Executive Summary: The Next Generation of Conservation Practice Standards

THE CEAP INITIATIVE

The Conservation Effects Assessment Project (CEAP) was initiated in 2003 by the Natural Resources Conservation Service (NRCS) in partnership with the Agricultural Research Service and the National Institute of Food and Agriculture in response to requests from Congress and the Office of Management and Budget for greater accountability of US taxpayers' investments in conservation programs. This call for greater accountability was initiated by a substantial increase in conservation funding in the 2002 Farm Bill and recognition of the need to bring *environmental* management, including the numerous services provided by ecosystems, on par with traditional emphasis on sustainable agricultural production. The primary goals of CEAP are to 1) assess and quantify the effects of conservation practices on environmental quality at national, regional, and watershed scales and 2) build a solid scientific foundation to improve natural resource assessment, conservation planning, and implementation.

The Rangeland CEAP Synthesis was formally initiated in 2006 and involved 40 rangeland scientists over 3 1/2 yr. These scientists thoroughly analyzed the peer-reviewed literature and objectively evaluated the effectiveness of seven major conservation practices and two crosscutting issues that are of fundamental importance to rangeland conservation. The stated purposes of and expected outcomes for a given conservation practice, as itemized in the NRCS National Conservation Practice Standards, were evaluated against the peer-reviewed scientific literature to determine whether the available evidence supported, refuted, or was insufficient to assess the purported conservation outcomes. Scientists were organized into nine writing teams to address the seven conservation practices and two crosscutting issues. Each team was led by an individual with recognized experience and expertise in the respective subject matter area. Team leaders were instructed to recruit two to four team members with the disciplinary and geographic expertise deemed necessary to address the scope of ecological topics under consideration—soils, water, air, plants, animals, and human activities—for each of the major conservation practices. NRCS advisory teams consisting of a leader and several members were organized to provide each of the writing teams with additional insight into how the agency describes, interprets, and applies the various practices.

> "This synthesis provides a foundation upon which the next generation of rangeland conservation practice standards can be designed and implemented."

"This synthesis broadly supports the ecological foundations of many purposes stated in the NRCS conservation practice standards, but it was not possible to determine the magnitude or trend of conservation benefits."

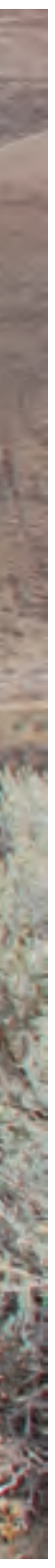
Following are the seven major conservation practices and two crosscutting issues addressed within the Rangeland CEAP Synthesis:

- Prescribed Grazing (Code 528)
- Prescribed Burning (Code 338)
- Brush Management (Code 314)
- Range Planting (Code 550)
- Riparian Herbaceous Cover (Code 390)
- Upland Wildlife Habitat Management (Code 645)
- Herbaceous Weed Control (Code 315)
- Landscape Analysis (crosscutting chapter)
- Socioeconomics and Ecosystem Services (crosscutting chapter)

Chapters underwent rigorous peer review by three recognized experts who had not been affiliated with CEAP, and their recommendations were provided to chapter authors for incorporation. The revised chapters were then reviewed by the academic coordinator of Rangeland CEAP. Finally, the entire document was evaluated for relevance and impact by one external and one NRCS reviewer prior to publication. This synthesis represents an unprecedented assessment of the existing research information addressing rangeland conservation in the United States. These findings and recommendations provide a foundation on which the next generation of rangeland conservation practices standards can be articulated, designed, and implemented.

CURRENT STATE OF KNOWLEDGE

This comprehensive synthesis of peer-reviewed research broadly supports the overall NRCS approach to conservation planning and validates the ecological foundations of many of the purposes addressed in the conservation practice standards. Although these analyses collectively indicate that NRCS investments in conservation programs are sound, it was not possible to



determine the magnitude or trend of conservation benefits originating from these investments because of the paucity of information documenting conservation benefits. Thus, there is a clear need to develop protocols and programs aimed at generating standardized and systematic evidence-based assessments of conservation investments on the nation's rangelands. Such assessments must extend their focus beyond traditional agricultural production systems to explicitly include other key services that ecosystems provide to society. This synthesis provides recommendations for addressing the challenges associated with the incorporation of environmental quality considerations in conservation planning and enhancing the cost-effectiveness of future conservation programs.

The equivocal nature of a portion of the Rangeland CEAP findings reflects the minimal investment made by the USDA and the rangeland profession in formally assessing conservation practice effectiveness. Consequently, conservation practices have seldom been sufficiently monitored to obtain the ecological and socioeconomic data necessary for a thorough assessment of conservation practice outcomes. This is particularly necessary for scales of space (pastures and watersheds) and time (5–10 yr) most relevant to natural resource management. Major constraints prohibiting a more thorough assessment of the effectiveness of rangeland conservation practices are summarized below. These constraints must be acknowledged and at least partially overcome to increase accountability and cost-effectiveness of conservation programs:

- Science and management utilize distinctly different styles of inquiry, making meaningful integration of these two knowledge sources difficult. Science emphasizes hypotheses testing, usually through highly regulated manipulation of one or a few ecological variables at relatively small scales over short time frames, to develop a process-based understanding of ecosystem structure and function. In contrast, managers often learn by observing qualitative indicators across large and often diverse landscapes to devise management "rules of thumb." This distinction between process-based and experiential-based knowledge indicates that conservation practice standards are unlikely to be based solely on explicit science-based recommendations, and it emphasizes the need to integrate these two knowledge sources to strengthen conservation programs.
- Rangelands are characterized by a complex interaction of physical, ecological, economic, and cultural variables that collectively determine system responses and management outcomes. Research programs have focused primarily on ecological components to guide implementation of conservation practices, but significant information gaps remain regarding how economic and cultural circumstances influence or constrain adoption of ecosystem-based management and policy recommendations. In particular, the contributions of management decisions to both short- and long-term outcomes of conservation programs are rarely documented and are poorly understood.
- A methodology does not exist to reliably estimate the potential costs of environmental degradation, both on- and off-site, which may have been averted by the installation of conservation practices. The inability to incorporate the potential cost of inaction within cost–benefit analyses of conservation investments likely undervalues their importance. However, there is little agreement on how to effectively estimate the negative impacts that have been avoided through investment in conservation programs as well as the positive impacts that have been realized. The capacity for conservation practices to maintain or enhance multiple ecosystem services for society is a major goal of CEAP that merits much greater attention in conservation planning and assessment.
- Conservation goals are dynamic and change with the desires and needs of increasingly diverse stakeholder groups and the evolution of societal values. These expanded conservation goals broaden the base of affected stakeholders beyond landowners per se and create an array of challenges for assessing inevitable tradeoffs between commodity production and ecosystem services. Societal tolerance for environmental risks originating from uncertain and unintended consequences associated with specific land management practices are an important component of these values.

"Conservation practices have not been sufficiently monitored to obtain the information necessary for a thorough assessment of environmental outcomes."

- The biophysical environment is temporally dynamic as evidenced by climate fluctuations, woody plant encroachment, loss of biodiversity, and expansion of invasive species. These biophysical changes pose multiple challenges regarding the conservation of pre-European ecosystems and force decisions regarding management and trade-offs associated with the occurrence of “novel” ecosystems comprised of both native and invasive species. These biophysical dynamics uniquely influence the availability of ecosystem services for both current and future generations as well as the spatial distribution of ecosystem services beyond their point of origin.

SUMMARY OF CONSERVATION PRACTICE FINDINGS

These key findings were established by consensus within the individual writing teams after analyzing the relevant peer reviewed experimental data. These findings lend support to the current status of knowledge outlined previously as well as the programmatic recommendations that follow.

“Evidence suggests that effective management is more crucial to the success of grazed ecosystems than is a specific system of grazing.”

PRESCRIBED GRAZING CHAPTER 1

USDA Practice Definition and Purposes

Management of the harvest of vegetation with grazing and/or browsing animals:

- Improve or maintain desired species composition and vigor of plant communities
- Improve or maintain quantity and quality of forage for grazing and browsing animals’ health and productivity
- Improve or maintain surface and/or subsurface water quality and quantity
- Improve or maintain riparian and watershed function
- Reduce accelerated soil erosion and maintain or improve soil condition
- Improve or maintain the quantity and quality of food and/or cover available for wildlife
- Manage fine fuel loads to achieve desired conditions

Synthesis Findings

- Stocking rate, in conjunction with appropriate temporal and spatial animal distribution, is a key management variable that influences numerous conservation outcomes.
- Assumptions regarding livestock distribution and preferences for specific sites and conditions are valid, especially with respect to water distribution, steep topography, and high-elevation sites.
- Wildlife species exhibit varied responses to grazing systems, but the majority of investigations indicate neutral or positive wildlife responses with continuous compared to rotational grazing.
- The preponderance of experimental evidence indicates that all systems of grazing are similarly constrained by stocking rate and weather; thus, effective management is more important than the specific system of grazing.
- Hydrological responses of soils to grazing largely parallel those of other ecological variables in that stocking rate is the most important management variable.
- Grazing management recommendations should not be developed exclusively from individual plant responses without partial verification in communities or ecosystems.

Implications: Conservation programs that promote adaptive management may more effectively balance variable forage production with livestock demand in addition to investment in infrastructure. Effective management will enhance both production of agricultural goods and provisioning of ecosystem services as outlined by CEAP. Greater development and delivery of management tools and guidelines to support adaptive grazing management will likely optimize multiple goods and services provided to society and conservation investment in grazed ecosystems.

PRESCRIBED BURNING CHAPTER 2

USDA Practice Definition and Purposes

Application of controlled fire to a predetermined area:

- Control undesirable vegetation
- Prepare sites for harvesting, planting, or seeding
- Control plant disease
- Reduce wildfire hazards
- Improve wildlife habitat
- Improve plant production quantity and/or quality
- Remove slash and debris
- Enhance seed and seedling production
- Facilitate distribution of grazing and browsing animals
- Restore and maintain ecological sites

Synthesis Findings

- Woody plant cover can be effectively managed by prescribed burning; variability in fire characteristics is an important determinant of woody plant mortality.
- The potential for negative impacts on herbaceous plant communities is dependent on fire characteristics and postburn weather conditions; when negative responses of herbaceous plants do occur, they persist for only 2–3 yr.
- Fire return intervals vary between ecoregions; ecosystem benefits, including the mosaic of plant communities created on the landscape, are more likely to be optimized if fire return intervals reflect those that occurred historically.

Implications: Prescribed burning is an effective ecological tool for management of plant community composition and structure that has the potential to address numerous conservation applications. The greatest hurdles to effective implementation of prescribed burning are the logistic constraints associated with precipitation variability, liability associated with public health and welfare, and environmental compliance.

"Fire is a viable and often necessary conservation practice to effectively manage woody plant encroachment."

"Brush management is necessary to maintain the goods and services provided by grasslands and savannas, but it cannot be justified exclusively on livestock production."

BRUSH MANAGEMENT CHAPTER 3

USDA Practice Definition and Purposes

Management or removal of woody (nonherbaceous or succulent) plants, including those that are invasive and noxious

- Create the desired plant community consistent with the ecological site
- Restore or release desired vegetative cover to protect soils, control erosion, reduce sediment, improve water quality, or enhance stream flow
- Maintain, modify, or enhance fish and wildlife habitat
- Improve forage accessibility, quality, and quantity for livestock and wildlife
- Manage fuel loads to achieve desired conditions

Synthesis Findings

- Brush management is often critical for the maintenance of grassland and savanna ecosystems and the plants and animals that characterize them.
- Positive grass response varies widely across ecological sites, but most often occurs within 2 yr posttreatment and peaks about 5 yr posttreatment.
- Retreatment interval varies greatly with woody plant species and ecoregion.
- Overgeneralization of brush control recommendations across ecoregions has limited the success of this conservation practices.
- Deep soil water may increase following brush removal, but it is highly dependent on soil and climate conditions.
- Increased stream flow has only been documented for small watersheds receiving winter rainfall.
- Wildlife habitat is species specific and different species and functional groups respond differently to brush management; a clearer criterion of wildlife benefits, including nongame species, and a greater recognition of the potential to adversely affect non-target species are required.
- Returns on improved livestock production are typically insufficient to economically justify brush management, but benefits to nonmarket ecosystem services are increasingly recognized.

Implications: Brush management is a long term commitment and allowances for follow up treatments are essential for success. Desired conservation outcomes should be tailored to specific bioclimatic zones and specific wildlife species or functional groups. This practice presents a novel series of dilemmas and challenges in response to accelerating woody plant encroachment. The research community is challenged with quantifying and monitoring trade offs between livestock production, ecosystem carbon pools, erosion, and biodiversity, and the management community with devising approaches for creating or maintaining woody herbaceous mixtures in arrangements that satisfy competing conservation objectives.

RANGE PLANTING CHAPTER 4

USDA Practice Definition and Purposes

Establishment of adapted perennial or self-sustaining vegetation, such as grasses, forbs, legumes, shrubs, and trees:

- Restore a plant community similar to the Ecological Site Description reference state for the site or the desired plant community
- Provide or improve forages for livestock
- Provide or improve forage, browse, or cover for wildlife
- Reduce erosion by wind and/or water
- Improve water quality and quantity
- Increase carbon sequestration

Synthesis Findings

- Success of range planting practices is highly variable and limited; experimental data are focused on the relative success of alternative planting treatments rather than the assessment of conservation benefits.
- The literature broadly supports conservation practice recommendations for rangeland seeding and the expectations for conservation benefits from successful practices.
- Precipitation amount and timing are the most important variables determining seeding success; benefits of seeding technology are often realized only when precipitation is favorable.
- High variability in the environmental conditions necessary for planting success indicates that practice goals are most likely achieved by adaptive management of multiple landscape sites over a series of years.

Implications: Rangeland planting remains a high-risk venture because success is highly dependent on precipitation; design and implementation of this practice requires careful evaluation. The risk–reward considerations inherent to range planting, including the techniques used, imply that priorities should be assigned on the basis of the risks of weed invasion, wildfire, erosion, or the likelihood of future site degradation in the absence of planting.

“Riparian health is directly related to the time invested in grazing management to control the season, intensity, and duration of livestock use.”

RIPARIAN HERBACEOUS COVER CHAPTER 5

USDA Practice Definition and Purposes

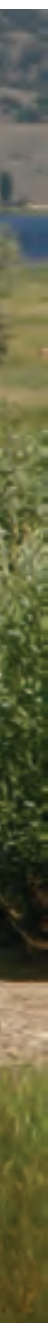
Establishment and management of grasses, sedges, rushes, ferns, legumes, forbs, and woody plants tolerant of intermittent flooding or saturated soils as the dominant vegetation in the transitional zone between upland and aquatic habitats:

- Provide or improve food and cover for fish, wildlife, and livestock
- Improve and maintain water quality
- Establish and maintain habitat corridors
- Increase water storage on floodplains
- Reduce erosion and improve stability to stream banks and shorelines
- Increase net carbon storage in the biomass and soil
- Enhance pollen, nectar, and nesting habitat for pollinators
- Restore, improve, or maintain the desired plant communities
- Dissipate stream energy and trap sediment
- Enhance stream bank protection as part of stream bank soil bioengineering practices

Synthesis Findings

- Control of the season, intensity, and duration of grazing promotes recovery of riparian plant communities.
- Reduced herbivore density decreases sediment, nutrient, and pathogen loads in associated waterways.
- Off-stream water development and food and/or mineral supplement placement to divert herbivore use from riparian zones promotes recovery of riparian plant communities.
- Vegetation buffers can attenuate pollutants but must be designed to fit site-specific conditions.

Implications: Management of season, intensity, and duration of grazing by large herbivores is critical for the recovery and maintenance of riparian habitat structure and function and for the reduction of surface water pollutants. Riparian health is directly related to the time invested in livestock and grazing management by the land manager.



WILDLIFE HABITAT MANAGEMENT CHAPTER 6

USDA Practice Definition and Purposes

Provide and manage upland habitats and connectivity within the landscape for wildlife:

- Treating upland wildlife habitat concerns identified during the conservation planning process that enable movement or that provide shelter, cover, and food in proper amounts, locations, and times to sustain wild animals that inhabit uplands during a portion of their life cycle

Synthesis Findings

- Research addresses primarily livestock–wildlife interactions, and most investigations report more negative than positive impacts to wildlife.
- Conservation practices designed to support generalized groups of wildlife species are often ineffective because of divergent and species-specific needs within the group.
- Species responses to specific conservation practices may be negative, positive, or neutral, depending on the species or species group of interest.
- Vegetation composition, structure, and the distribution of various habitats within landscapes are key variables that require inclusion in wildlife habitat conservation practices.
- Both the conservation practice standard and science are in need of further definition and development.

Implications: Selected conservation practices should be monitored to enable managers to evaluate the impacts that conservation practices have on upland wildlife populations and the habitat on which they depend. Overgeneralization of habitat management goals has produced mixed outcomes characterized by direct benefits to target species, while associated species may be detrimentally affected by the same practice. Landscape heterogeneity should be emphasized to provide appropriate habitats for as many species as possible given the diverse species-specific responses to conservation practices.

HERBACEOUS WEED CONTROL CHAPTER 7

USDA Practice Definition and Purposes

Removal or control of herbaceous weeds, including invasive, noxious, and prohibited plants:

- Enhance accessibility, quantity, and quality of forage and/or browse
- Restore or release native or create desired plant communities and wildlife habitats consistent with the ecological site
- Protect soils and control erosion
- Reduce fine-fuels fire hazard and improve air quality

Synthesis Findings

- Long-term risk of practice failure is very high with current procedures, even when invasive species have initially been controlled.
- Ecosystem function has been restored in only 20% of the attempts to control herbaceous weeds when introduced species were used; it is even less with native species.
- Both the conservation practice standard and science are in need of further definition and development.

Implications: Natural and human-induced disturbance to native plant communities often increase the threat of weed proliferation, but disturbance reduction alone is usually not a sufficient long-term strategy. Manipulation of ecological processes that direct vegetation change toward a desired species composition is needed to optimize conservation outcomes. Early detection followed by prompt control is an important strategy for recent invasions. Restoration of optimal ecosystem function to maximize resource utilization is an important goal for degraded rangelands.

> "Conservation programs and the supporting science require greater emphasis to confront the escalating challenges posed by invasive plants."

> "Landscape assessment can support conservation programs by determining how the location and arrangement of ecological sites influence environmental outcomes."

LANDSCAPE ANALYSIS: CROSSCUTTING ISSUE CHAPTER 8

Synthesis Findings

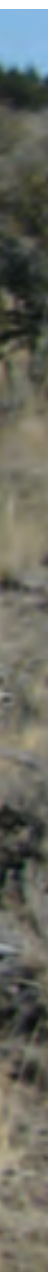
- A landscape perspective is required to promote the effectiveness of conservation programs because the spatial location and organization of sites within landscapes influences conservation outcomes.
- The use of landscape approaches in conservation programs requires integration of existing tools and the development of new procedures in the form of maps, models, and indicators of spatial pattern that are employed as part of national monitoring protocols.
- An investment in the development of landscape analysis can effectively link conservation practices to existing databases for national soils and ecological sites to improve the effectiveness and quantification of conservation outcomes.

Implications: A systematic landscape approach to conservation planning would increase effectiveness in several interlinked ways. Variation in conservation effectiveness could be accounted for with landscape-based information addressing the spatial location and relative position of multiple sites. This would enable managers to target practices to locations with the greatest need or likelihood of success. Landscape information would also support assessment of the cumulative benefits of conservation practices over large spatial scales. The linkage of conservation practice data to spatial locations, soil, and ecological state attributes in a national database would provide a useful framework for documenting conservation effects and planning future conservation programs.

SOCIOECONOMICS AND ECOSYSTEM SERVICES: CROSSCUTTING ISSUE CHAPTER 9

Synthesis Findings

- Social values and attitudes beyond those associated with profit optimization directly impact adoption of conservation practices and development of rangeland policy.
- Cost–benefit analyses currently utilized by NRCS contain the main features present in standard quantitative economic analyses.
- Traditional economic analyses based solely on market values often show that conservation practices are not cost effective, but these analyses are incomplete.



- The qualitative value of nonmarket ecosystem goods and services must be incorporated into cost–benefit analyses of conservation programs.
- Greater development and interpretation of social metrics are required if social information is to be effectively incorporated into conservation planning and assessment.
- Societal benefits from ecosystems often yield minimal direct economic returns to landowners but are an increasing priority influencing NRCS conservation investments.

Implications: Cost–benefit assessments of conservation programs based on only marketable goods produced by landowners do not reflect the total value of conservation investments to the broader societal interests supported by NRCS. Full consideration of nonmarket ecosystem services is essential to the development of valid investment analyses and effective conservation programs.

MAJOR RECOMMENDATIONS AND BENEFITS

- Implement monitoring as a necessary component of conservation planning to specifically document conservation benefits and to enhance cost-effectiveness by providing information to strengthen evaluation of practice efficacy.
- Structure conservation programs so that compliance will encourage landowners to use adaptive management as a means to optimize conservation benefits following practice adoption.
- Broaden the presentation of conservation programs to engage multiple stakeholders by emphasizing the wide array of ecosystem services provided by rangelands.
- Strengthen conservation management–science linkages as a mechanism for guiding development and implementation of the next generation of conservation practice standards.

Monitor Conservation Outcomes. Environmental monitoring is an essential component of conservation planning that links the adoption of conservation practices with goal-based outcomes to both document and enhance program effectiveness. Monitoring is also a critical component of adaptive ecosystem management that provides relevant information to support short-term and long-term decisions to ensure progress toward long-term goals. Regional and national monitoring programs will require that standardized protocols for data collection, analysis, and dissemination be developed and applied.

“Conservation programs must evaluate potential tradeoffs between agricultural production and the maintenance of ecosystem services.”

Current assessments emphasize practice implementation and program compliance, but seldom evaluate either short- or long-term production or environmental benefits following program adoption. This shortcoming deprives program planners and managers of critical information necessary to objectively evaluate the benefits of conservation practices and to make adjustments to enhance the likelihood of realizing desired outcomes. Monitoring following practice adoption has traditionally been viewed as unnecessary because the inherent value of conservation practices has been considered self-evident or assumed to be cost prohibitive. However, in an era of increased accountability and multiple-stakeholder involvement, these assumptions have become increasingly challenged.

Adaptive Management Following Practice Implementation. Benefits accruing from conservation programs are strongly influenced by landowner commitment, capability, and management decisions following program implementation. Management subsequent to adoption of conservation practices is as important to their success, as is the appropriate timing and location of initial installation. The complexity and variability of rangeland ecosystems make adaptive management imperative for conservation success. The development and delivery of additional information, tools, and incentives to encourage and support adaptive management following adoption of conservation practices and programs are urgently needed. This will require that traditional emphasis on installation of infrastructure (e.g., fencing, water developments, and roads) be broadened or reprioritized to promote effective decision making

> "Partnerships among scientists, managers, and policy makers will provide the most relevant knowledge to guide conservation science and planning."

and provide allowances to adjust management as necessary to achieve both long-term goals and optimal returns on conservation investments.

Delivery of Conservation Programs. Mechanisms for delivery of conservation programs would benefit from critical reevaluation because both the conditions influencing landowner adoption and the intended conservation goals have changed substantially within the 75-yr history of the NRCS. Conservation goals have expanded from primary emphasis on locally sustained maximum production to the maintenance and enhancement of ecosystem services at both local and regional scales. Incentives will likely be required to offset landowner costs incurred in the provisioning of ecosystem services for society, especially in cases where the potential for economic returns is reduced by these management actions.

Strengthened Conservation–Science Partnerships. The complexity of the current conservation planning environment suggests that it is no longer sufficient for programs to be evaluated exclusively within the implementing agency. Expanded conservation–science partnerships possess tremendous potential to support CEAP recommendations emphasizing assessments of the societal benefits originating from conservation programs. There is a critical need to further identify and capitalize on potential synergies among scientists, managers, government agencies, and nongovernmental organizations to facilitate development of evidence-based conservation practices and programs.

The NRCS National Conservation Practice Standards were developed to provide guidance for regional and national conservation planning, but their brief and generalized structure makes them difficult to critically evaluate and support with specific evidence-based information. Furthermore, mechanisms to support these standards in accordance with the rate at which new information and technologies become available could be strengthened to ensure that the most current scientific and management knowledge is available for conservation programs. Evidence-based information is necessary to anticipate and interpret conservation outcomes, diagnose reasons for conservation failures, assess the inherent risks associated with both action and inaction, and prioritize the selection, location, and timing of practice application.

CONCLUSIONS

Society is demanding increasing goods and services from rangeland ecosystems. This trend will likely accelerate in response to continued intensification of land use and growth of the human population. This unprecedented demand establishes that rangeland conservation programs evolve to meet the challenges of balancing trade-offs between agricultural production and ecosystem services. It is vital that conservation programs have well-defined goals and approaches designed to maximize success and minimize the potential for unintended consequences. It is recommended that monitoring programs be considered as a mechanism to assemble the spectrum of ecological, economic, and social information necessary to document the full scope of program impact. Monitoring programs reflecting the collective perspective of multiple stakeholders should be explicitly linked to adaptive management strategies so that short-term adjustments can be made to increase the likelihood of achieving long-term goals in a cost-effective manner.

The recommendations provided in the Rangeland CEAP Synthesis provide the information necessary to inform these suggested revisions and contribute to development of the next generation of conservation practice standards. This synthesis is intended to function as a "living document" that can be periodically updated to reflect new information as science and management advance and critical knowledge gaps are filled. A critical step in the second phase of CEAP is to directly engage conservation planners and policy makers in the dialogue with managers and scientists. Formalized partnerships among scientists, managers, and policymakers will provide the most effective and relevant knowledge source to guide conservation planning, implementation, and assessment.