programs.

“Adaptive management” (see Figure 2) is a systematic approach for improving resource management by learning from management outcomes and by incorporating new ideas. It involves considering alternative ways to meet management objectives, predicting the outcomes of alternatives based on current



**Figure 2.** Adaptive Management Cycle. Adapted from Williams, B.K., R.C. Szaro, and C.D. Shapiro. 2007. Adaptive Management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.

knowledge, and implementing one or more of the alternatives.

The adaptive management cycle – assessment, planning, implementation, monitoring, feedback, adjustment, and back to assessment (also known as a feedback loop) – is the basis of all decision making.

Within this framework, monitoring of indicators is equally important with any, or all, of the other steps that shape management decisions and activities.

After implementing management changes, the key to adaptive management is continued monitoring to learn about the actual impacts of the management actions, and then using the results to update knowledge and adjust management actions.

For example, an assessment of collected information and data might reveal that long-term goals are not being achieved.

**PROBLEM:** Grazed pastures did not regrow forage plants to the extent anticipated.

**SOLUTION:** Reduce stocking to match available forage or acquire other pastures through rental, lease, or permit.

**PROBLEM:** Sparse vegetative cover does not provide satisfactory forage for livestock and/or wildlife.

**SOLUTION:** Change grazing intensity or timing and/or undertake conservation practices to provide for increase in plant cover and develop satisfactory forage plants.

**PROBLEM:** Soil erosion is filling water reservoirs at an unsatisfactory rate.

**SOLUTION:** Change grazing intensity or timing to provide for increase in plant cover.

Monitoring might show that long-term goals are being met because management practices resulted in an increase in plant cover and a corresponding decrease in bare ground, a decrease in forbs, such as larkspur, and a decline in the number of poisoned animals. If the number of animal-days of grazing also increased, monitoring results would provide convincing evidence to continue with existing program activities.

In this guidebook, sustainable ranch management is defined as management of the land, natural resources, and business enterprises associated with a ranching operation to provide a desired mix of benefits to the present generation without compromising its ability to provide benefits for future generations.

It is not possible to describe here how to assess sustainability in every situation, but there are some situations that obviously could impact long-term sustainability. Significant erosion or significant increases of invasive plants are clear indications that the long-term productivity of a site and therefore the potential use of the site in the future are at risk.

It should be noted that the presence of significant issues may not be the result of current ranch management actions. Whether or not an erosion problem has been present for generations, or an invasive species problem was the result of a wild fire that originated on land adjacent to your ranch, those issues may still affect the sustainability of your ranch operation and need to be taken into consideration when identifying current management actions.

Although the significant issues discussed represent “red flags” that provide warnings about long-term sustainability, the other problems highlighted above provide additional examples of ongoing problems that could threaten the long-term sustainability of a ranch. Monitoring trends in the plant communities on a ranch can help to identify changes in plant communities -- whether positive or negative -- that will help to inform management decisions and help make a ranch operation sustainable.

The information and data that are collected can enhance sustainability by allowing ranch managers to better respond to emerging situations such as drought, or new issues or opportunities. For instance, if the information collected over time showed that one pasture has been improving and always has significant amounts of forage left over, whereas other pastures have not improved, this information could allow a manager to make quick decisions about which pastures might be more vulnerable to degradation as drought conditions force changes in the normal grazing pattern.

If data show that a certain plant species, critical to a threatened or endangered animal, has been increasing, then it could help the rancher show that his current management has been accomplishing the goals of providing adequate habitat for the animal species that is at risk. This could help the ranch avoid restrictions in management that aren't needed, or help them demonstrate that changes they already made are making progress and further restrictions are not necessary.

Part of sustainability is maintaining the flexibility to react and make changes in management when faced with changing conditions due to drought or other factors. As an example, your management during average or above average precipitation years may be adequate to maintain desirable plant communities. However, if you find it difficult and are reluctant to make changes when productivity is low due to drought or some other factor that has affected the productivity on the ranch, the impacts that occur during those periods may be slowly reducing the long-term productivity and condition of the plant communities that you rely on most.

Even though management during most years is adequate, such management still may not be sustainable over the long term. It is often the damage that occurs during weather extremes that can accumulate over time and result in deterioration in productivity that can threaten sustainability. Therefore, maintaining the flexibility and willingness to adjust the operation when needed may be critical to managing sustainably.

## How business planning and monitoring work together.

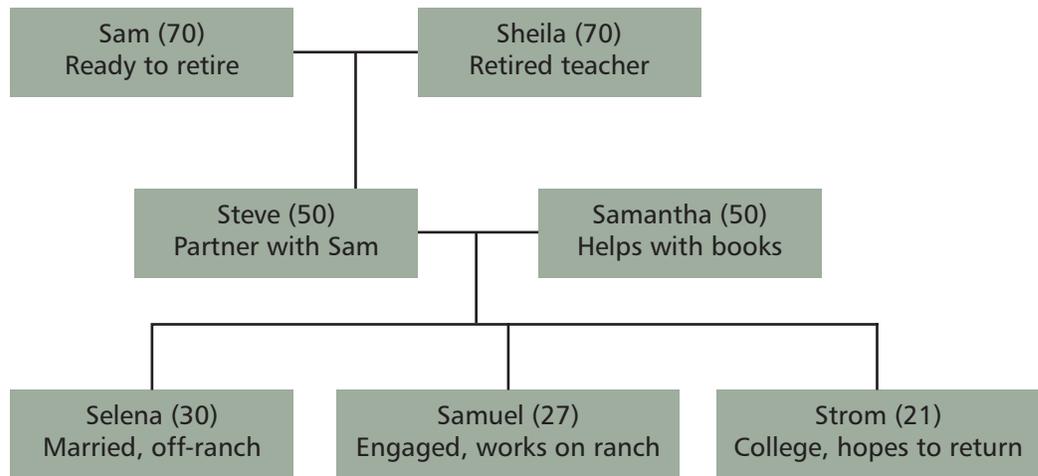
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The following case study illustrates how business planning and sustainability monitoring work together. While the case study as a whole is hypothetical, elements have been drawn from real situations. We do not intend for this to represent a specific ranching operation.

The Jones family (Figure 3) has owned the Jones Ranch, a 1,200 mother cow, cow-calf/yearling operation, consisting of several hundred acres of private, fee-owned and private-leased lands, and several thousand acres of federal permit lands, for the past three generations.

Grandfather Sam has operated the ranch for the past 40 years. At 70 years of age, he wants to retire. Grandmother Sheila, also 70 years old, was a full-time teacher at the local elementary school until retiring 10 years ago. She still occasionally substitute-teaches.

Father Steve is 50. He worked on the ranch as an employee for several years and has been a full partner for the past 20 years. Mother Samantha is also 50. She has kept the books for the ranch and helped with ranch work as needed.



**Figure 3.** Structure and roles of the Jones family ranch.

Steve and Samantha have three children, Selena (30), Samuel (27), and Strom (21). Selena is married and living off the ranch. Her family occasionally visits to get away from the rat race of city life. Samuel graduated from the state university in business and is now working on the ranch. He and a woman from a nearby town are engaged to be married in a few months. Strom is a junior in range management at “State University” and helps on the ranch when he can. He hopes to return to the ranch full time after graduation.

The ranch also employs two full-time cowboys and hires seasonal labor as needed.

About 20 years ago, Steve convinced Grandpa Sam to initiate a “holistic” management program for their private lands and a pasture system that consisted of many small paddocks with a central water point. Steve and Grandpa Sam felt that using a more intensive grazing system on the private-fee lands could increase production enough to allow the ranch to support both families comfortably and maintain their current way-of-life.

Prior to installing the new management and monitoring system on their private-fee lands, the ranch had run cattle in a deferred rotation system that included their fee-owned lands, leased private lands, and several allotments of federal public lands. The deferred rotation system is still being used on the leased private lands and federal allotments.

Included with the new management system was a “starter monitoring system” for resources –primarily a random point method in which multiple biological values were recorded at each point and animal days of grazing were recorded by pasture. The ranch used a target of 50-percent utilization to trigger moves between paddocks. Steve undertook the task of monitoring and made it a priority in his annual work plan.

Based on plant growth knowledge at the time, the management program assumed that there was potential for enough regrowth so that multiple grazing events could occur in each paddock, each year, thereby increasing the number of livestock that could be run on the ranch

Shortly after initiating the monitoring program and developing the baseline conditions, Steve decided to measure the regrowth to determine which paddock was ready to be grazed the second time. He went to the random point on the map of several paddocks and quickly realized that cool-season grass regrowth was insufficient for multiple grazing events. He reported his findings

that evening. Sam and Steve made plans to change the speed of the rotation for the rest of the grazing season.

The families were pleased that the monitoring program had quickly and simply produced actionable results. Grazing each paddock once per year still allowed improvements in forage yields and justified an increase in the number of paddocks, primarily by subdividing existing pastures. Monitoring over the following decade showed a reduction in bare ground and undesirable forbs and shrubs while increasing the abundance of desirable grasses.

A severe drought resulted in destocking about one-third of their herd 13 years into their management program. Subsequent to that event, about one-third of their paddocks went ungrazed for over a year, and as they did not immediately restock, the rest from grazing continued into a second year. The livestock sale funds were invested in relatively low risk investments to provide some level of income and to have the funds available when it was time to restock.

Meanwhile, the ranch accountant and lawyer convinced the families to take the first steps toward developing a business plan for the ranch, a succession plan for the ranch management team, and a plan for the transfer of ranch assets between the generations. Samuel has his degree in business management from “State University” and Samantha had years of experience in ranch business record keeping and accounting. Combined with more than a decade of resource monitoring information, the families had enough information to start the business planning process. They contacted their state department of agriculture and were able to obtain assistance in going through the step-by-step process that would lead to the “plan.”

One immediate beneficial result was that Samantha and Samuel found that they already had the information they needed to determine what type of return was needed, which made the decision to destock somewhat easier.

Monitoring indicated continued improvements in the amount of forage in the ground cover so they continued the pasture resting and saw continued increases in animal days. The ranch gained sufficient animal days to be back near pre-drought stocking levels within eight years and had the additional benefit of having about one-third of the ranch paddocks in a rested condition and available annually as a buffer if another drought occurred. The result was an increase of more than 50 percent in the base stocking level in less than a decade with the additional benefit of drought insurance.

While this was occurring on their private lands, the public land allotment was also being more intensively managed. Steve worked with the local rangeland management specialist on a monitoring plan for their deferred rotation grazing system. Monitoring both the health of the land and production from their livestock indicated that the system seemed fairly static.

As forage production on their private land increased, more options became available to change seasons of use, livestock numbers, and management intensity on the allotment. When the drought hit their private land, it also hit their allotment. With the planning in place, they were able to negotiate temporary reductions on their permit along with a plan for restocking once the drought ended. Monitoring data allowed the agency and the rancher to determine how and when to increase livestock numbers so that land health and livestock production could be improved and the family could build that into their financial and personal plans.

The family’s management/monitoring programs resulted in improvements in the plant communities, forage availability, management flexibility, drought protection, profitability, and ranch sustain-

ability. Their successes, using monitoring, tested the use of a business planning process, a formal ranch and business monitoring program, and a coordinated ranch management program.

Recently, Strom was told that when he graduated he would, among other tasks, be assigned the job of managing all of the land and resource monitoring tasks for the ranch. His duties would include working with the owners of the private leased lands and the federal land managers to ensure that the monitoring programs were suitable for the ranch needs and satisfactory to all partners including the lease and permit organizations.

His direction was clear, and he understood that he needed to devote considerable time over the next year and a half to understanding the monitoring programs in place and to getting to know the people he would be working with – in addition to his scholastic assignments.

The family has developed a business plan that works for them. It incorporates adaptive management concepts that use monitoring information (financial and ecological) to amend and improve management practices and programs.

The family has adopted a set of personal goals and business goals that guide daily activities. Sam, Sheila, Steve, and Samantha frequently visit about how the business is going, how changes might affect their families and employees, and what opportunities might exist in the future. Samuel and Strom sit in regularly as advisers. Twice a year, all family members, including Selena, sit down for a “formal “state of the ranch” meeting followed by a “family meeting.” The ranch hands and their wives are invited to the “state of the ranch” meeting.

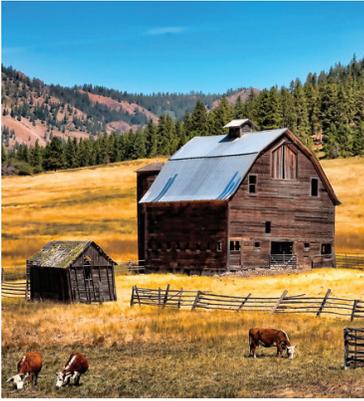
In accordance with suggestions from their accountant and lawyer, the family also developed a management succession plan to ensure that the ranch continues to be well managed. Additionally, the families created a legally sufficient ownership structure (family-owned corporation) and developed a plan for asset transfer from the grandparents to the parents to the children and eventually the grandchildren and perhaps beyond.

The family plans to continue to monitor ranch resources, keep detailed records, and make management changes based on monitoring information and good business practice as needed. They plan to use all the monitoring data to justify continuing the management strategy and making further adjustments.

As Steve takes on the leadership role formerly held by Sam, and Samuel and Strom prepare to join the family business, Steve and Samantha are looking to expand the business plan and develop a more formal management structure. They feel that this will enable everyone, including their hired hands, to more fully understand where the family wants to take the ranch into the future.

Ultimately, they plan to add Selena, Samuel, and Strom’s generation of families to the two already being supported by the ranch. Sam and Sheila should receive a secure retirement income even though they will no longer be involved in day-to-day ranch operations. They fully realize that they may need to increase the size of the ranch and perhaps add some new enterprises. They are considering the acquisition of a neighboring ranch, which includes fee-owned lands, private leased lands, and associated federal allotments.

The family appears able to maintain a long-term sustainable ranch business that will provide a satisfactory living and way-of-life for them and their descendants. They are currently on track toward accomplishing that goal.



## Chapter 6: Summary



Ranchers face challenges on a daily basis. Issues like invasive plants, low beef prices, drought, and court decisions need to be addressed as they arise. Planning and monitoring will help you cope with risk and may help your ranch become more resilient.

Readily available information on social, ecological, and economic aspects of a ranching operation can be provided by an up-to-date business plan, conservation plan, and consistent monitoring system. These resources can help inform the decision-making process by offering a framework for evaluation and adjustment of ranch management.

While most ranchers may have a conceptual business plan in mind, communicating with family members and putting outcomes of these discussions on paper is critically important to moving from a vague outline to a fully developed formal business plan.

Similarly, most if not all ranchers observe resource conditions on their ranch from year to year. Going the next step and creating a consistent monitoring program with precise measurements, photos, and record-keeping will allow structured analysis of observations about resource condition to create trend data.

Carefully documented information may be useful in conversations with agency personnel about permit renewal or program funding. It may also prove invaluable in response to special interest group allegations about inappropriate management tactics or grazing impacts.

With a conservation plan, business plan, and monitoring strategy in place, ranchers can make better decisions to secure a sustainable future for the operations of their families. As the quantity and complexity of challenges ranchers must confront continues to grow, it makes good sense for ranchers to have necessary information readily available to inform their decisions and achieve their personal and business goals.

Ranchers are among the most important users of criteria and indicators for rangeland sustainability. Ranchers are affected by changes in the ecological, economic, and social aspects of sustainability. They should understand how their management activities affect rangeland sustainability. Perhaps more importantly, they should work to ensure that the interested public understands that their management activities are contributing positively toward achieving rangeland sustainability.

We hope that this guidebook helps you understand the concepts of sustainable ranch management and how you can use those concepts to improve your family ranch business. Ranch businesses are like any other business in the sense that you get out of it what you put into it. Business planning, management succession planning, asset succession planning, financial and ecological monitoring, and adaptive management are just good business.

You know what to do. You have access to all the tools, advice, and assistance you need. **Now it is up to you to take on the challenge!**

# APPENDICES







## Appendix 1: Glossary



**ADAPTIVE MANAGEMENT:** Adaptive management is a recursive process in that the system continues to be monitored after adjusting the management design, ultimately providing evidence about the effectiveness of the change. Monitoring for rangeland sustainability entails repeated observations of various indicators with the goal of tracking changes in ecosystem, economic, or social variables in relation to management objectives and activities.

**BALANCE SHEET:** The balance sheet is an itemized statement that lists the total assets and the total liabilities of a business, and gives its net worth on a certain date. The preparation of a balance sheet or future projections is called the pro forma balance sheet. *Pro forma* balance sheets are used to project how the business will be managing its assets in the future.

For example, a *pro forma* balance sheet can quickly show the projected amount of money tied up in receivables, inventory, and equipment. It can also be used to project the overall financial soundness of the company. A *pro forma* balance sheet can quickly pinpoint a high debt-to-equity ratio. This statement provides two views of the same business: what resources the business owns, and the creditor and owner investments who supplied these resources. These divisions are generally set up in a two-column account form, with assets on the left and liabilities and equity on the right. An alternative – the one-column statement form or report form, which lists assets on top and liabilities and equity below.

**CASH FLOWS:** Cash flows fall into two categories: inflows and outflows. Inflows include revenues from sales, proceeds from loans, and capital injections by owners. Outflows include costs of sales, operating expenses, income taxes, repayment of loans and distribution to owners. The cash flow statement will also show the break-even point. The break-even point is when cash income equals cash outflows.

**CRITERION:** A category of conditions or processes that is an explicit goal of sustainable development or by which sustainable development can be assessed. A criterion is too general in scope to monitor directly but can be characterized by a set of indicators that can be monitored over time.

**DEVELOPMENT:** Using and developing resources in order for people to meet their social and economic needs.

**ECOLOGICAL SITE:** An ecological site is a kind of land with specific physical characteristics. It differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its response to management.

**INCOME STATEMENT:** The income statement, also called the statement of income and expenses or profit and loss statement, records revenues versus expenses for a given period.

**INDICATOR:** A variable that can be assessed in relation to a criterion. It should describe attributes of the criterion in an objectively verifiable and unambiguous manner as practicable, and is capable of being estimated periodically in order to detect trends.

**KEY AREA:** A location that represents either general or specific conditions of the entire area of which it is a part. Often an important monitoring location.

**KEY SPECIES:** (1) Forage species whose use serves as an indicator to the degree of use of associated species. (2) Those species that must, because of their importance, be considered in the management program.<sup>1</sup>

**PLANT COMMUNITY:** An assemblage of plants occurring together at any point in time, thus denoting no particular successional status. A unit of vegetation.<sup>1</sup>

**POTENTIAL PLANT COMMUNITY:** One of usually several plant communities that may become established on an ecological site under present environmental conditions, either with or without human interference.<sup>1</sup>

**RANGELAND:** Land on which the indigenous vegetation (climax or natural potential) is predominantly grasses, grass-like plants, forbs, or shrubs and is managed as a natural ecosystem. If plants are introduced, they are managed similarly. Rangeland can include natural grasslands, savannas, shrublands, deserts, tundras, alpine communities, marshes, and meadows.

**SCALE:** (1) Dimensions in time and space. Note: A dependency between temporal and spatial scales is well recognized in ecology. (2) A progressive classification of ecological and socio-economic systems. (3) In hierarchy theory, scale is the period of time or space over which signals regarding a system are smoothed to give a message. Signals come from data that are limited by the grain and extent (spatial and temporal sampling universe).

**SUSTAINABLE DEVELOPMENT (BRUNDTLAND DEFINITION):** Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. It includes the economic, social, and ecological realms. (Note: The above definition was first expressed by the Brundtland Commission in its 1987 report, *Our Common Future*. It infers two key objectives for the United States: (1) an innovative, resource-efficient economy that delivers a desired quality of life and (2) a healthy natural environment.)

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<sup>1</sup> Society for Range Management. 1998. *Glossary of terms used in range management, fourth edition*. Edited by the Glossary Update Task Group, T. E. Bedell, Chairman.

**SUSTAINABLE RANCH MANAGEMENT:** Management of the land, natural resources, and business enterprises associated with a ranching operation to provide a desired mix of benefits to the present generation without compromising its ability to provide benefits for future generations.

**UTILIZATION:** (1) The proportion of current year's forage production that is consumed or destroyed by grazing animals. May refer either to a single species or to the vegetation as a whole. Synonym: degree of use, (2) Utilization of range for a purpose such as grazing, bedding, shelter, trailing, watering, watershed, recreation, forestry, etc. 1





## Appendix 2: Indicator Measurement Protocols



Where you set up your monitoring studies is often just as important as what you monitor.

Monitoring sites should be located in key areas or other locations with significant resources or issues. Studies are most useful if they are located in an area that is representative of an entire pasture or if they will help document conditions in an area that is critical to the operation.

If livestock spend the majority of their time in a certain area and that area provides the majority of the forage consumed by livestock, monitoring there would help provide an early warning of declining conditions that would affect the ranch operation.

Similarly, an area that contains a sensitive or important resource can be important for monitoring conditions. For instance, if a particular section of streambank is vulnerable to bank erosion and impacts to a pasture are likely to show up there first, that may be a very good place for monitoring. Or, if you already provide, or are considering providing, hunting opportunities as part of your operation, you might want to monitor areas that provide the best habitat for the game species involved. This would help you notice if that habitat begins to change due to your management or other factors.

### 1. Soil indicator measurement methods and protocols.

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Increases in the amount of bare soil, or visible erosion are potential threats to long-term sustainability. Any increases should be noted and potential causes and management changes should be considered, but long-term trends that could result in loss of soils represent significant threats to future productivity and sustainability.

#### **Bare ground –**

This indicator measures percent bare ground as a function of the potential for erosion by water and wind. Insufficient vegetation cover also increases the effects of overland flow of water and associated movement of soil as sheet, rill, or gully erosion. Bare ground may be an artifact of excessive removal of herbage by grazing, other disturbance, low precipitation, or low productive potential. Annual grazing management should consider the degree of vegetation removal or residual herbage left as related to soil surface protection.

### **Measurement Methods and Protocols**

Bare ground may be measured using a point intercept method – commonly done along line transects. This is the same kind of transect used to measure the kinds and amounts of different forage species in plant communities. The most practical method to locate transects is to select an appropriate site and specific location (key area) in an area that is representative of the kind of vegetation and grazing level for the pasture. The reliability of the monitoring and subsequent assessment can be increased with more areas being sampled if time is available. Global Positioning System (GPS) coordinates of each transect should be recorded.

At the location of each transect, a 100-foot tape is stretched over the typical vegetation at the site. Stakes are placed at each end of the tape so the exact locations can be easily found in the future. The specific data that is recorded depends on the vegetation and the monitoring objectives for the location. There may be a need for information on all individual plant species, a few major species and other vegetation categories, or sampling may be limited to major life forms and other soil cover categories.

The categories recorded along the transect are: (1) live vegetation, (2) soil crust (moss and lichen), (3) bare ground, (4) litter, and (5) rock.

The **specific recording procedure** is to drop a point at each one foot mark on the tape and record the category that the point encounters on the soil surface. Forms to record point data in the reference are available in the *Wyoming Rangeland Monitoring Guide*.

Take photographs of the site – including photographs of quadrats at designated intervals along the transect (see *Wyoming Rangeland Monitoring Guide*, cover by life form procedure).

For additional information, and specific instruction on this protocol, please see references #8, 12, 13, and 15 in Appendix 3.

### **Soil Aggregate Stability –**

This indicator measures the degree to which soil aggregates retain their structural integrity when exposed to a water bath and is a good indicator of erosion potential in drier areas. The degree of aggregate stability is a function of soil organisms as they bind the soil particles and organic matter on the soil surface. Increased stability will reduce soil erosion. Desired soil stability ratings are a function of the kind of soil and other ecological site characteristics. Preliminary information on “expected” soil stability ratings for monitoring sites can be found in the range health section of ecological site descriptions developed at similar sites on your ranch or at nearby locations. Do not expect soil aggregate stability to change rapidly.

### **Measurement Methods and Protocols**

Soil aggregate stability is best evaluated in relation to reference values found in the Ecological Site Description for the sites in the monitoring area. The assessment, or comparison, should be done at the beginning of the monitoring time period.

In soils with little organic matter, recovery of aggregate stability seems to be tied to formation of biological crusts.

The **measurement score** for aggregate stability should be compared to the reference value found in the ecological site description for the specific location samples are taken. Absent a reference value, the objective would be to maintain or increase the stability value over time.

Complete soil stability kits can be obtained from Synergy Resource Solutions, Inc., at the website [www.countgrass.com](http://www.countgrass.com). The important part of this kit is a number of small sieves made by gluing a screen in the bottom of a piece of one-inch PVC pipe, one-inch long, sliced at an angle so that the basin above the screen is one-fourth-inch deep. The sampling process is included with the kit.

Soil samples are taken by excavating a small trench approximately 1 x 2 inches and extracting an undisturbed soil sample about the size of a pencil eraser from the side of the trench. To facilitate extracting the sample of an appropriate size without disturbing it, the sample may be circumscribed with a knife before extracting – or extracted and trimmed in the palm.

Score each sample as follows:

Score this number of points...	...IF THIS HAPPENS.
1.0	If the sample falls through the screen within five seconds.
2.0	If the sample is largely still on the screen after five seconds but falls through in 30 seconds.
3.0	If the sample has all fallen through the screen before five minutes.
4.0	If the sample remains after five seconds; is mostly present after five minutes; but less than 10 percent remains after the sieve is raised and lowered in the water five times.
5.0	If the sample largely survives intact after immersion for five minutes and being raised and lowered into the water five times.
6.0	If the samples float.

For detailed implementation information on this protocol, please see reference # 13 in Appendix 3.

## 2. Water indicator measurement methods and protocols.

Water is often the most limiting factor in the management of ranch land, and you often do not have direct control over the availability of surface water. Changes in the frequency, duration or amount of surface water can have profound effects on the productivity and future management options for a ranch. Although the availability of surface water needs to be considered in annual management decisions, longer term trends that indicate a reduction in the amount of available surface water on a ranch would be a threat to future productivity that would reduce future management options.

These indicators address the water resources available for use on the ranch. The quantity (amount) of water available to support livestock, wildlife, riparian zones, and wetland habitat is important. Equally important is the seasonality (time) when water is available from sources such as wells, streams, springs, and reservoirs. Water availability should also be considered in a spatial context; in other words, is water accessible to livestock where it is needed?

Lack of water when needed may significantly limit management options and opportunities, including implementation of best management practices that improve livestock distribution and provide for alternate sources of income such as that gained from enterprises such as haying, fishing, hunting, or bird watching.

Monitoring water resource indicators should provide the information needed to develop water systems that meet your ranch needs in all but the most extreme cases.

## Frequency or duration of surface water

This indicator addresses the season and length of time that reliable quantities of surface water are available on your ranch, and how that timing relates to your needs for the desired uses. This is a companion indicator with the other water indicator (amount), and the two should be evaluated together.

### Measurement Methods and Protocols

This indicator should be evaluated both for all intermittent water sources that are relied upon for the ranch operation. Annual evaluation is desirable to detect needs for management within the current year or season as well as to help detect long-term changes (trends). Annually evaluate and document:

- Do I have enough water to meet operational needs during the planned seasons of use? This need could be for livestock but also may include needs for wildlife and fish.
- How reliable are my water sources (e.g., streams, springs, ponds, wells, etc.) for specific seasons?
- What are the long-term trends in water availability by season?
- Is the duration of stream water adequate for the time that desired fish populations are present?

Together, these variables describe the frequency and duration (timing) of water availability periods for all sources of water on the operation.

## Volume of water available (amount) –

This indicator measures the quantities of water available across a pasture or operation and relates it to existing or projected needs – including the needs of water for maintaining aquatic and riparian resources. It also provides the opportunity to evaluate the ability of water amounts to support management options such as recreational fishing, waterfowl hunting, or bird watching. As such, this is a companion indicator with the other water indicator (time), and the two should normally be evaluated together.

### Measurement Methods and Protocols

This indicator focuses on the quantities of available water and its reliability. The answers to some basic questions can help quantify this indicator. All of the questions need to be answered in consideration of the time that the water is needed for the desired uses and values.

1. Identify and inventory all sources of reliable water on the entire ranch operation, including leased and permitted lands. Evaluate all sumps, ponds, surface flows, springs, and ground-water sources.
2. Determine the times that ephemeral water is available for use.
3. Determine how much water is available for use on the ranch in terms of volume, flow rate, and time available. Are these volumes protected, or limited, by legally defined water rights? Do you have adequate water supply or reserves to meet your existing and projected seasonal and year-round needs? Water volume in tanks and ponds can be estimated by measuring depth if the dimensions and shape of these storage units are known. Designing monitoring systems for stream flow will likely require technical assistance from a watershed specialist, but once a system is set in place, flow rates can be estimated.
4. Estimate useable water volumes in existing stock ponds and tanks – surface area and depth. Do you have adequate storage capacity (depth, volume, etc.) to meet your current and projected needs?

5. Estimate the volume of water available from water wells, streams, and springs in terms of flow rate and the period of time water is available. Obtain flow conversion charts to determine gallon supply. Do you have sufficient flow from wells and springs to supply the water needed from those sources?
6. Does your water system allow for grazing to be distributed across your entire ranch? Do you have enough water and is it adequately distributed to maintain satisfactory livestock (and wildlife) grazing distribution?

To evaluate this indicator against your current or projected needs for consumptive uses, it will be necessary to determine the amount of consumption per day or month and relate this to the amount available in a given pasture or management area. Conversion factors are available from the NRCS or the Cooperative Extension Service (CES).

Evaluations should be conducted for all sources of surface water and groundwater on the ranch. Monitoring should take place whenever differences in water availability (timing and amount) are noted. By doing so, it will be possible to obtain a better picture of how the water resource may change if temperature and precipitation patterns are altered in the future. Assistance should be obtained from agency personnel in conducting this evaluation.

The depth to the water table on key riparian and meadow sites is manifested by changes in vegetation. For example, gully erosion that lowers the water table in a wet meadow, changing it to a drier meadow, can be seen when sedges and rushes are replaced by upland species like bluegrass. Maintaining the water table is critical.

Springs and seeps are difficult to monitor unless they are developed and the water flow captured. If developed, the flow can be monitored periodically throughout the season and across the years by simply determining how long it takes to capture a known amount of flow and then determining amount of flow per unit time (for example: gallons per minute).

### 3. Plant indicator measurement methods and protocols.

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Increases in undesirable or invasive vegetation, or decreases in desirable vegetation may indicate potential threats to long-term sustainability. Trends that identify any unplanned changes in the plant community should be considered a red flag and managers should look for potential causes. In general, plant communities that are diverse (contain many different species) are more resistant to impacts and are more sustainable than plant communities that contain little variation with only a few dominant plant species. Trends that indicate an unintended loss of an entire component (such as the shrub component, or the grass component), or trends that indicate a reduction in the productivity, or loss of ground cover, represent significant changes that would reduce options for using the land in the future, and are therefore likely to reduce the long-term sustainability of the system.

The first steps a rancher should take to evaluate vegetative communities on ranch lands are to map existing plant communities with technical assistance from a CES or NRCS specialist. They can also help obtain high-quality aerial photos from the USDA.

Once the plant communities on the ranch are mapped, the species composition of key plant communities should be inventoried, then occasionally monitored. Species composition is essential in assessing rangeland health, and it can be used to estimate forage productivity. Information on rangeland health and forage production can be assessed if its ecological site is known.

Mapping ecological sites should be a fundamental step in preparing a ranch business plan and in getting ready to monitor soils, water, and vegetation. The first step in the vegetative community data collection process is to determine whether baseline data exists in ecological site descriptions (ESDs) or from other monitoring records. For more information on ESDs, see reference #10 in Appendix 3.

### **Key species/life form cover and abundance change –**

This indicator measures the abundance and distribution of key plant species that a rancher wants to manage for forage or ground cover, or that are sensitive to livestock management. The abundance and distribution of key species can be effectively quantified by estimating their canopy cover. Changes in percent cover, a vertical projection of the plant canopy on the ground, provide an indication of land management program efficacy in maintaining or improving toward desired composition.

In addition to monitoring abundance of the key species in a plant community, the rancher should summarize the abundance of all remaining species by monitoring their canopy cover by life form. Plant life forms may include: bunchgrasses, annual grasses, sod grasses, forbs, and shrubs.

Changes over time in the contribution of key species or life forms to the overall plant community provide the rancher with an indication of the effectiveness of a land management program in maintaining or moving toward a desired plant community. Individual key species, suites of species, or life forms may be selected to monitor depending on the ecological site and management activity being monitored.

Rangeland plants provide forage for livestock and wildlife, and knowing more about them will help improve a rancher's ability to better understand the principal resource that keeps the operation going. It is recommended that ranchers assemble a plant collection that can be kept in a pickup to help in plant identification. Collections can be made by taping or sealing plant specimens onto card stock. It helps to add notes to the card, noting location and time and pointing out features to look for when identifying the plant. Rangeland specialists can also help identify plants that are collected.

#### **Measurement Methods and Protocols**

Data collection for this indicator involves recording the presence of plants, by key species or cover class, at points along line point transects in key or benchmark areas, as described below. The same transect used to assess bare ground (indicator 1) can be used for this indicator. Invasive weeds encountered along the transect should also be identified by species.

The most practical method is to select an appropriate site and specific location in an area that is representative of the kind of vegetation and grazing level for the pasture, a key area. The reliability of the monitoring and subsequent assessment can be increased with more areas being sampled if time is available. GPS coordinates should be recorded.

A 100-foot tape is stretched over typical vegetation, and stakes are placed at each end of the tape so the exact locations can be found again. A pin is dropped each foot along the 100-foot permanent transect. If the pin passes through a plant canopy, it is considered a "hit," and the species or life form is noted. Species composition, in the form of plant cover, is estimated as the percentage of hits for that species/life form, i.e., 20 hits equals 20-percent cover. Specific data that is

recorded depends on the vegetation and the objectives for the location. There may be a need for information on all individual plant species, a few major species (either key forage species or potential invasive species) and other vegetation categories, or sampling may be limited to major life forms and other soil cover categories.

Where trends in plant species are desired, all individual species or key species and other vegetation categories along with other soil cover would be identified. If the primary focus is on soil surface protection from raindrop impact, the recorded categories of vegetation and soil cover might be the life forms (including perennial grasses, annual grasses, and forbs) in addition to bare ground, litter, and rock.

Where trends in some or all plant species are desired then instead of life forms, individual species or targeted groups of species might be recorded.

Changes in plant cover may be due to factors like weather, fire, invasions of noxious weeds, overgrazing, insects and disease, or responses to management. In drier climates, it can be difficult to determine whether changes in species composition are leading to one-way successional trends or are fluctuations caused by natural disturbances. Continued monitoring, along with expert opinions of rangeland specialists, will help resolve that question and allow you to decide whether management changes are needed.

Forms in the Wyoming Rangeland Monitoring Guide are available to record both the first hit and the soil surface or basal hit. Take photographs of the site and of quadrats at designated intervals along the transect (Wyoming Rangeland Monitoring Guide, using the cover by life form procedure).

For additional information on specific implementation procedures of this protocol, please see references # 12 and 15 in Appendix 3.

### **Extent of invasive plants –**

This indicator measures the presence and extent of invasive species such as knapweeds, leafy spurge, cheatgrass, and exotic thistles. This information can be used to help customize treatment and eradication programs, and it can serve as an indication of the efficacy of such programs for various invasive species. The mapping, if conducted periodically over time, can help to track the spread and increase in invasive plants and can help to relate such spread to management activities. For example, an area grazed heavily each year is at high risk of invasion.

#### **Measurement Methods and Protocols**

Presence and extent of invasive species should be recorded by mapping them as they are encountered while making range inspections throughout the year. GPS coordinates for the spot or area infested should be recorded. Taking photographs from the GPS coordinate can complement hand-drawn maps.

For additional information on this protocol, and on creating invasive species maps and related protocols, please see references # 11 and 12 in Appendix 3.

### **Extent of wildfire and prescribed fires (by year) –**

This indicator measures the impacts of wildfire and prescribed fire on vegetative communities by mapping the location, date, and extent of rangeland fires. Over time these maps can be used to explain changes in plant communities, wildlife populations, weed infestations, etc.

#### **Measurement Methods and Protocols**

Develop a map showing location of wildfires and prescribed fires on the ranch. Update as wildfires or prescribed burns occur, so location, extent, and sequence of fires can be determined. On the map, indicate areas of high-, moderate-, and low-intensity burns. As with invasive species, fire patterns can be recorded using GPS coordinates, photographs, and sketch maps. Aerial photos are especially effective right after a fire because the extent of the fire can easily be seen from the air. This is especially true for fires that burn in spotty or braided patterns.

After a wildfire, it is important to re-read any established transects or plots within the burned areas so that recovery can be monitored and evaluated. If there are insufficient plots within the burned areas for effective evaluation, new stations will need to be established.

It is also desirable to establish monitoring plots in prescribed burn areas. The best option is to establish one or more transects and several camera points in areas to be burned. Re-reading these transects or taking additional photographs over time after the burn provides good feedback regarding the effectiveness of the burn, the impacts of the burn on factors such as plant cover by species or life-form, and extent of bare soil.

### **Extent and condition of riparian areas –**

This indicator measures the location, extent, and health of riparian areas, wetlands, and lentic systems (lakes, ponds, reservoirs, etc.) located on the ranch – lands characterized by “water loving” plants like sedges and willows. In general, the grazing manager desires a grazing program that promotes the quantity and diversity of riparian and aquatic vegetation that stabilizes stream-banks, provides desirable wildlife and fish habitat, and supplies a reliable source of forage.

This implies that the plant communities along the riparian area should be made up of wetland grasses, sedges, rushes, willows, and other plants that need deep soil and available water. It is these types of plant communities that are most capable of ensuring bank stability, preventing accelerated erosion, and providing the maximum plant production (to include forage production). Kind of soils and steepness of the stream influence the potential kind and abundance of different classes of riparian plants.

#### **Measurement Methods and Protocols**

Use the Greenline method (percent composition of plant community types along the nearest vegetated line above the water in a stream). The community types can be scored as to relative stability to water flow providing a stream reach stability score.

A paced transect is followed along the left and right banks of the stream. At intervals of each pace, the plant community type on the Greenline is recorded.

Normally the category of Greenline cover is determined to be the dominant vegetation or cover category in an approximately square foot area at the observation point. Bare ground, stumps, or rocks would be self-evident. Using the Greenline technique for the first time will likely take some

field training from a CES or conservation district specialist or an agency conservationist. Identifying obligate aquatic plant species or upland species may require rudimentary plant identification skills. Specimens of key riparian species can be collected and incorporated into a ranch plant collection to facilitate future monitoring of riparian zones.

For additional information on this protocol, please see reference # 12 in Appendix 3.

### **Wetland monitoring –**

Wetlands provide hydrologic, biological, and social and educational values to the ranch. Hydrologic values include altering flood flows, removing sediment and excess nutrients, and erosion control, Biological values include productivity and providing habitat to invertebrates, amphibians, fish, birds, and mammals).

Perhaps the most useful indicator is the wetland's size. Size can be determined in any number of ways, from simply marking the boundary of the wetland in several locations each year with stakes to actually calculating the areal extent of the wetland. The amount of water a wetland holds is also important; that can be monitored by measuring changes in depth over time.

Indicators for monitoring habitat vary, depending upon the species of interest. For example, ratio of open water to emergent vegetation can be important to waterfowl. Land owners may wish to contact their local extension agent for assistance in identifying a monitoring program that matches goals in their business plan.

## **4. Animal indicator (includes fish) measurement methods and protocols.**

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When evaluating wildlife populations, dramatic changes or long-term trends are most likely to potentially impact sustainability. Similar to the discussion for plant communities, diverse wildlife populations are more sustainable and provide more options for using the land in the future. However, your ability to control wildlife populations at the ranch level are usually limited. This is particularly true for migratory species or other wildlife that are only present on your ranch periodically. When changes in wildlife populations on your ranch are identified or suspected, this should be compared with trends in those populations in the general area to help you determine whether or not these changes could be related to the current management of your ranch.

Animals on a ranch may be either domestic or wild. Domestic animals are generally those maintained by the operation for commercial purposes. Wild animals constitute a huge array of species from amphibians to deer, elk, mountain lions, bear, fish, and so forth. Normally these species are under the authority of the state. Some species may be of special value solely for their presence such as endangered or threatened species.

Large ungulates can often have a significant impact on ranch management and conversely can be significantly impacted by ranch management activities. These animals also offer the greatest potential for a ranch to diversify by focusing on the presence of those species as an additional source of income.

At times domestic and wild animals may come into conflict such as with certain predators, or where there is a conflict for forage resources. Depending on the species and the land ownership, management objectives may vary.

Public lands are often managed to promote multiple uses and often have requirements to sustain native wild species and habitats. On private lands, such requirements may or may not apply and ranch objectives may be to increase populations, to maintain stable numbers, or to manage for decreases in populations of specific species.

### **Population estimates of fish and wildlife (or feral) species important to the rancher –**

This indicator measures trends in key wildlife population levels of species (upland game birds, songbirds, large ungulates, game fish), with populations measured in terms of general trends. Monitored species will be those of interest to the rancher as part of a ranch enterprise – or for reasons of personal interest.

These key species will vary by ranch but will often be those species that have the potential to provide social or economic value (bird watching, elk hunting, trout fishing, etc.), or that can help to indicate the effectiveness of management in sustaining viable habitats.

Increasingly, ecotourism values increase the value of the entire array of plant and animal biota common to an area, thus placing more emphasis on maintaining the natural biological diversity of an area.

#### **Measurement Methods and Protocols**

Monitoring of wildlife should focus on trends such as elk harvest by ranch clients, or elk trends in the game management unit where the ranch lies.

There are several general methods for assessing animal populations. The methods all yield estimates of key species populations, or trends, with varying degrees of accuracy of the information.

One method is to consult with the local office of the state fish and game department and the federal or state agency (or agencies) that manages the land you lease. They have employees in the field who know your area, and they have access to information from many sources such as departmental inventories, federal fish and wildlife agencies inventory and management data, and Christmas bird counts. This is an excellent means to obtain information if you are considering a new or expanded enterprise such as hunting leases, guided fishing trips, etc.

In most cases, information on wildlife populations and trends is much broader than an individual ranch, and the actual population trends on the ranch may not be reflected by that data. Therefore, it may be necessary to collect information that is specific to the ranch.

A second method is to hire a professional wildlife consultant to estimate key species populations of interest to you. An advantage of this method is that the consultant can provide information and guidance for developing a successful management program. This method will be costly and may not be fiscally justified by the size or profitability of your program.

A third method of obtaining animal and fish information is to conduct your own counts using game trail cameras and/or direct observation. This method may be appropriate if you are knowledgeable in making species identification and population estimates, and if you have an enterprise that can support such intensive inventory practices.

The specific protocol recommended for measurement is counts on spotlight or daytime transects performed each year, and preferably done at the same time, on the same route with similar weather conditions. The rancher may choose to make direct observations at each site or may choose to establish trail cameras at selected locations.

Songbirds and some game birds can be assessed as to trends in numbers by stopping at designated repeatable intervals along a designated transect and recording the number of calls of the target species. Breeding season is the appropriate time as mating or territorial calls will be evident.

For additional information on this protocol, please see references # 17 and 18 in Appendix 3.

## 5. Productive capacity indicator methods and protocols.

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Changes in productivity occur on an annual basis, but long-term trends that indicate reductions in available products, or increases in forage utilization may signal concerns for sustainable ranch management. These changes may mean that the overall productivity of your ranch is being reduced even though your monitoring has not yet detected any changes in the vegetation or soils.

Productive capacity indicators are likely to be an area of key consideration in designing a monitoring program and crafting business plan goals, since these elements may be tied closely to economic return. Aspects to consider include forage utilization, livestock production, and comparable measures of other products produced for sale.

### **Forage utilization –**

This indicator measures the percentage of forage removed in pastures on the ranch. In the short-term, utilization of forages, i.e., use levels or residual forage across the landscape in key areas, are the result of the amount of forage produced, the number of grazing animals, and the livestock grazing system. Forage utilization estimates are commonly used to manage livestock in a grazing system.

Monitoring residual forage, often expressed in pounds per acre, is an alternative to monitoring utilization. The principle upon which a residual forage measure is based assumes that the amount of forage consumed is less important than the amount remaining after grazing. This concept has been shown to apply to shortgrass rangelands.

### **Measurement Methods and Protocols**

Forage use levels or residual forage may be recorded with use maps. These maps represent effects of animal numbers, distribution of grazing, provision of forage for alternative species, and soil surface protection. Values will be impacted by slope, distance to water, and presence of shrubs.

While not an objective in itself, the forage use attribute selected should have grazing season target levels that the manager can correlate with trends in other resource values to calibrate the grazing management program.

Possible measurements include the Livestock Utilization Landscape Appearance Method, stubble height measured along paced transects, paired plot sampling with grazed areas and grazing exclosures, and measurements taken before and after grazing. Animal use days for each pasture can be recorded. Note that multiple measurements are required for before and after grazing measurements.

Utilization is often monitored during a grazing season to determine if it is time to move livestock to another pasture. It is also monitored after the growing or grazing season to determine if enough plant material is retained to meet basic needs of the plants, the soils, and wildlife.

Normally the results are compared with a criteria (such as 40-percent utilization on Idaho fescue on the upland key area, or a four- inch stubble height on sedges and rushes on the riparian key area) to determine how well this year's management worked. The criteria are selected based on science that indicates that meeting them reasonably consistently will help to move the resource conditions toward desired goals. Stubble height objectives in riparian zones are primarily designed to filter the movement of sediment into the stream, thereby helping maintain stream bank and riparian habitat condition.

Another attribute of utilization used on many ranches, particularly those with intensive management systems, is the recording of the time and numbers of animal grazing in each pasture, typically reported as animal use days. This attribute only requires the recording of the entry and exit dates and animal kind/class numbers for each pasture.

For additional information on this protocol, please see references # 8, 12, and 16 in Appendix 3.

### **Livestock Products –**

This indicator measures the outputs of ranch enterprises that produce meat and other products from beef cattle, sheep, bison, goats, and other domestic grazing animals.

#### **Measurement Methods and Protocols**

The indicator measures pounds of livestock (beef, lamb, or bison, etc.) produced, as documented through *live-weight sales*, rather than numbers of animals. It also may be important to document rangeland forage-fed as opposed to feedlot-fed pounds; the success of unconventional marketing strategies may be evident in net returns.

Pounds of domestic stock sold is frequently the only measure of output documented on a ranch; however, value per pound varies so additional information should be recorded when practical.

Such attributes include the specific product, (i.e., cattle, goat, sheep, bison), season of sale, and size of an individual animal; these factors all may influence value.

### **Pounds of harvestable materials produced –**

This indicator measures the output of non-livestock products that are produced on the ranch including hay, seeds, nuts, timber, and other plant materials. Alternative profit centers may be of particular value when viewed in the context (i.e., as a percentage) of all sources of income for a ranch operation.

## **6. Socio-economic Indicator methods and protocols.**

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Annual production costs are important information for making decisions about your ongoing ranch operation. Trends in the production costs or changes in production costs that are likely to be consistent for the foreseeable future may represent serious threats to the sustainability of an operation. When changes in production costs threaten the sustainability of an operation, management changes or new business opportunities should be identified to offset rising costs in one enterprise of the overall ranch operation.

These indicators are designed to capture the economic elements of a ranching operation, as well as the social factors that may impact the operation's sustainability; income and expenses predominate. Three indicators fall into this category for ranchers.

### **Cost of livestock production –**

This indicator measures the production costs of products produced on the ranch such as the cost of purchased and raised feed for livestock – generally one of the largest expenses for ranchers. All costs, including opportunity costs (replacement costs, i.e., what would you have to pay to buy the same amount of hay or lease pasture), for hay and grazed forages should be determined and documented. Components of the cost analysis such as amortized cost of haying equipment in addition to direct costs should be calculated.

The benefits and costs of grazing on state or federal lands through a lease or grazing permit should be analyzed separate from the deeded lands. This would provide valuable information on the value of those permits and leases to the overall operation and help identify potential costs to replace that forage if it was no longer available.

This analysis identifies the best opportunities for managers to reduce the cost of production and subsequently reduce the break-even cost for their operations. The measurement could be combined with other indicators to capture all of the costs associated with operating a sustainable ranch. For demonstrative purposes, it could be expressed as the total cost to produce each 100 pounds of domestic livestock (and/or other products as noted above).

#### **Measurement Methods and Protocols**

This indicator requires information and data normally gathered through a formal business accounting system tailored to the ranch enterprises. The system should be designed to determine costs, revenues, unit costs, return on investment, and profitability of each livestock production enterprise.

Good guidelines are available in many states from the state's Cooperative Extension Service. Many of these organizations have developed enterprise budgets that outline the production system and typical returns and costs for different types of operations within the ranch. These can be tailored to specific ranches.

Costs for all inputs should be based on their market value. For example, while hay may be raised on the ranch, it should be treated as a separate enterprise with its returns equal to what it could be sold for on the open market. Similarly, when it is fed to cattle on the ranch, the cattle enterprise should consider this as another purchased input (even though it is being purchased from the same ranch).

Examples of cattle enterprise budgets for a 300 cow-calf herd can be found at the Oregon State University Extension Service website and the University of Idaho College of Agricultural and Life Sciences website. Many other options are also available. See reference # 3 in Appendix 3.

All such enterprise budgets (costs and returns) are basically structured the same way. All of the sales products for the enterprise are listed with expected average weights and prices to calculate gross sales. Below that all of the costs of production are listed with expected amounts for the current production system. These are normally split into variable costs (those that change with the amount of product produced) and fixed costs (those you pay regardless of whether anything is produced). Subtracting variable costs from gross sales gives an indication of what the net operat-

ing profit may be. This net operating profit (also called gross margin) is what is available to pay the ranch owner (return to management) and cover the fixed costs. However, the true breakeven cost or unit cost of production includes all costs that are incurred while a crop is being produced that are specific or prorated to that crop.

### **Itemized income/expense of each product produced –**

This indicator measures the cost per unit of production, a very effective interpretive tool, which can then be used to generate a break-even price. The difference between this cost and the return per unit represents the return to the operator.

All enterprises (livestock, forage, hay, labor, hunting, bird watching, rock hounding, facilities, etc.) should receive a separate analysis. The percentage of the operation's net return from each enterprise may be useful in allocating time and other resources to various profit centers.

Pounds of harvestable materials (hay, seed, nuts, wood, and other plant materials) produced may be included in calculation of this indicator. Alternative profit centers may be of particular value when viewed in the context of all sources of income for a ranch operation.

### **Measurement Methods and Protocols**

This indicator requires information and data normally gathered through a formal business accounting system tailored to the ranch enterprises. The system should be designed to determine costs, revenues, unit costs, return on investment, and profitability of each ranch enterprise and the overall business. It is important to allocate shared labor, equipment, and resources among the various enterprises. For example, if the same tractor is used to raise hay and feed cattle, its total annual cost must be split between the two enterprises based on some realistic criteria (such as hours of operation in each activity). Total annual costs include both operating costs and costs of ownership.

An important consideration in determining overall ranch profitability is the valuation of the land resources. Land should be evaluated as an enterprise of its own – requiring appropriate analysis and comparison with appropriate values as an investment.

Over the years, many economists have used the **market value** of land in calculating cost/returns of livestock operations and found that the livestock enterprise is unprofitable. In most areas today, land has investment and amenity values that often exceed the ranch production value. The livestock production system should not be expected to provide returns commensurate with investment and amenity value. Studies during the early 2000s indicated that for much of the western U.S., production values account for less than 25 percent of the market value of land based on actual ranch sales. While this may give some indication of land value in production, it is wholly dependent on location of the property, whether there are amenity or investment values associated with it, and a variety of other factors.

If the property is wholly owned and debt free, the livestock system could at worst be charged a fee based on comparable grazing leases. The profitability of the system would be based on the actual production cost, and the owner forgoes the cash income accruing to the land. If there is debt service then this becomes a cash cost that has to be paid annually like other actual operating costs and used in a similar manner to address profitability or unit costs.

Other input costs that are often difficult to place a value on include family labor and management. These have two very different opportunity costs and both must be accounted for in the

analysis. Both can be valued based on the opportunity cost principles. In the case of family labor, the easiest way to think about this is what you would have to pay to hire someone to work at the particular jobs.

The management cost is a different issue, but the same principles may apply. Information on what a ranch manager who is hired for that purpose would reasonably be paid in salary and benefits is available from a variety of sources. While that provides a comparator value, the rancher needs to determine if the amount of net returns after all variable and fixed costs are paid is sufficient to compensate them for their management or ownership of the ranch.

Another way to look at this is to use a modified income statement approach outlined by John Workman (see reference, below). While it uses much of the same information as a traditional accounting approach, it better answers questions of “How much do I have to live on after all the costs are paid?” and “How much return is there on my investment?”

For additional information on this protocol, please see reference # 1 in Appendix 3.

### **Visitor use information for appropriate enterprises –**

This indicator measures the number of visitor use days associated with enterprises that allow people to visit a ranch for a price based on a particular activity such as hunting, bird watching, rock collecting, etc. It is useful to document the number of visitors and the fees they pay to access the ranch to calculate and document dollars per visitor and the number of visitor days on an annual or seasonal basis. In addition, cost trends are useful in determining efficacy of non-consumptive land-use enterprises.

#### **Measurement Methods and Protocols**

Count the number of people (customers) who use a particular resource so that you may calculate user-days and cost/income per user day. The results can help identify the need to change prices/rents or spend more money on marketing, or the need to upgrade facilities, etc.

The procedure is basically the same as with any other ranch enterprise. Be sure to include all variable and fixed costs and allocate costs to this enterprise as with any other. Specific costs to these sorts of enterprises include extra insurance and liability costs and labor to manage the enterprise. As with any such service enterprise, the amount charged has to be based on what your costs are, what the going rate in the marketplace is for similar experiences, the quality of the service you are providing, the expected number of visitors buying the service, and other such considerations.

To measure this use, controlled access and a registration system for collecting fees are needed. Proper signage is also necessary, especially if your property is interspersed with federal and state lands. If people can access your land from public land or different entrance points, the costs or controlling or monitoring this should be considered.

If you are using a website to market recreational opportunities, monitoring visits, time on the site, and other such website metrics may allow you to evaluate changes that can be made both on how you market the opportunities and the website presentation. It may be that your website does not look professional enough, is not secure for people wanting to make reservations or pay a fee, or does not provide the kind of information needed to make a decision. These metrics, while they don't necessarily provide visitor use information, provide an indication of potential visitor information.

## 7. Legal and Institutional Indicator methods and protocols.

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You should continuously evaluate your continuing education, technical assistance programs, and institutional constraints (laws policies, and agency regulations) to enhance your abilities and knowledge. Your objective should be to stay current with the new and relevant issues to ensure that can take advantage of new opportunities and respond to issues that might affect your ranch management.

Indicators included in this category seek to identify legal constraints impacting the operation of a ranch and availability of opportunities for continuing education, training, and technical assistance. These indicators are generally somewhat less quantifiable than others in the monitoring framework, although they are equally important in the context of a rancher's business plan.

Special values could also include habitat for threatened or endangered species, protected wetlands, or water quality associated with Clean Water Act compliance. Monitoring for these values is covered in other sections of this guidebook specific to monitoring vegetation, wildlife, or water.

### **Continuing education and technical assistance –**

This indicator measures the use of technical assistance and continuing education (Cooperative Extension Service, GLCI and professional society conferences, NRCS programs, private consultants, etc.) by members of the ranch family. How frequently a rancher seeks technical assistance and continuing education may be an indicator of a mindset that fosters ongoing assessment and improvement in an operation. A thorough approach includes setting educational/training goals, scheduling periodic assessment of goals, and then setting new educational/training goals.

Ranchers can keep pace with an ever-changing social, economic, and political environment through education. A proactive rancher could consider incorporating this indicator into a business plan with a check-off at the end of the year to ensure that some sort of continuing education or improvement activity is completed. A more comprehensive approach could include setting educational/training goals, scheduling periodic assessment of goals, and then setting new educational/training goals to pursue.

### **Measurement Methods and Protocols**

Measurement of these indicator goals is simple – a “yes” or “no” answer suffices. The key to success is to persevere toward completion. Keep asking for assistance, implementing advice, evaluating progress, and asking for more help.

- Set educational/training goals. Periodically (annually) assess progress toward the goals. Set new educational/ training goals.
- Be aware of and appropriately use Technical Assistance programs. Federal agencies and state extension offices offer landowner assistance and education programs.

The USDA National Institute of Food and Agriculture (NIFA) provides rangeland-related information and educational programs to private owners of rangeland and permittees and lessees of public rangelands. Ranchers can learn about the impacts of grazing and other land uses on rangelands. Past educational efforts focused on commodity (animal) production while more recent programs emphasized ecological or aesthetic values.

### **Protection of special values –**

This indicator helps identify and monitor special values that may be non-economic or perhaps even costly to maintain. This could include historical sites such as cabins, old wagon trails, fire lookouts, cultural areas like old cemeteries or American Indian ceremonial sites, and other areas of significance to the family or the community.

Once the sites and their values are identified, goals are established and documented to deal with these special values. Periodic review of the goals and assessment of the results of management activities are recommended.

#### **Measurement Methods and Protocols**

Measurement of each of these indicator goals is very simple – a “yes” or “no” answer suffices. The key to success is to persevere toward completion. Ask for assistance, implement advice, evaluate progress, and ask for more help.

- Identify any special values (sites, resources, etc.) that are important.
- Set goals to handle special values.
- Periodically (annually) review progress toward goals, and assess the results.
- Set new goals.

### **Land planning and policy review –**

This indicator provides a framework for monitoring the interaction of the ranch business plan and the federal grazing permits and state grazing leases associated with the ranch. All federal grazing permits and state grazing leases come with their own set of limiting conditions on grazing use which may change from time to time. These conditions are a controlling factor on the use of the land and may have major impacts on the ranch business and its business plan. Because grazing permits and leases and associated land and resource management plans are affected by social and legal factors, particularly the National Environmental Policy Act (NEPA) and other federal and state laws, monitoring trends in permit and lease status can provide useful information concerning a ranch’s strengths, weaknesses, opportunities, and threats (SWOT).

#### **Measurement Methods and Protocols**

Detecting trends in factors affecting the administration of a grazing permit (or lease) is subjective and qualitative in nature – and can be quite difficult.

For example, federal permits and state grazing leases almost always establish stocking rates and available useable AUMs. These important numbers are tied directly to soil, water, plant, and animal indicators (such as forage produced, soil stability, and invasive weeds). Annual performance reviews address all of these factors in reaching conclusions on past use and setting the next year’s numbers.

Information collected to support an evaluation of grazing permits and grazing leases should include correspondence, notes from meetings with agency personnel, annual operating instructions, changes to the grazing permit, effects of other legal requirements (Rescissions Act, Clean Water Act, Endangered Species Act, National Historic Preservation Act) on administration of the grazing permit, etc.

Collectively, this information would comprise qualitative indicators that might show trends in how a grazing permit is being administered. Having supporting information from weather observations and biophysical indicators can also be useful in explaining (or contradicting) trends in these records. Likewise, the more years that information on grazing permits is kept, the more likely gradual trends can be detected. An appraisal of the same files during a period when more substantive changes are being implemented should require less supporting material over a shorter time frame, and will provide useful documentation for a ranch SWOT analysis.

## 8. Weather-related phenomena indicator methods and protocols.

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Although long-term trends in weather may identify the need for permanent changes, long-term trends are not the primary concern for this indicator. The weather related measures are used to help us make adaptive management changes based on annual productivity. If a reduction in precipitation reduces the productivity on a ranch for only one year, and no adjustments to management are made to reflect the reduced productivity, there could be long-term effects on sustainability. Even though management is appropriate for the conditions that occur during 8 out of 10 years, degradation of resources that occur during drought or flooding weather conditions could still threaten long-term productivity and sustainability. You need a contingency plan for the years when weather conditions are outside the expected norm.

Ranchers should monitor weather conditions because of the profound effects they can have on a ranching business.

These are general indicators that measure weather-related phenomena such as temperature, precipitation, and drought. Weather-related monitoring is perhaps the most important, and easiest, tracking activity that can be undertaken in a ranch operation. Monitor and record weather information in a systematic and easily reviewable format.

Nearly all of the biophysical indicators (soil, water, plants, and animals) are affected by weather. Measuring and recording precipitation and daily maximum/minimum (max/min) temperatures allow you to have a basis for evaluating trends in these other indicators.

For example, in some environments with predominantly cool-season grasses, precipitation in a definite window of time can reliably predict the upcoming forage production amount. This predictive ability allows advanced planning for making grazing and stocking adjustments that may be needed.

### **Temperature –**

This indicator measures the temperature range at selected points on your ranch on a regular, systematic (perhaps weekly) basis over the entire year. You may want correlate temperature measurements with other events and conditions on your ranch.

#### **Measurement Methods and Protocols**

Monitor temperature with at least one on-site max/min thermometer that is read and recorded on a regular, systematic basis – perhaps every week on the same day.

Inexpensive max-min thermometers are available that allow one to write down the maximum and minimum temperatures reached during the period since the thermometer was previously read. Max/min temperatures do not have to be read every day, but a regular monitoring program

of precipitation and temperature can provide useful information to a rancher that goes beyond explaining trends in vegetation.

An alternative is to find a website that displays temperature records for a site near you that accurately reflects temperature variations on your ranch. It may be useful to chart some combination of max/min temperatures and rainfall on the same chart along with information on other events and incidents relating to your ranch operation.

See reference # 21 in Appendix 3.

### **Precipitation –**

This indicator measures rainfall and snowfall amounts at selected sites on your ranch on a regular, systematic (at least a monthly) basis over the entire year. You may want correlate precipitation measurements with other events and conditions on your ranch.

#### **Measurement Methods and Protocols**

Monitor precipitation with an on-site rain gage, or obtain data from nearby precipitation stations that are part of the nationwide monitoring system. Be sure such data are representative of precipitation on your ranch.

See reference # 20 in Appendix 3.

### **Drought –**

This indicator monitors drought conditions on your ranch. Drought levels can be identified using information obtained from data collected, assessed, and presented in useable form by government agencies and other sources. You may want correlate drought condition reports with other events and conditions on your ranch.

#### **Measurement Methods and Protocols**

Drought conditions and status are monitored, synthesized into easily readable reports, and distributed by several organizations.

See reference # 19 in Appendix 3.





## Appendix 3: Selected References

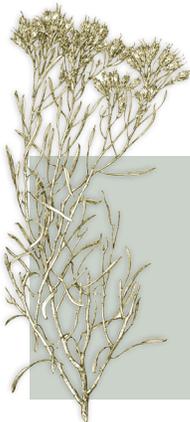


The following references are provided as supplemental material. Most were cited in the guidebook and we recommend that you consider these documents or websites if you want more information on a topic.

1. Workman, J. P. 1981. Analyzing ranch income statements – a modified approach. *Rangelands* 3(4):146-148. **Business planning – accounting practices – income statements.** Uses much of the same information as a traditional accounting approach, but it better answers the questions of how much does one have to live on after all costs are paid, and how much return is there on an investment. This publication may be downloaded at website: [http://digitalcommons.library.arizona.edu/objectviewer?o=http%3A%2F%2Frangelands.library.arizona.edu%2FVolume3%2FNumber4%2Fazu\\_rangelands\\_v3\\_n4\\_146\\_148\\_m.pdf](http://digitalcommons.library.arizona.edu/objectviewer?o=http%3A%2F%2Frangelands.library.arizona.edu%2FVolume3%2FNumber4%2Fazu_rangelands_v3_n4_146_148_m.pdf).
2. Wyoming Business Council. 2003. Sustaining western rural landscapes, lifestyles, and livelihoods. Contains detailed guidance for development of a business plan. **Business planning – assessing individual skills and traits.** Assessing individual skills and traits is critical when developing a business plan. Assessment forms can be found in the work-book. Many other options for obtaining business planning information are available from educational organizations, government agencies, and non-profit organizations. This publication may be obtained upon request through the Agribusiness Division of the Wyoming Business Council. See <http://www.wyomingbusiness.org/contacts/contacts.aspx>.
3. **Business planning – enterprise budgets for cattle.** Examples for a 300 cow-calf herd can be found at Oregon State University Extension Service website <http://arec.oregon-state.edu/oaeb/files/pdf/EM8686.pdf>, and at University of Idaho College of Agricultural and Life Sciences website: [http://www.cals.uidaho.edu/aers/r\\_livestock.htm](http://www.cals.uidaho.edu/aers/r_livestock.htm). Many other universities and other organizations may also have enterprise budgets available.
4. Pauley, L., A. Schroeder, C. Ehmke, and C. Paseneaux. Passing it on: an estate planning resource guide for Wyoming's farmers and ranchers. **Business planning – succession planning – estates.** The handbook is a publication of the Wyoming Agriculture & Natural Resource Mediation Program in conjunction with the University of Wyoming Cooperative Extension Service. See website: <http://ces.uwyo.edu/PASSINGITON.asp>.

5. Fulton, M.H., 2010. Succession planning for ranchers. California Rangeland Trust News, Winter/Spring 2010 edition. P. 4. **Business planning – succession planning -- estates.** See website: <http://www.rangelandtrust.org>. (Note, may be listed under Spring/Summer 2010 newsletter.)
6. Klinefelter, D., and B. McCann. 2009. Management transitions: handing over the reins. *Rangelands* 31:19-24. **Business planning – succession planning – management team.** See website: <http://www.srmjournals.org/doi/abs/10.2111/1551-501X-31.2.19?journalCode=rala>.
7. **Organization – Sustainable Rangelands Roundtable.** See website: <http://sustainableangelands.org>.
8. USDA Natural Resources Conservation Service. 2003. National range and pasture handbook. **Range management – NRCS handbook.** This publication may be reviewed and downloaded at website: <http://directives.sc.egov.usda.gov/viewerFS.aspx?hid=18937>.
9. USDA Natural Resources Conservation Service. National handbook of conservation practices. **Range management – conservation practices handbook.** Ranchers may select conservation practices for use on their ranch. This publication can be reviewed and downloaded at website: <http://directives.nrcs.usda.gov/viewDirective.aspx?hid=22299>.
10. USDA Natural Resources Conservation Service. Ecological site descriptions. **Rangeland monitoring – ecological site – descriptions.** Information on ESD(s) is available on the NRCS website: <http://esis.sc.egov.usda.gov/Welcome/pgReportLocation.aspx?type=ESD>.
11. Swanson, S., B. Bruce, R. Cleary, B. Dragt, G. Brackley, G. Fults, J. Linebaugh, G. McCuin, V. Metscher, B. Perryman, P. Tueller, D. Weaver, and D. Wilson. 2006. Nevada rangeland monitoring guide, second edition. University of Nevada, Reno, Cooperative Extension, and University of Nevada, Reno, Agricultural Experiment Station. Educational Bulletin 06-03. 81 p. **Rangeland monitoring – manual – State of Nevada.** This publication may be reviewed and downloaded at website: <http://www.ag.unr.edu/nsrm/publications/Nevada%20Rangeland%20Monitoring%20Handbook%20complete.pdf>.
12. **Rangeland monitoring – manual – State of Wyoming.** Wyoming Range Service Team 2008. Wyoming rangeland monitoring guide, version 2. USFS, BLM, NRCS, CES. 58 p. This publication may be reviewed and downloaded at website: <http://www.wyorange.net/monitoring.html>.
13. **Rangeland monitoring – rangeland health.** Pellant, M., P. Shaver, D.A. Pyke, J.E. Herrick. 2005. Interpreting indicators of rangeland health. Technical Reference 1734-6, Version 4. BLM National Business Center. 122 p. This publication may be reviewed and downloaded at website: <http://www.blm.gov/nstc/library/techref.htm>. Paper copies available from: [BLM\\_NCS\\_PMDS@blm.gov](mailto:BLM_NCS_PMDS@blm.gov).
14. **Rangeland monitoring – techniques.** Jornada Experimental Range, monitoring and assessment. This website contains considerable information on rangeland monitoring and other topics of interest to ranchers. See website: [http://usda-ars.nmsu.edu/monit\\_assess/videos\\_main.php](http://usda-ars.nmsu.edu/monit_assess/videos_main.php).

15. **Rangeland monitoring – vegetation.** Interagency Technical Reference. 1996. Sampling vegetation attributes. BLM/RS/ST-96/002+1730. 163 p. This publication may be reviewed and downloaded at website: <http://www.blm.gov/nstc/library/techref.htm>.
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17. **Rangeland monitoring – wildlife.** Braun, C.E. 2005, Techniques for wildlife investigations and management, sixth edition. The Wildlife Society. Bethesda, Maryland. 974 pp. ISBN 0-933564-15-5. This publication may be purchased at website: <http://bookstore.wildlife.org/Details.cfm?ProdID=42&category=4>.
18. **Rangeland monitoring – wildlife.** Knight, J.E. 1995. A rancher's guide for monitoring elk, and pronghorn antelope populations. Montana State University Extension, Bozeman, Montana. This publication contains information and protocols relating to monitoring of wildlife populations. See website: <http://www.msuextension.org/store/Departments/Outdoors--Environment-and-Wildlife.aspx>.
19. **Weather monitoring – drought.** Monitor weekly drought summaries at website: <http://www.drought.unl.edu/dm/monitor.html>. Save a copy as the records are not archived.
20. **Weather monitoring – precipitation.** Monitor with on-site rain gage or nearby precipitation stations. See website <http://www.wrcc.dri.edu/spi/spi.html> to monitor climate division summaries. See website <http://water.weather.gov/ahps/> for weather and river forecasts. See website <http://www.wcc.nrcs.usda.gov/wsf/> to monitor water supply forecast. See website <http://www.ncdc.noaa.gov/oa/climate/stationlocator.html> to locate historical weather (precipitation and temperature) data.
21. **Weather monitoring – temperature.** Measure the daily temperature range (maximum/minimum) at selected points on your ranch, on a daily basis, over the entire year. Alternatively see website <http://www.ncdc.noaa.gov/oa/climate/stationlocator.html> to locate historical weather (precipitation and temperature) data.
22. **Soils.** Soil survey information is a wealth of information. The Natural Resources Conservation Service maintains a website to obtain completed soil surveys at <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>. General information about NRCS soil surveys can be found at <http://soils.usda.gov/survey/>.
23. **Business Planning.** One source of assistance that is readily available is the SCORE program of the U.S. Small Business Administration. The program offers technical assistance and information about business planning, especially financial planning. Local Mentors are available almost everywhere. Templates and other tools are available to help the rancher develop or refine the business plan of a financial report needed by the business. <http://www.score.org/>.



## Sustainable Rangelands Roundtable Vision Statement

The SRR envisions a future in which rangelands in the United States provide a desired mix of economic, ecological, and social benefits to current and future generations, and criteria and indicators (C&I) for monitoring and assessing the economic, social, and ecological sustainability of rangelands are widely accepted and used.

