

**Meeting Notes for the Sustainable Rangelands Roundtable (SRR)**  
**Reno – July 24-25, 2001**  
**Facilitated by Lou Romero, DeLaPorte & Associates, Inc.**

**Welcome Remarks – Tom Bartlett, Roundtable Host/Convener**

Thank you for level of support and participation shown by the attendance at this meeting. During this meeting we hope to agree on the framework for evaluating indicators, refine the important issue list, prepare written drafts of indicators, and agree on important work to be accomplished at the next 2-3 SRR meetings.

**Participant self-introductions – led by Lou Romero, Roundtable Facilitator**

Participants should introduce themselves, answering the following questions:

- Name, organization, position?
- Familiarity with this subject?
- Interest you represent?
- Any “burning questions”?
- Participation in this meeting?

A list of participants can be found in Appendix A. Some issues brought up in this session:

- Where is it all going? Hard to see how it will tie back (range vs forestry)
- How will we tie together with other efforts such as SRM, National assessments, Interagency memorandum with NRCS and BLM? There are many national efforts; how will they build on each other?
- How can we keep up funding?

*For a summary of the following talks, please refer to Appendix B.*

Importance and potential benefits of Sustainability Indicators – **Rob Hendricks**

Overview of Sustainable Forest Roundtable Criteria and Indicators, and other Roundtable Efforts; linkages to SRR – **Alison Hill**

Value of the SRR for rangeland management and policy – **Tim Reuwsaat**

Sustainability Research for Rangelands - **John Mitchell**

SRR Process, Leadership, Funding, Logistics, Timeline, and Expected Product/Report – **Tom Bartlett**

**Achievements at the Salt Lake meeting – Lou Romero**

Looking at the Minerals Roundtable, it seems that we are about one meeting ahead of their process. We are making progress and building on experience from the other Roundtables.

At the Salt Lake Meeting we:

- Adopted a mission statement, 8 guiding principles, working definitions, and an operating plan (from Denver meeting input).
- Developed priority topics from which to develop indicators.
- Fleshed out framework for testing indicator suitability.
- Organized 6 topic groups and three working groups (scale, coordination, and outreach).

**Group input:**

Good to have livestock producers represented for the first time.

We should have the new participant introduction session for new people the evening before the meeting starts. Particularly liked presentations by Rob Hendricks and John Mitchell for giving perspective of the where the Roundtable fits.

**Report on Delphi synthesis and discussion: Definitions and Important Issues - Helen Rowe and Lou Romero**

Helen Rowe presented a description and synopsis of results from Delphi Rounds 3-5. Objectives for Delphi 3 and 5 were to establish the range of differing positions and to more clearly define areas of agreement and conflicting opinion. Delphi 4 solicited informed review of a document to span a wide range of disciplines. Delphi 4 gave participants a chance to think about issues independently and produced a document that categorized these new ideas for use at this meeting.

The goal for Delphi rounds 3 and 5 were to find closure on the vision statement and agree on a definition for rangelands. In Round 3, 28/32 preferred the SRM definition of rangelands, 29/33 indicated the Rangelands vision statement was acceptable, but respondents were split over whether to adopt the SRR vision statement along with Rangelands vision statement or adopt only the SRR vision statement. In Round 5, all participants accepted the SRM definition of rangelands (see text below.) Participants rated their level of acceptance on a selection of five packages. Results were split. Package 2 was chosen as a compromise (see below).

SRM definition of rangelands: 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. Rangelands include natural grasslands, savannas, shrublands, many deserts, tundras, alpine communities, marshes and meadows.

**Package 2:**

- Accepted SRR mission statement: The Roundtable will identify indicators of sustainability based on social, economic, and ecological factors, to provide a framework for national assessments of rangelands and rangeland use.
- Vision 1 (vision for rangelands): We envision a future in which rangelands in the U.S. provide a desired mix of economic, ecological and social benefits to current and future generations.
- Vision 2 (vision for the SRR process): We envision a future where we have widely accepted criteria and indicators for monitoring and assessing the economic, social, and ecological sustainability of rangelands.

The goal for Round 4 was to identify gaps in important issues developed at Salt Lake City meeting. These important issues were categorized into the following topics: change in vegetation patterns, monitoring change, conservation of biological diversity, plants, animals, disturbance regimes, water resources, riparian areas, economic evaluation of economic and biological costs, legal, economic, and institutional framework, social/political uses, toxics,

carbon budgets, climatic change. These categories were visited later in the meeting to incorporate into existing issue groups, create new issue groups, or reorganize issue groups.

### **Reports from Working Groups**

#### **Outreach Working Group - Mark Brunson**

- Met for the first time at the Salt Lake meeting.
- News release- a draft has been written.
- Thinking about doing a periodic update? Stan Hamilton had an idea for using the web and email to use for regular updates instead.

#### **Scale Working Group – Paul Geissler**

- Those with interest are encouraged to join.
- Been developing a bibliography to better understand the issues. The list is on the website [www.pwrc.usgs.gov/brd/srrscale.htm](http://www.pwrc.usgs.gov/brd/srrscale.htm)
- Grain and extent must be taken into consideration. This group is working on examples of how scale affects the indicators and data collection.
- It is helpful to use examples especially where there are problems aggregating. Input is needed as to where people perceive these problems?

#### **Coordination Working Group – Tom Roberts**

- Did not meet
- Suggestion that the EPA should be involved to work with emap, etc.

#### **Add important issues to small groups and revisit small group structure – Lou Romero/Tom Bartlett**

The group discussed each topic from Delphi four and either included these with existing topics, merged topics, or created new topic areas. For details see Appendix C.

#### **Group discussion:**

After realizing how closely the SRR issues matched the SFR C&I, the group had a discussion about whether to start using the SFR C&I. Participants felt that by merging our issues with the C&I we could benefit from the great amount of work already done by the SFR. This merge would also help dovetail SRR work into the appropriate reports.

There was some discussion about how the topic “Change on the Range” would fit with the C&I. It was decided that it should be tabled at the moment and revisited. Land use conversion and related issues must be addressed, but these issues are probably included within other topic areas. Revisiting the issue to see if the issues of “Change on the Range” are addressed can serve as a litmus test to evaluate the comprehensiveness of the indicators.

The following Criteria were developed by combining the issue groups and the SFR C&I:

1. Maintenance of Productive Capacity on Rangeland Ecosystems
2. Maintenance of Ecological Health and Diversity of Rangelands
3. Conservation and Maintenance of Soil and Water Resources of Rangelands

4. Maintenance and Enhancement of Multiple Economic and Social Benefits to Current and Future Generations
5. Legal, Institutional, and Economic Framework for Rangeland Conservation and Sustainable Management.

The group decided to meet in these small groups and discuss the SFR indicators and the results from Delphi 4 using the blue Journal of International Development and World Ecology and the draft papers on Indicators 6&7. Groups that encompassed two SFR C&I discussed how they would bring in both indicators.

**Review of evaluation framework for indicators** – John Mitchell and Lou Romero  
John Mitchell revised the framework based on input from the Salt Lake City meeting. He distributed these copies and asked people to use them in evaluating indicators. Further comments and suggestions for refining this framework would be welcome.

### **Wednesday, June 5**

#### **Brief Review of Monday's Accomplishments** Led by Lou Romero

Each group presented their progress from the previous day on indicator work.

#### **Small groups draft indicators for important issues** – Lou Romero/Groups

Small groups asked for a written draft to include:

1. New criterion titles.
2. List of potential indicators.
3. Develop a few of the most promising indicators using 6-point framework.

#### **Brief reports from small groups with merged document on overhead** (Appendix D).

Changes were made to #6 Evaluation Framework of Indicators; see Appendix E.

For a summary of how the criteria have evolved in the SRR process from the Salt Lake Meeting until now, please see Appendix F.

### **Next Steps**

1. Develop full list of indicators
2. Continue work on indicators through framework
  - a. Ideas for performing work in small groups between meetings: web based conferences, list serves, conference calls, websites
  - b. Group leaders will be responsible for getting the group rolling on small group work between this meeting and San Antonio. These leaders are: Tom Lustig, Linda Joyce, David Pyke, John Tanaka, and Dennis Child.
3. Evaluate Indicator Classification System through Delphi.
  - a. Existing regional-national protocols and data sets.
  - b. Accepted protocol, no data sets at regional or national scale.
  - c. Abundant data, no comprehensively accepted protocols.
  - d. Conceptually feasible.
4. Presentations for San Antonio – Phil Janik.

5. Suggestion to have separate rooms for small group meetings.
6. Next meeting will only involve a 1½-hour meeting for newcomers (November 7, 8-9:30). During this time Scale, Outreach, and Coordination Groups will meet. Returning participants should plan to arrive by 9:30.

**Tucson**

1. Review indicators (large group).
2. Continue development of indicators with framework (scale considerations).
3. Plan for subsequent meetings in 2002.

## **Appendix A**

### **Salt Lake City Participants**

1. Tom Bartlett, Colorado State University
2. Marty Beutler, South Dakota State University
3. Ben Bobowski, NPS
4. Mark Brunson, Utah State University
5. Larry Bryant, USDA-Forest Service
6. Larry Cadwell, Pacific Northwest National Lab
7. Jason Campbell, National Cattlemen's Beef Association
8. Dennis Child, Colorado State University
9. Paul Geissler, US Geological Survey
10. Stan Hamilton, National Association of State Foresters (NASF)
11. H. Theodore Heintz, Jr., U.S. Department of the Interior
12. Rod Heitschmidt, USDA-ARS
13. Robert Hendricks, USDA-Forest Service
14. Allison Hill, USDA-Forest Service
15. Linda Joyce, USDA-Forest Service
16. Sherm Karl, USDI-BLM
17. Linn Kincannon, Idaho Conservation League
18. Thomas D. Lustig, National Wildlife Federation
19. Kristie Maczko, USDA Forest Service
20. Mike Manfredo, Colorado State University
21. Dan McCollum, USDA-Forest Service
22. John McLain, Resource Concepts, Inc.
23. John Mitchell, USDA-Forest Service
24. Kenneth E. Nelson, USDA-Economic Research Service
25. Duncan Patten, Montana State University
26. David Pyke, US Geological Survey
27. Tim Reuwsaat, USDI BLM
28. Tom Roberts, USDI BLM
29. Lou Romero, de LaPorte and Associates
30. Helen Rowe, Colorado State University
31. Lou Swanson, Colorado State University
32. John Tanaka, Eastern Oregon Agricultural Research
33. Doug Tedrick, Bureau of Indian Affairs
34. Dennis Thompson, NRCS
35. Allen Torell, New Mexico State University
36. Paul Tueller, University of Nevada, Reno
37. Jeanne Wade Evans, USDA Forest Service

## **Appendix B Talk Summaries**

### **Importance and Potential Benefits of Sustainability Indicators – Rob Hendricks**

The focus of Rob's talk was the benefits to be gained by rangeland management stakeholders, both national and local, from incorporating sustainable rangeland management as a goal and the implementation of the criteria and indicators (C&I) to measure progress in that goal. Neither the data needs for the upcoming United States 2003 Report on sustainable resource management nor any other government need is alone sufficient to support the collaborative partnership required to implement national C&I. It must be based on self-realized practical results for all members of the rangeland management community.

The origins of the sustainable development and C&I processes can be traced to the Earth Summit in 1992, the largest gathering of world leaders up to that time. In 1993, the forest management community around the world began a number of processes to "define" and measure national progress in the forest management sector's part of sustainable development (sustainable forest management). This was driven by a growing public opinion in the developed world that the purchase of forest products might be harmful to the maintenance of biodiversity, global climate systems, and the welfare of people in the developing world. As an example, Brazil lost 40 per cent of its timber market in Europe because of these perceptions. If the McDonald Corporation's reduced the use of beef from Brazil's Amazon region is an example, the future of beef production may be similar to that of the wood industry.

An important notion of what sustainable development is was discussed. It not a fixed state of harmony, but rather a process of change in which the management of resources, the direction of investment, and technological development and institutional change are consistent with present as well as future needs. We need a tool to help make this possible.

Sustainable range management should not be thought of as a separate program or initiative. It is the way we all do our work in inventory, assessment, planning, and collaboration, policymaking and budget allocation etc.

It is critical that ranchers, NGO's and government workers see for themselves the value of using criteria and indicators at the national or local level. The notes from the previous Roundtable meetings reveal some skepticism about C&I and sustainable range management. It appears to me some people do not see how sustainable range management or C&I can work. Well, there is a precedent we can look at and that is origin and use of the national economic accounts.

Developed in the great depression, the national economic accounts (indicators) now provide national leadership with an ability to analyze the impact of alternative policy actions on the entire economy. Perhaps more importantly, they can see what is going on in the economy on a national scale. Without such figures as gross national product (GDP), policy makers would be adrift in a sea of unorganized and or incomplete data. Such data are beacons that help steer the economy toward economic objectives. The statistics are daily fodder for the media. Alan Greenspan and others have said the national economic accounts are the "greatest advance in

governance in the 20<sup>th</sup> century." That is a pretty strong statement. What is also interesting is that Greenspan says he cannot recall a single instance when the integrity of the estimates was called to question by informed observers.

Rob pointed out the many parallels between the current needs of natural resource community policy makers and the past needs of national economic policy makers. In the end, if we can provide a reliable set of indicators relevant to the management of this country's grass and shrub lands, it will be public interest that drives the use of any indicators that are developed. For example, with the economic indicators it is labor unions that make sure policy makers give consideration to unemployment indicators. Business leaders drive government interest in interest rates. In the same way, the western agricultural community can pressure decision makers, in government or business, to make decisions that respond to an indicator important to their welfare. The same goes for NGO's, state government or federal agencies.

One day we should be able to see in USA Today the indicators generated by the range management community of interests. The source and accuracy of data for such indicators should be unquestioned. The rangeland indicators, on-the-other-hand, should generate a productive public dialogue regarding the success of western management strategies or what to do about observed problems.

### **Overview of Sustainable Forest Roundtable Criteria and Indicators, and other Roundtable Efforts; linkages to SRR - Alison Hill**

The Sustainable Rangeland Roundtable (SRR) effort can potentially streamline its criteria and indicator (C&I) development process by gaining knowledge from other related efforts. Today's discussion will be limited to the two other roundtable efforts (i.e. the Roundtable on Sustainable Forest and the Minerals and Energy Roundtable); the development of standards (the Federal Geographic Data Committee Standards and the National Vegetation Classification System), national data collection efforts (i.e. the National Resources Inventory, Forest Inventory and Analysis, Forest Health Monitoring, and EMAP); and reporting efforts such as the Heinz Center Report and the 2003 National Report.

### **Value of the SRR for Rangeland Management and Policy - Tim Reuwsaat**

Currently, we cannot easily assimilate information to track the state of the Nation's rangelands because of: differing jurisdictions and laws affecting those jurisdictions, multiple uses of rangelands, conflicting societal values, scale issues, ecological, societal, economics changes over time, and inconsistent data collection costs & budgets. Agencies should be able to provide easily understood, nationally consistent information so social, economic and ecological status on the rangelands that can be compared regionally and over time.

A common set of indicators will:

- Lead to improved efficiencies by measuring only what is important.
- Provide for the development of common techniques, again improving efficiencies.
- Allow agencies, universities and organizations to develop sets of protocols and methodologies to measure these ecological, economic, and social indicators. This will



help avoid redundancy, but still giving flexibility to the independent needs of the various entities collecting the information.

- Help establish workload priorities to those areas most at risk or in need of restoration.
- Through assessments, report consistent and comprehensive status of the nation's rangelands, improving accountability to our partners, stakeholders and Congress.
- Help us determine compliance with applicable laws, i.e. Clean Water Act, Endangered Species Act.
- Provide a national assessment from which recommending funding shifts for new appropriations among work priorities, agencies and Departments.
- Build a foundation of common understanding that will improve the debate on the management of rangelands.

Most importantly, criteria and indicators developed by a diverse group of individuals representing a wide spectrum of values will build a comprehensive understanding of rangeland sustainability now and in the future.

### **Sustainability Research for Rangelands - John Mitchell**

Until a decade ago, perceptions of rangeland sustainability focused upon range condition. In recent years, the Forest Service and other organizations have started considering sustainability in terms of ecological, economic, and social measures at multiple scales. When trying to incorporate multiple scales in relation to indicators of sustainability, it is important to understand hierarchy theory. Higher scales within a hierarchical system constrain behavior at the next lower scale, while the latter can explain the mechanism for the next higher scale. There must be communication between scales in order for constraint to occur. Three important attributes of a scale are grain, extent, and frequency behavior of data describing it. Tradeoffs between grain and extent can explain why it is unfeasible to aggregate site data to a national level.

A number of research forums and reports concerning the sustainable development of rangelands have been published during the past 10 years. The Ecological Society of America's Sustainable Biosphere Initiative called for increases in basic research on sustainability of ecological systems to help improve the wise management of natural resources. Two broad scale research items in the SBI are effects of changing land use patterns on ecological processes and feedbacks between ecosystem and atmospheric processes. At least two forums on interrelations between environmental quality and economic growth have been published. They both emphasize the need to study linkages among physical, biological and socio-economic systems. The Society for Range Management outlined sustainability research goals for the next century in a 1993 report calling for more work on livestock management systems, enhancing riparian systems, providing for wildlife habitat, and understanding goals of society. Finally, scientists at the Rocky Mountain Research Station have published an evaluation of the 7 criteria and 67 indicators for sustainable development of temperate and boreal forests. Many of these indicators are also important measures of rangeland sustainability.

### **SRR Process, Leadership, Funding, Logistics, Timeline and Expected Product/Report - Tom Bartlett**

Roundtable general agenda: the first morning will be introductions for new members; therefore, returning participants can arrive for the afternoon schedule. The agenda of these meetings is meant to be flexible to fit the needs and dynamics of the group process.

At the end of day two, we assess our progress, determine the topics for Delphi process, and agree on rough agenda for the next meeting.

The Delphi Process will be used between meetings to make progress through discussion on topics from the previous meeting, continue to develop ideas, and discuss needs for the next meeting. Full participation is critical for success. Helen will send out the questions, members respond, Helen will analyze and summarize responses anonymously, and will send these out with further questions. The process is iterative. The Delphi is beneficial as it keeps members involved and decreases the slow start up time for next meeting.

SRR team: Hosts: Tom Bartlett and John Mitchell  
Facilitator: Lou Romero, de LaPorte & Associates, Inc.  
Kristie Maczko: Hotel arrangements, notes, and communications  
Helen Rowe: Delphi process, web page, communications  
Noelle Grether: Travel reimbursements, communications  
Al Abee, Larry Bryant, Alison Hill, and Mike Manfredo: Idea staff and coordination

In addition to the staff, SRR has a Steering Committee and various working groups.

The Sustainable Rangelands Roundtable (SRR) is meant to be an open, positive, future focused, dynamic process that values and respects all opinions and contributions of members. Our purpose is to identify indicators for sustainable rangelands. We will publish a report on US Sustainable Rangelands in 2003. SRR gains from links with other indicator efforts, such as the Heinz Report, SFR, SMR, SDI.

Time line: we hope to be done by 2003 (nine meetings - four this year, five next year).

Support: the attendance of participants. USDA-FS and CSU are matching funds; the Bureau of Land Management and Agricultural Research Service provide additional funding. Additional partners will be needed.

## Appendix C

On Tuesday afternoon we discussed how to merge the Delphi 4 ideas with the existing list of important issues from the Salt Lake City meeting. The text in bold are category headings taken directly from the Delphi 4 results; the text that follow the headings are the comments from this session.

**Change in Vegetation Patterns** – include with Rangeland Health.

- Component of rangeland health.
- Build into indicators.
- Built into change and trend.
- Vegetation patterns do change with change on the range as well.

**Monitoring change** - include with Change on the Range.

- Conservation of biological diversity, plants, animals – include with Rangeland Health.
- Change on the Range.
- Rangeland Health?
- Put invasives and also biodiversity with Rangeland Health.

**Disturbance Regimes** – new category.

- Invasives go under Disturbance Regimes.
- We don't like the term regimes. Rename DisturbanceAgents.

**Water Resources** – expand soil category to Soil and Water group.

- What about a water roundtable?
  - Phil Janik, the Corps of Engineers, and others met to start a Water Roundtable. It will be a FACA group. There is support from people who organized their agenda. We would deal with overlaps as part of forestry assessment. Wetland and riparian overlaps would be addressed in scoping meetings. We will have to continue to address water issues within the context of Rangelands.
- As important a topic as Soils.
- Stream courses as indicator as treatment of forestlands. Can be one of the best indicators of what is occurring on land.
- Changes from perennial to annual or from periods of flow and no-flow in streams are valuable biological measurements, but are specifically measurements of water.
- How about combining water and soils?

**Riparian areas** - include with Change on the Range.

- Could fall into Rangeland Health it is a specific community type. It is already listed as a component of Rangeland Health.

**Economic evaluation of economic and biological costs** – new category.

- What is biological cost? Loss of biodiversity.
- For invasives such as cheat grass, what is the cost of changing? In this accounting, we run the risk of double counting. Example: cheatgrass causing a loss of watershed for a city.
- Maybe does not need to be moved into another topic.

**Legal, economic, and institutional framework** – new category.

- Do these go under social goods and services or a separate topic?
- Difference between social conditions measured at community level and conditions measured nationally.

- We should use sociological literature. This area is not as well conceptualized.
- Legal and institutional framework should maybe stay separate.
- Social/political Uses – divide subtopics into appropriate topics.
- Some subheadings belong under capacity, some under social. Groups should decide which points go under which heading.

**Toxics** – include in Soil and Water

- What are toxics? What do we mean? Pollutants? Toxic waste? Are range ecosystem affected by air pollutants?
- Perhaps waste? Fort Collins purchased land to process waste, for example.
- Is it lost as rangeland? The community type is changing.
- Chemical substances to be put under Soil and Water. Providing a benefit?
- Move to Soil and Water.

**Carbon Budgets** – include with capacity.

- Combine carbon and climatic change.
- Don't have as much option to mitigate on rangelands as we do on forests.
- Conversion of grassland is a major research topic. There can be a tremendous amount of carbon sequestration underground.
- Based on models that there is a great deal tied up in rangelands. Is it capacity? Does it contribute with methane?

**Climatic Change** – include with Rangeland Health.

## Appendix D

Each group wrote notes on their indicator evaluation work. Notes in brackets were taken from their presentations to the large group.

**CONSERVATION OF SOILS AND WATER RESOURCES** - Allison Hill, Mike “Sherm” Karl, David Pyke, Tim Reuwsaat, Paul T. Tueller

### *Potential Indicators:*

Indicator 18. 1. Area and percent of rangeland with significant soil erosion. Can erosion really be measured? However, this is deemed to be a very important indicator.

2. This indicator measures soil loss and thus soil productivity and could be a measure of sedimentation. There could also cause affects on vegetation as the vegetation is impacted during the erosion processes. Erosion is the number one contributor to declines in past human civilizations.

3. The measure is applicable at various spatial and temporal scales.

4. The measurement of erosion likely requires additional research to determine what methods are available and if the methods are repeatable, reliable and accurate.

5. The indicator is sufficiently important to maintain without an adequate monitoring framework in place at this time.

6. The indicator is sensitive over various time frames and scales.

Indicator #19. 1. Area and percent of rangeland managed primarily for protective functions. This indicator possibly should be a social indicator. This could be changed to “An area of rangeland managed primarily for soil and water maintenance and conservation.” Protective function tends to imply a hands off policy. We recommend that this not be an indicator on rangelands as written.

The assumptions related to rangeland sustainability are faulty. [Reserves will not necessarily protect it from degradation; without management invasives can become a greater threat and soil and water resources can decline.]

Indicator #20. 1. The percent of stream kilometers in rangeland catchments in which stream flow and timing has significantly deviated from historic range of variations. This might be a good indicator on rangelands although we have a concern that the historic range of variations in stream flow is essentially unknown. This may be rectifiable by using current conditions for the base line. Proper functioning condition may be a substitute for stream flow and timing. This indicator may be measured using the PFC data.

2. Changes in stream flow and timing. Hydrologic changes are important to the water component of rangeland sustainability. It reflects how well water is retained and supplied on rangelands. 3. Yes. 4. Many measurement protocols are available and the data would have to be accumulated, summarized and interpreted. There are potential gaps for stream gage data for many western rangelands. It must be determined what data is available. This is an important indicator and should be maintained. 5. Yes. 6. Depends upon where the baseline of data is established; we are afraid that it will be difficult to establish the historic range of variation. In

many cases stream have gages at only one point and that it will be difficult to extrapolate the stream flow characteristics to the entire stream.

**Indicator #21** 1. Area and percent of rangelands with significantly diminished soil organic matter. This is an extremely important indicator. This indicator should be retained and new procedures for measuring this indicator should be developed. This should include questions of soil salinity.

2. It measures carbon and organic matter. It is an indicator of soil productivity, energy flow and nutrient cycling and infiltration. 3. Yes 4. The different procedures for measuring carbon and organic matter for rangeland soil must be researched and determinations made as to best procedures for both analytical technique and sampling. 5. Yes depending upon sampling protocol and cost. 6. Yes if described in terms of the goodness of soil organic matter.

**Indicator 22:** (MP-4.e) 1. Area and percent of rangeland with significant soil compaction ~~resulting from human activities~~. We agree that this is not a good national level indicator but may be a reasonable indicator on a local level. We have concerns about its localized nature on the ground and being able to translate it to the national level with coarse resolution. However, this indicator may be useful when used in combination with one or more of the other indicators.

2. Measuring the physical properties of soils, e.g., bulk density, infiltration. This indicator measures affects on soil productivity and possibly soil/water relations. 3. Primarily useful at the watershed level. It would be more difficult to carry to the smallest scales (broad extent). 4. The NRI is proposing a protocol that may be useful in the future to measure this indicator. This has not really been tested. 5. Probable but still being tested. 6. Yes with the term compaction.

**Indicator 23:** (MP-4.f) 1. Percent of water bodies in range areas (e.g. stream kilometers, lake hectares) with significant variance of biological diversity from the ~~historie~~ (natural) range of variability. This is a good and valuable indicator. However, there is concern relative to the determination of the historic range of variability. On many rangelands the baseline of aquatic organisms must be evaluated as presently constituted and then monitoring should evaluate any changes including possible improvements in biological diversity of these organisms.

2. A determination of water quality and the amount and kinds of various aquatic organisms. Aquatic organisms are very sensitive to disturbance. 3. Yes. 4. We suspect the answer to #4 is yes but we lack specific expertise in this area. 5. This indicator is definitely temporally sensitive although the 'natural' must be defined before it can be used at the broadest scales. 6. Yes it is relatively understandable to many but further education may be required to make such information easily interpretable.

**Indicator 24:** (MP-4.g) Percent of water bodies in range areas (e.g. stream kilometers, lake hectares) with significant variation from the historic range of variability in pH, dissolved oxygen, levels of chemicals (electrical conductivity), sedimentation or temperature change. We wonder if the value added with this indicator extends beyond the data acquired with indicator #23. Fecal coliform bacteria should also be considered. In addition it was mentioned that hormones might be an important factor consider.

**Indicator 25:** (MP-4.h) 1. Area and percent of rangeland experiencing changes in soil chemical properties including toxic substances. .

A New Indicator - “Area and percent of rangeland with significant variance in diversity of soil microorganisms” The Soil Food Web Structure. This is an important indicator but would be very costly.

Another new indicator - Measuring the change of aquifers may be an important indicator. None of the members of this group feel qualified to consider this question.

Another new indicator - “Area and extent of rangelands occupied by wetlands” What percentage of these areas is moving from perennial to ephemeral wetlands?

Another new indicator - Area and extent of rangelands with changes in soil stability.

2. Measures the strength of soil aggregates. It can influence erosion potential and soil productivity. 3. Yes. 4. The slake test for measuring soil stability, a measure of soil aggregate stability, can be used as a measure for this indicator. 5. Yes 6. The indicator is understandable but the interpretation may take further education.

[Concern expressed by this group about duplication amongst indicators, soil productivity, for example.]

**Criterion 6 – Maintenance and Enhancement of Multiple Economic and Social Benefits To Current and Future Generations** - Allen Torell, Mark Brunson, Lou Swanson, Marty Beutler, John Tanaka, Dan McCollum, Mike Manfredo, Rob Hendricks

List of potential indicators

Production and Consumption – From Delphi 4 gaps converting range

Indicator 29 – change to livestock forage

Indicator 30 – change to non-livestock forage products

Indicator 31 – change to livestock forage

Indicator 32 – change to livestock and non-livestock forage products

Indicator 33 – Not a potential, maybe recycling water products

Indicator 34 – change to non-livestock forage products

Recreation and Tourism

Indicator 35 – include wilderness and other special designations, should be by type of recreation and tourism opportunities

Indicator 36 –

Indicator 37 – include revenues from fees (might go into indicator 30) and dependency of local communities on rangelands (might need to move to a more general category)

Investment in the Forest Section

Indicator 38 – needs major rewrite

Indicator 39 – add rangeland to research

Indicator 40 – add rangeland technology

Indicator 41 – add rangeland investment

## Cultural, Social and Spiritual Needs and Values

Indicator 42 – should include areas protected/consumed for lifestyles (ranchettes vs. open rangeland), should sort out indicators by cultural, historical and spiritual values – public values for ESA and other societal values

Indicator 43 – Not good, dump - will be subsumed in rewrite/expansion of 42

## Employment and Community Needs

Indicator 44 – employment in ranching and government employment, recreation and tourism

Indicator 45 – need to determine which sector

Indicator 46 – change to rural communities, changing structure of rangeland users (general demographic data)

Indicator 47 – Not potential

## **Salt Lake City Indicators and Gaps:**

### 1. Rangeland Resource Outputs and Resulting Costs/Benefits To Various Stakeholders

Outputs are:

Recreation opportunities

Ranching – grazing use

Non-agricultural landowners – ranchettes, development, open space

Nonuse, preservation/protection

Lifestyle, work ethic

Indicators 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41

### 2. Community Viability and Stability

Demographics and Population Dynamics – Measures change in population characteristics (e.g., Length of residence, Racial composition, Social/economic composition, County level or state level population, Crime rate, Educational achievement rate) and composition over time.

Important to know who is living where and who is moving in and out, indication of level of use (consumption of resources) by different parts of the population and political power shifts.

Indicator is meaningful at multiple scales, maybe most meaningful at local scales. Data are readily available from a variety of sources (Census, American Community Survey) at multiple scales, repeatable, reliable, and accurate. Tends to be sensitive over time, given slight changes in collection methods. It is understandable and interpretable in a consistent way. Obstacle in relating it directly to rangelands.

Social Networks – Not good measure at national level. At the local level, very important to understand social fabric (e.g., volunteerism sense of community, sharing community events, helping neighbors, participation in 4-H and other groups). No data at national level, data not



collected consistently. Indicator would be sensitive over time at the appropriate scale. Would need case study communities as indicators to the nation as a whole.

Perception of Quality of Life – Measures people’s satisfaction with various factors in their community. It indicates where people would prefer to live. Measured at local level could be made national though community sampling. Not currently available. Its importance to sustainability as a measure of how committed current users are to remain in their community. Measure of community stability.

Indicators 42, 43

### 3. Social Attitudes and Beliefs Associated with Rangelands

Number of Administrative Appeals and Court Cases on Public Land Decisions

Degree of Variation Among Groups on Attitudes and Beliefs about Rangeland Uses

Number of Collaborative Processes

Indicators 42, 43

### 4. Mutual Support Between Urban and Rural Communities

Number of Conservation Easements Purchased – It measures the willingness of people to contribute to the conservation of open space and as a way to help ensure land is not developed. Meaningful at all different scales. Data are obtainable. It’s sensitive and understandable.

Acres of Rural Land Purchased by NGO’s – It measures the willingness of people to contribute to the conservation of open space and as a way to ensure land is not developed. Meaningful at all different scales. Data are obtainable. It’s sensitive and understandable.

Contributions to Restoration Activities – It measures the willingness of people and organizations to invest (time and money) in a variety of rangeland activities. Meaningful at all different scales. Data are obtainable, but probably harder as the scale gets larger. It’s sensitive and understandable.

In/Out Migration – Measures the change in traditional lifestyles and population structure in rural communities, effects on community infrastructure and demand for services. Meaningful at all different scales. Data are readily obtainable, sensitive, and understandable.

Area in Urbanized Areas – Measures the amount of land area that is urbanized based on population density. Meaningful at all different scales. Data are readily obtainable, sensitive, and understandable.

Trade flows (regional economic modeling information) – Measures how economic goods and services are traded between rural and urban areas. Important to know where investment of

income is occurring. Variable data at different scales, national level has not been updated in many years. Local/regional data may be either based on national relationships or primary data collection. May not aggregate. If measured at different times, it should be sensitive and understandable.

Labor flows and market areas (journey to work/commuting patterns)

Absentee ownership

Expatriate labor

Seasonal populations

Local infrastructure – Measure of modernization and development. Likely mostly useful at local level, but some may be more regional/national (% access to internet, electricity, telecommunications, other services).

Indicators 44, 45, 46

#### 5. Transformation of the Structure of Agriculture (Economy, Community)

Economic structure/base/diversity

Land tenure patterns

Opportunities for off-ranch employment

Degree of economic dependence on rangeland and related economic sectors

Length of tenure – Measures stability of ownership

Indicators 46

**Maintenance of productive capacity on rangeland ecosystems** - Dennis Child, Ted Heintz, Ben Bobowski, Dennis Thompson, John Mitchell, Jeanne Wade Evans

Potential Indicators – (Capacity is related to all criteria)

#### **Alternative A**

Overall Productivity

Area of rangeland by type and seral state

Green measure – biomass production

Carbon sequestering (above and below ground)

Changes in area (CRP, exurban etc.) new

Determinants of Rangeland Productivity

Area of rangeland by type and seral state

Soil and Water

Native Seed Production – Genetic material

Patches

Current Production (consumptive and non-consumption)

Area of rangeland by current use

Products from rangelands – Current Production

Number of domestic livestock from rangeland – number in July  
Surveys of Hunting and fishing – Area available  
Non-forage products removed (Berries, nuts, oils, medicinal plants, wood)  
Wildlife

### **Alternative B**

Consumptive commodity (path forest group took) considered but dropped.

[This group discussed the delineation of forest and rangeland definitions. Specifically how should pinion juniper communities be counted? One option is not to do as a definition, but instead look at specific lands that are either not counted or double counted and make site-specific decisions. They suggested forming a working group to deal with the issue.]

**Criterion: Maintenance of Ecological Health and Diversity of Rangelands** - Linn Kincannon, Rod Heitschmidt, Duncan Patten, Linda Joyce, David Pyke, Paul Geissler, Larry Cadwell, Jason Campbell

#### **Potential Indicators-Land**

Indicator 1. Extent of land area in rangeland

Indicator 2. Extent of rangeland area by community type and seral stage

Indicator 3. Extent of rangeland area under protected status or special management

Protection of lands is often a restriction on harvesting of timber; protection as designated by laws may be not restrictive with respect to other uses. For example, all lands, even protected lands, unless expensively constrained with fences, are grazed by wildlife and/or domestic animals. Discussion raised concerns about land use such as 5 acre ranchettes, use in terms of grazing intensity, protection designated by law such as parks and wilderness. A concern was that the use of the term ‘use’ would imply that there should be a designated ‘best use’ or single use of the land.

Indicator 4. Fragmentation of rangeland where the size, pattern, and dispersion of rangeland community types is quantified.

Indicator 5. Fragmentation of rangeland based on size of parcel (e.g. ranchettes).

#### ***Potential Indicators-Species***

Indicator 6. The number of native rangeland species.

Indicator 7. The number of non-indigenous rangeland species.

Indicator 8. The presence and status of species of concern or officially threatened and endangered rangeland species.

NOTE: ‘Rangeland dependent’ versus rangeland species; is it important to keep dependent? Rangeland dependent would imply that the species needs rangeland habitat. This may be more important from an animal habitat perspective.

Indicator 9. Number of and genetic diversity of rangeland species that occupy a small portion of their former geographic range.

Indicator 10. Population levels and current geographic range of representative species monitored across their known geographic range. This indicator is an attempt to get at population viability of species that are keystone or key species within diverse habitats. These are species that would assist in identifying trends so potential threats to the community identified early. This indicator is not focused on the threat per se, but rather the population levels and their changes.

### ***Potential Indicators-Process***

Indicator 11. Area and percent of rangeland affected by processes or agents beyond the range of historic variation. Invasive species are a required element.

Indicator 12. Area and percent of rangeland subjected to levels of specific air pollutants (e.g. sulfates, nitrate, ozone) or ultraviolet B that may cause negative impacts on the range ecosystems.

Indicator 13. Area and percent of riparian ecosystems in rangelands that are in proper functioning condition.

Forest C&I Indicator 17. This is a challenging indicator. Note that the examples that surfaced in the discussion were soil carbon and plant productivity, these might be in the other groups— check to see what they decided.

### **Evaluation Framework of Indicators**

#### **1. Indicator 2. Extent of rangeland area by community type and seral stage**

Question 2. This indicator measures the total area within each community type by seral stage. It is important to note changes in certain community types and/or seral stages because these changes would have implications to habitats for plants and animal species.

Question 3. Yes

Question 4. Yes. Existing data is spotty. Community type definitions appear to be well recognized across the agencies. The completion of the National Soils inventory would assist in this indicator.

Question 5. Yes, the indicator is measuring the quantity of interest. So, the indicator would be sensitive to change. For example if a fire occurred and the site changed from sagebrush to cheatgrass, this would be noted as an early seral state within sagebrush. Community type might be measured on a longer time frame than seral stage; 10 years versus 1 year.

Question 6. Yes.

Question 1. **Indicator 10. Population levels and current geographic range of representative species monitored across their known geographic range.** This indicator is an attempt to get at population viability of species that are keystone or key species within diverse habitats. These are species that would assist in identifying trends so potential threats to the community identified early. This indicator is not focused on the threat per se, but rather the population levels and their changes.

Question 2. This indicator measures status of representative species: population levels, current range. This is critical so increases and decreases can be recognized before the species becomes lost or epidemic. This indicator applies to both plants and animals.

Question 3. Meaningful with respect to the known geographic range of the species.

Question 4. Yes, field techniques exist to monitor population levels of species, methods are repeatable and reliable. Accuracy may be subject to the individual species, rarity of the individual species, or environmental conditions of the sampling.

Question 5. Indices may not be as sensitive over time as direct measurements.

Question 6. Yes.

**Group 7: Legal, institutional and economic framework for range rangeland conservation and sustainable management** - Tom Roberts, Stan Hamilton, Doug Tedrick, Larry Bryant, Tom Lustig, Ken Nelson

The Group accepted the wording of the Sub-criteria.

**CRITERION 7: 1. *Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of ranges, including the extent to which it:***

**Indicator 48:** (MP-7.1.a) Clarifies property rights, provides for appropriate land tenure arrangements, recognizes customary and traditional rights of indigenous people, and provides means of resolving property disputes by due process.

What is the Indicator (Descriptive Title)?

1a. As above.

2. What does it measure, and

2a. Measures property rights, in the broad sense of property. Present or not present, Why is it important/critical to sustainability?

2b. Provides incentive for property maintenance and the division of responsibilities and benefits. Provides certainty in the distribution of benefits and responsibilities and resolution of disputes.

3. Is the Indicator meaningful at different geographic sites, regions and climatic scales?

Not scaleable, but laws differ at local, state, and federal levels.

4. Can the indicator be adequately monitored with existing or obtainable data and or models?

4a. Yes. A paralegal could go through all state statutes and court decisions in a year to determine status and change.

Are measures of the indicator repeatable, reliable and accurate?

4b. Yes-- Although they evolve continuously. Some are not yet known.

Can indicators using nominal and ordinal measurement scales be adequately reported over time?

4c. Yes.

If one or more of the above is not true, is the indicator sufficiently important to maintain without an adequate monitoring framework in place?" N/A all were yes.

5. Is the indicator sensitive over time frames commensurate with its scale?

5a. Yes, can follow the temporal sequence. Scale issue is as before not scalable, but local, state, federal sequence could be monitored.

6. Is the indicator understandable and interpretable in a consistent way by people everywhere?

6a. Yes.

***1. Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of ranges, including the extent to which it:***

Indicator 49: (MP-7.1.b) Provides for periodic range-related planning, assessment, and policy review that recognizes the range of [range-rangeland](#) values, including coordination with relevant sectors.

1. What is the Indicator (Descriptive Title)?

1a. As above.

What does it measure, and why is it important/critical to sustainability?

2a. Measures the degree to which planning framework exists at local, state, and federal levels.

Presence or Absence. With subjective ordinal designations

2b. Important to know what legal and institutional framework is in place for assessment.

3. Is the Indicator meaningful at different geographic sites, regions and climatic scales?

3a. Meaningful at all levels of ownership and jurisdictions. Climate is irrelevant.

Can the indicator be adequately monitored with existing or obtainable data and or models?

4a. Yes

4b. Are measures of the indicator repeatable, reliable and accurate?

4b. Yes.

4c. Can indicators using nominal and ordinal measurement scales be adequately reported over time?

4c. Yes.

4d. If one or more of the above is not true, is the indicator sufficiently important to maintain without an adequate monitoring framework in place?"

Is the indicator sensitive over time frames commensurate with its scale?

5a. Yes

Is the indicator understandable and interpretable in a consistent way by people everywhere?

6a. Yes.

***1. Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of ranges, including the extent to which it:***

Indicator 50: (MP-7.1.c) Provides opportunities for public participation in public policy and decision making related to [rangelands ranges](#) and public access to information.

1. What is the Indicator (Descriptive Title)?

1a. As above.

2. What does it measure, and

2a. Measures the laws and institutions providing extent and ease of access to information, and existence of public participation public policy and decision-making. Presence or Absence. With subjective ordinal designations.

Why is it important/critical to sustainability?

- 2b. It is Important to measure whether societal preferences are expressible and the ability of the public to monitor public, private, and tribal decisions and behavior.
3. Is the Indicator meaningful at different geographic sites, regions and climatic scales?  
3b. Yes, levels of access vary by federal, state, and local jurisdictions.
4. Can the indicator be adequately monitored with existing or obtainable data and or models?  
4a. Yes.
- Are measures of the indicator repeatable, reliable and accurate?  
4b. Within the bounds of subjective evaluations.
- Can indicators using nominal and ordinal measurement scales be adequately reported over time?  
4c. Subjectively ordinal measures can measure the evolving conditions.
- If one or more of the above is not true, is the indicator sufficiently important to maintain without an adequate monitoring framework in place?  
4d. N/A
5. Is the indicator sensitive over time frames commensurate with its scale?  
5a. Yes,
6. Is the indicator understandable and interpretable in a consistent way by people everywhere?  
6a. Yes, assuming a frame of reference.

***1. Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of ranges, including the extent to which it:***

| Indicator 51: (MP-7.1.d) Encourages best [management practices](#) ~~practice codes~~ for rangeland management.

1. What is the Indicator (Descriptive Title)?  
1a. As above.
2. What does it measure, and  
2a. Are there laws and institutions to encourage recommended or required practices. Presence or Absence. With subjective ordinal designations.  
Why is it important/critical to sustainability?
- 2b. Shows availability and incentive for best practices.
3. Is the Indicator meaningful at different geographic sites, regions and climatic scales?  
3a. Yes
4. Can the indicator be adequately monitored with existing or obtainable data and or models?  
4a. Yes
- Are measures of the indicator repeatable, reliable and accurate?  
4b. Yes
- Can indicators using nominal and ordinal measurement scales be adequately reported over time?  
4c. Yes
- If one or more of the above is not true, is the indicator sufficiently important to maintain without an adequate monitoring framework in place?  
4d. N/A
5. Is the indicator sensitive over time frames commensurate with its scale?  
5a. Yes

6. Is the indicator understandable and interpretable in a consistent way by people everywhere?

6a. Yes

**1. Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of rangelands, including the extent to which it:**

**Indicator 52:** (MP-7.1.e) Provides for the management of rangelands to conserve special environmental, cultural, social and/or scientific values.

1. What is the Indicator (Descriptive Title)?

1a. As above.

2. What does it measure, and

2a. Are there laws or institutions to provide for conservation of stated values. Presence or Absence. With subjective ordinal designations.

Why is it important/critical to sustainability?

2b. To protect our environmental, cultural, social, and scientific heritage.

3. Is the Indicator meaningful at different geographic sites, regions and climatic scales?

3a. Yes, has value across all ownership and all levels of society.

4. Can the indicator be adequately monitored with existing or obtainable data and or models?

4a. Yes

Are measures of the indicator repeatable, reliable and accurate?

4b. Yes

Can indicators using nominal and ordinal measurement scales be adequately reported over time?

4c. Yes

If one or more of the above is not true, is the indicator sufficiently important to maintain without an adequate monitoring framework in place?

4d. N/A

5. Is the indicator sensitive over time frames commensurate with its scale?

5a. Yes

6. Is the indicator understandable and interpretable in a consistent way by people everywhere?

6a. Yes

**2. Extent to which the institutional framework supports the conservation and sustainable management of rangelands, including the capacity to:**

**Discussion of how we measure the system of litigation over property rights and treatment of Native Americans.**

**Indicator 53:** (MP-7.2.a) Provide for public involvement activities and public education, awareness and extension programs, and make available range~~land~~ related information.

*Consider adding indicator to address whether mechanisms exist, and implications of having few or many.*

**Indicator 54:** (MP-7.2.b) Undertake and implement periodic range~~land~~-related planning, assessment, and policy review including cross-sectoral planning and coordination.

**Indicator 55:** (MP-7.2.c) Develop and maintain human resource skills across relevant disciplines.

**Indicator 56:** (MP-7.2.d) Develop and maintain efficient physical infrastructure to facilitate the



supply of range land products and services and support range land management.

Indicator 57: (MP-7.2.e) Enforce laws, regulations and guidelines.

53 through 57 are similar:

1. What is the Indicator (Descriptive Title)?

As above. (53 – 57)

2. What does it measure, and

2a. Measures the level of support to implement range policy and programs.

Why is it important/critical to sustainability?

2b. To ensure conservation and management of the rangeland resources.

3. Is the Indicator meaningful at different geographic sites, regions and climatic scales?

3a. Yes

4. Can the indicator be adequately monitored with existing or obtainable data and or models?

4a. Yes

Are measures of the indicator repeatable, reliable and accurate?

4b. Yes

Can indicators using nominal and ordinal measurement scales be adequately reported over time?

4c. Yes

If one or more of the above is not true, is the indicator sufficiently important to maintain without an adequate monitoring framework in place?

4d. Yes

5. Is the indicator sensitive over time frames commensurate with its scale?

5a. Yes

6. Is the indicator understandable and interpretable in a consistent way by people everywhere?

6a. Yes

***3. Extent to which the economic framework (economic policies and measures) supports the conservation and sustainable management of ranges through:***

***Discussion about ability to buy and sell permits.***

Indicator 58: (MP-7.3.a) Investment and taxation policies and a regulatory environment which recognize the long-term nature of investments and permit the flow of capital in and out of the range sector in response to market signals, non-market economic valuations, and public decisions in order to meet long-term demands for range products and services.

Indicator 59: (MP-7.3.b) Non-discriminatory trade policies for range products.

***4. Capacity to measure and monitor changes in the conservation and sustainable management of ranges, including:***

Indicator 60: (MP-7.4.a) Availability and extent of up-to-date data, statistics and other information important to measuring or describing indicators associated with criteria 1-7.

Indicator 61: (MP-7.4.b) Scope, frequency and statistical reliability of range inventories, assessments, monitoring and other relevant information.

Indicator 62: (MP-7.4.c) Compatibility with other countries in measuring, monitoring and reporting on indicators.

**5. Capacity to conduct and apply research and development aimed at improving range management and delivery of range goods and services, including:**

Indicator 63: (MP-7.5.a) Development of scientific understanding of range ecosystem characteristics and functions.

Indicator 64: (MP-7.5.b) Development of methodologies to measure and integrate environmental and social costs and benefits into markets and public policies, and to reflect range related resource depletion or replenishment in national accounting systems.

Indicator 65: (MP-7.5.c) New technologies and the capacity to assess the socioeconomic consequences associated with the introduction of new technologies.

Indicator 66: (MP-7.5.d) Enhancement of ability to predict impacts of human intervention on rangelands.

Indicator 67: (MP-7.5.e) Ability to predict impacts on rangelands of possible climate change.

[Not much more work to do on this. A third year law student could look up all of these indicators. The question is then are the results they produced useful or not. For example, the group discussed how one senator could block progress. Yet these criteria brought out the ability to assess this.

Explanation of why it would be so simple a task to collect this data. There has simply been more litigation over livestock grazing. Apparently the 1982 mining laws and others have not often clashed, thus the institutions have not be sorted through yet in hard minerals.

Comparison with institutions of other governments. Is ours complex and thorough? Are more mechanisms better? Might make change hard if there are more rules. We could insert an indicator: is an elaborate framework better or is streamlining better? Impact of having a lot vs few institutional mechanisms.

Cross ownership of public, private, and tribal lands can strengthen this document across boundaries.

Is there an opportunity to use economic markets to yield results?

Consider institutional framework allow economic mechanism to operate allow rancher to sell. Flexibility? Inadequate to allow rancher to sell public grazing rights to nature conservancy.]

**Appendix E**  
**Evaluation framework of indicators**

1. What is the Indicator (descriptive title)?
  
2. What does it measure, and why is it important/critical to sustainability?  
[Comment from meeting: would responses to this question be value laden? Would different people give different answers?]
  
3. Is the indicator meaningful at different geographic sites, regions and climatic scales?
  
4. Can the indicator be adequately monitored with existing or obtainable data and/or models? Are measures of the indicator repeatable, reliable and accurate? Can indicators using nominal and ordinal measurement scales be adequately reported over time? If one or more of the above is not true, is the indicator sufficiently important to maintain without an adequate monitoring framework in place?
  
5. Is the indicator sensitive over time frames commensurate with its scale?
  
6. Is the indicator understood and accepted by the general public?

## **Appendix F: Development of SRR Criteria**

At the Salt Lake City meeting, we identified six topic areas and formed a small group for each topic. These six groups chose their top three most important issues and started drafting indicators for these. The synthesis of this work can be found in the Salt Lake City meeting notes, Appendix F.

In between meetings we sent out Delphi 4 with a list of the most important issues identified in each group and asked participants to identify missing important issues. These issues were categorized in the document “Delphi 4: Results” and distributed to the group.

At the Reno meeting we worked to blend at these missing issues with the six topic areas identified in SLC. This task completed, the participants requested that we start merging our topics with the SFR C&I, in accordance with our Guiding Principles.

We compared the SRR important issue list, which now comprised 5 topic areas, with the SFR C&I. The group decided that the 7 SFR Criteria could be folded into 5 SRR Criteria. Each criteria group established a name and began evaluating the relevance of the SFR C&I to rangelands and identifying new indicators. Appendix D contains the notes taken from each group on indicators using the framework as an evaluation tool. Groups will be continuing work within their work groups between now and San Antonio.