Rangeland Conservation Effects Assessment Program (CEAP)

Program Overview with Emphasis on the Literature Review of Rangeland Practices

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Program Overview

- CEAP Vision… Enhanced natural resources and healthier ecosystems through improved conservation effectiveness and better management of agricultural landscapes.

- CEAP Goal… To improve efficacy of conservation practices and programs by quantifying conservation effects and providing the science and education base needed to enrich conservation planning, implementation, management decisions, and policy.

Multi-agency Program

- Natural Resources Conservation Service
- Agricultural Research Service
- National Institute of Food and Agriculture
- Farm Service Agency
- National Agriculture Statistics Service
- 8 additional federal agencies
- 18 NGO
- Universities
- State agencies

Multi-year Program

- Approximately $62 million the last 10 years
- $5 million 2012
  + 3 special studies
- Rangeland ~$1.1 million/year since 2008.

Assessments of Effects

- CEAP Assessments are carried out at field, watershed and landscape scale and include analysis of the cumulative effects and benefits of conservation practices on natural resources and the environment.
- Assessments are carried out on cropland, grazing lands (pasture, rangeland and grazed forest), wetlands and for wildlife.

Three Principal Components of CEAP

- National assessments,
- Watershed assessment studies, and
- Literature bibliographies, reviews, syntheses

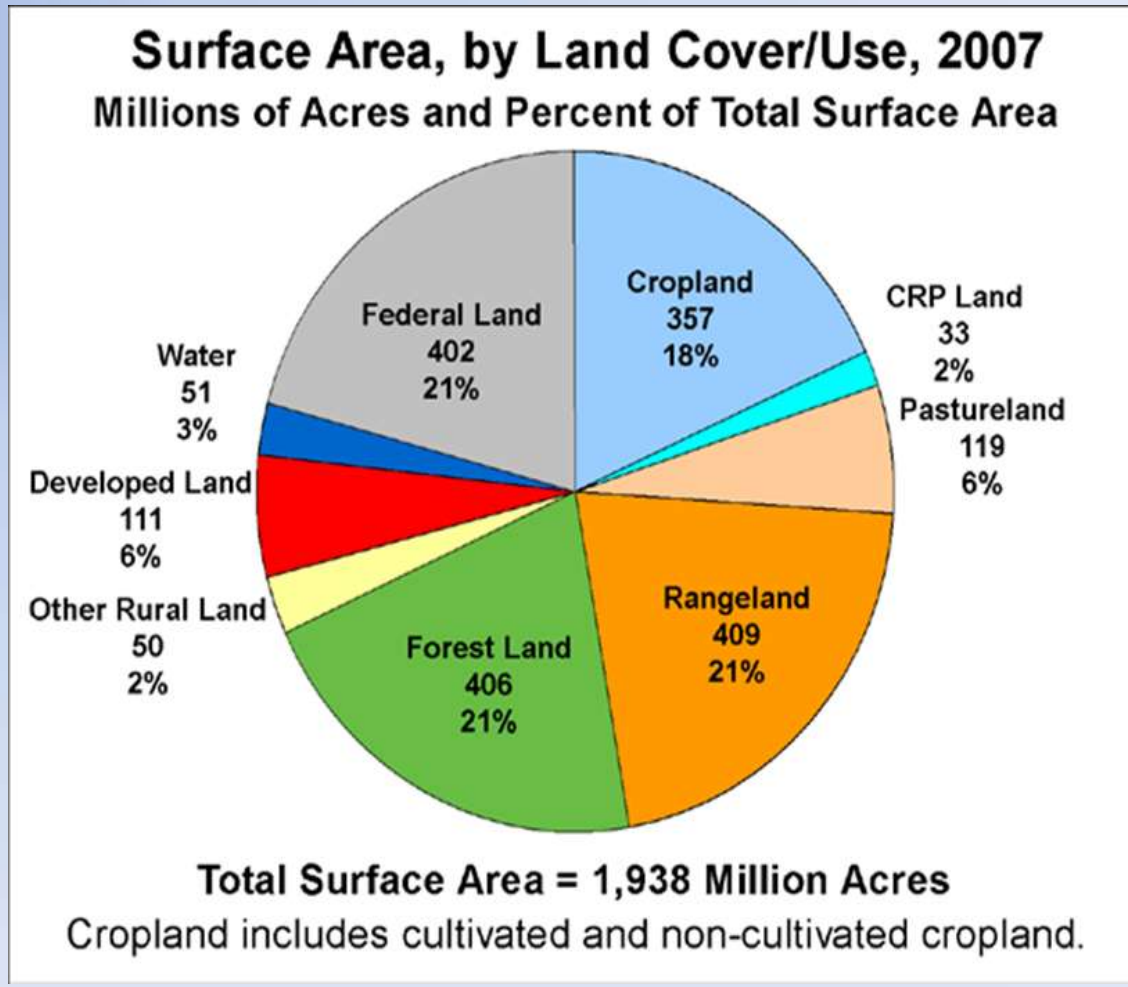
All three will contribute to building the science base for conservation. That process includes research, modeling, assessment, monitoring and data collection, outreach, and extension education. Focus is being given to translating CEAP science into practice.

National and Regional Assessments

- CEAP-Cropland
  - A sampling and modeling approach using data from representative crop fields, from the National Resources Inventory, and farmer surveys to estimate impacts of conservation practices on the environment.
- CEAP-Wetlands
  - An effort to develop a collaborative scientific foundation that facilitates the production and delivery of data to inform conservation decisions affecting wetland ecosystems and the services they provide.
- CEAP-Wildlife
  - A cooperative effort with the fish and wildlife conservation community involving multiple regional assessments that document habitat condition and biological response of selected species to conservation practices and programs at multiple spatial scales.

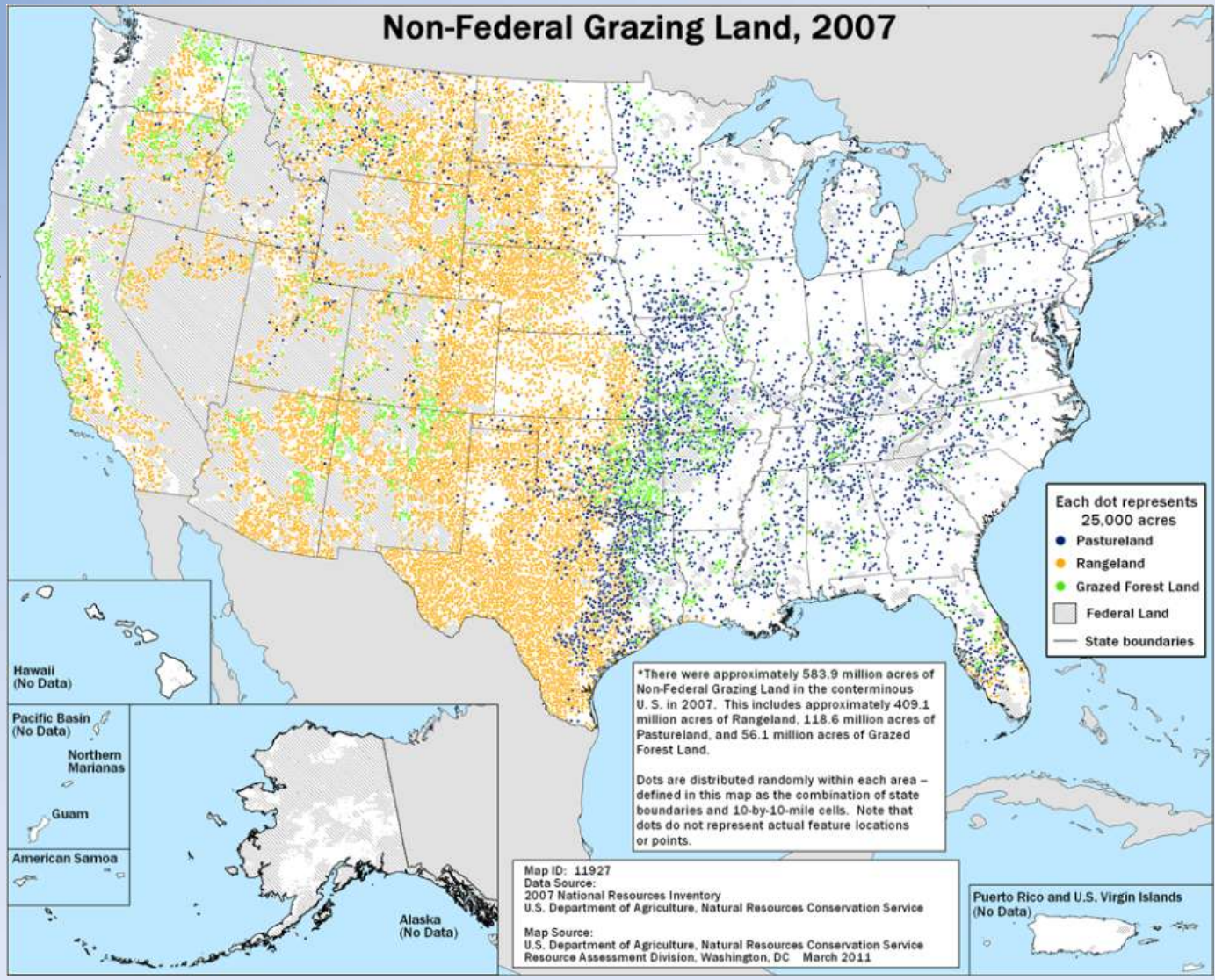
National and Regional Assessments

- CEAP-Grazing Lands
  - An effort designed to quantify the environmental effects of conservation practices on non-Federal grazing lands in the United States.
- 2011 RCA appraisal

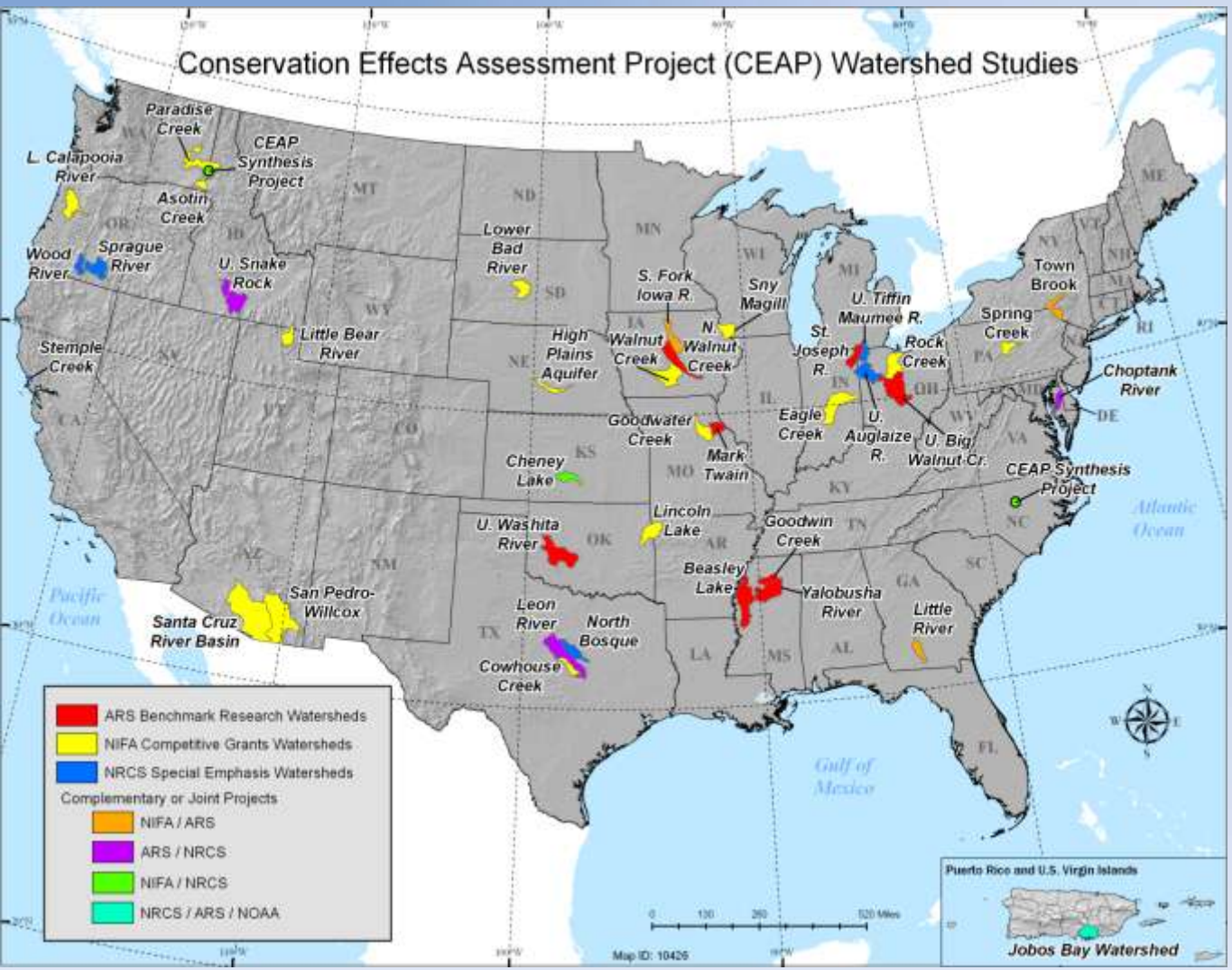


National Assessment

- 2003 - 2006 Rangeland On-site NRI
- Modeling using NRI data and watershed data.



Watershed Studies



Forty-two

Provide in-depth analysis and quantification of measurable effects of conservation practices at the watershed scale

Enhance our understanding of the effects of conservation in biophysical setting of the watershed

Grazing Lands Bibliographies

- Bibliographies since its inception in 2003.
- Seven bibliographies produce dynamic (automatically updating) search results
- Over 7500 articles and publications.
- Available through the National Agriculture Library:

http://www.nal.usda.gov/wqic/Bibliographies/ceap-dynamic.shtml#grazing

Literature Reviews

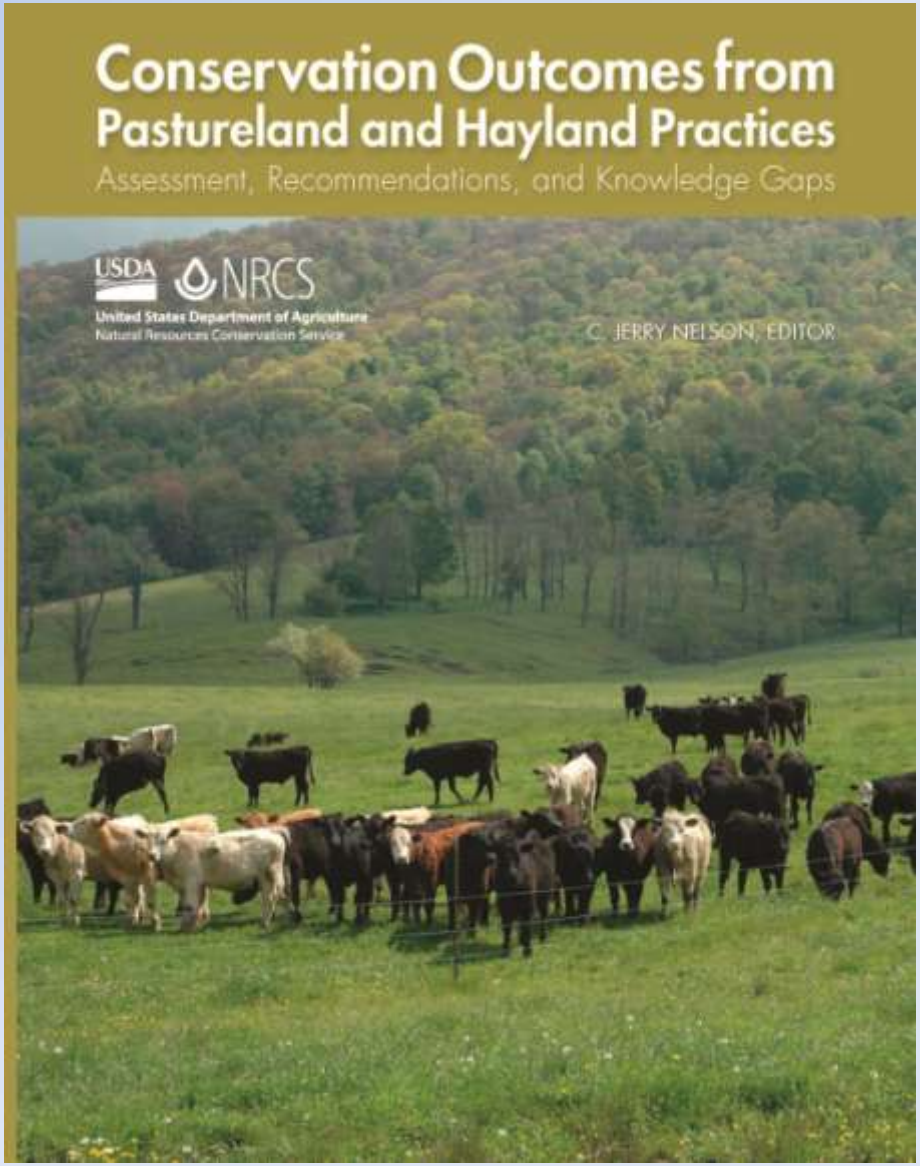
- Cropland
  - Environmental Benefits of Conservation on Cropland: The Status of Our Knowledge, 2006.
- Fish and Wildlife
  - Fish & Wildlife Benefits of Farm Bill Conservation Programs 2000-2005 Update, October 2005.
  - Fish and Wildlife Response to Farm Bill Conservation Practices, September 2007.
- Wetlands
  - Conservation of Wetlands in Agricultural Landscapes of the United States, April 2011.

Literature Reviews

Conservation Outcomes from Pastureland and Hayland Practices

Assessment, Recommendations, and Knowledge Gaps

pending, 2012

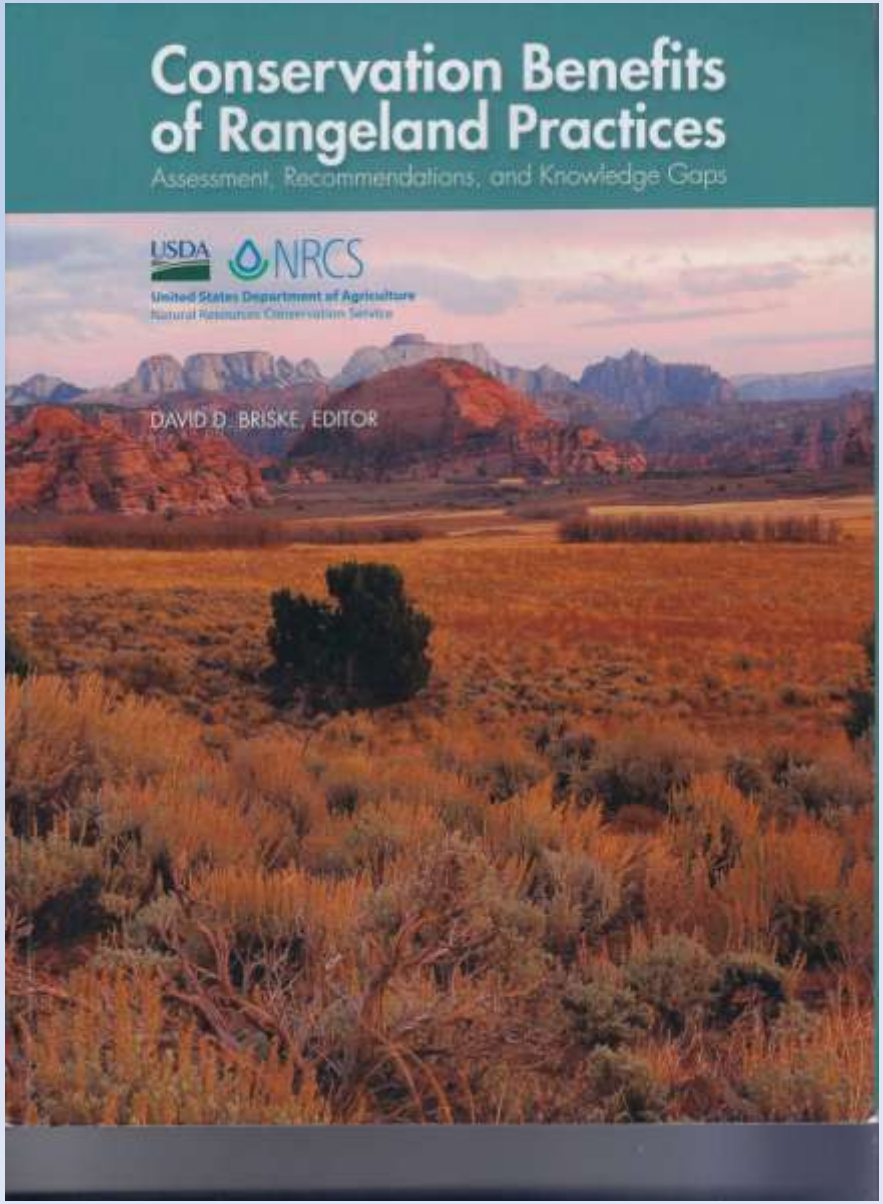


Literature Reviews

Conservation Benefits of Rangeland Practices

Assessment, Recommendations, and Knowledge Gaps

2011



Process for Rangeland

- Evaluate the effectiveness of purposes stated in 7 conservation practices and 2 crosscutting issues (Landscape Analysis, Socioeconomic/Ecosystem Services)
- 9 Teams of 4 – 5 rangeland scientists/team evaluated peer reviewed literature
  - Supported
  - Refuted
  - Insufficient
- Each team worked with 4 – 6 NRCS specialist
- Independent review by 3 recognized experts
- Entire document then evaluated for relevance & impact by 1 external and 1 NRCS reviewer
- 3 1/2 years

Overall Assessment

- "Peer-reviewed research broadly supports the overall NRCS approach to ***conservation planning*** and validates the ecological foundations on many of the ***purposes*** addressed in the conservation practice standards."

Overall Recommendations
(in terms of ensuring success)

- General for all practices
  - Understand pre-existing conditions

    Resource inventory & analyze resource data
  - Meet needs and objectives of landowner and agency

    Evaluate alternatives
  - Monitoring

    Evaluate effects

CONSERVATION PLANNING PROCESS

Overall Knowledge Gaps

- Lack of peer reviewed literature dealing specifically with conservation purposes
- Lack of peer reviewed literature dealing with 'Adaptive Management'
- Lack of peer reviewed literature acknowledging interaction of practice application and management

Knowledge Gaps

- "…analyses collectively indicate that NRCS investments in conservation programs are sound, it is not possible to determine the magnitude of conservation benefits…because of the paucity of information documenting conservation benefits."
- "…conservation practices have not been sufficiently monitored (researched) to obtain the information necessary for a thorough assessment of environmental outcomes."

Conservation Practices Assessed

- Prescribed Burning
- Brush Management
- Range Planting
- Riparian Herbaceous Cover
- Upland Wildlife Habitat Management
- Herbaceous Weed Control
- Prescribed Grazing

Two crosscutting issues were also included: Landscape Analysis and Socioeconomics and Ecosystem Services.

Prescribed Burning

Findings

- Plant response to fire is variable
- Woody plant control is frequently realized, but exceptions do exist
- Negative herbaceous plant effects disappear in 2-3 yrs, if they occur
- Results consistent across varied eco-regions

Implications

Effective ecological tool for woody plant management

Brush Management

- Grass response positive 2 yrs post; peak 5 yrs post treatment
- Retreatment interval: 4-12 yrs mesquite; 20-30 yrs sagebrush; > 50 yrs creosote bush
- Erosion not consistently reduced
- Recommendations over-generalized across eco-regions
- Some assumptions regarding hydrology are unfounded

Brush Management-Water

Reduced ET and increased ground water recharge

- No effect in arid southwest
- Support for removal of juniper and sagebrush in northwest
- Support for removal of juniper and mesquite in southern plains

Increased stream flow

- Shown for only small watersheds receiving winter rain

Planting/Seeding

Findings

- Marginally successful; < 20% with native species
- Precipitation strongly determines success and overrides technology – although drilling is better than broadcast
- Weed control is beneficial
- Effective weather forecasting is vital for success

Implications

- Carefully evaluate application given marginal success

Riparian Herbaceous Cover

- Livestock exclusion promotes riparian recovery
- Reduced livestock density decreases nutrient and pathogen loads
- Off-stream water development, supplement placement (except salt), and herding promote recovery

Upland Wildlife Habitat

- Conservation practice application and science are not coordinated
- Insufficient information to make generalizations for most species groups
- Species show negative, positive or no response
- Vegetation structure is a key habitat variable

Invasive Plant Management

Findings

- Conservation practice application and science are not coordinated
- Long-term risk of practice failure is very high
- Restoration success 20% with introduced species, less with natives

Summary

- These 6 practices and both crosscutting issues recognize that grazing ***management*** is key to conservation benefits
  - Cannot evaluate benefits of practices separate from grazing management applied during and after application of practice

- Conservation Planning Process
- Monitoring

Prescribed Grazing

- Grazing Systems and Prescribed Grazing are **not** the same thing!
- The only literature that met the standards (replicated, experimental controls, equal treatments, sufficient data) for this synthesis was grazing systems research.
- Interaction of grazing strategy and adaptive management is essential, but evidence is lacking.
- Temporal and spatial scale is important in interpreting results

Prescribed Grazing

- Stocking rate, and grazing intensity, in conjunction with appropriate temporal and spatial animal distribution, is the key management variable that influences numerous conservation outcomes.

- Experimental evidence indicates that all systems of grazing are similarly constrained by stocking rate and weather: ***effective management*** is more important than the specific system of grazing.

Prescribed Grazing

- Assumptions regarding livestock distribution and preferences for specific species, sites and conditions are valid

- Majority of investigations show neutral or positive wildlife response to grazing systems due to changes in plant community structure

Prescribed Grazing

- Recovery period from grazing (length and timing) is important
  - Effects of grazing deferment during mild to moderate drought are minimal, (assuming adequate residual) but may be important during and after severe drought.

- Responses to timing of grazing and deferment are dependent on timing and amount of precipitation, intensity of defoliation, opportunity for regrowth after defoliation.

- Season of use and time of grazing (species preference) is important

Prescribed Grazing

- Changing patterns of defoliation is important if plant species change is desired

- Some beneficial effects for watershed function of properly managed grazing that provides regular, adequate deferment or targeted timing of grazing, particularly in riparian areas.

Constraints

- "Rangelands are characterized by complex interactions of physical, ecological, economic, and cultural variables…research has focused on ecological components…significant information gaps remain regarding how economic and cultural circumstances influence…the combinations of management decisions to both short- and long term outcomes of conservation programs are rarely documented and are poorly understood."

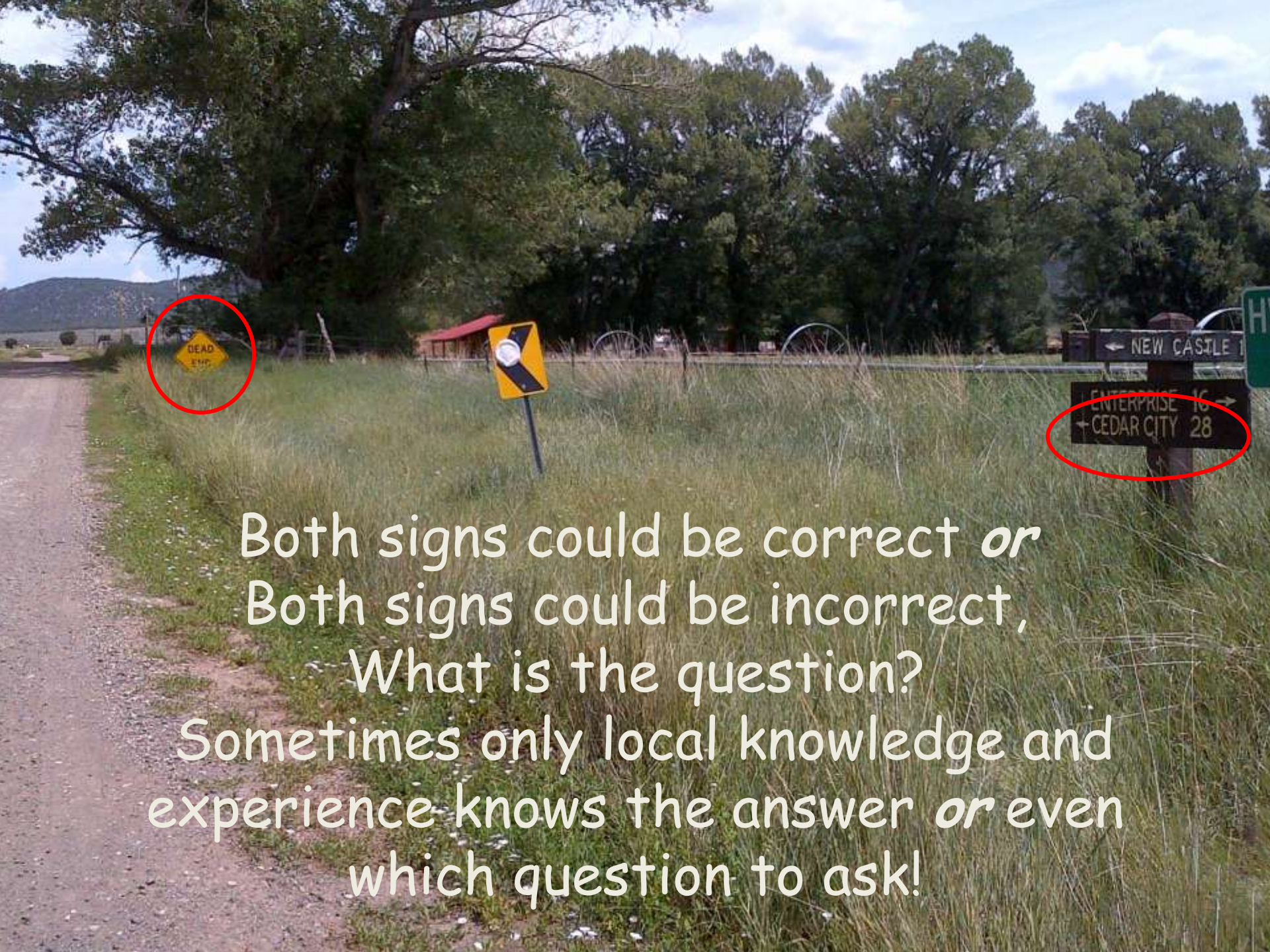
Constraints

- Scale, both temporal and spatial generally much shorter and smaller than management application
- "A methodology does not exist to reliably estimate …degradation…which may have been averted by installation of conservation practices (conservation plan)."
- "Conservation goals are dynamic and change with the desires…"
- species…"

Constraints

- "The biophysical environment is temporally dynamic…climate…woody plants…invasive species…"

- "The synergistic effects of grazing systems and adaptive management inputs have not been examined experimentally at the ranch enterprise level…will require direct involvement of social and political scientists…"



Both signs could be correct *or*
Both signs could be incorrect,
What is the question?
Sometimes only local knowledge and experience knows the answer *or* even which question to ask!

CEAP Synthesis: disjunctive concepts

"Science and management utilize distinctly different styles of inquiry… hypothesis testing…qualitative observations…"

- Hypothesis testing
  - Control as many variables as possible
  - Manipulate as few as possible at a time
  - Small spatial scale
  - Small temporal scale
- Qualitative observations
  - Control very few variables
  - Manipulate several variables at a time
  - Large spatial scale
  - Large temporal scale
  - Million $ business decisions

CEAP Synthesis: disjunctive concepts

- "There is merit to both lines of inquiry and rangeland conservation practice application at the field level ***cannot be based solely on science-based recommendations***. Continued integration of these two knowledge sources will provide NRCS with practical, science based, cost-effective conservation programs for the future."

CEAP Synthesis: disjunctive concepts

- Encourage greater integration of information exchange among researchers and managers to facilitate development of conservation practices based on the latest and most accurate information.
- Effective monitoring is crucial.
- This approach should be formalized by the agency(s) and used to revise practice standards.

CEAP Synthesis: disjunctive concepts

- Align research to meet needs of agency (and landowners) – **ask the right questions**
  - Not, is short duration grazing better than year (season) long grazing, but *how to apply grazing management to meet operator/society objectives and goals.*
  - Not how to kill mesquite, but *how to manage plant communities to meet producer and environmental objectives.*
  - Not how to design a prescribed burn, but *how to determine and reestablish fire regimes on the landscape.*

CEAP Synthesis: disjunctive concepts

- Increase agency and landowner input into quantitative databases:
  - Monitoring - how do we design and conduct 'credible' monitoring data in an economically feasible way?
  - Case studies – how do we develop and document 'credible' case studies?

CEAP Rangeland Synthesis

- The CEAP literature synthesis confirms that the Natural Resources Conservation Service (NRCS) approach to rangeland conservation planning is sound, and conservation practice standards are valid.

CEAP Synthesis

The synthesis also identified:

1) The need to appraise overall net benefits of rangeland conservation practices.
2) In addition to market values related to food and fiber production, other benefits such as watershed values (clean water), biodiversity, wildlife habitat, and aesthetics need to be assessed in order to fully realize the benefits of the Nation's investment in conservation.

CEAP Synthesis

- The synthesis helped to identify critical knowledge gaps in rangeland science and set a precedent for formalized partnerships among scientists, land managers, conservation specialists, and policymakers.
- These partnerships can assist NRCS in providing the most up-to-date science-based information for rangeland conservation practice standards.
- The CEAP synthesis provides a valuable collection of information and will serve as a "living document" to be updated as new scientific information comes forth.

CEAP Synthesis

- The CEAP synthesis concluded that "…quantification of conservation benefits and long-term trends requires monitoring and assessment at the site level… Monitoring protocols that assess various **management strategies** are needed so that long-term goals are achieved in the most cost effective manner."

CEAP Synthesis

- "The knowledge generated by the rangeland CEAP effort is essential to continued and future NRCS conservation practice perspectives. The evidence-based findings and recommendations within the synthesis provide a foundation for development of future conservation planning and assessment procedures on the Nation's non-Federal rangelands."


CEAP
Moving Science and Management
Forward Together?
Thank You