FEDERAL RESOURCE MANAGEMENT AND ECOSYSTEM SERVICES GUIDEBOOK Federal Agency Explorations and Applications: Case 8 (Bureau of Land Management)

An Ecosystem Services Approach to Sage-Grouse Conservation: Upper Green River Conservation Exchange Program

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FEDERAL AGENCY EXPLORATIONS AND APPLICATIONS: CASE 8 BUREAU OF LAND MANAGEMENT

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FEDERAL RESOURCE MANAGEMENT AND ECOSYSTEM SERVICES

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About This Document

This case is part of the Federal Resource Management and Ecosystem Services (FRMES) Guidebook created by the National Ecosystem Services Partnership (NESP). NESP, housed at the Nicholas Institute for Environmental Policy Solutions, seeks to enhance collaboration within the ecosystem services community and to strengthen coordination of policy implementation and research at the national level. The FRMES Guidebook represents a collaborative effort by federal agencies and outside experts to develop a credible and feasible approach to incorporating ecosystem services into the decision-making processes of federal agencies.

Cases are written and approved by the author(s)' agency, but they have not been peer reviewed. They describe the decision-making context within which that agency is considering or testing an ecosystem services management framework, and they present approaches or innovations that the agency is using to incorporate ecosystem services into its planning and decision-making processes. Cases informed development of the FRMES Guidebook and could be of value to others embarking on ecosystem services planning and management efforts.

To read other federal agency explorations and applications of an ecosystem services management framework, visit www.nespguidebook.com.

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An Ecosystem Services Approach to Sage-Grouse Conservation: Upper Green River Conservation Exchange Program

Introduction

In 2011, the Sublette County Conservation District of Wyoming, the University of Wyoming, and The Nature Conservancy came together, using Natural Resources Conservation Service (NRCS) Conservation Innovation Grant funding, to explore the idea of an ecosystem services exchange in the Upper Green River Basin. This group teamed up with the Environmental Defense Fund, which was also exploring an exchange in the region, and together they created the Upper Green River Conservation Exchange Program (UGRCE).

The UGRCE Program is driven largely by landowners' desire to be compensated for conservation actions. Its goal is to develop a trading framework and a set of associated quantification tools that can be adapted to protect multiple ecosystem services, while providing economic incentives for landowners. In particular, the program aims to protect water quality and riparian function as well as mule-deer and sage-grouse habitat for a number of economic and social benefits.

Due to pending regulations regarding the potential listing of the Greater sage-grouse as a threatened or endangered species and the need to develop coordinated conservation efforts across landownership, the UGCRE Program has focused the first phase of the exchange on protecting sage-grouse habitat in Sublette County, Wyoming, which provides a nexus of landowners, core sage-grouse habitat, and oil and gas development, much of which is managed by the Bureau of Land Management (BLM). The BLM must ensure that energy companies provide appropriate mitigation for impacts to the land and resources, including mitigation on federal and non-federal lands outside of the area of impact, referred to here as "off-site" mitigation. The UGRCE Program could provide an important mechanism for this off-site mitigation.

Although the UGRCE Program provides a framework for assessing and offsetting impacts to multiple ecosystems services, the focus here is on its application to protect sage-grouse habitat given the urgency of the pending listing decision and the BLM's responsibility to advance sage-grouse conservation on the lands it manages.

Location

The Upper Green River Basin lies at the headwaters of the Colorado River in southwestern Wyoming. It is located in the upper watershed of the Green River drainage in Sublette County, Wyoming, and in a small portion of Lincoln County, Wyoming.





Source: K. Musser, U.S. Geological Survey.

The Basin includes more than 2.6 million acres, 39% of which is managed by the Bureau of Land Management; 34%, by the U.S. Forest Service; 22%, by private landowners; and 5%, by miscellaneous other owners. The area includes high mountain wilderness, forested areas, and open space that provides important wildlife habitat and migration corridors for species such as mule-deer, pronghorn, elk, pygmy rabbits, and sage-grouse. As Figure 2 shows, nearly all of Sublette County is within Greater sage-grouse habitat; core areas cover more than half of the county. The basin is also home to the headwaters of the Colorado River and, therefore, it is critical to providing millions of ranchers, farmers, industry, and citizens with ample, clean water. Additionally, the area provides significant outdoor recreation opportunities.





Source: Melanie J. Purcell, Sublette County Conservation District.

Figure 3 shows the landownership in northwest Sublette County and the overlay with Greater sage-grouse core habitat. The checkered-board pattern of landownership also reflects varying uses of the land and resources and the challenges of developing a comprehensive conservation strategy for the sage-grouse.



Figure 3. Landownership and Sage-Grouse Core Areas in Northern Sublette County.

Source: Sublette County Conservation District, http://www.sublettecd.com/pid/73/sage-grouse-initiative.aspx.

Though ranching dominated the economy through much of the 20th century, tourism, recreation, and energy production increasingly drive the local economy. A 2007 county report notes that one of every two workers in the county work for the natural gas industry, and one of every two dollars spent in the county derive from that industry.¹ Much of this development is occurring on public lands, but because revenues from oil, gas, and mineral development on federal lands are shared with the state and county, they important to local communities.

Since the early 2000s, the area has experienced significant growth in oil and gas activity. One of the largest natural gas fields in the United States—the Jonah Field—is within the Green River Basin. Located some 35 miles south of the town of Pinedale, this field is estimated to have 10.5 trillion cubic feet of natural gas in an area the size of a single survey township (approximately 13,000 acres).

The area continues to experience residential development pressures, with population growth between 2000 and 2010 accelerating at four times the national rate. The area ranks as one of the top 25 in the Rocky Mountain region for potential conversion of rangeland for development. Nonetheless, a significant portion of lands (nearly 600,000 acres of private lands) remains in use as agricultural land, largely as rangelands.

Motivation

A central motivation for applying an ecosystem services approach to sage-grouse conservation through the UGCRE Program is the potential listing of the Greater sage-grouse as threatened or endangered under the Endangered Species Act (ESA). Such a listing would have a significant impact on economic activities in the region, especially on oil and gas development. However, the UGCRE Program offers significant potential to protect and enhance sage-grouse habitat on private lands.

Background

In recent decades, sage-grouse populations have declined throughout their range, which includes portions of 11 western states. Currently, Wyoming holds more than one-third of the total sage-grouse population. Between 1999 and 2003, the U.S. Fish and Wildlife Service (FWS) received eight petitions to list the Greater sage-grouse throughout all or parts of its range. Concern about a potential listing of the species and its impacts on land uses prompted the state of Wyoming and other entities to initiate significant, coordinated planning efforts to create a statewide strategy for sage-grouse conservation. The complexity associated with sage-grouse and sage-grouse habitat conservation in Wyoming stems, in part, from the involvement of multiple entities, including the FWS as the deciding official with regard to sage-grouse listing, the state of Wyoming as the agency with trust responsibilities for managing the sage-grouse, the BLM and U.S. Forest Service (FS) as agencies with management responsibilities for federal surface land ownership and mineral rights, and private landowners that currently or could conserve sage-grouse habitats on their lands.

In a March 2010, the FWS concluded that listing the Greater sage-grouse was "warranted, but precluded."² In other words, it found that the Greater sage-grouse met criteria for being listed under the ESA but deferred a final decision. As a "candidate" for listing, the Greater sage-grouse was among 251 species for which the FWS agreed in a multi-district litigation settlement to provide final listing determinations by 2015.³

In its 2010 decision assessing the status of the species against the five "listing factors" under Section 4(a)(1) of the ESA, the FWS concluded that Factor A, "the present or threatened destruction, modification, or

¹ Sublette County, *Social and Economic Impacts to Sublette County, Wyoming from Natural Gas Development,* http://www.sublettewyo.com/DocumentCenter/Home/View/274.

² U.S. Fish and Wildlife Service, "12-Month Finding for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered" (75 *Federal Register* 13910, March 23, 2010).

³ See http://www.fws.gov/endangered/improving_ESA/listing_workplan.html.

curtailment of the habitat or range of the Greater Sage-Grouse," and Factor D, "the inadequacy of existing regulatory mechanisms," posed "a significant threat to the Greater Sage-Grouse now and in the foreseeable future."⁴ In this same document, the FWS indicated that the principal regulatory mechanisms for the BLM were conservation measures in its land use plans.

State of Wyoming Response

Concern about a potential listing of the species and its impacts on land uses prompted the state of Wyoming and others entities—local working groups—to initiate significant, coordinated planning efforts to create a statewide strategy for sage-grouse conservation. These efforts resulted in adoption of a conservation plan by the Wyoming Fish and Game Commission in June 2003. Within this context, the local working groups, including the Upper Green River Basin Local Sage-grouse Working Group, were established in 2004 to "develop and facilitate implementation of a local conservation plan for the benefit of sage-grouse and, whenever feasible, other species that use sagebrush habitats."⁵

In 2007, the Upper Green River Basin Local Sage-Grouse Conservation Working Group, of which the BLM is a participant, developed a conservation plan that, among many other provisions, identifies research and development of "incentives that would reward landowners who provide the type of habitat that maintains and enhances sage-grouse populations."⁶ The plan also proposes consideration of "off-site mitigation as an alternative mitigation for mineral development impacts on known sage-grouse habitat" and calls for development and implementation of "acceptable off-site mitigative measures for enhancing sage-grouse or habitat, as needed, to offset impacts of surface disturbing activities."⁷

The state of Wyoming has also worked with the FWS to develop an "umbrella" Greater sage-grouse Candidate Conservation Agreement with Assurances (CCAAs) "for ranch management activities that could offer private landowners assurances their livestock operations could continue in the event the species was listed under the ESA."⁸ CCAAs are voluntary conservation agreements between the FWS and non-federal landowners to implement conservation measures that remove threats to or improve the status of unlisted species. In return, landowners receive assurance that their conservation efforts will not result in future regulatory obligations in excess of those established in a CCAA if the species is later listed.⁹

BLM Response

Most of the occupied sage-grouse habitat in the Upper Green River Basin is public land, where as many as 90% of known sage-grouse leks (strutting grounds used in breeding season) are found on. Because this land is primarily managed by the BLM, its actions are critical to sage-grouse protection.¹⁰ In response to the 2010 finding on petitions to list the sage-grouse, the BLM issued Instruction Memorandum No. 2012-043 to provide interim management policies and procedures to field offices for protecting the sage-grouse and managing their habitat.¹¹ The guidance focuses on protection of un-fragmented habitats; minimization of habitat loss and fragmentation; and management of habitats to maintain, enhance, or restore conditions that

⁴ See https://www.fws.gov/endangered/laws-policies/section-4.html.

⁵ Upper Green River Basin Sage-Grouse Working Group, "Upper Green River Basin Sage-Grouse Conservation Plan," May 24, 2007.

⁶ Upper Green River Basin Sage-Grouse Working Group, Conservation Plan, May 24, 2007, p. 42.

⁷ Ibid., p. 56.

⁸ Greater Sage-Grouse Umbrella CCAA for Wyoming Ranch Management: A Candidate Conservation Agreement with Assurances for Greater Sage-Grouse, Draft Document, December 19, 2012, http://www.fws.gov/mountain-prairie/species/birds/sagegrouse/20130207DraftCCAA.pdf.

⁹ FWS, Candidate Conservation Agreements with Assurances Handbook, June 2003.

¹⁰ See http://www.blm.gov/wo/st/en/prog/more/sagegrouse.html.

¹¹

http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2012/IM_2012-043.html.

meet sage-grouse needs.¹² Following this guidance, the BLM Wyoming state director issued Instruction Memorandum IM WY2012-019.¹³ This memorandum is used in place of Instruction Memorandum No. 2012-043 to allow for other established sage-grouse management prescriptions such as those established by the Wyoming Governor's Executive Order 2011-5.¹⁴

The BLM is also the lead, in coordinated effort with the FS, in preparing land-use plan amendments and accompanying environmental impact statements (EISs) and related National Environmental Policy Act (NEPA) analyses "to incorporate specific conservation measures across the range of the Greater sage-grouse."¹⁵ The BLM plan amendments will apply to six resource management plans (RMPs) across Wyoming (as well as three Forest Service plans), with conservation actions designed to "attempt to prevent the bird from being listed as a [threatened or endangered] species."¹⁶ The Wyoming Greater Sage-Grouse Draft Land-Use Plan (LUP) Amendments and draft EIS for the BLM covering the nine RMPs and three Forest Service plans were released in December 2013. Publication of a Record of Decision is expected in fall 2014.¹⁷

Eight key issues were identified in the scoping process for the land-use plan amendments. These issues include questions about how to (1) maintain energy and mineral development, given valid existing rights while protecting sage-grouse and their habitat, (2) maintain and put in place measures to protect and improve sage-grouse habitat while maintaining grazing privileges, and (3) "promote or maintain activities that provide social and economic benefit to local communities while providing protection for Greater sage-grouse habitat."¹⁸

In 2013, the BLM issued an interim policy and draft regional mitigation manual for developing regional mitigation plans and implementing offsite mitigation.¹⁹ The purpose of this guidance is to move the BLM from planning for compensatory mitigation on a project-by-project basis to planning for compensatory mitigation on a project-by-project basis to planning for compensatory mitigation actions have greater value for species conservation and other resource values. The manual also clearly affirms the BLM's authority to require compensatory mitigation as a stipulation for granting permits and other land use authorizations. Although this guidance pertains to mitigating all impacts to resource values on BLM lands, its immediate application is in guiding mitigation strategies in the land-use amendment process for advancing sage-grouse conservation. To this end, the draft sage-grouse land-use plan amendments issued in December 2013 have a placeholder for developing and implementing a regional mitigation plan for sage-grouse management zones.²⁰ These regional mitigation plans will identify potential compensatory mitigation actions, which may include contributions to mitigation banks or other credit trading mechanisms.

¹² Bureau of Land Management, "Greater Sage-Grouse Interim Management Policies and Procedures," IM 2012-043, December 22, 2012.

¹³ http://www.blm.gov/pgdata/etc/medialib/blm/wy/resources/efoia/IMs/2012.Par.56874.File.dat/wy2012-019.pdf.

¹⁴ http://governor.wy.gov/Documents/Sage%20Grouse%20Executive%20Order.pdf.

¹⁵ Greater Sage-Grouse Land Use Plan Amendments/EISs: Scoping Summary Report, ES-1, May 2012.

¹⁶ BLM, NEPA Hotsheet, July 31, 2013.

¹⁷ See http://www.blm.gov/wy/st/en/programs/Planning/amendments/sage-grouse.html.

¹⁸ Greater Sage-Grouse Land Use Plan Amendments/EISs: Scoping Summary Report, ES-3, May 2012.

¹⁹ Bureau of Land Management, "Interim Policy, Draft- Regional Mitigation Manual Section- 1794," IM 2013-142, June 13, 2013,

http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2013/IM_2013-142.html.

²⁰ The Wyoming Greater Sage-Grouse Draft Land Use Plan Amendment and Draft Environmental Impact Statement, December 2013. See http://www.blm.gov/wy/st/en/programs/Planning/amendments/sage-grouse.html, Chapter 2, p. 9.

Key Players

The UGRCE Program is intended to be a "performance-based conservation mechanism for mitigating impacts on riparian function, Greater sage-grouse, and mule deer habitat from energy and other resource use pressures."²¹ The working group notes that

Protecting upland sagebrush habitat for Greater sage-grouse and other sagebrush obligate species..., such as Mule Deer, will also potentially benefit a number of other ecosystem services. Game species such as Mule Deer provide important revenues to the state of Wyoming. Additionally, riparian areas play a critical role in the life cycles of all species in the area, including Greater sage-grouse. Water and riparian areas are scarce, and therefore all the more precious. Maintaining or improving the function of riparian areas, and the ability of local water bodies to provide optimal seasonal water quality and quantity, is therefore key to supporting fish, wildlife, livestock and human uses of both range and riparian resources.

The central set of decision challenges for the working group include how to select, characterize, measure, and evaluate a set of ecosystem services that can be incorporated into a "conservation exchange." The exchange is conceived as

- "Creating a viable source of revenue—from development companies, and groups concerned with environmental conservation—for farmers and ranchers who create quality habitat for species and improve riparian function."
- "Enabling mitigation actions that result in a net increase in functional habitat while enabling resource use projects to proceed with greater certainty and lower administrative costs."
- "Significantly improving the effectiveness and efficiency of conservation investments, resulting in more meaningful and longer-lasting benefits for the species."²²

The UGRCE working group, in which the BLM participates, includes representatives of the Sublette County Conservation District, the University of Wyoming, the Wyoming Department of Agriculture, the Wyoming Game & Fish Department, the Environmental Defense Fund, and The Nature Conservancy as well as a number of consultants and landowners. Participants in the prospective exchange include "primary participants," who generate on-the-ground environmental benefits and facilitate transactions; "supporting participants," who provide technical and administrative support; and "oversight participants," who ensure that everyone is adhering to the operational protocol and meeting regulatory requirements.²³

Given the motivations of the BLM, local and state agencies, and other public and private actors to protect the sage-grouse, the UGCRE will focus the first phase of the exchange on protecting and improving sagegrouse habitat. The exchange will develop a framework for trading credits/debits and a quantification tool for measuring impacts and conservation actions for protecting and restoring sage-grouse habitat. Once tested and validated, the exchange will adapt these tools for other ecosystem services. It is expected that initial credit buyers will be energy and agriculture producers but that the exchange may appeal to other buyers such as conservation groups once it begins operating.

Decision Context

In the context of sage-grouse conservation, the UGCRE must fit into local, state, and federal decisionmaking processes. At the local level, the exchange must provide benefits to incentivize private landowners' participation. At the state level, trust responsibilities for managing the Greater sage-grouse—until listed as

²¹ Upper Green River Conservation Exchange: Local Context and Scope, February 2013, p. 2.

²² Ibid.

²³ Ibid., pp. 12–13.

threatened or endangered under the ESA—reside with the state of Wyoming. Thus, the state is a primary decision maker in approving the UGRCE as consistent with its sage-grouse conservation plan, including support for off-site mitigation as an appropriate conservation tool.

At the federal level, several procedural challenges complicate development and implementation of a conservation exchange involving BLM lands, as in Sublette County. One pertains to NEPA and timing considerations. The BLM is under an extremely tight timeframe to prepare its sage-grouse proposed land-use plan amendments and accompanying draft EIS; a Record of Decision is scheduled for release by 2014. The timeframe is driven by the need to have conservation measures identified prior to the deadline by which the FWS makes its final sage-grouse listing determination, expected in 2015. Regional mitigation plans will be developed in a parallel effort outside of the NEPA process; however, given their implication for conservation of the sage-grouse, these plans are driven by the same FWS deadline.

Ideally, the UGRCE could be used as one of multiple tools to implement off-site mitigation that would be required for BLM land-use authorizations. In this way, the UGRCE would be contributing to the last step in the mitigation hierarchy, which is to offset unavoidable impacts through compensatory mitigation actions, which can include off-site mitigation.²⁴ The UGRCE does not set out to implement avoidance or minimization measures, which would be identified through the BLM land-use plan and regional mitigation plan. The decision to employ the exchange for off-site mitigation would likely come during the project-level EIS and NEPA analysis. During this process, the applicant and BLM will examine site-specific mitigation needs and potential actions. If off-site mitigation is implemented through the UGRCE, these actions may be included in one or more NEPA alternatives or as part of the mitigation plan for that project.

For the UGRCE to fit into this decision context, quantification measures or credits must be developed and deemed acceptable by the state and the BLM, and participating agencies need to approve use of the UGRCE as a mechanism for off-site mitigation. However, many details are still being worked out, and there are significant questions about supply and demand of credits, contract terms that would be amenable to buyers and sellers, and binding agreements with private parties to monitor mitigation actions on private lands. Energy companies need a supply of offset mitigation credits for their impacts on lands, and these credits must extend for the life of the impacts. Ranchers and other landowners are the potential suppliers of the credits. Yet their willingness to participate in the UGRCE depends on the design and quantification of credits and the financial benefits they receive by undertaking the activities that generate credits. To work through these challenges, the UGRCE will use "paper" pilot tests to test certain design options and then will implement one or more actual exchange pilot tests to work out technical and implementation details.

²⁴ The Council on Environmental Quality's definition of the mitigation hierarchy is to avoid, minimize, rectify, and then to compensate for unavoidable impacts. See 40 CFR 1508.20.



Figure 4. Proposed Structure of the Upper Green River Conservation Exchange.

Source: Anne MacKinnon.

Tradeoffs Considered and Analysis

The UGCRE aims to develop a conservation exchange program that may be adapted for multiple ecosystem services, but it will first test the exchange on sage-grouse habitat due to concerns about the species, its potential listing as threatened or endangered under the ESA, and potential avoidance of such a listing through improved protection of the species and its habitat. However, the following sections on tradeoffs and analysis apply to the larger ecosystems framework being developed by the UGRCE; therefore, they are not specific to the sage-grouse context.

Management and Policy Options

The UGCRE is considering a variety of actions as potential generators of mitigation credits. These actions include practices to control invasive weeds, create or improve game corridors, remove or minimize infrastructure, and undertake certain defined best practices in grazing management, stream bank stabilization, irrigation management, agriculture flooding for wetland development, sediment and erosion control, and meadow restoration.

For the BLM, key policy considerations include whether and how to include off-site mitigation of energy and other projects on BLM lands in its decision making. For the BLM and the UGRCE, the following determinations are significant:

- Processes for landowner engagement in setting up the exchange;
- Mitigation ratios and reserve requirements based on multiple factors, including habitat quality, location within the landscape, risk of failure to reach conservation goals, and the nature of conservation actions and impacts;
- Verification and monitoring processes;
- Duration of credits-permanent, time-limited, or both, depending on circumstances; and
- Timing of credit "releases"—that is, when credits from a conservation project can be applied to an investor's "account."

These design determinations can affect incentives, transaction costs, and on-the-ground results. For example, high mitigation ratios may provide buffers against failures of actions to produce desired outcome,s but they can also raise delivery costs and reduce program participation. Requiring permanent credits may be

necessary to ensure mitigations that apply to long-term impacts, but it may raise costs and reduce landowner participation.

Ecosystem Goods and Services Considered

In 2011, The Nature Conservancy, the University of Wyoming, and the Sublette County Conservation District completed a feasibility analysis of a payment for ecosystem services program for the Upper Green River Basin.²⁵ The study looked at a wide range of potential ecosystem services and found that the primary interests for ecological protection were sagebrush-grasslands, desert shrub, and riparian and coldwater aquatic systems. It further found that potential credit buyers might include the extractive industry, tourists, the hospitality industry, second-home owners, municipalities, sportsmen, downstream water users, and irrigation districts that derive benefits from these habits and their functions. The Sublette County Conservation District, which represents agricultural interests, was very interested in protecting riparian functions for irrigation; conservationists and sportsmen were interested in wetlands for migratory birds and wildlife; and many stakeholders were interested in protecting sage-grouse habitat not only for habitat connectivity and avoiding an ESA listing of the Greater sage-grouse, but also for recreation and tourism.

Building on this analysis, the UGRCE decided to focus on protecting and enhancing sage-grouse and mule deer habitat and on restoring or improving riparian function. The ecosystem services provided by protecting, enhancing, and restoring this habitat and riparian function include, primarily, maintaining biodiversity, supporting outdoor recreation (hunting), sustaining adequate water supplies and water quality, and regulating weeds to improve grazing forage. However, at this point, the focus of the project and its metrics is primarily on the ecological benefits of conservation actions. These benefits are evaluated at the project-level scale and in the landscape context (e.g., how do actions at the project site affect connectivity and population levels?).

At this point, the exchange is not looking at other ecosystem services functions, such as air quality or carbon capture. This decision is based, in part, on the potential credit buyer market (i.e., the extractive and agriculture industries will create demand for sage-grouse habitat credits). The decision also takes into account the complexity of measuring and quantifying certain ecosystem services. In limiting the scope of these services to sage-grouse and mule-deer habitat and riparian function, the working group will be able to develop a robust set of quantification tools for measuring impacts (buyers) and credits (sellers) and will be able to test the overall exchange format.

Analysis

One analysis of ecosystem services opportunities in the Upper Green River Basin was undertaken in 2011. Researchers conducted interviews and focus group discussions with landowners, government agency and NGO scientists, conservation funders, and industry and other experts to assess ecological priorities, program design preferences, desired outcomes, and the demand for conservation credits.

The UGRCE is now building off that research as well as similar exchange efforts led by the EDF in other states to develop two products to implement the exchange: (1) science-based quantification tools for sage grouse and mule deer (a similar tool for riparian function is led by the University of Wyoming) and (2) an operations manual for the overall structure of the exchange and implementing transactions. A multi-stakeholder science team is developing the interactive geospatial quantification tools, which take into account local site-specific factors, as well as the larger landscape context. Ultimately, there will be separate quantification tools for mule deer habitat, sage-grouse habitat, and riparian functions.

²⁵ Esther A. Duke, Amy Pocewicz, and Steve Jester, *Upper Green River Basin Ecosystem Services: Feasibility Analysis Project Report* (Washington, DC: The Nature Conservancy, 2011).

Table 1. Credit Types and Tradable Units.

Credit Category	Credit Type	Tradable Unit	Examples of Eligible Conservation Actions
Sagebrush habitat	Habitat for Greater sage- grouse	 Functional acres 	 Cheatgrass and invasive weed control Creation or maintenance of game corridors Grazing management Removal or minimization of new infrastructure
Muledeer habitat (sagebrush, bottom lands, irrigated hay meadows)	Habitat for mule deer	 Functional acres 	 Cheatgrass and invasive weed control Creation or maintenance of game corridors Grazing management Removal or minimization of new infrastructure
Water quality and supply	Riparian function	 Functional acres or stream length 	 Streambank stabilization Irrigation management Meadow restoration

The quantification tool either calculates the value of a conservation action at a specific location (credit) or measures the level of impact from development actions at a specific site (debit). This analysis is based on the regional context of the site and local site conditions (see "Specific Data and Information" below). Mitigation ratios are developed to ensure consistency among credits throughout the landscape and an overall net benefit to the species and habitat.

Existing Resources and Funding

General Data

Because of the decade-long focus in the state of Wyoming on enhancing protection for sage-grouse and their habitat, extensive amounts and variety of data are available on wildlife, vegetation, water, and other natural resources. In addition, for their planning processes and analyses, the Forest Service and the BLM have national data sets with census, labor, economic, and other data. They have developed and piloted use of the Economic Profile System—Human Dimensions Toolkit to help assess demographic and economic issues and to standardize the collection of social and economic data for land use planning, environmental analyses, and others purposes. The toolkit, which is available to the public, draws from public domain data sources such as the U.S. Census, the Bureau of Economic Analysis, and the Bureau of Labor Statistics.²⁶

In addition to having access to significant data and analytic tools, the UGCRE involves partners with knowledge and experience in designing payment-for-ecosystem services programs. These partners include the Environmental Defense Fund, The Nature Conservancy, the Willamette Partnership, Environmental Incentives, the University of Wyoming, and a variety of consultants with specialized expertise.

Currently, the UGRCE is using, with permission of the affected landowners, existing conservation plans and their ecological information to prioritize ecosystem services and locations in the Upper Green River Basin. This information will be used to explore opportunities for individual landowners to participate in pilot programs.

Specific Data and Information

Ecosystem services credit systems and exchanges require site-specific and regional- or coarse-scale information; therefore, the quantification tools under development include geospatial information about

²⁶ See http://www.ntc.blm.gov/krc/viewresource.php?courseID=504.

habitats at the local and regional scale. For example, the sage-grouse quantification tool is based on a framework of four spatial scales for sage-grouse habitat in an unpublished BLM report.²⁷ These scales are (1) occupied species range, (2) subpopulations associated with different habitats conditions (i.e., BLM core habitat), (3) habitat immediately surrounding the project site, and (4) habitat at the project site. First- and third-order data can be collected from existing data models, such as BLM core habitat or state core area maps, but third- and fourth-order data must be collected and verified at the site. For example, site-level habitat data such as cover and foraging vegetation will be collected through a site visit and survey.

Funding

Much of the work leading up to development of the UGRCE has been provided by in-kind contributions from the various organizations involved in the work. Additionally, funding from a USDA NRCS Conservation Innovation Grant has supported its development.

The exchange will need to seek seed money to implement its first transactions; ultimately, administration of the exchange will be funded through a transaction fee structure. The goal is for the exchange to be selfsustaining in approximately three years. The first mock "paper" transaction took place in March 2014 in Sublette County, allowing parties, including the BLM, to get a feel for how the exchange will work. Participants included a diverse group of potential sellers and credit developers (i.e., landowners) and credit buyers (in this case, energy companies). One pilot transaction, cheat-grass treatment on private lands, has already occurred. Additional pilot transactions, including the real exchange of credits/debits, are anticipated for fall of 2014 and spring and summer of 2015.

Implications

The UGCRE efforts are designed to link into overall conservation planning, resource management, and species protection in the region. The goal is to create an exchange program that can attract landowner participation in conservation; provide cost-effective ways for energy companies and others to offset the impacts of their activities on wildlife habitat, water, and other natural resources; and generate both environmental and economic benefits in the region. Ultimately, the exchange could become a model for agencies, in particular for the BLM, to implement off-site mitigation. If combined with adequate resource management planning, the exchange could help avoid the need to list the Greater sage-grouse as threatened or endangered. Additionally, because the exchange is built on a science-based analysis of the value of conservation measures, it provides a level of assurance for investors, communities, and policy makers in making choices and tradeoffs among conservation options.

In particular, the USGCRE could provide multiple benefits to the BLM's planning and permitting processes and ongoing management of resource values:

- The UGCRE provides an easy avenue for implementing off-site mitigation that may be identified through a regional mitigation plan or through a project-level NEPA analysis. Local, state, and public entities are likely to accept that the mitigation actions are adequate to protect the resource values, because the quantification of credits is driven by a multi-stakeholder, science-based process.
- Management responsibilities for generated credits resides with the landowner or third-party entity per the exchange agreements. Therefore, the BLM is relieved of long-term management activities for off-site mitigation actions. However, it remains responsible for ensuring their implementation and success through "enforceable, binding agreements between private parties and the BLM."²⁸

 ²⁷ S.J. Stiver, E.T Rinkes, and D.E. Naugle, eds., Sage-Grouse Habitat Assessment Framework: Multi-scale Habitat Assessment Tool, unpublished report (Boise, Idaho: U.S. Bureau of Land Management, Idaho State Office, 2010).
 ²⁸ Bureau of Land Management, "Interim Policy, Draft- Regional Mitigation Manual Section- 1794," IM 2013-142, June 13, 2013.

• Adaptive management is built into the exchange framework so that conservation actions are monitored for their effectiveness. This knowledge will benefit the BLM's land-use planning process and mitigation recommendations for land-use authorizations.

The Upper Green River Conservation Exchange Local Context and Scope document includes additional program outcomes clustered into three categories, by type of participant. It states that

Landowners are able to quantify the amount of environmental benefit (credits) from implementing conservation practices. These credits can attract funding from public and private investors seeking to improve habitat for sage-grouse and mule deer, and increase riparian function in the Upper Green River Basin. By participating in the Conservation Exchange, landowners can:

- Efficiently identify the areas and opportunities with the greatest potential to create environmental benefit through the use of interactive geospatial credit/debit quantification tools.
- Identify investors and create new funding opportunities for conservation.
- Create a tangible product from conservation efforts with financial, social and environmental value.
- Have consistency to be able to confidently include restoration and conservation projects into their annual planning.

Investors can efficiently invest with confidence, knowing that credits are consistently defined and useful in comparing the relative improvements across projects to find opportunities for achieving the greatest environmental benefit. This increases accountability with taxpayers, regulators and local constituents, and allows for greater coordination with other investors to fund large-scale projects. By participating in the Conservation Exchange, investors can:

- Increase the effectiveness of environmental investments, maximizing the environmental return on investments.
- Increase efficiency by relying on the market structure to identify quality projects with willing landowners to guide project design and to verify that the completed project delivers the expected amount of benefit.
- Consistently report results that are verified and periodically checked to ensure that they are appropriately maintained.
- Choose from a variety of high-impact investment approaches.
- Be confident that their investments are producing environmental benefits without having to maintain the staff to monitor every project and develop complex arrangements that define success for each unique project.

Local Constituents and Environmentalists can identify habitat priorities and show how individual actions help address these priorities. Regional reports of accomplishment can rally the community around making progress toward common goals. By participating in the Conservation Exchange, local constituents and environmentalists can:

- Shift focus to project outcomes, not just practices.
- Enable the possibility of larger projects through aggregation.
- Create incentives for implementing projects with the greatest environmental benefits.
- See net increases in the amount of overall conservation benefits generated in the Upper Green River Basin.

http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2013/IM_2013-142.html.

- Attract investment to support a sustainable, conservation economy.
- Assess development impacts and restoration improvements using consistent methods to ensure mitigation results in net environmental benefits.²⁹

²⁹ Ibid., pp. 3–4.

Cover photo: Holly Copeland, The Nature Conservancy

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About the National Ecosystem Services Partnership

The National Ecosystem Services Partnership (NESP) engages both public and private individuals and organizations to enhance collaboration within the ecosystem services community and to strengthen coordination of policy and market implementation and research at the national level. The partnership is an initiative of Duke University's Nicholas Institute for Environmental Policy Solutions and was developed with support from the U.S. Environmental Protection Agency and with donations of expertise and time from many public and private institutions. The partnership is led by Lydia Olander, director of the Ecosystem Services Program at the Nicholas Institute, and draws on the expertise of federal agency staff, academics, NGO leaders, and ecosystem services management practitioners.

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Established in 2005, the Nicholas Institute for Environmental Policy Solutions at Duke University improves environmental policymaking worldwide through objective, fact-based research in the areas of climate change, the economics of limiting carbon pollution, emerging environmental markets, oceans governance and coastal management, and freshwater management. The Nicholas Institute is part of Duke University and its wider community of world-class scholars. This unique resource allows the Nicholas Institute's team of economists, scientists, lawyers, and policy experts not only to deliver timely, credible analyses to a wide variety of decision makers, but also to convene decision makers to reach a shared understanding of this century's most pressing environmental problems.

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