



Incentives for Biodiversity Conservation: An Ecological and Economic Assessment





DEFENDERS OF WILDLIFE

Defenders of Wildlife is a national, nonprofit membership organization dedicated to the protection of all native animals and plants in their natural communities.

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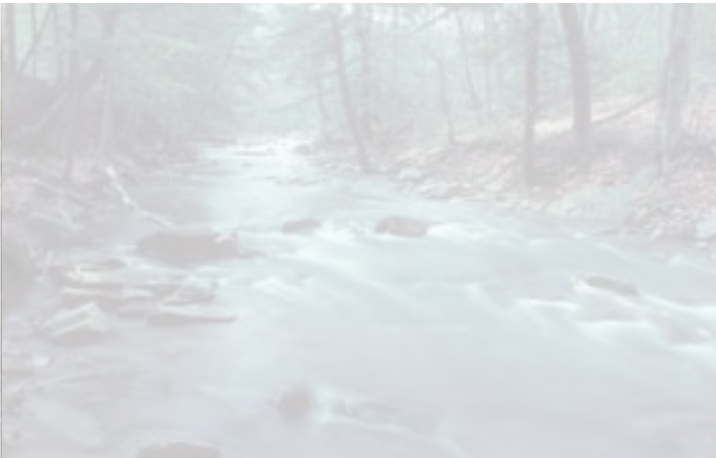
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Executive Summary

This report is an economic and policy assessment of the biological effectiveness and economic efficiency of incentive mechanisms for private landowners to conserve U.S. biodiversity. Its focus is on rural lands that tend to be used for forestry, agriculture and residential purposes. Its audience is those working to amend the 2007 Farm Bill to improve its effectiveness in conserving native habitat and to enhance the capacity of the Endangered Species Act to encourage voluntary activities that are beneficial to listed species. These include policy makers, resource professionals and landowners.

for protecting endangered species and habitats, for more than a decade.

Much of this report outlines major incentive mechanisms and assesses key incentive tools in cases where adequate information exists. For each incentive mechanism, there is a description, an assessment of its ecological effectiveness and economic efficiency, and recommendations for improving its biodiversity conservation. The following types of incentives are addressed: regulatory and economic disincentives, legal and statutory incentives, property rights innovations, market-oriented institutions, financial incentives, public tax

tion available, but there is no coordinating institution to guide landowners in the selection and use of these measures. Second, there is no one incentive mechanism that meets all the criteria for biological effectiveness and economic efficiency. There will always be tradeoffs when employing one incentive mechanism over another, and these compromises need to be recognized. What may be more useful is implementing a system or program of “flexible incentives,” whereby landowners can access a combination of public and private incentive measures that best fit their ecological and economic circumstances. Third, it is useful to think about using both an opportunistic and targeted approach for applying incentive mechanisms, and to take full advantage of combining various private and public approaches. Fourth, to improve the future effectiveness and efficiency of incentive tools, incentive programs need a more robust monitoring and evaluation component.

Incentives are necessary to supplement other conservation tools, such as regulation and land acquisition. It is generally acknowledged that although there are many public and private incentive programs designed to encourage conservation, they tend to be overly specialized and prescriptive, fragmented and underfunded. These programs are also generally constrained by the fact that the primary threats to biodiversity – habitat loss, degradation and fragmentation – operate across public and private ownerships. Existing programs are

“Incentives are necessary to supplement other conservation tools, such as regulation and land acquisition.”

This report represents a continuing commitment by Defenders of Wildlife to work with landowners and policy makers to develop incentives for conserving biodiversity. Defenders’ compensation fund, aimed at reimbursing livestock operators for losses caused by carnivores, has a long and successful history. In addition, Defenders’ staff has generated discussions and proposals for improving landowner incentive measures, within the context of regulatory frameworks

incentives, and educational, technical assistance, administrative and recognition incentives. Unfortunately, the literature on conservation incentives contains few systematic assessments of these mechanisms or programs, so further research is needed.

This report also provides several general observations and recommendations on incentive mechanisms. First, there are many public and private incentive mechanisms and programs for biodiversity conserva-

also implemented to benefit the greatest number of constituents. Targeted, strategic investments in conservation incentives are the exception rather than the rule. The recent completion of state wildlife action plans by all 50 states, and ecoregional assessments provided by The Nature Conservancy, can help guide more strategic investments with greater ecological benefits.

Since landowner needs, objectives, attitudes and capacity to conserve biodiversity vary widely, program flexibility is needed. Public-private partnerships may provide the best approach to biodiversity conservation, since public funding is limited. The elimination or reallocation of funding for programs that create perverse incentives, like crop subsidies, may save taxpayer dol-

lars and reduce ecological damage. Performance-based programs may produce better results, but they will require the development of specific goals and an efficient and cost-effective monitoring system, which are not currently in place.

Defenders of Wildlife and partners developed the following set of criteria for evaluating conservation incentives: *Effective programs focus on habitat and multiple species, rather than taking a single species approach. Implementation is strategic, based on clearly defined statewide or regional ecological goals. Program implementation is tracked, biological outcomes are monitored, and adaptive management allows for adjustments to improve achievement of program goals. Effective incentive programs are also administered well. Partnerships and*

coordination leverage limited resources, fill gaps and prevent duplication. Adequate funding, research and technical assistance are critical. Programs need to be accessible to landowners, including streamlined paperwork and realistic timelines.

The report concludes that, although incentives will be an important part of strategies to conserve biodiversity on private land, there will always need to be regulations that set a minimum or base level of performance for all landowners. Regulations should prevent ecological damage, while incentives may be most effective at promoting restoration and maintaining intact habitats. Landowners who have a history of good stewardship should not be penalized by limiting assistance to those whose lands have been damaged.



Stripcropping to prevent soil erosion, Maryland | Natural Resources Conservation Service

One immediate need is to decrease the public and private sector costs of accessing and implementing incentive programs. One-stop shopping that offers landowners a clear picture of the full range of options, incentives, permit requirements, funding sources and other information could result in higher levels of participation and improved administrative effectiveness. Building more flexibility into existing programs, while minimizing additional transaction costs, may bring about improved effectiveness.

An incentive tool that deserves further exploration is an ecosystem services marketplace that promotes biological integrity and economic efficiency. The tool is beginning to be

applied in the realm of compensatory mitigation, but the potential exists for broader, more integrated application that could make conservation profitable for savvy landowners. Regardless of the mechanism, however, incentives will be most effective if they are implemented within the context of specific biodiversity conservation goals or outcomes that allow us to measure progress against the goals and make adjustments as necessary over time. Developing an efficient system to measure progress and to develop a performance-based system will not be easy or inexpensive, but it should be a part of an overall conservation strategy.

Although there has been a lack of assessment and comparison of incen-

tive mechanisms and programs, these mechanisms, over the many decades they have been used by private landowners, have no doubt contributed to helping conserve at-risk species and their habitats. Indicators of this are the high participation rate of applicants to access public incentive programs and the dedication of many federal and state agents in conserving at-risk species. This report does not conclude that past and current incentive measures have been ineffective or inefficient in protecting biodiversity in this country, only that we implement recommended changes and continue monitoring and evaluation of incentive measures in order to improve their biological effectiveness and economic efficiency.



Restored wetland, California | Natural Resources Conservation Service

I. Introduction

This report is a policy and economic assessment of the effectiveness of incentives for private landowners to conserve biodiversity in the United States. The focus is on existing incentives, which tend to be applied on rural lands that are primarily used for agriculture, forestry or residential purposes. The primary audiences for this report are policy makers, public conservation agents, the private conservation community, legislative staff and landowners.

Defenders of Wildlife has been involved in promoting incentives for private landowner conservation efforts for more than a decade. Some of its work has focused on financial compensation and proactive cost-share funds for landowners directly affected by reintroduction and recovery of large predators such as wolves and grizzly bears. Starting in 1993, Defenders (see Hudson 1993) has sponsored workshops and provided policy guidance on the use of landowner incentive mechanisms and programs. Defenders' interest in applying incentives to broader biodiversity conservation goals also grew out of its experience with the Oregon Biodiversity Project in the mid-1990s. That project, which conducted a statewide assessment of Oregon's biodiversity conservation needs and opportunities, highlighted the need for conservation efforts on private lands and led Defenders to undertake its first examination of incentives available to private landowners (Vickerman 1998). Recognizing the importance of a stronger

technical foundation for its work on these issues, Defenders hired a natural resource economist in 2000, and in 2002 it created its Conservation Economics Program to apply socio-economic science and principles to biodiversity conservation. Economic analysis of the benefits and costs of biodiversity conservation is a major thrust of the program. Because the purpose of the Conservation Economics program is to inform policy choices, the work is based on a team approach and augmented with assistance from biologists, habitat conservation planners and legal experts from other Defenders programs (for example, see George (2002), Hummon and Casey (2004) and Hummon (2005)).

This report is intended to summarize and synthesize current thinking about the role of private landowner incentives in biodiversity conservation, what works, what

doesn't work and how incentives could be used more effectively. Although the report assesses key incentive mechanisms based on an extensive literature review, the search was not exhaustive. Nevertheless, an evaluation of existing incentive mechanisms is particularly timely now. The biggest single source of funding for conservation incentives, the Farm Bill, is up for reauthorization in 2007, and improved conservation incentives for private landowners figure prominently in the continuing debate on possible changes to the federal Endangered Species Act.

Why Incentives?

Despite having perhaps the most comprehensive national legislation in the world to protect endangered species and their habitats, the United States continues to suffer significant biodiversity loss. The federal agen-

Scope of This Report

This report is applied in nature and does not delve into the economic or social theory related to an analysis of incentives.¹ It describes current biodiversity conservation incentives mechanisms and programs and how they work, and it suggests improvements. Existing public and private incentive mechanisms are addressed and, to the extent possible, assessed in terms of their biological effectiveness and economic efficiency.

The emphasis of this report is on voluntary economic incentives (e.g., financial assistance, market development, tax code changes, etc.) that have the potential to influence conservation behavior on private lands. The term "economic incentives" includes institutional arrangements that affect landowner conservation choices. For example, although mitigation banking might be thought of as a private, quasi-market financial transaction, the actual establishment of the bank and its operational rules are institutional innovations (and therefore an incentive) that make private transactions possible. This report addresses both market-based and non-market incentives. The one exception to this is that fee-simple and donation land acquisition programs are not considered, because management responsibility is transferred from one landowner to another.

1. For examples of more theoretical approaches to the economic analysis of incentive mechanisms, see Casey et al. (1999).



Mountain stream, Maryland | Natural Resources Conservation Service

cies charged with implementing the Endangered Species Act are fragmented, under-funded and subject to considerable political pressure by those who perceive conservation to be an impediment to economic growth, private property rights and/or well-being. These perceptions have slowed down the process of both listing species for protection and for defining the critical physical habitat and land management practices required for recovery. Other conservation programs are under-funded or lack clear biodiversity conservation goals.

The need for private landowner incentives as part of an overall biodiversity conservation strategy has been widely accepted in recent years. The principal threats to biodiversity – habitat loss, degradation and fragmentation – operate across public and private lands, and weeds and other invasive non-native species recognize no boundaries. Resource management on public lands is clearly a matter of public policy. There is much less consensus on the degree to which public policy should guide management of private lands. Even if there were a consensus in support of a

stronger regulatory approach, it is difficult to envision a legal framework that could adequately address the complexities involved in developing a prescription for biodiversity management on private lands.

A Mix of Tools

This report proceeds from the assumption that incentives should supplement, not replace, existing regulations and land acquisition programs designed to conserve habitats and species:

- Effective regulations can prevent activities that contribute to biodiversity losses.
- Land acquisition programs can secure the most important places and help ensure their long-term protection.
- Economic incentives can encourage and assist landowners in taking action to maintain and enhance biodiversity values on private lands.

Organization of This Report

Section II describes the importance of biodiversity conservation and the crucial role that incentives play in achieving this objective on private lands. It discusses the complementary conservation strategy of combining voluntary incentive mechanisms with land acquisition and a regulatory approach. Finally, it provides the framework for the successful implementation of incentive measures.

Section III presents the methods used to evaluate different incentive mechanisms in the subsequent sections.

Sections IV through X each deal with one related set of incentive mechanisms. Each section describes the mechanisms, gives a preliminary assessment of biological effectiveness and economic efficiency, and presents recommendations. Both public (federal and state) and private incentive mechanisms are considered. Examples of incentive programs are discussed.

Section XI provides a summary of the descriptions, assessments and policy recommendations from Sections IV through X.

Section XII presents conclusions about the future structure of conservation incentive mechanisms and programs and their application to biodiversity conservation.

Creating reserves on public or private lands is unlikely to conserve adequately the full range of biodiversity. Although public reserves provide important conservation benefits, private lands support nearly 67 percent of known populations of federally listed endangered or threatened species. It is neither realistic nor desirable for governments to acquire and manage all of the land necessary to conserve the nation's biodiversity through fee-simple purchase or permanent easements. It has been estimated that it would cost approximately \$488 billion over 40 years to purchase enough land to establish a representative network of biodiversity areas in the United States (Shaffer et al. 2002). Although this expenditure level is equivalent or even below other types of social investments, there are also political and practical constraints to such a large land conservation program. Thus, working with private landowners and managers to conserve native species and ecosystems outside the traditional reserve-based model becomes imperative.

Many lands used primarily for human purposes (including agriculture, forestry, recreation and urban uses) can support some elements of biodiversity and help sustain ecosystem functions. These include extensive rangelands that retain native vegetation, lightly managed forest lands, intact natural areas within agricultural landscapes, and even rural residential and suburban areas with significant ecological elements retained or restored.

Land-use planning and zoning are important tools for maintaining native biodiversity in selected places. Intensive development may be encouraged in some areas in order to spare habitats and species in others. However, increased land-use intensity can be a double-edged sword. For example, maintenance of adequate farm income

in the face of declining product prices can lead to more intensive use of fertilizers and chemicals that degrade water quality and damage aquatic ecosystems. Similarly, recent legislation targeting conservation funds towards large "confined animal feeding operations" to deal with manure management may actually subsidize expansion of these large operations and lead to even more environmental degradation.

Although much remains to be learned about ecological restoration techniques, information is available to guide landowners in conserving species and their habitats, and restoration efforts on private lands have been successful in many areas. However, it remains difficult and expensive to measure the contribution of an individual landowner to broader environmental

“Land-use planning and zoning are important tools for maintaining native biodiversity in selected places.”

benefits, especially those not directly observable or easily monitored. Without multi-scale, coordinated, strategic monitoring within the context of landscape-scale conservation plans, it will be difficult to determine the effectiveness of conservation efforts on individual sites or across programs.

Targeted, strategic investments in conservation incentives are the exception rather than the rule with most existing incentive programs. Political considerations often reinforce bureaucratic inclinations to spread resources as widely as possible, rather than targeting investments to locations and activities that can generate the greatest conservation benefits. Until

recently, few broad-scale assessments were available to help guide conservation priorities in general and biodiversity values in particular. The Nature Conservancy's ecoregional assessments and other statewide and regional conservation planning efforts now provide useful information for many areas. The state wildlife conservation strategies that were completed nationwide in 2005 under the State Wildlife Grants program could provide the public policy foundation for more effective targeting of incentives in the future.

Which type of incentive or mix of incentives are most appropriate to address any particular conservation need will vary, depending on the type of land-use activity (e.g., agriculture, forestry, suburban, etc.), land ownership and the mix of ecological attributes on

the land. In areas where high-quality natural habitats still exist, incentives to encourage continued conservation will be the most effective mechanism. The potential to restore native habitats or modify production practices will vary significantly by land use activity. There are also significant differences in the conservation values and preferred strategies in different parts of the country and among individuals.

Program flexibility is important in applying and combining individual incentive mechanisms at the landowner level. Landowners vary widely in the physical characteristics of their lands, their financial needs and their willingness to cooperate with conserva-



Federal conservation agent and farmer, Pennsylvania | Natural Resources Conservation Service

tion partners. Disparate conservation programs, each with a complex set of incentives and participation rules, are less effective and efficient than a flexible conservation program that offers several incentive mechanisms to choose from and combine (Batie and Ervin 1999).

Especially in the current political and fiscal climate, public funding for landowner incentive programs is limited, so public-private partnerships tapping a broad range of funding sources may be the most practical approach to biodiversity conservation. State and local programs will need to complement federal and private incentive programs. Some “perverse incentives” like subsidized crops and export subsidies can inadvertently cause habitat loss and may need to be reduced or eliminated to save taxpayer dollars and reduce ecological damage.

If society demands greater efficiency in the use of conservation funding, there may be support for more performance-based incentive programs.

Public financial assistance to achieve public benefits would be based on the actual physical outcomes that landowners accomplish: improved water quality and aquatic habitat, restored terrestrial wildlife habitat, less soil erosion and other ecological benefits. However, performance-based systems will require defining specific goals or performance levels to be achieved, developing the indicators to measure progress towards those goals, and implementing an effective and efficient monitoring system to measure actual performance. These tasks, while necessary, are not technically easy— and are expensive.

Defining a More Successful Approach

Defenders of Wildlife has established in very general terms criteria for effective habitat programs (Hummon 2005). These criteria can be summarized as follows: *Effective incentive programs focus on habitat and multiple native species, rather than taking a*

single species approach. Implementation is strategic, based on clearly defined statewide or regional ecological goals. Program implementation is tracked, biological outcomes are monitored, and adaptive management allows for adjustments to improve achievement of program goals. Effective incentive programs are also administered well. Partnerships and coordination leverage limited resources, fill gaps and prevent duplication. Adequate funding and technical assistance are critical. Programs need to be accessible to landowners, including more efficient application processes and realistic timelines.

Most conservation incentive programs currently fall far short of these ideals, but our examination of existing incentives suggests a powerful potential still waiting to be tapped. We hope this report will help bring some clarity to this complex issue and provide a framework for more creative thinking about the ways incentives can be used to advance biodiversity conservation in the 21st Century.

II. The Importance of Biological Diversity: The Context for Conservation Incentives

This section lays the groundwork for a discussion of landowner incentive mechanisms and programs. It discusses why conserving the biological heritage of the United States is important; the rationale for using a combined approach of regulation, acquisition and incentives to increase conservation effort; and the physical, institutional and administrative context in which stewardship incentives are likely to be successful. The context includes the scale of conservation effort, the use of conservation planning, flexibility and adaptive management, and the design of incentive mechanisms in recognition of land use intensities.

Importance of Biological Diversity

An essential step in describing the importance of biological diversity is to first define what biological diversity, or biodiversity, is. The definition of biodiversity used in this report is: “The variety of living organisms considered at all levels of organization, including the genetic, species and higher taxonomic levels, and the variety of habitats and ecosystems, as well as the processes occurring therein” (Meffe and Carroll 1997). The inclusion of “ecosystems” in the definition is especially important, because it is widely recognized that ecosystems provide “services” that benefit humans— reflecting a mutual interdependence of life at all levels.

Biodiversity can be described at four interactive levels: genetic, species, community/ecosystem

and landscape/regional (Wisconsin Department of Natural Resources 1995). All of these levels of biodiversity require conservation effort. Because the approach towards biodiversity conservation in this report is applied in the context of land use, we define biodiversity conservation as maintaining native plants and animals and the communities and ecosystems in which they occur (Vickerman 1998).

Two types of values are associated with conserving our biodiversity heritage. Callicott (undated) has described these values as intrinsic and instrumental. The value of something in and of itself, or, as an end in itself, is intrinsic value. The value of something as a means to an end is instrumental or utilitarian, that is, useful for achieving some anthropocentric goal such as food consumption.

Intrinsic and instrumental values are both important reasons to conserve our biodiversity heritage. Instrumental values include enhancement of appreciation and aesthetic enjoyment of nature, support for the integrity of ecological systems and services on which humans depend, the provision of resilience in the face of environmental stress, and the supply of food, medicines and other goods from living plants and animals. Species and habitats also make economic contributions to human livelihoods through the provision of natural resources (e.g., soils, forage, lumber, etc.) as well as for ecosystem services including flood control,

water filtration, carbon sequestration and pollination, to name just a few. The Organization for Economic Cooperation and Development (1999) has described the importance of biodiversity in instrumental terms as an asset for present and future generations— as a basis for sustainable development, including the provision of food, energy, raw materials, industrial chemicals and medicines, as well as for important social and cultural benefits.

The literature analyzing and quantifying the benefits of species and habitat/ecosystem restoration and protection is large and growing.² For example, Costanza et al. (1997) estimated worldwide ecosystem service benefits at about \$16 to \$54 trillion per year, with an average estimate of \$33 trillion per year. Other studies relate to individual species or local areas. In a study of sea otter recovery, Loomis (2004) estimated combined public and private benefits to the economies of several California counties to be about \$172 million per year. Using conservative estimates, research by Defenders of Wildlife (2004) on designating critical habitat for the Canada lynx showed that gross benefits ranged from \$2.5 to \$19.2 million per year in local communities and from \$34 to \$256 million per year at the national level. Kroeger (2005) has estimated that ecosystem service benefits derived from protecting natural lands in four counties of northern Florida amount to about \$3.2 billion per year.

2. An extensive reference list on resource valuation is available at Defenders' website for conservation economics at www.biodiversitypartners.org/econ/pub.



Common egrets | U.S. Fish and Wildlife Service

The Rationale for Incentives in Conserving Biodiversity

The conservation of intrinsic and utilitarian values associated with biodiversity will require the cooperation of private landowners, with participation enhanced through incentive mechanisms. There are three major reasons why the role of private landowners and incentives are important: the location of listed and at-risk species, the need for conservation tools that are complementary to regulation and the lack of markets for public goods like species and habitat conservation.

Listed Species Distribution and Land Ownership and Fragmentation

Eighty-five percent of the species listed as threatened or endangered by the federal government are in that condition, at least in part, because of the loss or degradation of the habitats they need to survive (Wilcove et al. 1998). Although the federal government owns and/or manages more than 30 percent of the nation's land area, federal lands support only about 33 percent of known populations of threatened and endangered species (Groves

et al. 2000). Thus, 67 percent of the known populations of threatened and endangered species occur either in aquatic habitats or on the 1.485 billion acres of non-federal lands. At the species level, Hudson (1993) noted that about 50 percent of the species listed as threatened or endangered (728) were found exclusively on private lands.

Private agricultural, forestry and other rural lands are an extremely important component of non-federal lands, with 92 percent used for private crop, forestry and/or livestock production. In 2001, land in agricultural production accounted for almost 50 percent of all land in the contiguous 48 states and comprised 401 million acres of cropland, 522 million acres of pasture and range land and 405 million acres of forest land. About 34 million acres of cropland are currently idled by the U.S. Department of Agriculture's Conservation Reserve Program. With so many threatened and endangered species occurring solely on private rural lands, the identification of effective and efficient incentive mechanisms and the implementation of effective

landowner conservation incentive programs are crucial.

Private agricultural land use and management have contributed significantly to the decline of biodiversity conservation in the United States. Over time, habitat loss associated with modern farming methods on more than 400 million acres of cropland brought about dramatic reductions in many wildlife species in North America (Wildlife Management Institute 1995; Risley et al. 1995). In 1995, nearly 84 percent of 663 plant and animal species inhabiting the contiguous 48 states were listed as threatened or endangered because of agricultural activities. Specifically, 272 species (41 percent) were listed exclusively due to agricultural development, 115 (17 percent) because of fertilizer and/or pesticide use and 171 (26 percent) due to grazing (Lewandrowski and Ingram 1999).

There are increasing threats to biodiversity conservation in the United States, primarily through uncontrolled conversion and fragmentation of land to uses (mostly urbanization) that have little or no

habitat value. Over the five-year period of 1992 to 1997, there was a combined loss of nearly 20 million acres of rural lands, as represented by diminishing cropland, grassland, range, pasture and forested land categories. Those lands that are the most suitable for the maintenance of native biodiversity and ecosystems (grassland, range and forest land) accounted for three-fourths of the decrease or about 15 million acres. Part of this loss was offset by the increase in special recreation and wildlife use lands (federal and state parks, wilderness areas and wildlife refuges) of 9 million acres. Nonetheless, from 1992 to 1997, there was a net loss of about 11 million acres of rural lands, posing a significant risk to biodiversity conservation. Most of this loss may be attributed to increasing sprawl and urbanization and the conversion of land to uses that are unsuitable for supporting species and their habitats. For example, between 1997 and 2001, almost 9 million acres of rural lands were developed—46 percent of which were forest land, 20 percent cropland, 15 percent rangeland and 16 percent pastureland (Natural Resources Conservation Service 2003 need reference). Combined, forest land and rangeland conversion accounted for about two-thirds of the growth in developed land from 1997 to 2001. These trends continued through 2003. An important condition for the successful application of incentive mechanisms for biodiversity conservation will be to implement more effective land-use and development policies.

Complementing Regulation With Incentives

The Endangered Species Act of 1973 is the United States' principal regula-

tory mechanism to halt biodiversity loss. The law prohibits the taking of native plants and animals threatened with extinction and protects their habitats. One of its fundamental tasks is to bring about the recovery of species, which is achieved in many cases by the protection and restoration of habitat on private lands (Goldstein and Heintz 1993). In the name of a public good (e.g., health, safety), certain types of land use and practices have been banned (Claassen et al. 2001). Regulation can be a very effective tool, provided there is enforcement. Unlike policy choices in which landowner participation may be uncertain, regulations

“An important condition for the successful application of incentive mechanisms for biodiversity conservation will be to implement more effective land-use and development policies.”

require participation. The major disadvantage of regulatory requirements is that they have the least amount of flexibility, often requiring landowners to adopt specific practices or technologies. This approach is less efficient than setting conservation goals and performance standards, because it doesn't target low-cost producers of environmental benefits.³

Conflicts over land use and economic activity have occurred with implementation of the Endangered Species Act, and relying solely on the regulatory approach may only increase these conflicts (Goldstein and Heintz 1993). Under the act, some landowners feel they are being asked to carry the primary responsibility

for endangered species recovery while the public at large enjoys the benefits. Although landowners share in the benefits from species conservation, they cannot realize potential economic benefits from doing so unless institutional arrangements are created to do so (Hudson 1993).

A purely regulatory approach may miss conservation opportunities and can engender unnecessary opposition to species and habitat protection (Brown 1999). Goldstein and Heintz (1993) point out, “There is growing evidence that the approach adopted in the act is making the achievement of these conservation goals more costly and more controversial than

need be. The act relies on regulatory authority and civil penalties to prevent the degradation or destruction of the habitat of listed species, making little if any use of positive economic incentives to induce conservation. Since regulatory constraints can prevent private landowners from realizing commercial uses of their land, it is not surprising that they frequently resist the imposition of habitat conservation measures needed to support listed species” (p. 51). Within the context of the act's regulatory framework, there are now voluntary institutional incentives that provide landowners with a level of regulatory certainty in exchange for the conservation of wildlife habitat and species.⁴

3. A performance standard sets a benchmark or outcome level and allows those who are required to achieve this outcome to do so in the best, least-cost way they can. One of the challenges for biodiversity or wildlife habitat “outcomes” is the difficulty in defining what a suitable outcome is and developing the indicators to measure those outcomes. These issues are discussed in more detail in Section XI.

While economic activities can result in habitat and species loss or degradation, McKinney et al. (1993) observe that “economic and market forces do not have to act counter to our national goal of endangered species preservation. These forces can complement the regulatory approach to conserve and restore endangered species and biodiversity. A system of economic incentives, both positive and negative, can begin to translate the broader values of biological conservation into prices. Economic activities that conserve or restore valuable habitats or species can be encouraged through lower costs or higher returns. ...Those with valuable biological resources on their land can be rewarded for conservation or restoration efforts and integrating habitat protection with sustainable economic activities. ...There is a need to translate the public social value of conservation into financial incentives for private landowners to invest in and manage lands for biodiversity” (p.1).

In light of the conflict arising from land-use regulation, the certainty that population growth and economic development will exacerbate the pressures on species and habitat, and the growing economic costs of species preservation, it seems useful to discuss the means to use incentives to promote private conservation efforts. According to Goldstein and Heintz (1993, p. 52), “Two principal objectives are important in the application of incentives to conserve biodiversity: (1) Inducing private landowners to participate voluntarily in conservation efforts, and (2) reducing the costs of species and habitat conservation.”

A system of flexible incentives, in the context of well-defined

environmental goals or performance standards, is the most promising approach (Casey et al. 1999). Voluntary flexible incentives can have three complementary advantages: they reduce resistance to regulation, they provide value to landowners for supplying important non-market

“The right incentive mechanisms can encourage changes in land-use patterns that achieve habitat objectives at lower cost.”

social benefits associated with biodiversity conservation (Brown 1999), and they encourage increases in conservation effort. The right incentive mechanisms can encourage changes in land-use patterns that achieve habitat objectives at lower cost. Incentives may also induce innovations in habitat conservation and in the techniques employed in managing land for commercial uses that allow some habitat objectives to be met (Goldstein and Heintz 1993).

Regulation, acquisition and incentives are necessary ingredients in a successful strategy of balancing biological effectiveness with economic efficiency to conserve biodiversity. Section III provides some basic descriptions of regulatory programs that define the institutional boundaries within which voluntary incentives can be effective.⁵

Private Lands and Public Goods

From the perspectives of economics and law, wildlife species, biodiversity and ecosystem services are pub-

lic goods. Public goods are defined via two predominant characteristics: non-exclusiveness and non-rivalry. Non-exclusiveness is the inability to exclude those who benefit and do not contribute, or those who impose costs, but do not pay (Randall 1999). Non-rivalry means that there

are no additional costs for providing a good to additional users once a particular amount of the good has been provided (Randall 1999). Classical examples of non-exclusiveness and non-rivalry are the benefits provided by a national army and the warning services provided by lighthouses. The non-rivalry and non-exclusive nature of public goods result in what is commonly termed “market failure.” Market failure exists when there is an inability of private markets to provide certain goods, either at all or in “optimal levels” (Pearce 1989). In legal terms, wildlife species and the ecosystems in which they exist are characterized by *res nullis*, “a resource owned by no one.” The combination of no ownership and market failure for environmental goods has resulted in a situation where, except for an individual landowner’s own private valuation, there are few perceived economic benefits from restoring or conserving species and their habitats that are commensurate with other land uses (e.g., crop agriculture,

4. These voluntary institutional incentives are Safe Harbor and Candidate Conservation Agreements with Assurances. Both are described and analyzed in Section V.

5. Although critically important for the success of conservation efforts, “perverse” incentives or policies that encourage destruction of wildlife habitat, either directly or indirectly (e.g., logging and mining policies on federal lands, mortgage deductions, absence of taxes on new infrastructure, etc.), are not treated in this report. Brown (1999) has noted that eliminating perverse subsidies that encourage environmental degradation would have a significantly positive impact on the environment and be fiscally prudent (p. 480).

ranching, forestry or development) that have readily available private markets. The fact that these same public goods are provided from a physical base (land) that is privately owned and valued for attributes unsupportive of biodiversity further complicates matters.

Although private markets have a role, it is not feasible, nor desirable, to rely primarily on them for the preservation of biodiversity and species habitat (Goldstein and Heintz 1993). First, biodiversity is a public good that is intrinsically valuable and requires protection. Second, many critical conditions necessary for markets to function properly can't always be fulfilled for biodiversity or ecosystem service resources. However, this does not mean that private market incentive mechanisms cannot be selectively employed and structured to achieve sustainable biodiversity conservation. Private market incentive mechanisms for landowners can be used to achieve biodiversity protection or to enhance ecosystem services through reduced compliance costs and/or new profit opportunities (e.g., ecotourism, ecolabeling, tradable development rights, etc.). Under some circumstances, quasi-private market institutions can be developed for landowners to capture some economic value of the public conservation benefits they provide.

The public goods of biodiversity and habitat conservation must be recognized in order to develop and apply incentive mechanisms. Since ecosystem services comprise, for the most part, non-market public goods, it becomes incumbent upon policy makers to provide conservation incentives to private landowners to “supply” these services.



Cypress bay, Georgia | Natural Resources Conservation Service

Framework for Biodiversity Conservation and Incentives

A framework of four components is essential to successfully understanding the importance of biodiversity conservation and using incentives to achieve conservation goals: scale and context, conservation planning, flexible implementation and adaptive management, and multiple conservation strategies across various land uses (Vickerman 1998). These are necessary conditions for the identification of appropriate incentive mechanisms and effective and efficient implementation of incentive programs.

Scale and Context

Vickerman (1998, p. 7) says that “Effectively conserving biodiversity requires an approach that considers both scale and context. Scale refers to both time and space. ... Context refers to the biotic composition of the surrounding region and the activities taking place on adjacent lands.” Spatial scale is important because there may be a minimum geographical area in which a species or ecosystem can function effec-

tively. The temporal scale is equally important because some ecological processes may require long-term time frames in order to remain biologically functional. Both the time and geographical scale and the context requirements facilitate what ecologists refer to as the “three R’s” for maintaining sustainable, healthy ecosystems: representation, resiliency and redundancy (Shaffer et al. 2002)

Conservation Planning

Biodiversity conservation planning addresses the need to prevent the loss of native species and habitat and to sustain the conditions that allow diverse plant and animal communities to survive and thrive over time. Targeting habitats for protection and restoration requires that these habitats first be identified, mapped and prioritized. Several national and state planning initiatives to achieve this objective have been implemented over the past few years. For example, initial planning efforts have taken place in Florida (Cox et al. 1994), Oregon (Defenders of Wildlife 1998) and Massachusetts (Commonwealth of Massachusetts 2001).

Oregon and Florida have identified land areas, including those in agricultural production or ownership, necessary to maintain natural community types. The Florida Game and Freshwater Fish Commission published a comprehensive habitat conservation plan for the state (Cox et al. 1994). The commission documented that some 4.82 million acres of private lands (13 percent of the state's land area), much of it in agricultural production, would need to be kept in their current natural or semi-natural condition to achieve comprehensive conservation of the state's at-risk native species. A similar planning exercise in Oregon identified 25 percent of the state's land area as important for habitat conservation (Defenders of Wildlife 1998). This land area includes the existing network of public and private lands dedicated to conservation (e.g., wilderness areas, parks, refuges, etc.) and 42 new "Conservation Opportunity Areas." The new areas were selected by evaluating the overall distribution and status of vegetation types, species at risk, aquatic diversity and other factors. As in Florida,

the Oregon project found that selected private lands will be essential to achieving comprehensive conservation goals. More than 31 percent of the land in Oregon's Conservation Opportunity Areas is in private ownership, much of it in some form of agricultural production.

Federal funding for state-based wildlife conservation plans (now referred to in many states as state wildlife action plans) was authorized through Title VIII of the 2001 Interior Appropriations Act and Title IX of the 2001 Commerce, Justice and State Appropriations Act. The annually appropriated State and Tribal Wildlife Grants program is designed to assist states and tribes in conserving wildlife species not covered by hunting and fishing fees or by endangered species appropriations. In order to receive funding, each state was required to develop a comprehensive wildlife conservation plan by October 2005. The objective of these plans is to identify and address the broad range of state wildlife and associated habitats in a comprehensive fashion. Special emphasis is placed on "species of greatest conser-

vation need" to prevent the need for further listings under the Endangered Species Act (The Biodiversity Partnership 2005). All states have now completed their wildlife action plans, which can serve as a strategic framework for conservation projects and investments throughout each state. All state plans were reviewed by Defenders' staff (Lerner et al. 2006) and found to be generally adequate (with a few excellent examples), but further work is needed in the areas of setting conservation goals, producing focal area maps, prioritizing conservation actions, agency and policy coordination, and developing monitoring systems.

Under conditions of scarce public resources, planning becomes essential in order to efficiently target those species and habitats that need to be conserved. Furthermore, planning that appropriately considers scale and context can benefit landowners in a variety of ways. Just knowing where conservation needs to take place provides an informational benefit to landowners and lends some certainty to their land-use decisions (Vickerman 1998). There are potentially



Prairie pothole wetlands, South Dakota | Natural Resources Conservation Service

significant cost savings in designing incentive mechanisms and programs to protect or enhance habitats if they target lands based on identified need for protection. The ability to target valuable habitat areas for protection requires that conservation programs be flexible enough to account for different species, habitats and activities in different parts of the country (Lewandowski and Ingram 1999). The conservation areas or habitats identified in the state wildlife action plans can serve as the explicit goals to which incentives can be targeted.

In summary, conservation planning can increase the biological effectiveness and economic efficiency of public and private financial resources and incentive mechanisms. One counter-balancing issue is that planning exercises can also add to the costs for private landowners. In the public realm, planning and targeting may result in changes in the distribution of incentive benefits and will thus raise social equity issues. This is especially a concern for U.S. Department of Agriculture Farm Bill conservation incentive programs that are voluntary in nature and where substantial funding is allocated more or less evenly across the states.

Flexibility and Adaptive Management

The condition of individual species, and the habitats and ecosystems of which they are a part, are dynamic and stochastic in nature. For biodiversity conservation to be successful, the challenge is to implement flexible and dynamic management approaches that integrate conservation goals through economic and social interests (Vickerman 1998). It is therefore important that habitat restoration and conservation plans, and the incentive mechanisms to

achieve plan objectives, have a degree of flexibility in order to respond to unforeseen physical, economic or legal events that could harm conservation efforts. The process of adaptive management is one means to deal with dynamic environmental changes and the uncertainties that species and their habitats are subject to over time. Brunner and Clark (1997) define adaptive management as a practice-based approach by which actions are implemented, monitored and refined as new information becomes available. The principle of adaptive management recognizes the importance of incorporating new information, that our knowledge about how ecosystems function is incomplete, and that we must monitor actions to determine whether conservation goals are being met (Vickerman 1998).

It is not only important to have agency flexibility in the implementation of conservation and restoration plans, it is also necessary that landowners have flexibility with respect to the types of incentive measures they can access and management practices they employ in meeting the goals of conservation plans. Because land is used in varying degrees of intensity, there is need for a variety of incentives to promote habitat protection and restoration either permanently or as part of the working agricultural landscape. A flexible approach to incentives recognizes that the social and economic factors that influence habitat-conservation decisions are not the same for all producers, or in all parts of the country. Rather, an array of public and private incentive mechanisms is required to provide a level of flexibility within which many individuals may find a combination of features that suit the physical and economic conditions of their operation. With

respect to conservation management practices, landowners need flexibility to design, test and implement new agro-environmental technologies and management practices that are appropriate to local environmental and economic conditions.

Incentives and Multiple Land-Use Categories

The incentive mechanisms discussed in more detail in the following sections can be selectively applied via a three-part strategy corresponding to land-use intensity and alternative production systems.

First, some private lands may be relatively untouched and still maintain a large portion of native biodiversity and ecosystem functions. Accordingly, one conservation strategy would select incentive mechanisms to maintain intact remnant habitats such as conservation easements or long-term stewardship agreements.

Second, the intensity of use on other private lands may be fairly low over time, allowing for the possibility of restoring some species and ecosystems. This type of landscape may require cost-share incentive mechanisms for restoration and some type of permanent protection to follow up.

Lastly, private lands may have been substantially modified to support the current production system. Thus, a third strategy would focus on minimizing production impacts on native species and habitats. Each of these strategies will necessitate a different mix of incentive mechanisms requiring a balance between land conservation programs and incentives for alternative production practices. The most effective mix of incentive measures will depend on the types of land use and ownership patterns and the viability of the economic enterprises practiced (Vickerman 1998).

III. Methods For Evaluating Incentive Mechanisms: Taxonomy, Assessment and Recommendations

This section presents the methods used in evaluating individual incentive mechanisms. First, we developed a taxonomy of conservation incentives to serve as a framework for describing and assessing individual incentive mechanisms in a logical and comprehensive manner. The taxonomy is structured with a socio-economic perspective, because it provides a comprehensive approach to examining choice behavior. The taxonomy developed in this section serves as the organizing tool for the more in-depth assessment of individual incentive categories in Sections IV through X. After presenting the taxonomy of incentive mechanisms, we lay out some general criteria for assessing and providing recommendations for the various incentives in the sections that follow.

A Taxonomy and Description of Incentive Mechanisms

An incentive mechanism is defined as any type of instrument that is designed to encourage a change in behavior. In this case, it is behavior (induced or voluntary) that is associated with biodiversity conservation. Incentives provide a series of economic messages to private landowners that convey the value of the biological habitat they may own (McKinney et. al 1993). The right combination of regulatory prohibitions and incentives could more effectively guide private landowners to make socially beneficial decisions about the way they use their lands to support habitat for endangered and imperiled species.

A broader definition of incentive used for the purposes this report is any policy, program, institution or economic instrument that motivates landowners to conserve and/or restore native species and habitat/ecosystem functions on their land. Behavior may be induced through regulatory “*disincentives*” that discourage harm to at-risk species and their habitats and through the imposition of some type of penalty for doing so. Landowners may also choose to voluntarily participate in public or private economic incentive programs that support conservation and restoration

activities. Both types of incentives are required to effectively prevent at-risk species from becoming extinct and to ensure their recovery (Batie and Ervin 1999; Segerson 1999; Swinton and Casey 1999).

There is a wide array of voluntary incentive mechanisms currently in use to achieve, either directly or indirectly, biodiversity conservation on private lands. Although this section describes individual incentive mechanisms, many conservation *programs* employ several incentive measures simultaneously to attain conservation goals. For example,



Testing water quality | U.S. Fish and Wildlife Service

easement programs include three types of incentive mechanisms: the creation or redistribution of a property right (legal innovation) that defines an easement, the actual financial payment associated with an easement contract, and frequently some type of public tax advantage in creating the easement. Because each of these mechanisms may have different implementation requirements and distributional consequences, they are considered separately.

An incentives taxonomy to conserve wildlife habitat can be defined by any number of categories. Incentive measures range from regulatory approaches and environmental taxes to voluntary mechanisms that include technical assistance, public subsidy or cost-share programs, or private-market approaches.

Claassen et al. (2001) describe a variety of incentives to encourage conservation behavior that are available to policy makers. These are broadly categorized as information dissemination tools, economic incentives and regulatory requirements. Important differences among these categories are defined by the degree to which landowner participation is voluntary, the role of government and the nature of the land-management decision targeted. A policy can be designed to influence landowner choices about how much and which land to farm for economic purposes. Or, it can target decisions about how the land is managed using conservation practices.

Incentive-based policies can provide positive inducements designed to encourage beneficial activities for species and their habitats or negative inducements (e.g., taxes, fees, etc.) designed to discourage activities harmful to species or their habitats. Positive incentives come in the form of landowner payments, risk

reduction or the creation of private market opportunities.

Heimlich and Claassen (1998) define a taxonomy of incentive mechanisms consisting of four categories: involuntary regulatory *disincentives*; voluntary, non-regulatory economic incentives; institutional innovations that provide the market, legal and planning authorities to enhance resource conservation; and facilitative incentives that ease the implementation of economic incentives and/or new institutions (e.g., administrative coordination, educational programs, technical assistance, etc.).

Brown (1999) utilizes an expanded taxonomy of incentive “tools” that is comprised of six categories: property rights tools, tax policies, incentive-based tools, private-public partnerships, government programs and voluntary initiatives. Property

however. Public-private partnerships cover institutional arrangements like safe harbor agreements. Market-oriented tools include tradable development rights, mitigation banking and conservation banking.

Finally, Batie and Ervin (1999) have developed a typology of flexible incentives that defines categories of both voluntary incentives and economic disincentives. Flexible incentives are defined as environmental management tools that specify objectives but do not dictate how the environmental objective is to be achieved. In order for flexible incentives to be effective, a performance standard or outcome (for example, achieving a specific level of water quality or habitat or species restoration) needs to be defined. A performance standard specifies *what* needs to be accomplished, but not

“Positive incentives come in the form of landowner payments, risk reduction or the creation of private market opportunities.”

rights tools refer to conservation easements, covenants, deed restrictions, conservation agreements, and land exchanges and trusts. Tax policies include property, income and estate tax allowances. Incentive-based tools are inclusive of all types of “market” mechanisms to allow landowners to capture the benefits of providing a public environmental good. These mechanisms are represented by user fees, ecolabeling, green investments and environmental contracts. Not all of these are aimed at the individual landowner,

the exact means (technologies or management practices) to be utilized in attaining the standard. The Batie/Ervin typology uses the following classification of incentives/disincentives: charges/financial penalties (effluent, ambient, input or habitat/species modification), subsidies, educational and technical assistance, compliance rewards, deposit refunds, marketable permits, ecolabeling, performance bonds, contracts and assigned liability. Subsidies include tax allowances, cost sharing, low interest loans and grants.

The taxonomy developed in this report offers a new perspective but also draws on some elements of the approaches described above. The primary difference is that our broad definition of institutional incentive mechanisms covers market and non-market institutional innovations. We also include both public and private incentive mechanisms. Public incentives are comprised of regulatory and economic *disincentives*, institutional innovations, financial payments (including tax allowances), education and technical assistance, administrative and organizational structures, and

ments, these incentives are generally available through both the public and private sectors. Some conservation incentive programs discourage the use of environmentally sensitive land in production. Other programs focus on financial assistance to change production practices or restore habitats. Education and technical assistance help landowners improve environmental performance, with or without financial incentives. To be eligible for these and other conservation program payments, however, landowners in the agricultural sector must frequently meet minimum standards set out

“...to ensure that an incentive mechanism continues to be biologically effective, there must be outcome- or performance-based evaluation and adaptive management systems in place.”

recognition programs. For the purposes of this report, tax allowances are treated as a financial incentive, even though they are frequently applicable only to specific types of easements.⁶ Private market incentives overlap with public incentives and include easements, user fees, ecotourism, ecolabeling, habitat permit trading, and compensation, insurance and recognition programs.

The major categories of voluntary stewardship incentives include institutional innovations, financial payments, facilitative incentives related to education, technical assistance, conservation program administration and landowner recognition programs. With the exception of some institutional innovations, tax incentives and selected kinds of financial instru-

through the compliance measures previously described. Most of these incentives are available to interested landowners who meet minimum standards rather than being targeted to the highest conservation priorities.

Each of the major incentive categories is discussed in the sections that follow (see Table 1, p.21 for a summary). Regulatory and economic disincentives are covered in Section IV. Institutional innovations, property rights and market-oriented institutions are assessed in Sections V, VI and VII, respectively. Financial incentives are discussed in Section VIII, and section IX covers tax incentives. Section X is dedicated to “facilitative incentives,” which includes the topics of education, information, technical assistance, administrative reform and recognition programs.

Criteria for Assessing the Effectiveness and Efficiency of Incentive Mechanisms

This section discusses two main criteria for evaluating incentive mechanisms in the sections that follow: biological effectiveness and economic efficiency.⁷ This is an “initial” assessment in the sense that ecological monitoring and evaluation information for assessing most incentive mechanisms does not exist. This is clearly a gap in our knowledge that needs to be remedied. As Wilcove and Lee (2004) have observed in the specific case of safe harbor agreements, a major constraint to a full assessment is the lack of a database on endangered species management actions and associated incentive types.

With respect to biological goals, there are several criteria that determine whether or not a particular incentive mechanism is effective. First and foremost is whether an incentive mechanism has contributed to the long-term, sustainable conservation of wildlife or habitat. The second criterion is whether the mechanism is targeted to individual species or more broadly to protect priority habitats. Both species and habitat approaches have a role to play. The third criterion is the extent to which incentive mechanisms target large or small landowners, and lands in agricultural production or intact natural areas. Depending on the species or habitats to be conserved, flexibility requires that both types of landowners be eligible for incentives. A fourth criterion is whether or not there is a habitat or biodiversity management plan that stipulates conservation goals and guides landowner conservation decisions. Fifth, biological effectiveness is also determined by the capacity of technical assistance to deliver

6. Deposit refunds, assigned liability and performance bonds incentives have not yet been developed or utilized for the conservation of wildlife habitat or species and are not included in this report.

7. Equity, or the way that costs and benefits associated with particular incentive measures are distributed among affected groups, is extremely important from a public policy perspective. Relevant conditions include whether incentives are targeted or open to all landowners and whether they should be delivered to primarily small or large landholders. Although some examples of equity impacts are illustrated in this section, a lack of prior analysis prevents us from fully investigating the equity dimension in this report.

incentive programs and outreach to landowners. Last, to ensure that an incentive mechanism continues to be biologically effective, there must be outcome- or performance-based evaluation and adaptive management systems in place. Furthermore, biological (technical) indicators on which to base a performance-based incentive system must be defined and measured.

Broadly speaking, the criteria for economic efficiency include cost-effectiveness and the level of transaction costs. Cost effectiveness refers to the attainment of the greatest ecological benefit (biological effectiveness) at the least cost. Transaction costs occur at two levels. They occur at the individual landowner level for information search and accessing, implementing, or evaluating incentive mechanisms. At the public or program level, transaction costs comprise the expenses to administer a particular incentive mechanism. The conditions that affect whether an incentive mechanism is efficient include the cost of management practices, the cost of delivery of incentive mechanisms to landowners, the degree of coordination among incentives, how incentive tools are financed and what secondary economic impacts stewardship incentives may result in. From the standpoint of efficiency, economic incentives may allow landowners greater flexibility than regulatory approaches, as long as conservation goals are clearly stated. Landowners can weigh the costs and benefits of particular incentive mechanisms in achieving a target conservation goal or other financial goals. Whether a specific incentive mechanism is efficient will also depend on the agro-environmental setting and details of program design (Claassen et al. 2001).

Table 1. A Taxonomy of Conservation Incentive Mechanisms

Type of Incentive	Public	Private	Section in Report
Regulatory & Economic Disincentives			IV
Government Regulation	X		
Conservation Compliance	X	X	
Financial Charge/Penalty	X	X	
Voluntary Incentives			
Institutional Innovation			V
Legal/Statutory	X		
Safe Harbor	X		
Candidate Agreements	X		
Regulatory Relief	X		
Property Rights			VI
Conservation Easements	X	X	
Covenant and Deed Restrictions		X	
Stewardship Exchange Agreements	X		
Market Oriented Institutions			VII
User Fees	X		
Eco-Tourism	X	X	
Ecolabeling and Certification		X	
Mitigation Banking	X	X	
Conservation Banking	X	X	
Tradable Development Rights	X	X	
Financial Incentives			VIII
Compensation Programs	X	X	
Cost-share Incentives	X	X	
Land and Water Leases	X	X	
Conservation Contracts	X		
Debt Forgiveness	X		
Insurance	X	X	
Public Tax Incentives			IX
Income Tax Incentives			
Property Tax Incentives			
Estate Tax Incentives			
Facilitative Incentives			
Education, Information and Technical Assistance	X	X	X
Administration and Organization	X		X
Recognition	X	X	X



Federal conservation agent and rancher, Hawaii | Natural Resources Conservation Service

There will always be tradeoffs between attempting to simultaneously maximize biological effectiveness and economic efficiency. For example, conservation subsidies like cost-share agreements may encourage landowners to expand production into areas away from critical habitat for one species but may result in threats to other species in expansion areas. Conservation easements encourage landowners to reduce production area, which may only be possible for large landowners.

Despite tradeoffs, there are some general characteristics of incentive mechanisms that will facilitate the joint achievement of effectiveness and efficiency. One characteristic is that an incentive mechanism should provide greater rewards to landowners who conserve more or higher quality habitat. In other

words, incentives should be geared to reward better performance. Second, an incentive mechanism should be continuous and responsive (i.e., flexible) to the quantity and quality of habitat over time. Third, incentive mechanisms for a given ecological area and landownership pattern should encourage activities that will reduce the total cost of providing the habitat needed to support viable populations. Lastly, incentive mechanisms that provide landowners new techniques to provide high quality habitat at less cost should be promoted. To achieve these objectives, there is a need for on-going research and adaptive management.

Other conditions for achieving conservation effectiveness through incentive mechanisms have been identified by Wilcove and Lee (2004, p. 644). “First, the habitat require-

ments of species to be protected must be reasonably well known; second, the habitat itself must be restorable without excessive cost of effort; third, the habitat must be restorable relatively quickly.” This last condition is particularly relevant to safe harbor incentives because although the participating landowner is not obligated to protect restored habitat permanently, the U.S. Fish and Wildlife Service must be satisfied that temporary protection will result in a net benefit to the species (Wilcove and Lee 2004).

The most frequent evaluation criteria that are employed by both the public and private sectors to indirectly determine the effectiveness or efficiency of incentive mechanisms are landowner participation rates and agency allocation of funding. These data include the number of partici-

pants or acres in various conservation programs and the surplus demand for a particular conservation program as measured by the backlog of qualified applications that exceed available funding. However, actual and potential program participation may have less to do with effectiveness and efficiency of a particular incentive mechanism and more to do with financial or environmental compliance requirements of individual landowners, or effectiveness of outreach or technical assistance.

Public incentive mechanisms for wildlife or habitat restoration and conservation are numerous and have been described in previous documents prepared by Defenders of Wildlife.⁸ Nearly all financial (cost-share, land rentals, tax benefits) and educational/technical assistance incentives for ecosystem restoration are offered by state and federal agencies. Most of these programs are not directly aimed at biodiversity conservation but can and do have positive impacts on habitats in particular ecosystems.

There is hardly any research available that assesses the effectiveness or efficiency dimensions of public or private conservation incentive mechanisms. For example, at the public level, most of the assessment work that exists has been done for the U.S. Department of Agriculture's Conservation Reserve and Wetland Reserve programs.⁹ However, as stated earlier, success has been mostly defined by the number of acres and landowners enrolled in a specific conservation program and the type and number of management practices being implemented. There have thus far been no direct measures of biological performance with respect to specific incentive mechanisms or programs.

Implementing and Structuring Conservation Incentives

This section provides general structural recommendations that will facilitate the achievement of the criteria discussed above. Recommendations are provided at two levels. We provide specific recommendations with respect to improving the technical effectiveness and economic efficiency of selected individual incentive mechanisms. The second level is more general and defines the structural or *programmatic* conditions under which specific incentive mechanisms can be more effective.

Structural *program* conditions for success are broader in nature

“There is hardly any research available that assesses the effectiveness or efficiency dimensions of public or private conservation incentive mechanisms.”

and refer to the delivery apparatus and structure of a particular incentive, or package of incentives. These structural program conditions include goal setting, planning and targeting to priority biodiversity and wildlife habitats, technical and administrative capacity, scale of land ownership, incentive funding levels, meeting geographic and temporal requirements, incentive policy consistency, and monitoring and evaluation.¹⁰ These structural recommendations are discussed in Section XI.

The recommendations provided here apply to three habitat conservation approaches that combine land use and conservation potential: protecting remaining intact native wildlife habitats; restoring and conserving native habitats altered by past or current land use; and improving wildlife habitat, water quality and soil quality on lands that remain in production.

The first permanently conserves intact native habitats on private lands. The second restores and then protects native habitats. The third remedies the adverse impacts on wildlife and their habitat from production practices and encourages more sustainable conservation

of wildlife, water and soil resources on lands that remain in production. The third approach recognizes that there are land uses and management strategies that can contribute to the conservation of biodiversity, achieving water quality standards and maintaining low rates of soil erosion.

The three approaches are complementary and implicitly require that a menu of conservation management practices and economic incentives be available to landowners.

8. Two recent reports that describe in detail federal and state incentive mechanisms are *Status and Trends in Federal Resource Conservation Programs: 1996-2001*. (Hummon and Casey 2004) and *Conservation in America: State Government Incentives for Habitat Conservation* (George 2002). Both reports can be found at Defenders' website at www.biodiversitypartners.org.

9. See Heard et al. (2000) and Hauffler (2005).

10. The programmatic recommendations in this section are based on Casey, Boody, and Cox (2004), and C. Hummon (2005). Both references are available at www.biodiversitypartners.org/incentives/workshop.shtml.

IV. Regulatory and Economic Disincentives

Regulatory and economic *disincentives* are laws, policies and economic instruments that define required environmental performance standards and prescribe the form of economic penalty for non-compliance. Regulatory policy has also often prescribed specific technologies to accomplish conservation goals. It is believed that the presence and enforcement of regulatory standards and penalties are what drive landowners to comply with environmental laws through participation in incentive programs. This section will provide a description of each regulatory mechanism followed by an assessment and recommendations.

Developing voluntary incentives for biodiversity or habitat conservation does not mean a retreat from national laws to prevent species extinction. Results of public opinion polls indicate that a majority of citizens prefer existing or higher standards for endangered species and other wildlife protection (Batie and Ervin 1999). Furthermore, incentives must operate within a regulatory framework “to ensure that a minimum habitat is maintained, contracts are enforced and promises are kept” (Brown 1999, p. 464).

There are three general types of policy instruments that constitute disincentive mechanisms: govern-

mental regulation, conservation compliance and financial charges.

Governmental Regulation

The primary purpose of environmental regulations is to protect public goods such as clean air, clean water and our biodiversity heritage. Governmental regulations to conserve and/or restore individual species and their habitats are both direct and indirect in nature and are conceived and enforced at the federal, state and local levels. The preeminent form of government regulation with respect to biodiversity and habitat conservation is the federal Endangered Species Act, which



Stream restoration project, California | Natural Resources Conservation Service

prohibits any “take” of a species that has been listed as threatened or endangered. The act may constrain the use of private lands from certain uses, depending on the habitat needs of particular species. Some other federal laws that invoke regulations that impact the quality of habitat include the Clean Water Act, Clean Air Act and Coastal Zone Management Act. Many state governments have their own (and sometimes more restrictive) regulations that impact these same resources.

It is generally recognized that regulatory mechanisms that “set the rules of the game” are both needed and desirable to achieve specific environmental goals and to protect the public interest (Batie and Ervin 1999). With respect to the biological effectiveness of the Endangered Species Act, only nine species have been lost since its inception.

Regulatory mechanisms are an important complement to incentives. From the standpoint of the public and the policy maker, regulations are relatively cheaper to administer than incentive programs, especially if there is minimal compliance monitoring. However, if there is a need to monitor landowner behavior, then costs can become quite high. Meeting regulatory requirements on the part of the private landowner can be substantial in the absence of incentives.

From an economic standpoint, there is ample evidence that it is more efficient to set environmental goals and let the regulated community choose the means to reach those goals (Batie and Ervin 1999). Setting technology standards by specifying which physical technologies and management practices are to be employed to meet an environmental objective generally constrains cost-effective solutions and innovation.

There is currently much discussion about changes to the Endangered Species Act. These discussions are centered on three major points: making the law more effective at recovering species and protecting and restoring habitats, decreasing the costs of landowner compliance, and developing incentive mechanisms to assist landowners in conserving at-risk species and their habitats. We believe that part of this discussion should include the recognition that the act can also generate both public and private economic benefits related to species and habitat conservation.

eligibility for all farm program benefits—including price supports and loans, commodity and disaster payments – until the violation is remedied (Claassen et al. 2001).

A major characteristic that allows for federal land rental incentives to be more biologically effective is conservation compliance. That is, in order to receive commodity or rental payments, recipients must be in compliance with soil and water conservation regulations on their whole farm. Conservation compliance as a requirement for land rental payments has been cited as one of the major reasons for achievements

“Meeting regulatory requirements on the part of the private landowner can be substantial in the absence of incentives.”

Conservation Compliance

Compliance mechanisms require a basic level of environmental performance as a condition of eligibility for income support programs (Claassen et al. 2001). Compliance has been primarily associated with federal Farm Bill legislation that penalizes producers who cultivate on highly erodible soils or who destroy wetlands. The penalties consist of taking away government subsidy or income payments. Under the “Sodbuster” and “Swampbuster” provisions of the 1985 Farm Act, payments are withheld from farmers who cultivate highly erodible land without an approved conservation plan or who drain wetlands, respectively (Claassen et al. 2001). Violation of Swampbuster regulations can mean the loss of

in reducing soil erosion and improving water quality (Heimlich et al. 1998; Brady 2005). Between 1992 and 1997, total erosion on U.S. cropland fell from about 3 to 1.9 tons per year, a decline of about 40 percent. Conservation compliance required conservation plans on 91 million acres of highly erodible cropland. However, there is some evidence that because the Conservation Reserve Program helped raise crop prices through supply control, landowners eventually reacted by putting additional marginal lands into production, thus actually increasing erosion to the detriment of aquatic habitats. In addition, the 1996 Farm Bill significantly weakened cross-compliance requirements by decreasing the number of farm support programs that could be penalized.



American wigeon brood | U.S. Fish and Wildlife Service

Compliance mechanisms share characteristics with both government standards for private goods/actions and economic incentives. Because existing programs are used for leverage, compliance mechanisms require no budget outlay for producer payments, although considerable technical assistance is needed to develop conservation compliance plans and to actually monitor compliance. We would recommend that the enforcement of conservation compliance be left to a third party government office, perhaps outside of the U.S. Department of Agriculture, and not be implemented by agricultural extension and technical agents who are charged with assisting landowners to be in compliance.

Conservation cross-compliance needs to be strengthened in terms of the penalties that landowners would face for producing on highly erodible lands and/or breaking out new lands for production. In addition

to the significant, but non-quantified, contribution of conservation compliance to the conservation of specific species and habitats (Brady 2005), we need to have better estimates of the relative private and public economic costs and benefits of various compliance measures.

Financial Charges

Financial charges refer to any payments that landowners make as compensation for habitat degradation. These payments include fees or fines associated with the Endangered Species Act, effluent or ambient water quality charges, taxes on inputs such as fertilizers and pesticides to induce less use, tax payments for conversion of habitat, and real estate transfer fees to discourage land conversion to more intensive uses.

Environmental taxes are per-unit charges for actions contributing to environmental degradation. Charges may also be associated with

exceeding emission levels or the use of certain inputs.

Two conditions must be met to make charges effective: they have to be set high enough to discourage degradation or conversion of at-risk habitats and the probability of enforcement must be fairly high.

States also levy environmental taxes. For example, Minnesota and Iowa tax agricultural pesticides and fertilizers to induce less use and improve groundwater quality and aquatic habitat. Generally speaking, however, sales tax rates have been too low to have a significant impact on the use levels of these inputs.

No data could be located on the relative effectiveness or efficiency of environmental charges and taxes on biodiversity conservation activities. We would recommend taking a sample of such programs and analyzing them for their impacts on resource conservation and their cost-effectiveness from both a public and private perspective.

V. LEGAL/STATUTORY INCENTIVES¹¹

Institutions are principles, laws, conventions, codes and social norms that structure behavior between individuals and society. In the context of our incentives taxonomy, institutional innovations comprise three major subcategories: legal/statutory, property rights and market innovations. This section addresses legal/statutory incentives, and Sections VI and VII address property rights and market institutional incentives, respectively.

habitat conservation. Non-market institutions set the conditions for market behavior and the legal actions that alter the definitions of property use or ownership. The rights and duties associated with the ownership of wildlife habitat and the legal environment affecting ownership and management constitute important determinants of economic behavior and the effectiveness of various financial incentives.

There are three major types

harbor agreements, liability limitation for public access and no-take cooperative agreements, the state also allows certain landowners an exemption from new regulations if a long-term habitat management plan is adopted under its Habitat Incentives Program. The program, established in 1998, allows landowners to enter into an agreement to enhance habitat for food fish, game fish or other wildlife species in exchange for state regulatory certainty with regard to future applications for irrigation project approval or a forest practices permit.

“Legal/statutory innovations refer to new rules or regulations that in some way limit liability or issue some type of permit for habitat modification.”

Legal/statutory innovations refer to new rules or regulations that in some way limit liability or issue some type of permit for habitat modification. Legal/statutory innovations include “assurances,” usually combined with liability limitation and/or regulatory relief.

Legal/statutory and property rights incentives are often referred to as non-market institutional mechanisms. However, they are of equal importance relative to market innovations in their application to wildlife

of voluntary legal arrangements that have been used to encourage landowners to protect species and habitats and to relieve some of the perceived regulatory burden. Safe harbor agreements¹² and conservation agreements are generally referred to as “assurances.” These agreements are purely voluntary. The third type of legal instrument is classified as “regulatory relief.”

The state of Washington offers several legal incentives. In addition to providing landowners with safe

Safe Harbor Agreements

• Description

Safe harbor agreements constitute a legal innovation to assist landowners with the uncertainties of managing their lands that are habitat to listed species. The purpose of an agreement is to promote the management and conservation of targeted species. Participation is voluntary and may include provisions for proposed or candidate species if a participant chooses. Under safe harbor agreements, participants are guaranteed a reduction in liability and are ensured that they will be exempt from any future regulations not included in their agreement. All non-federal landowners are eligible to participate in the program, but their land must contain, or be potentially suitable habitat for, listed threatened and endangered species.

11. Within this section and others that follow, there are some incentive mechanisms for which no assessment literature could be found. In these cases, we combine the assessment and recommendation sub-sections for these mechanisms.

12. Habitat Conservation Plans (plans), as defined under the Endangered Species Act, are not considered a “voluntary incentive” for purposes of this report because they are a purely regulatory requirement. These plans are a mechanism to reconcile development and land use on private lands subject to Endangered Species Act regulations (Brown 1999). The act was amended in 1982 to allow “incidental taking” (killing, harming or disrupting essential habitat of an endangered or threatened species incidental to otherwise lawful activities such as land development or logging) provided the landowner submits and funds an approved plan. The plan must be submitted along with an application for an incidental take permit and should provide strategies that minimize and mitigate the impact of the proposed development or land use on endangered or threatened species (Bean and Wilcove 1997).



San Joaquin kit foxes | U.S. Fish and Wildlife Service

Safe harbor agreements are designed to encourage landowners to voluntarily maintain or enhance habitat on their property to attract threatened or endangered species without fear of future land-use restrictions. A landowner may not face penalties if he/she engages in voluntary wildlife survey and monitoring activities.

A safe harbor agreement contains two main elements. First is the delineation of a set of baseline conditions that describe the initial number and location of individuals of the listed species and a measurement of the habitat size and quality. The second consists of establishing a monitoring program designed to assess the success of a recovery effort. At the conclusion of the agreement term, landowners are allowed to return the property to the baseline condition and still be covered by the assurances of the agreement. The agreement may be amended to add a non-covered listed species, for which the relevant agency and the participant would agree on proper enhancement or maintenance actions. At the end of a safe harbor agreement a landowner may develop the covered property or undertake other activities that result in a legal “tak-

ing” of the threatened or endangered species (Minette and Cullinan 1997), provided that there are protections for the minimum and previously defined “baseline population.”

There are two types of safe harbor agreements. One is an individual agreement between a landowner and the relevant federal agency (U.S. Fish and Wildlife Service or National Marine Fisheries Service), depending on the species addressed. The other is an umbrella agreement under which a state fish and game agency, agricultural agency, local government or private conservation organization can act as an intermediary between the relevant federal agency and several individual landowners. The intermediary develops a safe harbor program for a defined area and species and works with landowners to develop individual agreements that are consistent with the intermediary’s umbrella agreement. For example, several states have signed an intermediary agreement with the U.S. Fish and Wildlife Service for the restoration and conservation of Karner blue butterfly habitat in the Northeast and upper Midwest. There are 16 states with safe harbor agreements for federally listed

species, but a few of these were still in draft form as of 2004 (Environmental Defense 2005).

Eleven states provide safe harbor agreements (George 2002). For example, Kansas has a state “Safe Harbor Law” which offers owners of land or aquatic habitat deemed necessary for the conservation of non-game or state-designated threatened and endangered species the opportunity to enter into an agreement with the state, allowing the landowner to carry out activities specified in the agreement without fear of liability or penalties.

• *Assessment*

Legal and/or statutory incentives include engaging in safe harbor agreements and candidate conservation agreements with assurances, as defined under the Endangered Species Act. Only safe harbor agreements have been assessed in any detail.

As do public agencies, Wilcove and Lee (2004) base their assessment of the safe harbor incentive mechanism on the number of enrolled landowners, the number of species targeted for assistance and the cumulative acreage enrolled under safe harbor agreements.

The authors conclude that safe harbor has been “remarkably successful” (p. 639), because it removes regulatory burdens associated with attracting endangered species to property as a result of engaging in conservation activities. Wilcove and Lee (2004) also found that technical assistance to restore habitats for endangered species, and cost-share incentives for endangered species, were also very important complementary incentives that enhanced the effectiveness of safe harbor agreements.

There has been a steady increase in the number of private landowners participating in safe harbor agreements since the program began in 1995. In 2002, 189 landowners had enrolled nearly 2 million acres of land and were restoring habitats for 21 endangered species, and no landowner had withdrawn or exercised the right to alter the restored habitats (Wilcove and Lee 2004). By 2005, participation had increased to 325 landowners, protecting 36 species over about 3 million acres (Environmental Defense 2005). This growth in participation and the number of species and acres covered is one indicator of its economic benefits, as demonstrated by the growth in private landowners willing to participate.

Wilcove and Lee (2004) state that although the safe harbor mechanism is too new to determine its biological effectiveness, they note that there have been some notable successes with respect to the recovery of the northern aplomado falcon in the Southwest, the nene goose in Hawaii and the red-cockaded woodpecker in North Carolina. For the red-cockaded woodpecker, about 35 percent of the total population lives on safe harbor lands (Environmental Defense 2005). In addition, safe harbor agreements have been signed that run for 30 to 80 years, indicating that safe harbor

may be an effective conservation tool because it meets the requirement for a sufficient temporal scale.

There are two issues related to the biological effectiveness of the safe harbor incentive mechanism. The first is that safe-harbor agreements are primarily single-species oriented, not habitat oriented. Second, if a baseline population is set at zero and the landowner attracts species to his or her property, then the landowner could potentially return to zero at the end of the agreement, and any restoration gains would be lost. Although no landowners have returned to a zero baseline, the potential for them to do so underscores the need to combine safe harbor with other incentives.¹³ One of the main benefits of safe harbor agreements is that they have reduced landowner fear and have allowed landowners to be in more control.¹⁴ In terms of biological effectiveness, safe harbor agreements were not intended to be a long-term solution but were instead designed to buy time for species recovery.¹⁵

There is no evidence thus far that safe harbor agreements are a more or less cost-effective means to maintain wildlife habitat compared to other incentive mechanisms. However, Wilcove and Lee (2004) note that the safe harbor program has grown rapidly nationwide, which “suggests that many landowners are willing to assist endangered species if doing so does not carry the risk of added regulatory burden” (p. 643). Nonetheless, it has been observed that landowners’ enthusiasm for safe harbor agreements have dimmed somewhat due to the high transaction costs associated with bureaucratic delays in processing the agreements. Zhang and Hehmood (2002) found that the lack of financial incentives was a shortcoming of the red-cockaded woodpecker safe harbor program in terms of garnering more

landowner support. From a public finance perspective, some safe harbor agreements have not been cost-effective because they have been implemented at sites where a particular species may not actually be using the habitat.

• Recommendations

Recommendations for safe harbor incentives pertain to increasing their biological effectiveness and lowering current transaction costs. Safe harbor agreements can be more biologically effective and economically efficient by allowing landowners to engage in multiple compatible land uses that do not negatively impact a species or its habitat. The more flexible the agreement is, the more efficient it is from the landowner’s perspective.

Decreasing the amount of time and financial resources for negotiation and entry into safe harbor programs could expand participation. There are several ways this could happen. First, the permit fee for landowners applying for safe harbor agreements should be eliminated (Environmental Defense 2005). Second, a package of additional financial and technical assistance incentives should be offered in conjunction with a safe harbor agreement, possibly through agricultural resource conservation incentive programs. Third, regional programmatic safe harbor agreements could lower transaction costs for individual landowners and increase their participation rates. In addition, designing safe harbor agreements that address multiple species would be an important improvement for protecting biodiversity.

Candidate Conservation Agreements with Assurances

• Description

The purpose of Candidate Conservation Agreements with Assurances (“Conservation Assurances”) is to

13. Watchman, L. Personal communication. August 24th, 2005. Defenders of Wildlife.

14. Clark, J. Personal communication. August 24th, 2005. Defenders of Wildlife.

15. Senatore, M. Personal communication. August 24th, 2005. Defenders of Wildlife.

facilitate action for the conservation needs of federal proposed and candidate plant and animal species and species likely to become a candidate or proposed in the near future. Conservation Assurances offer two incentive instruments. The first allows an exchange of conservation measures for a reduction in liability under the Endangered Species Act. Landowners are issued an “enhancement of survival” permit that allows for the modification of habitat, and the incidental take of individuals, according to technical provisions of each agreement.

The second incentive is an exemption from future regulations. Participants are provided assurances that, in the event that the covered species becomes listed, their conservation efforts will not result in future regulatory obligations in addition to those described in the original agreement.

Private and other non-federal property owners are eligible for conservation assurances, but their land must contain, or be potentially suitable habitat for, proposed or candidate species or species of concern. There must also be a reasonable expectation that a species will receive a sufficient conservation benefit, defined as removal of the need to list the species. An agreement must include a description of the existing population levels and habitat characteristics on the land, a description of the conservation measures that the participant will undertake and an estimate of the expected conservation benefits.

• *Assessment*

To date, only about 10 candidate conservation agreements are in operation,

and no evaluation of these agreements with respect to their effectiveness or efficiency has taken place. This is mostly due to the fact that these Conservation Assurances are relatively new.

• *Recommendations*

Even though the number of agreements with conservation assurances is small, we recommend that an assessment be carried out to start tracking progress and to signal any unforeseen technical or economic problems. Based on the fact that these agreements are preventative in the sense of keeping species from being federally listed as threatened or endangered, we see two major potential benefits that Conservation Assurances can provide. First, depending on the biological and management characteristics of a formal agreement, Conservation Assurances can lead to technically sound recovery of species and their habitats. Second, by preventing species from being listed, substantial transaction costs can be avoided. There is some anecdotal evidence, however, that long planning and negotiation timeframes for agreements can lead to not insignificant public and private costs.

Regulatory Relief

• *Description*

Regulatory relief allows a landowner an exemption from legal obligations contained in public environmental regulations. Relief is sometimes accompanied by a liability limitation. In addition to federal safe harbor and assurances programs, some states also offer regulatory relief. Georgia, for example, provides a liability limitation for allowing public access on

conservation easements. Washington state allows certain landowners an exemption from new regulations if a long-term habitat management plan is adopted under its Habitat Incentives Program. The program, established in 1998, allows landowners to enhance habitat for food fish, game fish or other wildlife species in exchange for state regulatory certainty on future applications for irrigation project approval or a forest practices permit.

• *Assessment*

Similar to Conservation Assurances, no information was found that directly assessed the impacts of regulatory relief on the biological and economic characteristics of this particular incentive mechanism. Certainly, benefiting from regulatory relief as a consequence of entering into a Safe Harbor or Candidate Conservation Agreement with Assurances would not necessarily entail any additional financial resources, and therefore one could say that it is cost-effective. However, if regulatory relief in some way compromised the status of additional species, then it may be less technically effective than other mechanisms.

• *Recommendations*

Because regulatory relief can have the benefit of addressing the risk and uncertainty that landowners perceive with respect to the presence of endangered species or habitats compromising land use, it can add to both more biologically effective solutions and least costly solutions if an agreement is monitored and enforced. We do believe that more research on this topic is required.

VI. PROPERTY RIGHTS INNOVATIONS

Property rights incentives are associated with changes in the distribution of habitat ownership or use rights. Property rights tools provide opportunities for landowners to alter their legal rights use or ownership of their property. These tools include conservation easements, covenants and deed restrictions, and stewardship exchange agreements.

Property rights innovations are based on the legal concept that such rights are essentially a “bundle of sticks” that are divisible from each other (Bowles et al. 1996). At one end of the spectrum is the sale or donation of land, which amounts to surrendering the entire “bundle” of land rights. Other property rights transfer mechanisms includ-

ing covenants, deed restrictions and easements separate out some rights from others. The purpose of these mechanisms is to restrict the development and/or intensity of land use or to encourage specific types of land use (Brown 1999). Tax incentives are an important complement for making property rights tools more attractive. Transferring some or all of the property rights may yield tax benefits, because restricting the property to certain uses may decrease its overall value.

At the state level, property rights tools are likewise often part of a larger program that offers some type of tax benefit or financial payment. All states provide opportunities for landowners to voluntarily alter their

property rights for conservation purposes. The most common method is the authorization for placement of a conservation easement on private property, which is available in 48 states (George 2002).

Conservation Easements

• Description

A conservation easement transfers a portion of the rights associated with a piece of property, while allowing landowners to maintain ownership and to use the land in ways that do not conflict with the terms of the easement (Kusler and Opheim 1996). A landowner creates a conservation easement by donating or selling the development rights to another party. The easement holder



Restored wetland, Wyoming | Natural Resources Conservation Service

(buyer) is prohibited from using restricted development rights and is responsible for monitoring the easement (Brown 1999). Conservation easements bind current and future owners of the land in the event of a title transfer. Easements may be either “perpetual” or “term.” Land trusts and other non-profits use perpetual easements almost exclusively, while governmental agencies offer both term and perpetual easements. Federal and state government agencies have conservation easement programs.

There are usually tax benefits associated with perpetual easements, including income tax reductions, property tax exemptions or estate tax reductions (see section below on tax incentives). However, to receive federal tax benefits, the easement holder must be “a qualified conservation organization” as defined by the Internal Revenue Service. There are also some state tax laws that allow for reductions or exemptions associated with easements.

The federal government has increasingly become involved in private landowner easement programs where it is the easement holder. There are currently seven federal easement programs. Five are administered through the U.S. Department of Agriculture: the Farm and Ranch Land Protection Program, the Wetland Reserve Program, the Grassland Reserve Program, the Healthy Forests Reserve Program and the Forest Legacy Program. The Coastal Wetlands Conservation Grant Program and a western region Grassland Easement Program are managed by the U.S. Fish and Wildlife Service.

The scope and structure of federal easement programs differ¹⁶. First, the actual physical resource to be protected varies between programs:



Grazing cows, California | Natural Resources Conservation Service

active farm and ranchland, wetlands, grasslands and forests. Second, the easement options vary. For instance, the wetlands program offers two different term easement options and a permanent option. Alternatively, the grasslands program offers term and permanent easements, but also land rentals. Third, easements differ in who pays the costs. While the wetland and grassland programs pay the full cost of an easement, the farm and ranch easement program requires contributions by either state or private entities. Lastly, program size and the amount of funding received differ among the programs, with the majority of federal resources thus far going to the Wetland Reserve Program.

Fifteen states have easement programs. In one example, Massachusetts’ open space bond provides \$5 to 10 million annually for acquisitions of fee simple title or easements on lands that contain native species or important natural communities. The program, which has been in existence since 1990, had acquired approximately 10,000 acres by 2002.

In addition to easement programs administered by federal and state agencies, there is a significant effort by the private non-profit sector to hold conservation easements, although for a variety of purposes other than for the protection of biodiversity and wildlife (e.g., recreation, open space, historical sites, scenery, etc.). Land trusts are private

16. For detailed description of the various federal easement programs, see Hummon and Casey (2004).

non-profit conservation organizations that protect land from intensive uses through direct involvement in voluntary land transaction activities. In 2003, more than 1,500 private land trusts operated at the local, state or regional levels, pro-

• *Assessment*

Conservation easements are the only type of property rights tool that has been adequately assessed in terms of biological effectiveness and economic efficiency. Specific conditions have been identified as contributing to the

“The management requirements of a conservation easement need to be clearly identified, including what needs to be done and who is responsible for doing it.”

tecting 9.4 million acres, including 5.1 million acres in about 18,000 conservation easements (Trust for Public Land and Land Trust Alliance 2004). Between 1998 and 2003, voters across the nation approved more than 500 ballot measures to provide over \$20 billion to protect farmland, open spaces and environmental quality (Trust for Public Land and Land Trust Alliance 2003). However, it is unknown what percentage of this funding is dedicated either wholly or partially to biodiversity or wildlife habitat conservation.

The major private groups who buy and hold conservation easements include The Nature Conservancy, Trust for Public Land, American Farmland Trust, and all of the local land trusts, most of which are associated with the Land Trust Alliance. Recently, several private organizations have emerged whose purpose is to coordinate the activities of several individual land trusts (Albers et al. 2004).

biological effectiveness of an easement program. One condition is that the value of an easement cannot be destroyed through punitive tax laws¹⁷ that devalue use of easements for habitat conservation. For example, agricultural or forestry land on which a conservation easement is placed, and that can potentially generate recreational income, is taxed at a higher rate in Wisconsin. Thus, there can actually be disincentives for restoring and conserving natural habitat. In addition, the effectiveness of public agencies and private organizations in using easements to protect environmentally sensitive areas depends on the specific land-use restrictions that each individual easement contains (Wiebe et al. 1996). These restrictions may vary widely from one agreement to the next.

The success of easements as an incentive mechanism also depends on the stringency with which land-use restrictions are monitored and enforced. Use of easements can result

in passive management by the landowner rather than active management by a public agency. Passive management means that landowners usually do not maintain the biodiversity values of the land area covered by an easement. The management requirements of a conservation easement need to be clearly identified, including what needs to be done and who is responsible for doing it. In times of dwindling state and local budgets, taking on management costs through easements may be economically inefficient for the landowner compared to other types of land use investments (Roka and Main 1999).

Conservation easements in association with wetland restoration have been successful in the protection of wildlife habitat and water quality and in the retention of flood waters. Easements have protected important wildlife habitat, open spaces and forests as well as ranch and farm lands on more than 17,000 properties totaling more than 5 million acres (Anderson and Christensen 2005). As measured by application backlogs for 30-year and permanent easements offered by the U.S. Department of Agriculture's Wetland Reserve Program, there were more than 3,000 landowners waiting to enroll almost 536,000 acres that did not get funded in 2004. Heimlich et al. (1998) indicate that this program has become the single largest national program for wetland restoration and has reduced the rate of wetland loss on agricultural landscapes. The Wetland Reserve Program has also increased the availability of a unique habitat used by a great diversity of wildlife species (Mitsch and Gosselink 1993).

The success of easement incentives in the Wetland Reserve Program has not taken place in a vacuum. Complimentary policy changes

17. Haglund, Brent. March 2005. Personal communication. Madison, Wisconsin.

relating to the institutional framework have also been a big factor. For example, Section 404 of the Clean Water Act of 1972 regulates discharge of dredge and fill material into wetlands, and the Tax Reform Act of 1996 eliminated tax preferences that encouraged wetland drainage. Lastly, swampbuster regulations deny a wide range of farm program benefits to landowners who convert wetlands for crop production. Claassen et al. (2001)

preventing development of farmland and forest land and protecting scenic values. Existing wildlife habitat has been conserved, but easements rarely include specific management requirements to protect or enhance habitat values. As a result, clear-cutting and other intensive silvi-cultural and agricultural practices often end up being preserved, to the continued detriment of wildlife and water quality. Although this limited conservation

to acquire easements on properties for which the costs of enforcing such easements against violations are fairly low. Properties that land trusts tend to buy, or seek to get donated outright, require more intensive hands-on management to achieve conservation goals. Such properties include land where habitat for rare and endangered species needs to be restored. Because easements for management purposes only can be difficult and costly to enforce, it is more efficient to own and manage land with significant restoration or management needs.

Despite Parker's findings, there are economic efficiency issues associated with easements. The first is that for some landowners, the opportunity costs associated with not extracting marketable resources or converting land to commercial or residential uses can be substantial. This may limit the amount of land that is available or affordable through easement protection. Second, there are the high transaction costs associated with developing guidelines and monitoring whether land is being managed effectively. Third, the easement tool has occasionally been abused, thereby causing legal and public financing problems. Anderson and Christensen (2005) indicate that some landowners have made a profit by using inflated appraisals to take advantage of huge tax write-offs at the expense of taxpayers. Another problem is that some landowners have used easements to protect swamps and mountainsides that could never be developed, or golf courses and private lots that have little or no conservation value. These abuses can weaken political support for easement incentives and their public funding.

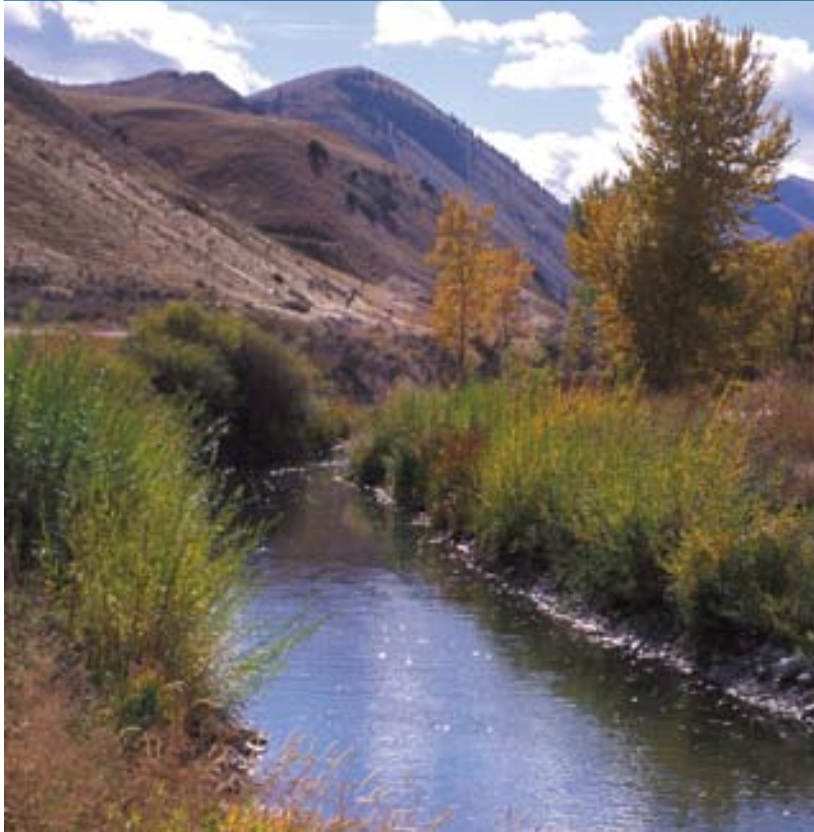
“From an economic perspective, easements have been one of the most cost-effective incentives for conserving land.”

estimate that between 1.5 and 3.3 million acres of wetlands are being preserved with swampbuster compliance, depending on producer expectations of crop and livestock prices. Thus, legal disincentives have played an important role in augmenting the effectiveness of the Wetland Reserve Program's voluntary easement mechanism.

As is similar to the case for safe harbor agreements, easements have been found to be more effective when combined with complementary financial and technical incentives. Still, there is a strong need for more education of private land trusts on the strategic use of easements for biodiversity conservation. As some authors have noted, “By using easements, land trusts across the United States have done a remarkable job conserving land over the past 30 years. However, much of this effort has focused on

may be consistent with the wishes of some landowners, it may also result from some land trusts not being well equipped to provide advice and expertise to landowners regarding all conservation options” (Biophilia 2005, p. 1).

From an economic perspective, easements have been one of the most cost-effective incentives for conserving land. According to Anderson and Christensen (2005, p. 11), “The beauty of conservation easements is that they provide a way for the public to help pay for environmental-protection efforts by landowners on private lands.” Parker (2004) studied conservation easements held by 1,250 land trusts around the country. His results suggest that most land trusts make economically efficient choices about whether to acquire conservation easements on properties or purchase the land outright. Land trusts tend



Lehmi River restoration project, Idaho | Natural Resources Conservation Service

• Recommendations

For easement incentives to be more effective in conserving wildlife habitat we have a few recommendations. First, there needs to be more coordination between public easement programs at the state and federal levels, and also between public and private easement programs. In addition, recommendations should be developed and implemented that would decrease the time and financial resources needed to establish and maintain conservation easement agreements.

There have been some recent proposals to reduce the federal tax deduction that a landowner can take for donating a conservation easement, from the full value of the donation to just 33 percent of that value. However, reducing deductions would discourage some landowners with the most economically valuable conserva-

tion easements, such as for grazing lands. The full deduction needs to be maintained (Anderson and Christensen 2005). If the goal is to stop inflated easement valuations, then the Internal Revenue Service, state tax departments, land trusts, county tax assessors and appraisers need to police the appraisal process, and specific standards are needed for appraising conservation easements. There may be a limited role for self-regulation among conservationist land trusts, to curb any abuses (Parker 2004). However, self-regulation will require rigorous accredited standards that are periodically monitored with public oversight. The Land Trust Alliance has developed new guidelines that member land trusts are required to have appraisers use, if the land trusts want accreditation. The alliance requires land trusts to inform potential easement donors about the Internal

Revenue Code appraisal requirements, that the donor should use a qualified appraiser who follows the Uniform Standards of Professional Appraisal Practice, and that the land trust will not participate in a donation where it has concerns about the value of the deduction.¹⁸

In the private sector, there is a need to develop the capacity of land trusts to effectively enhance, restore and protect wildlife habitat and biodiversity values. The rigor of conservation easements held by land trusts to encompass habitat restoration and long-term stewardship goals need to be expanded. Existing state and federal conservation programs can provide assistance for restoration and enhancement of conserved habitats, and land trusts can provide a service by actively guiding landowners through these programs. Ensuring appropriate long-term management to maintain these habitats and protect the public's conservation investments will also require land trusts to adopt appropriate management language within easement language. Land trusts will need training, technical assistance and financial support to address all of these issues.

Covenants and Deed Restrictions

• Description

A covenant is a contract between a landowner and a second party that may stipulate certain land uses or practices. Like easements, a covenant can be used to restrict certain land uses, and it may follow the property to subsequent owners (Brown 1999). A covenant can also be placed in a land deed itself, which then becomes a deed restriction (Kusler and Opheim 1996). Covenants are less secure than conservation easements because they do not follow a uniform

18. Hummon, C. January 17, 2005. Personal communication. See www.lta.org/sp/land_trust_standards_and_practices.pdf.



Evaluating rangelands, Arkansas | Natural Resources Conservation Service

federal statute, lack clear enforcement provisions and may be challenged by future landowners.

Minnesota employs covenants for the preservation of wetlands. This statutory authorization allows landowners to enter into a covenant where private land becomes a “wetland preservation area.” This entitles landowners to a property tax exemption. Pennsylvania also allows for the creation of covenants for designated uses such as farm, forest or open space. Landowners entering into covenants receive a property tax reduction through a lower assessed value.

Deed restrictions are similar to covenants in that they can be used to restrict, for example, the conversion of wetlands or forests to more intensive uses. The problem with a deed restriction is that it is generally not enforceable or transferable (Kusler and Opheim 1996).

• *Assessment*

We were unable to locate any information that assessed either the biological effectiveness or econom-

ic efficiency of covenants and deed restrictions as incentive mechanisms to conserve biodiversity or wildlife habitat.

• *Recommendations*

Because these mechanisms are instituted at a very local level and can vary by state or county, we would recommend that a sample of these instruments be evaluated to see how effective or efficient they have been. Clearly, the relatively short-term nature of these mechanisms, and the fact that they can change with ownership, would seem to compromise their biological effectiveness. Although there is an issue on non-permanence, covenants and deed restrictions could be looked upon as a bridging device between no protection and a permanent easement. We believe, however, that monitoring could be improved and that specific biological outcomes should be stipulated in these types of agreements. With respect to economic efficiency, there would be enforcement costs, but these would probably be less than the costs incurred through easements.

Stewardship Exchange Agreements

• *Description*

Stewardship exchange agreements involve landowners implementing conservation measures on their private land in exchange for use privileges on public lands. An example of such an agreement is a landowner’s action to protect privately owned riparian areas in exchange for forage or grazing rights on public lands (Otley 1998¹⁹). Arizona employs the use of a stewardship agreement to encourage private land conservation by providing improvements to a landowner’s property in exchange for guaranteed public access to, or through, that same property.

• *Assessment*

There is no information for stewardship exchange agreements currently available that assesses their biological effectiveness or technical efficiency.

• *Recommendations*

There is a need to do an inventory of stewardship exchange agreements and not only evaluate their contribution to biodiversity conservation but also establish the relative advantages to both the private and public sectors. For example, in the above example of the exchange of public grazing rights for conservation of private riparian areas, it is necessary to assess the relative costs and benefits to both the public and private parties involved. The basic question is whether private riparian restoration is more or less valuable compared to grazing on public lands. If the damage to public grazing lands exceeds the public benefits that come from riparian restoration, then the stewardship agreement would result in a net cost to the public but a net benefit to the private party.

19. Otley, M. Personal communication as referenced in Vickerman (1998).

VII. MARKET-ORIENTED INSTITUTIONS

Market innovations are incentives that affect the value of a resource (including wildlife habitat), or product derived from a resource, through the creation of new economic opportunities. For example, increased market opportunities and habitat values can be achieved through the creation of ecolabeling and/or certification information, benefits sharing mechanisms such as ecotourism, mitigation or conservation banking, and the transfer of development rights.

Private market incentives exist where landowners have an opportunity to turn species and their habitats into assets that consumers (private or public) will buy. In order to create these opportunities, it is often necessary to create an institutional structure that allows a market to evolve and function. Creating, developing and authorizing effective market structures and rules are prerequisites for public goods for which purely private markets do not exist.

Assessments have been made for mechanisms such as user fees, ecotourism, ecolabeling, mitigation banking, conservation banking and tradable development rights. These assessments tend to focus on the conditions for the improved economic efficiency and less on their biological effectiveness.

User Fees

• Description

User fees are state-authorized “fees charged to third parties (by private landowners) for the use of natural resources, which may be consumptive or non-consumptive, on public or private land” (Brown 1999, p. 471). Fees involve an agreement between a landowner who engages in conservation activity and a public agency that regulates a particular natural resource. Compatible consumptive and non-consumptive uses are usually defined as hunting, fishing, wildlife viewing, etc. Some federal agencies grant the right to landowners to collect user fees in exchange for a minimum level of conservation activity. At the state level, Colorado’s Ranching for Wildlife program allows landowners to market a guaranteed number of hunting licenses in exchange for allowing access to private land.

• Assessment

Financial assessments of user fees have been limited to those situations where landowners are given the authority to charge individual hunters or fishermen a fee for access to land and water resources on private

“Seventeen states have created some form of market institution to encourage conservation on private lands.”

In some cases it is possible to create private market institutions to address what was described in Section II as market failure. Public institutions can create markets through the establishment of a trading structure and the rules and regulations of trading activity between private parties. A goal of creating quasi-market institutions is to provide an efficient way to incorporate public environmental concerns into private market structures. One example of such a quasi-market is the current “cap-and-trade” program administered by the Environmental Protection Agency to improve air quality.

There are several types of market mechanisms that are relevant to wildlife habitat conservation, including the allowance for user fees, certification and ecolabeling programs, mitigation and conservation banking, and transferable development rights. To varying degrees, each of these mechanisms requires cooperation between private and public entities. Seventeen states have created some form of market institution to encourage conservation on private lands. The most common are those that facilitate the purchase or transfer of development rights, found in 10 states (George 2002).

property in exchange for public assistance with habitat improvement. No data was found that has assessed the biological effectiveness of user fees as an incentive measure for biodiversity conservation. Although user fees have been attractive from the private landowner perspective, in the initial years of user-fee implementation, when private hunting, fishing or birding preserves are being established, start-up costs associated with habitat maintenance can be high (Robles 2000), and some economic losses can occur. Other potential economic issues relate to the costs of supervision and scheduling and the potential for market saturation.

• *Recommendations*

Research needs to be done on the biological effectiveness of user fees. One means of achieving biological effectiveness would be to encourage cooperation between several contiguous landowners in cases where individual dispersed holdings are too small to support viable hunting or fishing habitat. Because of potential threats from over-use and damage to potential biological resources, we would also recommend that visitation to conserved lands be controlled to optimize biodiversity conservation.

Ecotourism

• *Description*

In most cases, establishing an ecotourism enterprise is simply driven by the market forces of demand and supply. However, in some cases such enterprises may need legal permission or start-up assistance from public entities. The development and rules of conduct for an ecotourism market for at-risk species is usually the role of a federal or state agency.

Some states and private parties have provided funding to investi-

gate tourism markets and tourism assistance projects. For example, Defenders of Wildlife commissioned a study to investigate the ecotourism potential in North Carolina associated with reintroduction of the red wolf.²⁰ Ecotourism is believed to be especially lucrative as a result of reintroduction of gray wolves in Yellowstone National Park.

An example of a private wildlife-based ecotourism activity is Moose Creek Adventures in Idaho, which offers wolf tours as well as horseback riding, hunting, cattle drives and bison viewing on private ranches.

“...ecosystem tourism provides landowners an opportunity to communicate with the public about their stewardship efforts.”

Birding festivals take place on private lands throughout the states. On an individual level, ecosystem tourism provides landowners an opportunity to communicate with the public about their stewardship efforts (Robles 2000).

• *Assessment*

Private market ecotourism incentives are increasingly important in the United States and offer a potential economic opportunity to encourage private landowners to restore and conserve wildlife habitat. Worldwide indicators show the growing economic importance of nature tourism and ecotourism, which now make up about 20 percent of all international tourist travel. Such travel is growing 10 percent to 30 percent per year. The annual direct eco-

nommic impact of nature travel and ecotourism runs into the hundreds of billions of dollars, and the United States maintains an important share of these direct benefits.

The economic potential for wildlife-based ecotourism in the United States is substantial. National surveys show that 50 percent of American tourists now seek out nature-based activities, including wildlife and bird viewing (Claudill 2003). Passive use such as wildlife watching was estimated to have generated nearly \$38 billion in expenditures by almost 66 million persons in 2001 (Claudill

2003). Bird watchers alone accounted for almost \$32 billion in retail sales by almost 46 million participants in 2001 (LaRouche 2003).

In terms of biological effectiveness, badly planned and implemented ecotourism can be a detriment to conservation. For example, excessive ecotourism activity can put increased pressure on habitats and species that can result in degradation or loss (Clayton 2004). Although ecotourism has done more good than harm, there are growing signs that private tour operations can emphasize profit margins over species conservation (Clayton 2004).

An important condition for ecotourism to be economically attractive is that private landowners must develop an understanding of what their land can offer in terms

20. See Lash and Black (2005).



Red wolf, North Carolina | U.S. Fish and Wildlife Service

of wildlife opportunities (Robles 2000). This may mean financing an inventory of wildlife present in their area. It is also important for landowners to identify and select the times of the year that offer the best opportunities for viewing species and to organize tourism activities. Ecotourism may be a more viable incentive for private landowners if it is also tied to rural development activities that bring multiple benefits to local communities (Lash and Black 2005).

In order to increase the economic efficiency of ecotourism incentives, it is necessary to estimate

what the potential demand will be for a wildlife-based experience. Market studies to estimate how much people would be willing to pay and what they are interested in viewing (Lash and Black 2005; Rosen 1996) are essential.

An important consideration with respect to the long-term economic viability of ecotourism is that the proceeds are generated in and stay in the local community. Lash and Black (2005) have estimated that the potential benefits to local communities that support red wolf ecotourism could be as much as \$1 million per season.

• *Recommendations*

Very little information is available relating to the biological effectiveness of ecotourism in the United States as an incentive tool to promote species or habitat conservation. Our first recommendation therefore is to support more research in this area, especially in the areas of impacts to targeted species and habitats.

On the economic efficiency side, several recommendations can be put forward. To provide any economic benefit to the private landowners that may support at-risk habitats or species, market research and development are crucial and more of this should take place before setting up an ecotourism activity. Just as important, there is a need for more work in determining the fiscal mechanisms (e.g., sales tax, revenue sharing, etc.) by which to translate ecotourism income into maintaining the rural character of the area (and hence its value as wildlife habitat) and linking the tourism activity to rural community development. There is also a need to develop programs that minimize liability risk to landowners. Finally, establishing ecotourism activities can have substantial start-up costs. Therefore, we recommend that more public-private partnerships be developed to initiate and manage ecotourism programs through various cost-sharing agreements.

Ecolabeling and Certification

• *Description*

Ecolabeling provides consumers with information regarding the environmental impact of a good or service. Basically, eco-labels use information to change producer and consumer behavior and to improve environmental performance by linking management practices to consumer demand for environmental goods (Brown 1999).

Ecolabeling for private goods has the potential to create or expand markets for products produced with environmentally sound practices.

A government agency or private certification organization sets technical standards which must be met to allow for a product to be certified as contributing to specific environmental goals. By informing consumers of the environmental benefits of a particular product or production system, it is possible to create a market for a public good like biodiversity or habitat conservation.

Certification is an integral and crucial component of ecolabeling in that it verifies the environmental claim being made by the product or the producer. For example, for products labeled organic by the U.S. Department of Agriculture, the department establishes certification standards associated with the use of pesticides, fertilizers and other inputs. Certification inspection, carried out either by a government agency or a third party, can reassure the consumer that the claims of the eco-label are reliable.

Consumers of ecolabeled goods want to purchase a product not just because it is good for their health, but also because it is good for the health of the environment, for family farms, or for the local community and economy. Ecolabeling initiatives that distinguish products as wildlife-friendly are relatively new. However, these types of eco-labels have the potential of attracting a substantial amount of consumer interest and market share, if viable markets are available.

There are two types of labeling programs. First-party labeling involves claims made by a producer that his or her output is wildlife friendly. A producer signs an affidavit pro-

claiming that land use is beneficial to wildlife or not harmful to predators. Or, a landowner stipulates he/she manages an operation in accordance with best management practices or a conservation plan. Third-party labeling or certification provides an independent inspection that verifies that a property is managed on a set of agreed upon and scientifically sound criteria. Efforts by private, non-profit environmental organizations have led to certification for forest products (e.g. “SmartWood”), marine

and ranchers. The group has developed a “certification mark” or eco-label for wool produced on ranches that use non-lethal control of predators (Robles 2000). As part of the certification process, the rancher must sign an affidavit committing the ranch to non-lethal predator control. The Growers’ Wool Cooperative is a separate organization of ranchers who carry the Predator Friendly label. Marketing strategies include a line of Predator Friendly wool products such as sweaters and

“Consumers of ecolabeled goods want to purchase a product not just because it is good for their health, but also because it is good for the health of the environment...”

and freshwater products (Turtle-safe Shrimp, Dolphin-Safe Tuna). Other examples of ecolabels for species or habitat conservation activities include Predator-Friendly Wool and Salmon-Safe. For the Salmon-Safe label, The Pacific Rivers Council has developed a program in which an independent third party certifies growers as being salmon-safe if they adopt specific agricultural practices to improve water quality and salmon habitat. Food Alliance standards address fish and wildlife habitat, soil and water resources, and working conditions.

Predator friendly wool in Montana is certified by Predator-Friendly, Inc., a non-profit organization made up of biologists, environmentalists

hats sold locally and through The Nature Conservancy catalogue.

The Wisconsin Vegetable and Potato Growers Association has developed a third-party certification process and ecolabel for their fresh potato harvest called “Wisconsin Healthy Grown.” Certification is carried out on an annual basis by a third party non-profit called “Protected Harvest.” The label certifies that member growers are achieving targeted reductions in the use of pesticides that are considered toxic to a range of fish and bird species. Some of these same growers are restoring habitats native to their area and are being certified by Protected Harvest for their restoration activities



Wisconsin farmer with “Healthy Grown” potatoes | Wisconsin Potato and Vegetable Producers Association

in 2006. The growers want this additional benefit to increase the private market premium or market share they receive for their product.

There are few states that sponsor ecolabeling programs. One example is Oklahoma’s Wild-Scape Certification Program, which recognizes individuals and businesses that have landscaped their property with the goal of wildlife conservation. Certified “wild-scapes” become a part of a statewide network of natural areas set aside for wildlife. Whether certification through this program has led to any kind of economic advantage through increased marketing opportunities is unknown.

• *Assessment*

Although certification and ecolabeling can provide market premiums or increased market share to producers and landowners who engage in habitat conservation, there are several conditions that must be met for ecolabeling incentives to work. A particular advantage of certification standards is that they assure consumers of the value of a specialized product, making it easier for producers to capture price premiums

or market share for species or habitat friendly practices.

The effectiveness of certification and ecolabeling incentives is partly conditioned by whether certification is carried-out by a “first party” or “third party.” First party certification refers to a landowner or resource user who attests that his or her management practices are habitat or species compatible. Third party certification requires an outside entity to measure and verify whether the environmental goals of the landowner are achieved.

The downside of first-party certification and labeling is that there is little or no regulation, and it is hard for the consumer to tell which labels are legitimate. Many consumers are reluctant to buy products certified and labeled as environmentally beneficial by the producers themselves (Robles 2000).

Third-party certification and labeling are not without issues, either. The major challenge for these programs is consumer recognition and demand (Robles 2000). Recognition leads to developing a market niche where consumers will pay a premium for products they

trust—or at least buy more of them. There is also the issue of competing for shelf-space with conventional counterparts (Robles 2000). A good example of these constraints is the habitat-friendly Wisconsin Healthy Grown label for fresh potatoes produced in mid-state Wisconsin. Some growers for the Wisconsin Potato and Vegetable Producers Association are in the process of cutting back on toxic pesticide use and are restoring native ecosystems in order to recover and conserve some listed plant and animal species. Although their goal has been to receive a price premium for their certified produce, to date such a premium has not been attained. However, market share has gradually increased over the years, even though the effort to develop and secure new markets has been expensive. Because of the high degree of price competition and the structure of the fresh potato market, the association has been investing in market development for their “eco-potato.” However, market development costs can be quite high and add to the transaction costs of capturing the public benefits of restoration work in the private market.

An example of an unsuccessful third-party certification was the Tall Grass Beef eco-label that was based on the preservation of tall grass prairie habitat. In addition to the constraints of self-certification, issues arose when the U.S. Department of Agriculture's certification of grass-fed beef as being lean and low-fat was sought. The transaction costs in attaining the department certification were high due to the long time period it took to adhere to program rules and associated high costs of production and distribution. In addition, the department's approval process was lengthy and the outcome remained uncertain, causing increased transaction costs and economic risks.

In order to increase effective sales (and therefore conservation), there is an important role for non-governmental organizations to play in terms of supporting ecolabeled products through advertising to their membership and contacting distributors and retailers of eco-friendly products. One important factor in this effort will be to determine the processes for monitoring and evaluating whether improvements are actually being made with respect to biodiversity recovery and conservation.

Two wildlife habitat and species ecolabels that have met with limited success are the Salmon-Safe label and the Predatory-Friendly labels for sheep wool. One advantage of Salmon-Safe is that it is tied to a high-profile species that consumers at the marketplace can identify with and want to protect (Robles 2000). Between 2000 and 2004, the area under improved, Salmon-Safe production practices increased from 10,000 to 40,000 acres. Although there is no price premium, the label has led to increased market share for producers using improved practices.

The Predator Friendly eco-label for wool in Montana has received quite a bit of media attention, and other ranches around the United States have inquired about the label. However, market saturation may be a potential problem. Most of the ranchers using predator-friendly management techniques operate small ranches and admit that non-lethal methods are more difficult to implement on larger operations (Robles 2000).

In the private market context, certification standards will generally be effective only where private gains from providing public goods can be captured in a market setting. One of the most important issues to address

tials, monitoring, marketing, adoption levels and potential trade issues, they represent one market approach for private landowners to partially capture the demand for public goods such as wildlife habitat conservation.

• *Recommendations*

In order to increase the biological effectiveness of ecolabeling as a viable incentive for ecosystem restoration, it is necessary to develop specific conservation goals and to set up monitoring protocols to measure achievement towards those goals. The Wisconsin Potato and Vegetable Growers Association and the Food Alliance are in the process of developing desired outcomes and indicators for measur-

“One of the most important issues to address is the difficulty in linking program participation to measurable environmental benefits.”

is the difficulty in linking program participation to measurable environmental benefits. To respond to this problem it is necessary to have conservation objectives spelled-out and a monitoring and evaluation program established to determine the linkages between actions and results. For ecolabels to be economically efficient, they must be based on transparent standards that clearly define production practices and whole-farm management standards that link economic and environmental sustainability. In sum, while certification and ecolabeling incentives face significant hurdles in terms of price and cost differen-

ing those outcomes. These activities are a key input for gaining consumer confidence in the ecosystem restoration claims of the eco-label and need to be expanded. A complementary requirement is to increase the technical capacity of third-party certifiers to evaluate ecosystem and species restoration activities.

In order to make ecolabeling a financially viable means for landowners, there needs to be better identification and verification of potential market outlets and/or price premiums. Market research and development is a constant, on-going requirement in order to find

new consumers and market niches. Marketing structures should be employed that create a link between producers and consumers that is as direct as possible.

Mitigation Banking

• Description

Mitigation banking is an example of a state-established quasi-market for the conservation of habitats and species. Market structure and conduct (rules) are designed by public agencies, and market transactions are usually restricted to certain participants and conditions.

Mitigation banking was originally applied to wetland habitats. The federal government defined mitigation banking as “the restoration, creation, enhancement or preservation of a wetland and other aquatic resources for purposes of providing compensatory mitigation in advance of authorized impacts to similar resources at another site (Federal Register 1995). Mitigation banking is authorized by the Clean Water Act Section 404 permit program and the Swamp-Buster provisions of the 1985 Farm Bill. It is overseen by several federal agencies and requires developers or agricultural producers to replace, in an equal amount—measured by chemical, physical and biological functions—the wetlands they destroy. It allows for outside parties to establish wetlands and designate their ecological value as “credits” in a wetlands banking system. A “credit” is measured in acre units. Developers and farmers who need to mitigate wetland conversion on their lands can go to these banks and purchase credits to cover the “debits” they will inflict on their own wetlands. Debits are considered to be any harm, degradation or destruction to wetlands.

Under the banking concept, a mitigation banker assembles a contiguous area where existing wetlands can be protected, new wetlands created or degraded ones restored. As the bank creates or restores habitat, it earns mitigation credits from a regulatory agency. Those credits can then be sold at market rates to either public or private developers that face mitigation requirements for their projects that involve converting wetlands at the development site. Buying credits relieves the developer of the need to conduct on-site mitigation, which generally results in low-quality wetlands. From a landowner’s perspective, buying a share in a bank transfers mitigation responsibility to bank owners who pay for the site, restoration and long-term monitoring. Depending on the cost of the credits, this could save landowners money (Hemminger 2003). The establishment of a bank is “anticipatory and aggregative” (White and Ernst 2004).

Banks can be established by private landowners or investors who seek to profit from habitat conservation. Mitigation banking creates a private market by placing a monetary value on a resource that provides several public goods in the form of various ecosystem services. Mitigation banks can prevent a decrease in property values as a result of being designated as conservation land. To date, the majority of bank creators have been private companies, not individuals. Individual landowners may be approached by a mitigation company that wishes to use their land for wetlands protection or development. The company may purchase the land, or a conservation easement from the landowner, or other compensations may be worked out between the two parties.

In addition to the federal effort, some states have created mitigation banking programs. For example, the

Arkansas Wetland Mitigation Bank Program is aimed at providing off-site mitigation opportunities for impacts to wetlands from development and is administered by the Arkansas Soil and Water Commission (George 2002).

• Assessment

From the standpoint of biological effectiveness, mitigation banking has been highly controversial. The National Research Council (2001) found that mitigation banking through wetland creation does not replace the original ecological functions of the destroyed wetland. By mitigating off-site, the impacted area loses the biological values and hydrologic functions that wetlands provide. The study therefore recommended that mitigation banking be minimized. To address the issue of ecological function requires a full specification of what constitutes success, identification of the parties responsible for both mitigation and long-term maintenance of the site, provisions for monitoring, and enforceable penalties for the failure to meet specifications (Goldstein and Heintz 1993).

The availability of appropriate physical properties for mitigation is also a biological issue. Availability and existence of suitable mitigation sites varies significantly among regions/states and ecosystems, especially with respect to endangered species’ habitat.

Conceptually, private mitigation banks have the potential to reduce landowner costs of conservation by creating a market mechanism for protecting wildlife habitat (Goldstein and Heintz 1993). The potential to make financial gains could increase the protection of habitat on private property. However, mitigation banking can be very expensive in terms of locating and buying mitigation sites, conducting restoration and managing

the bank itself. The high cost of mitigation banking has equity implications in terms of who can initiate and support a bank. Mitigation banking works only when a landowner with sufficient holdings and means goes through the legal, administrative and restoration costs of setting up a bank (Olson et al. 1993). The need to meet high start-up costs is not conducive to small landowner participation. This suggests that other incentive mechanisms may be more economically efficient from the private perspective, at least for small holdings. In addition, smaller land holdings may be less biologically effective because of isolated and smaller habitats, and they may be less economically efficient due to the lack of economy of scale.

White and Ernst (2004) identify additional issues with respect to mitigation banking. First, regulators have found it difficult to deny a permit to projects which otherwise pose unacceptable impacts, because they provide existing mitigation. The problem is that mitigation is automatically assumed to replace ecological function. In addition, sites are sometimes offered on the basis of availability and price, rather than appropriate features and scale for habitat equivalents and a strong probability of restoration success. This compromises biological effectiveness for cost considerations. There is also the problem of allowing mitigation for one species or habitat by providing benefits for other types of species and habitats: the apples and oranges issue.

There can be substantial economic risks associated with mitigation banking. McClure (2005) reports that a mitigation banking group in California called The Environmental Trust recently declared bankruptcy

and had abandoned many of their preserves. The Trust was responsible for managing more than 90 properties covering about 4,600 acres, including adjacent lands that developers had to buy for approval of housing projects. Management of the preserves was supposed to have been paid for by obtaining endowments from developers. The money was to have been invested, with the interest paying for up-keep. However, costs of labor and equipment far outpaced the endowment. The failure of The Environmental Trust to maintain long-term viable habitat through mitigation banking highlights the overall problem of how mitigation banks, whether run by public or private entities, are managed, and how there is little to no oversight by public agencies to ensure that mitigation is being carried out per the issued permits.²¹ An equally important issue is that the expertise to both manage and monitor mitigation banking lands needs to be improved.

• Recommendations

To avoid the problem of not replacing the original functions of a destroyed wetland, mitigation lands

should be chosen from identified conservation priority areas that are established under a respected habitat planning effort. Also, mitigation banking programs need to recognize that there is a point when a specific ecosystem becomes irreplaceable due to scarcity. At this point, no more development or mitigation should be considered.

In order to promote biological effectiveness and improved economic efficiency of public resources, the mitigation banking community should establish accreditation criteria and develop an oversight mechanism by which individual banks and bankers are held accountable for the biological values that they are responsible for managing. Further research on what a tradable unit should consist of, and on the indicators used to measure the biological integrity of those units, should be established through peer review.

A new assessment of mitigation banking should investigate the full economic costs and benefits of this incentive mechanism, what needs to be improved, and recommendations about the appropriate roles for the public and private sectors.



California red-legged frog | U.S. Fish and Wildlife Service

21. Delfino, K. 2005. Personal Communication. Defenders of Wildlife, Sacramento, California.

Other helpful information would include developing a standard system to monitor bank effectiveness and performance. Establishing a monitoring and evaluation program for mitigation banks becomes even more important in light of the numerous recent statements by public agencies that mitigation banking will be a primary incentive tool going into the future.

principles of increasing the probability of survival and addressing populations with adequate natural habitat. As of 2004, about 35 conservation banks had been established (Fox 2004). California leads the nation in established banks with 30, including 11 in San Diego County alone. It is estimated that these banks shelter about 22 species protected by the Endangered Species Act. Cumulatively,

agement, the habitat may degrade, and the species may be displaced. If conducted in the framework of large-scale conservation plans, conservation banking has the potential to permanently protect native habitats and their species. Established conservation banks do not reflect all of the ideals set forth by the federal guidance, but they have protected significant amounts of ecologically functioning habitat that would have otherwise been developed (Fox and Nino-Murcia 2005).

Those individuals or entities that have participated in conservation banking have found it financially attractive. Financial motives drove the founding of 91 percent of the banks, and the majority of for-profit banks are breaking even or better (Fox and Nino-Murcia 2005). With credit prices in conservation banks ranging from \$3,000 to \$125,000 per acre in California, banking agreements offer financial incentives that compete with development activities such as building golf courses and homes (Fox 2004).

Research has shown that the transaction costs of establishing a conservation bank agreement with the U.S. Fish and Wildlife Service can be high. However, 63 percent of bank owners reported that they would set up another agreement given the appropriate opportunity (Fox and Nino-Murcia 2005). The time of establishment of a conservation bank is about two years (Fox 2004). High establishment costs, and the large areas required, may be disadvantageous to smaller landowners unless they can establish a cooperative banking project that offers enough habitat at a competitive price.

More needs to be understood about the actual and potential constraints to conservation banking.

“...the majority of for-profit [conservation] banks are breaking even or better.”

Conservation Banking

• Description

Conservation banking is an off-shoot of mitigation banking. Conservation banks are areas that are set aside to protect endangered or at-risk species and their habitats. Conservation banking allows private landowners to obtain conservation credits for conserving and maintaining endangered species or their habitat and are nearly a decade old. Credits are “banked” for future trading (Yeager 1993), and banks must be pre-approved by federal and state agencies and established within the context of a federal habitat conservation plan under the Endangered Species Act. The purpose of conservation banks is to proactively preserve large contiguous tracts of habitat to offset impacts from development activities (White and Ernst 2004).

Conservation banking differs from mitigation banking in that conservation banking is based on conserving the original ecosystem and relevant species where they exist. Conservation banking is based on the

the banks cover over 44,200 acres of habitat and protect a variety of plants and animals such as the golden-cheeked warbler, red-legged frog, vernal pool fairy shrimp and Pima pineapple cactus (Fox and Nino-Murcia 2005). There are also state-wide banking initiatives in Colorado and North Carolina to preserve habitat involving both public and private participants (White and Ernst 2004).

• Assessment

There are several conditions that must be met for conservation banking to serve as a viable incentive mechanism for biodiversity conservation. First, conservation banks will have to complement other protected areas in order to conserve wildlife habitat on a scale that is biologically viable. Banks will therefore require large, contiguous areas. Small isolated patches will be insufficient to provide viable habitat. Second, conservation banks also require substantial management in order to maintain desired biological functions. Without protection and man-

Among many professional conservation planners, there is a lack of understanding and knowledge of what conservation banking is, and some that do understand it perceive it as financially and biologically risky. Because the overall positive and negative impacts of banking are not well known, there may be unanticipated consequences in terms of habitat protection.

• Recommendations

The goal of conservation banking should be to protect in-kind, on-site habitats and species. To achieve this goal, a standardized and centralized information base for identifying lands that could serve as viable conservation banks for various species and habitats should be established. In order to avoid a net loss of habitat, conservation banking should include a restoration component, and not be just a protection exercise. A necessary criterion for approving banking operations should include establishing large contiguous areas of appropriate habitat.

To improve the financial returns to conservation banking, bankers and public agencies should consider segmenting different ecological services contained at a banking site and identifying an array of potential buyers interested in multiple or individual services (e.g., pollination, flood control, water purification, etc.). The concept of ecosystem service markets is broadly explored in the recommendations part of Section XI. In order to lower the transaction costs of establishing and managing a conservation bank, we would recommend implementing a research project to quantify such costs in both the public and private sector and to provide suggestions for improved administrative efficiency.

Transferable Development Rights

• Description

Transferable development rights (also referred to as tradable development permits) are created rights to develop a landscape. Under a transfer of development rights approach, a landowner in a designated “sending area” is assigned tradable development rights for preserving his or her land and may sell them to an owner of a designated “receiving area,” to be used to increase allowable development densities. Prior to a government agency establishing a market in tradable development rights, a local planning commission defines conservation and development zones and determines which areas should be conserved, where growth should occur and where to allow buffer-zone activities such as agriculture or forestry (Brown 1999).

Establishing a tradable development rights process and market involves several steps (Goldstein and Heintz 1993). First, a conservation plan is developed for a delineated and zoned region specifying how much area will be protected together with a process for determining which areas will be developed. Second, a process is established for evaluating the habitat value of protected lands and assigning tradable conservation credits to landowners. Third, a development/conservation ratio is defined for determining the amount of mitigation (and hence conservation credits) required to undertake a proposed development. Fourth, an actual market process is developed for conducting trade transactions in conservation credits. Last, a monitoring and evaluation program is established for securing performance, guaranteeing compliance with mitigation requirements and making sure conservation

objectives are met. Recent examples of tradable development permit programs include the New Jersey Pinelands, the Central Pine Barrens in New York and Palm Beach County in Florida (Robles 2000).

As with mineral rights, water rights, easements and tradable pollution permits, development rights on private property that supports important biological habitat can be disaggregated from the original land base and traded freely on the open market. Owners of land providing habitat would be allowed to trade or sell rights to development. Both development and non-development interests, public and private, would be eligible to buy these development rights. The determination on the amount of habitat eligible for development would be based on biological data on the amount of habitat required to sustain and maintain species and overall biodiversity (Hudson 1993).

Delaware’s Agricultural Lands Preservation Program has created a trading institution that allows landowners to sell development rights. While this program is designed to keep agricultural land in production, it is also intended to provide for permanent open space for the public. Landowners may enroll in Agricultural Preservation Districts and receive in exchange the protection of right-to-farm legislation as well as the opportunity to preserve their land in perpetuity through conservation easements.

• Assessment

There is a fair amount of information on the effectiveness and efficiency of tradable development rights. With respect to biological effectiveness, tradable development rights are considered particularly useful, especially within small geographic areas where



Lynx kitten | ©Corel Corp.

sending and receiving areas are clearly defined and relatively non-controversial (Olsen et al. 1993). A significant condition for biological effectiveness is that management prescriptions must be identified that will optimize the value of the habitat. Another major condition is that the public agencies have to make the initial allocation of rights that maximizes habitat protection. This is done by determining how much of the particular habitat for an at-risk species would be eligible for development and then distributing these rights to eligible landowners (McKinney et al. 1993).

From the economic efficiency perspective, tradable development rights can promote the selection of the lowest cost lands for conservation (Goldstein and Heintz 1993). Trading tends to encourage those landowners to sell their rights who would give up the least value by foregoing development. But, the success of trading ultimately depends on where the important habitat is. More often than not, important habitat is located where landowners would

have to give up the most in foregone development revenues.

There are some conditions that must be met in order for tradable development rights to be economically viable for participants. One of the difficulties in designing a tradable rights system is that, at least for some landowners, the potential gains from development may exceed the gains from the sale of development rights. If a credits market does not set a sufficiently high price, the amount of land traded into conservation status may not be adequate. In this case, a managing agency must subsidize the market price, purchase additional credits, supplement the zoning/trading scheme with direct acquisition of land or easements, or revert to a regulatory approach. Government subsidization of the market or purchase of additional development rights spreads the costs of habitat conservation more broadly among the general public (Goldstein and Heintz 1993).

Many counties throughout the United States have experimented with transfer of development rights incentives. The degree of success with

respect to conserving viable wildlife habitat has varied. Montgomery County in Maryland, for example, has permanently protected 43,000 acres of farmland through tradable development rights. However, other county programs have not been successful, because incentive levels have not been high enough to attract landowners. If, for example, there are many landowners who want to sell their development credits, but few developers who wish to buy the credits, the value of the credit will be low (simple supply and demand). County governments have to balance the supply and demand of development credits and insure that the area of land in the “receiving” areas matches the area of land in the “sending” areas. A similar economic challenge is that the tradable land commodities have to be comparable. That is, it is not viable to trade lands supporting pygmy owl habitat for vernal pool habitat, or lynx habitat in Maine for lynx in Montana. This is a problem associated with “thin” markets.

The transaction costs associated with establishing and managing a tradable habitat development rights market can be very high. A primary cost is the substantial ecological research needed to determine viable habitat amounts. An institutional mechanism to distribute and monitor the allowable development rights also has to be created. Field surveys to establish the habitat unit size and value on private parcels must be conducted. Finally, a plan for monitoring and enforcement has to be developed and implemented. All of these actions increase both the public and private costs of using tradable development rights as an incentive mechanism.

There are social equity implications to a system of tradable development rights. Depending on the

original pattern of landownership, trading can redistribute development windfalls caused by zoning or a conservation plan from those who are allowed to develop to those whose land is restricted. The costs of conservation that would otherwise be borne mostly by landowners in restricted zones are offset by payments for development rights made by landowners in zones designated for development. Furthermore, developers are likely to pass along at least a part of the cost of development rights to the ultimate purchasers or users of the developed lands, thus passing on the costs of conservation more widely. One major question is whether it is possible to compensate enrolled lands differently based on their unique habitat values (Olsen, et al. 1993).

• Recommendations

We offer three recommendations to increase the biological effectiveness of transferable development rights incentive mechanisms. First, the identification of lands that are eligible as “sending sites” could be done by using state wildlife action plans and

then contacting the appropriate landowners to solicit their participation. Biodiversity conservation would benefit because the amount of habitat authorized to be altered would be clearly defined and capped. Second, as in the case of mitigation and conservation banking, biological criteria for in-kind and on-site conservation needs to be established. Third, we recommend that additional research be done to determine what size land base is necessary for recovering individual species and to define biologically effective management practices.

To improve the economic efficiency of trade development rights measures there is a need to conduct economic valuation studies of unique habitats in order to set out compensation values for credits. Another research requirement is to estimate the level of transaction costs for developing a market in tradable development rights (e.g., designing a conservation plan, developing trading ratios, determining market rules, etc.) in order to identify cost-saving mechanisms that do not compromise established biological goals. Because the opportunity

costs of forgoing land development may be high, there is a need to develop transferable development rights programs that leverage funds from several “receiving” sources in order to continue to pay for managing lands for their biological value.

Ecosystem Service Markets

The emergence of private markets for ecosystem services such as carbon sequestration and water quality is just beginning, and no formal assessment of their biological effectiveness or economic efficiency has been carried out. To date, these service markets have been focused on one specific resource. The one exception to this has been a very vibrant market in pollination services for commercial crop production.

The Willamette Partnership in Oregon is developing an ecosystem marketplace where business, government and conservation interests work together to protect and restore the Willamette River Basin. Conservation credits, which will be traded in the marketplace, can leverage the collective resources of factories, farms, forests, cities and sewer/water ratepayers to make strategic, coordinated conservation investments that yield dividends to the entire ecosystem. The initial focus of the marketplace will be to reduce water temperatures in the Willamette Basin to benefit fish, public health and wildlife habitat.

There is a need to monitor and evaluate the forthcoming experiments in ecosystem service markets to make sure that biological resources are not being compromised. Many of the concerns and assessment needs for mitigation and conservation banking would apply to the concept of an ecosystem marketplace.



Willamette River wetlands, Oregon | © Jim Yuskavitch

VIII. FINANCIAL INCENTIVES

Financial incentives, or subsidies (see Batie and Ervin 1999; Heimlich and Claassen 1998), constitute a payment in exchange for habitat conservation projects or activities. There are several types of financial incentives, such as compensation programs, cost-sharing of new conservation technologies or management practices, land rental or leasing, conservation contracts, debt forgiveness, insurance programs and public tax benefits. Over-and-above cost-share payments, incentive payments are broadly defined to include payments exceeding farmers' costs. A relatively new incentive mechanism provides payments for continued protection of environmental resources to agricultural producers and is similar to what some would call a "green payment."

The financial incentive mechanisms assessed in this section include public and private compensation, insurance, cost-share, stewardship payments, rental payments and debt forgiveness. Because there are many public tax-related instruments, we treat these incentives separately in Section IX.

Compensation Programs

• Description

Conservationists have been experimenting with compensation that directly pays landowners to offset wildlife threats to crops, livestock, property or personal safety. Compensation programs are designed to reimburse individuals who suffer economic losses due to wildlife depredation

or damage. Full or partial payment is made in the form of cash or other assistance (Nyhus et al. 2003). The most frequent application of these programs in the United States is to reimburse livestock owners for losses incurred by large predators such as wolves and grizzly bears. These

carnivore conservation and many enjoy the environmental, aesthetic and economic benefits of restoring carnivores. However, the direct costs of conserving these animals often falls on a minority of individuals in rural areas who lose livestock or pets to carnivores. Wildlife managers hope

“Compensation programs are designed to reimburse individuals who suffer economic losses due to wildlife depredation or damage.”

programs are managed by both public and private entities and their overall purpose is to mitigate human/wildlife conflicts, with the intention of providing support for the presence of wildlife.

When humans encroach on carnivores' habitats, or as reintroduced or recovering populations increase, carnivores more frequently encounter and prey on pets or livestock. Such encounters can be costly and can undermine wildlife recovery programs. Naughton-Treves et al. (2003, p. 1501) offer the rationale for such programs: "Compensation programs offer a means to redress the inequitable distribution of costs and benefits associated with restoring large-carnivore populations. Most U.S. citizens support

that direct compensation payments will improve these individuals' tolerance for carnivores and dissuade them from killing carnivores in retaliation." For illustrative purposes, we describe a public compensation program managed by the state of Wisconsin and a private sector program managed by Defenders of Wildlife.²²

Since 1982, Wisconsin has had a program to compensate for damage caused by species listed as endangered or threatened, drawing on funds from the state Endangered Resources Fund (funded by voluntary contributions on tax returns and the sale of special license plates). The state has compensated wolf-related losses suffered by livestock producers, game farmers and bear hunters (for hunting hounds). Compensation depends on

22. See Wagner et al. (1997) for a list of states with wildlife compensation programs.

a field investigation and confirmation by the U.S. Department of Agriculture's Wildlife Services to verify that losses were due to wolves. The time to complete a compensation payment averages about 80 days from the first report of depredation (Treves et al. 2002). Between 1976 and 2002, the Wisconsin Department of Natural Resources offered compensation for 121 verified incidents on cattle, sheep, horses, farm deer,

livestock owners are reimbursed for their losses upon confirmation by the appropriate state, federal or tribal official. After an investigation report is sent to Defenders, it then contacts the rancher to determine the value of the livestock lost. Full market value is paid for confirmed kills by wolves and grizzly bears, and 50 percent of the current market value for probable losses when the evidence is strong, but inconclusive.

a broader public acceptance for wolf recovery and helped pave the way for reintroductions.”

Public compensation funds such as that managed by the state of Wisconsin have had their share of issues to contend with. These issues are set within the context that, as wolf populations have been growing and expanding their range, depredations are on the rise. Naughton-Treves et al. (2003) found that while all Wisconsinites approved of compensation payments as a wolf management strategy, there are particular societal groups who have experienced losses (e.g., bear hunters) who are less tolerant of wolves.

Public compensation incentives have been criticized for being inadequate, fraudulent or cumbersome. Naughton-Treves et al. (2003) maintain that public compensation suffers from what economists refer to as a “moral hazard” problem. That is, the existence of a compensation program may mitigate against a livestock owner taking preventative measures to protect his/her herd to lower the risk of depredation. Thus, the compensation mechanism could result in higher public or private outlays.

There are additional economic and social reasons why compensation programs may not be very effective or efficient in increasing tolerance for predators. These can include: (1) traditional attitudes towards wolves consider lethal control the only viable option; (2) ranchers consider compensation payments inadequate given the emotion and years invested in their livestock; and (3) recipients incur high costs for complying with requirements to have definitive evidence of a predator attack (Naughton-Treves et al. 2003). With respect to adequate payments, landowners have long maintained that they expe-

“Defenders of Wildlife administers a compensation incentive mechanism to encourage private landholders, primarily ranchers, to accept the presence of predators...”

pets and hunting dogs. The value of the compensation payment is set by the projected fall market price of the animal (e.g., \$602 per calf in 2002) (Treves et al. 2002).

The compensation program managed by Defenders of Wildlife has been in existence since 1987. This was the first private compensation fund for wolves ever established in North America (Nyhus et al. 2003). By 1992, Defenders had established a permanent fund to pay for verified losses anywhere in the northern Rockies (this was later extended to include the Southwest). A trust fund has been established with private foundation contributions that compensates livestock owners for losses due to wolves and grizzly bears. The goal of the program is to shift the economic responsibility for wolf recovery away from the individual rancher and toward society at large.

• *Assessment*

Private and public compensation mechanisms differ in their eligibility criteria and their administration. In the private sector, Defenders of Wildlife administers a compensation incentive mechanism to encourage private landholders, primarily ranchers, to accept the presence of predators, mostly wolves and grizzly bears (Brown 1999). Between 1987 and 2004, Defenders paid over \$400,000 in compensation to 345 ranchers for predator-related losses. About 1,580 livestock animals were lost, almost two-thirds of which were sheep. Nyhus et al. (2003, p. 39) observed that “Some feel this is a huge sum to pay for wolf damage, others feel it is a tiny price. But almost all wolf experts agree that shifting the economic responsibility for wolves away from ranchers towards wolf supporters (the general public) has created

rience undiscovered and unverified losses of livestock. The question then becomes what would be an adequate and fair compensation ratio. In addition, public compensation programs have been criticized because they frequently run out of funding.

Whether compensation funds are private or public, there are common conditions under which they can be successful in protecting wildlife. The most important condition is the need for clear and convincing evidence that a depredation has been caused by a protected species. Obtaining evidence is one of the most critical challenges to compensation schemes. Ignoring or delaying verification can have negative impacts on the acceptability of compensation mechanisms. Finally, there is a need for timely payments based on verified losses if landowners are going to continue to participate (Bulte 2005).

Although compensation programs may not completely ameliorate individuals' grievances against carnivores, they are considered to be very useful. Compensation payments are supported and expected by the broad public. Research (Bangs et al. 1998) suggests that ceasing compensation payments causes retaliation and increased hostility. Some experts suggest that compensation programs offer a means to buy off broader public constituencies and earn support from state-level political representatives (Nyhus et al. 2003). One observer has noted that only \$15,000 per year has been paid for grizzly bear depredations on livestock in Montana and Idaho, a "puny" amount of money spent to shift the economic burden from livestock growers to bear supporters.²³

• Recommendations

Our major recommendation with respect to compensation programs,

public or private, is to make compensation payments dependent on some level of adoption of proactive, preventative measures. This achieves two goals. First, it can induce increased protection efforts that are more biologically effective because they lessen the probability of the need for lethal control. From an economic perspective, insisting on preventative measures would counter the moral hazard problem discussed above.

The major future constraint for public and private compensation incentives will be funding levels. To lessen the impact of this constraint somewhat, it would be more effective to try and leverage public and private efforts and use existing funds in a more targeted manner. Targeting compensation funds to cover specific areas and domestic prey that are more at risk of predation would help these funds to be used more efficiently (Haney et al. 2005). There must also be research on ways to lower the transaction costs associated with reporting, verifying and reimbursement of losses. Lastly, compensation ratios should be established on the basis of ecological regions and the species configurations in those regions in order to settle the question of verified versus unverified losses.

Insurance

• Description

Insurance is another form of compensation, with the exception that private individual potential claimants pay premiums. Insurance programs can be private, or they may include the participation of a public agency. Premiums are determined by market values and historic loss rates (Nyhus et al. 2003). They are designed to minimize potential financial losses incurred as a result of livestock predation by carnivores.

Several European and Asian countries have used insurance programs (Klemm 1996; Fourli 1999; Blanco 2003). In many cases, insurance programs are combined with other types of financial investments such as rural community development funds, local savings and loan associations, or the establishment of ecotourism activities (Mishra et al. 2003, Karky and Cushing 2002). In fact, it is these activities that usually generate the funding to start up community insurance programs. In most cases, local communities determine premium rates and claim rules. A major advantage of linking insurance with other economic opportunity programs is that there is little incentive to commit fraud, because community development activities would suffer.

• Assessment

Because of the recent development of insurance incentives as a species or habitat conservation incentive tool, there is not much information on either their biological effectiveness or economic efficiency.²⁴ However, based on our earlier discussion of compensation mechanisms, it is possible to outline what the general conditions would be for determining the biological effectiveness and economic efficiency of insurance incentives for biodiversity conservation.

In an insurance-based compensation program, landowners are insuring themselves against catastrophic loss, that is, those losses that are beyond "average." Insurance funds that are financed through an external donor may be better able to address average or individual losses. However, reliance on compensation funding from external sources may also make insurance mechanisms less sustainable, and therefore less effective, over the long run.

23. Johnson, M. 2005. Personal Communication. Defenders of Wildlife, Missoula, Montana.

24. See Mishra et al. (2003); Karky and Cushing (2002); and Hussain (2000).

Primary weaknesses of insurance incentives are the current lack of an actuarial basis for setting premiums and the difficulty in determining the actual value lost by landowners (Goldstein and Heintz 1993). These conditions must be addressed in order for insurance incentives to be economically efficient. In the case of wolves and grizzlies in the United

States, governmental reintroduction has been the primary event that has caused livestock losses, and thus losses do not have the type of random occurrence exhibited by most insurable events (e.g., car accidents, hurricanes, floods, etc.). Therefore, any type of insurance incentive mechanism would have to be based on expected losses due to continuing business operations. The design of the insurance mechanisms would be more like a business insurance model for inventory loss or damage (Goldstein and Heintz 1993).

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Nyhus et al. (2003) pointed out that one obvious pitfall is that the cost of insurance premiums could outweigh the average per capita cost of damage to an individual landowner. This problem could be offset by combining an insurance product with a community development fund to help offset individual losses.

Similar to any compensation mechanism, insurance is susceptible to the moral hazard problem whereby a landowner may have a reduced incentive to prevent losses if he/she knows that an insurance program will reimburse at full value. This results in higher costs for insurance providers and perhaps an unwillingness of providers to offer the insurance product

• Recommendations

Similar to the situation with compensation incentives, insurance incentives can be more biologically effective if there are requirements for ranchers and landowners to prevent losses from occurring in the first place, by requiring the use of proactive, preventative management practices to avoid conflicts. In cases where no preventative measures were taken, reimbursement rates would be lowered or standard deductibles could be increased. From a purely biological perspective, actuarial rates for determining the level of risk of loss should be developed for various parts of country.

We think there is a good opportunity for testing community-development based insurance programs in the western United States. Insurance programs could be offered through

local Rural Conservation and Development organizations or through specialized cooperatives. This would contribute to lowering the costs of verifying and administering claims for losses.

Cost-Share Incentives

This discussion of cost-share incentives is divided into two categories: public and private. The overwhelming majority of cost-share incentives are in the public federal sector, and we selected a few representative examples of federal cost-share incentives to assess.

Public Cost-Share Mechanisms

• Description

At the public level, there are cost-share incentives that are directly allocated to at-risk species and habitats, while other cost-share programs have indirect impacts. Most public conservation incentive programs that provide cost-share assistance also contain technical assistance and educational components. Examples of cost-share incentives at the federal level that directly impact species and habitat conservation include the U.S. Department of Agriculture's Wildlife Habitat Incentives Program and Environmental Quality Incentives Program, and the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife and Landowner Incentive Programs.

At the federal and state levels, there are literally dozens of programs designed to assist landowners with the costs of implementing habitat and resource conservation projects²⁵, each with its own unique eligibility criteria, payment levels and mechanisms. For the general purposes of this taxonomy, however, there are common characteristics of these pro-

25. A detailed description of recent federal cost-share, grant and other incentives programs is provided in Hummon and Casey (2004).

grams that warrant description. First, most public cost-share programs also provide for technical assistance. Second, most are not aimed directly at species or habitat conservation but instead predominately address soil erosion and water quality problems that have indirect beneficial impacts on species and habitats, especially aquatic habitats. Third, depending on the purpose and structure of each individual program or recommended management practices, cost-share amounts can range from 50 percent to 100 percent. In addition, many programs, especially those at the federal level, offer extra incentive payments for the adoption of specific practices or for a selected habitat type (e.g., riparian zones).

Typically, the federal government, especially the U.S. Department of Agriculture, determines which management practices it will cost-share. The Environmental Quality Incentives Program administered by the Department of Agriculture uses an Environmental Benefits Index to target cost-share funds to projects considered to have the highest environmental benefit.

Ninety percent of states have at least one type of public payment program.²⁶ The most common are grants or cost-share programs that pay all or part of the total cost of activities such as habitat restoration or enhancement. Thirty-seven states have cost-share programs, and 20 states have grant programs. One example of a state cost-share incentive for habitat conservation is Wisconsin's Turkey and Pheasant Stamp Program, which provides funding to landowners for practices to manage, restore and preserve woodlands, savannah, wetlands and prairie. The cost-share provides funds for the labor costs of prescribed burning as well as in-kind materi-



Masked bobwhite quail | U.S. Fish and Wildlife Service

als such as burning equipment and prairie seed. The cost-share incentive also covers some payments to landowners to allow hunting access and requires a ten-year commitment from landowners. Georgia administers a cost-share incentive to landowners for the preservation, creation or enhancement of bobwhite quail habitat. Under this incentive, a landowner or lease holder controlling a minimum of 50 contiguous acres of row crop agricultural land or thinned pine stands may be eligible for payments of up to \$10,000.

Twenty-one states offer in-kind materials to landowners to encourage enhancement or restoration of resources on private land. For example, the Illinois Private Land Wildlife Habitat Program assists landowners with native plant materials, equipment and labor to develop and maintain wildlife habitat management practices.

• Assessment

To date, there is little information on either the technical effectiveness or economic efficiency of individual

cost-share mechanisms to conserve species and wildlife habitat. From the standpoint of biological effectiveness, the cost-share mechanism may only be a temporary solution unless the initial one-time payment is augmented with management funds or other longer-term mechanisms.

From an economic perspective, cost-share payments increase the likelihood that landowners will adopt practices conducive to species and habitat conservation, because they reduce the net cost of doing so (Claassen et al. 2001). Incentive payments that exceed the cost of adoption can provide income support to farmers who adopt habitat conservation practices, compensating them for providing a public good such as wildlife habitat and native species diversity. If landowners are required to improve their environmental performance as a result of a regulatory requirement, public subsidies for adopting required practices are conducive to voluntary contracts spanning a number of years, ensuring continuity of practices and maintaining species and habitats over time.

26. See George (2002) for a more detailed description of selected state direct payment programs.

Cost-share mechanisms that provide less than 100 percent of adoption costs will be effective only to the extent that targeted practices provide additional private economic benefits or regulatory compliance. Participation will increase along with the incentive payment level. However, it may be expensive for taxpayers alone to fund substantial efforts in species and their habitats. Therefore, private-public partnerships may be

implemented in a targeted fashion. Under this program, each state has prepared (and some have updated) a summary of general wildlife habitat conditions, and that determines priority habitats or species for targeting cost-share funds. Each state biologist for the USDA Natural Resources Conservation Service, in consultation with their state technical committee and other entities, prioritize state habitat conservation needs by design-

about \$40 to \$60 million available per year, which is only enough for a few projects per state. Gray et al (2005) have indicated that the Wildlife Habitat Incentives Program has a wide range of habitat enhancement actions that affect hundreds of target and non-target species. Furthermore, while the authors state that few quantitative data exist “describing how fish and wildlife have responded to terrestrial and aquatic habitats enrolled in the program ... there is anecdotal evidence (that) implies that tangible benefits to target species are being realized” (Gray et al, 2005, p. 155).

The major “working lands” cost-share incentive mechanism is delivered through the U.S. Department of Agriculture’s Environmental Quality Incentives Program. The program is the largest single federal cost-share incentive program that indirectly impacts species and wildlife habitat. From 1996 to 2001, this cost-share program was used to implement almost 14,000 projects nationwide, covering more than 5.3 million acres, for a total cost of nearly \$13 million. Most of the projects related to improved water quality probably had beneficial impacts on aquatic habitat, but this is as yet unverified. Projects providing indirect benefits to wildlife included those for soil erosion, residue and pesticide management, vegetative buffers and windbreaks. The program also provides funding for projects that conserve habitat for at-risk species. For example, program funding has been applied to preventing the listing of the arctic grayling in Montana by paying farmers for foregone production from not irrigating, and for rehabilitation of sage grouse habitat on agricultural and ranch lands in several western states.

However, neither the effectiveness, nor the economic efficiency, of

“One indication of the financial attractiveness of the Wildlife Habitat Incentives Program is the backlog of landowners who wish to participate...”

a potential solution to funding constraints for cost-share mechanisms.

One feature that makes some public cost-share incentives biologically effective is that they are open to all types of landowners, not just those in the agricultural sector. For example, a relatively recent addition to the U.S. Department of Agriculture’s Wildlife Habitat Incentives Program is the option for a 15-year or longer cost-share agreement that is aimed specifically at at-risk species and habitats. Furthermore, the cost-share incentive can cover 100 percent of the investment needed for defined management practices. Both of these elements contribute to this program’s increased effectiveness and, from the standpoint of the participant, financial viability.

The Wildlife Habitat Incentives Program has to some extent been

nating priority regions, habitats or species (Burke 1999). In some states, threatened and endangered species and their habitats have been targeted for cost-share assistance on agricultural and non-agricultural lands.²⁷

One indication of the financial attractiveness of the Wildlife Habitat Incentives Program is the backlog of landowners who wish to participate but cannot get funding. For example, between 1998 and 2001, more than 2,500 landowners applied for cost-share funds to cover 250,000 acres of habitat, but a lack of program funds prevented their enrollment. In 2004 alone, the backlog was 2,000 landowners. Presumably, private landowners would not be interested in this program if the costs of doing so outweighed the perceived benefits. One drawback in implementing the program is lack of funding, with only

27. States that have indicated that their primary goal is improving conditions for threatened and endangered species are Arizona, Colorado, Kentucky, Maine, Maryland, Montana, New Jersey, Nevada, and New Mexico (Burke 1999).



Bombay Hook National Wildlife Refuge, Delaware | U.S. Fish and Wildlife Service

the cost-share incentive mechanism on biodiversity conservation has been examined. Before 2005, this cost-share program supported two projects (covering only 20 acres) that had a direct impact on contributing to the restoration and management of declining habitats. However, new uses of this program in 2005 have included predator deterrent measures as well as and habitat improvements for piping plover, salmon, arctic grayling and pallid sturgeon. The efficacy of cost-share incentives for these direct uses has not yet been evaluated, but all public funding allocated for cost-share amounts was applied for by landowners.²⁸ At least at the private financial level, this indicates that the cost-share amounts were sufficient enough to attract landowners.

The U.S. Fish and Wildlife Service offers cost-share incentives through its Partners for Fish and Wildlife Program. Under this program, the highest priority is given to projects that benefit declining migratory bird and fish species, threatened and endangered species, and species proposed

for listing, and to those proposals on private lands that satisfy the needs of populations adjacent to National Wildlife Refuges. Special consideration is given to projects that are on permanently protected lands or that reduce habitat fragmentation. Projects of longer duration, those that leverage non-federal money, and those that are most cost-effective are highly ranked. To date, there has been no analysis of either how effective or efficient the cost-share incentive mechanism has been in meeting the program's goals.

The U.S. Fish and Wildlife Service's Landowner Incentive Program offers cost-share and technical assistance incentives. This program, which is administered by each state, helps landowners enhance habitat for at-risk, threatened and endangered species. It is therefore targeted to cost-sharing conservation practices for species in need of conservation and assistance. Some states are prioritizing funding for projects that implement their state wildlife action plan.

One of the biological benefits of the cost-share incentives offered by

the U.S. Fish and Wildlife Service is that they can prevent habitat degradation for at-risk species. One of the features that make this cost-share potentially more effective is that it incorporates a monitoring component, which includes a pre-agreement survey and a periodic progress check. The monitoring activity lends the program flexibility through adaptive management. On the other hand, U.S. Fish and Wildlife Service cost-share programs have been criticized with respect to whether they help endangered species. Some observers say that the structure of these incentives actually discourage landowners from conserving federally listed species (Freedman 2003). The program guidelines establish that projects should benefit "at-risk" species, which is broadly defined. However, the high transaction costs associated with accessing cost-share incentives for federally listed species has encouraged states to use the funds for state-listed or other at-risk species (Freedman 2003).

There are two types of economic constraints that may reduce private landowner participation. First, the financial level at which landowners meet their part of the cost-share requirements may be too high to allow for widespread participation. For example, a private landowner can receive up to \$20,000 in Florida to cost-share practices for conserving endangered species. However, a 50 percent non-federal match is required, which may discourage smaller private landowners. Second, landowners only receive reimbursement after restoration work is completed and evaluated by state fish and wildlife biologists.

From the public finance perspective, Congress and the U.S. Fish and Wildlife Service have had problems getting enough incentive funding

28. David White. May 2005. Personal Communication. Natural Resources Conservation Service. Bozeman, Montana.

out to the field, therefore making it less effective.

• *Recommendations*

To the extent that targeting cost-share funds already takes place in the public realm, those efforts should be maintained and expanded. At the federal level, the Department of Agriculture cost-share incentive programs should develop biological criteria for incorporation into the Environmental Benefits Index as a decision making tool. For Department of Agriculture cost-share programs, we would recommend that only a portion be targeted to habitats identified in state wildlife action plans as needing conservation. For both federal Agriculture and Fish and Wildlife Programs, the management practices that are cost-shared should be reviewed for their biological effectiveness and economic efficiency. To a limited extent, the Department of Agriculture is already implementing such a review through its Conservation Effects Assessment Program. This effort needs to be continued.

We have three basic recommendations that could be useful in improving the economic efficiency of public cost-share incentives. First, there needs to be coordination of practices, payment levels and priority areas between the state and federal efforts in order to make more effective use of existing funds. Second, we would recommend that an economic evaluation of environmental outcomes be implemented in order to gauge the public benefits of landowner conservation efforts, and perhaps to readjust cost-share amounts. Third, for those landowners that engage in activities that can result in better conservation (e.g., coordination with other landowners, conducting

monitoring and evaluation activities, addressing critical resources of concern, etc.), incentive bonus payments should be offered.

monitoring flights; retiring grazing allotments; providing alternative grazing pastures and feed sources for livestock; and hiring range herd-

“To date, there has been no assessment of the biological effectiveness or economic efficiency of private cost-share mechanisms.”

Private Cost-Share Incentives

• *Description*

One example of a private cost-share incentive is the funding of proactive projects and practices to prevent conflicts between landowners' economic utilization of their resources (crops or livestock) and native wildlife. Private funds have been employed to provide assistance to livestock owners and other rural landowners to cost-share preventative measures to avoid conflicts between wildlife and humans.

Defenders of Wildlife established a proactive cost-share carnivore conservation fund in 1999 to help with recovery efforts for wolves and grizzly bears and to prevent conflicts before they occur. Other objectives are to keep predators from being unnecessarily killed by agencies in response to human conflicts and to increase general tolerance for carnivores across the landscape. Defenders collaborates with federal, state and local governments, livestock producers, and private enterprises to initiate proactive projects.

Examples of proactive practices include furnishing guard animals, radio-activated guard boxes, flags of ribbon fabric on fencing, electric fences around calving grounds, electric night pens and aerial

ers and riders. From 1999 to 2003, Defenders' completed 76 projects for a cost of about \$257,000. For 2004 and 2005, investments in proactive measures reached \$219,000. Most of these projects have been aimed at reducing conflicts between wolves and livestock in the Northern Rockies.

• *Assessment*

To date, there has been no assessment of the biological effectiveness or economic efficiency of private cost-share mechanisms. With respect to economic efficiency, and to the extent that the private sector can administer funding with fewer administrative requirements, private cost-share mechanisms may involve fewer transaction costs than public programs. Another economic advantage of private cost-share incentives, specifically for livestock depredations by large carnivores, is that they can improve the effectiveness of compensation programs.

• *Recommendation*

Our major recommendation is that private proactive cost-share incentives be more rigorously assessed to determine their economic efficiency and their impacts on species and habitat conservation. This work is important, as demand for such programs is likely to increase in the future.

Conservation Stewardship Incentives

• Description

Conservation stewardship incentives are payments to landowners for supplying and maintaining environmental services such as clean water, reduced soil erosion and improved biodiversity. This incentive mechanism differs from cost-share payments in the sense that landowners receive compensation for the public resource goods that they are already providing. That is, landowners are not receiving compensation or assistance for “fixing” environmental problems, but rather for maintaining sound environmental practices that they are already implementing and will continue to implement. The major justification for a stewardship incentive is that landowners who manage their land to generate environmental benefits, which are enjoyed by the public at large, should receive some form of compensation for public benefits that have no readily available markets.

• Assessment

The only conservation stewardship incentive mechanism now being implemented is through the Department of Agriculture’s Conservation Security Program. This program was authorized in 2002, and the first participants were enrolled in 2004. Since the program is so new, there has been no biological or economic assessment to determine its effectiveness or efficiency. However, because the program has been in high demand throughout the country, we assume that private landowners are finding it cost-effective to participate. One observer (Henry 2005) has stated that the potential for improving wildlife habitat through the Conservation Security Program is enormous. Certainly,

offering incentives to landowners to maintain public biodiversity benefits over time through active management could be more biologically effective than a one-time cost-share incentive for installation of a practice.

• Recommendation

Our major recommendation for this stewardship incentive mechanism is that it undergo a full evaluation to determine its contribution to biodiversity conservation and its private and public economic efficiency. This will require some estimates of the economic value of the environmental goods and services that are being generated and maintained by landowners in the Conservation Security Program.

Land and Water Rental and Leases

• Description

Conservation incentives in the form of land rental payments occur primarily in the federal sector, and specifically through the U.S. Department of Agriculture. The major land rental programs are the Conservation Reserve Program and its sister program, the Conservation Reserve Enhancement Program.²⁹ The Conservation Reserve Program was established in 1985 and provides compensation through land rental payments to landowners who cease production of agricultural products on erodible and other environmentally sensitive lands and establish perennial grass or trees. Whereas the program was originally conceived as a dual-purpose commodity supply control and soil-erosion-reduction program, it has evolved into a multipurpose conservation program with wildlife conservation now recognized as one of its core goals (McKenzie 1997). The Conservation Reserve Program is

the largest federal resource conservation program in terms of the number of participants and program expenditures. More than 34 million acres are currently in land rental agreements. In 1996, policy makers created the Conservation Reserve Enhancement Program, a federal/state partnership program, to focus on local environmental problems. In Maryland, for example, the Enhancement Program is targeted to protect water quality in the Chesapeake Bay. In Washington and Oregon, the program focus is on salmon recovery. Rental contracts are for 10 to 15 years, with annual payments set at levels (based on local agricultural land rental rates) to compensate landowners for forgone net revenues (net benefits they would have received had they used the land for some form of production).

An example of a state-funded land rental/lease program is Kansas’s “Walk-In Hunting Access.” This incentive provides landowners lease payments for wildlife habitat retention and enhancement in exchange for access to the public for hunting. In 2001, the Kansas Department of Wildlife and Parks leased about 680,000 acres of habitat under this program.

Contrasted to land rentals, leasing in-stream water rights to protect aquatic habitat and species has been primarily an instrument utilized by private western conservation groups such as the Oregon Water Trust. In addition, Oregon’s Conservation Reserve Enhancement Program, which uses federal and state funds to restore riparian areas for habitat and water quality, includes an option for leasing irrigation water for in-stream uses. To date, there has been no analysis conducted to determine the biological effectiveness or economic efficiency of water leasing incentives. Thus, the

29. The U.S. Department of Agriculture’s Grassland Reserve Program has only been implemented since FY 2003, and not enough experience has been gained to determine either its effectiveness or efficiency in protecting wildlife habitat.

assessment and recommendations sub-sections below address only land rental incentives.

• *Assessment*

Van Buskirk and Willi (2004) found that land withdrawn from agricultural production through land rental payments enhanced native biodiversity in the United States. The number of species of birds and insects, for example, are higher on rental lands, and population densities increase, especially for those in decline. Additionally, they concluded that land rental incentives improved the viability of native plants and animals on adjacent lands that remained in agricultural production. The major determinants of biological effectiveness were identified as using native plant species, renting larger parcels, using less intensive production practices and having longer rental agreements.

The availability of permanent cover on Conservation Reserve Program rental lands has had some positive impacts on biodiversity in the form of providing nesting cover, wintering habitat, and plant and insect food sources. Land rental agreements usually contain some restrictions on harvesting practices in order to benefit wildlife. For instance, the enrolled lands in a special biomass production category may not be harvested more than once every other year, and the biomass may not be used for anything other than energy production. There are restrictions to protect particular bird species, such as forbidding harvesting or mowing during nesting seasons.

Land rental incentives are particularly well suited for securing environmental benefits that increase with the length of time land is removed from crop production. Land retirement can be easily confirmed and, therefore, easily enforced. However, since land

rental programs are temporary, there is no long-term guarantee that habitat will remain protected after a 10 to 15 year agreement has expired. Furthermore, only 25 percent of the land area of any one county may be rented under the Conservation Reserve Program at any one time, possibly mitigating the achievement of a sufficient biological scale for some species.

It is generally assumed that taking land out of intensive production will benefit native plants and animals. However, there have been serious questions about the conservation value of land rental incentive payments. As Van Buskirk and Willi (2004, p. 998) point out, "Various ecological and economic arguments suggest that these programs and incentives are inefficient and relatively unsuccessful at providing habitat for wildlife. Agro-ecological monitoring of the impacts of set-asides on biodiversity has produced a large and contradictory literature." However, the authors do not explicitly recognize that the Conservation Reserve Program has been primarily aimed at reducing soil erosion and that providing wildlife habitat has not historically been its major focus.

Despite some successes in attaining biological effectiveness, the Conservation Reserve land rentals have had some unintended negative consequences. One is that native prairie habitat has been destroyed (Baker 2005). "Sod busting," the practice of converting virgin prairie into cropland, has apparently been particularly acute in South Dakota. However, the federal agencies overseeing the Conservation Reserve Program have indicated that after 2000, sod busting has not been a large problem. Still, from a public goods perspective, land rental payments are less effective and economically inefficient if they result in losses of ecological function in

adjacent native prairies.

Another technical problem with the Conservation Reserve Program has been the lack of an explicit prohibition against certain practices that may undermine native prairie habitat, such as planting invasive species. Because the original purpose of the program was reducing soil erosion, federal agencies at one time even required the use of invasive grass species. Currently, however, new enrollment policies encourage and reward landowners to plant native grasses.

From the perspective of the landowner, Allen and Vandever (2003) report survey findings designed to gauge the impacts of the Conservation Reserve Program, and indirectly the effectiveness of land rental incentives. The authors state that 85 percent of respondents reported improved control of soil erosion as a result of putting land into the program, more than 75 percent believed that the benefits to wildlife are important, and 73 percent believed that there were positive changes in wildlife populations. On the other hand, only 39 percent of the landowners that responded thought there were improvements in water quality.

The biological impact of the Conservation Program Reserve has differed by region, but there are no definitive numbers in terms of species protected. Winkleman (2005) reported that the program has had a positive influence on nesting success of the greater prairie chicken in Minnesota by providing dense grassland habitat, detaching predators, and providing a greater food supply.

In the Midwest, Heard et al. (2000) observed that bird abundance has been substantially higher on unconverted Conservation Reserve Program lands than on row crop fields typically replaced by reserve plantings. Limited evidence indicates

that reproductive success and survival are sufficiently high to yield positive population growth for a few species. To date, however, a significant positive relationship between the establishment of habitat and growth of populations has been documented for only two grassland bird species. Overall, the evidence accumulated to date indicates that reserve habitat protected with rental payments in the Midwest likely contributes to the population stability or growth of many, but not all, grassland bird species (Reynolds 2000). However, there is a need to control management practices such as haying and grazing for the conservation of habitat to remain effective. Johnson (2005) has indicated the change from cropland to grassland since 1985 has influenced bird populations and that many, but not all, grassland species can do well on reserve lands. However, the responses of birds will differ by species, region, the vegetation composition in the field, and whether or not haying or grazing has taken place (Johnson, 2005, p. 17).

In the Great Plains, the effects of the Conservation Reserve Program on waterfowl have been documented. In a review of published and unpublished studies, Johnson (2000) found that grass cover on reserve land rentals was highly attractive to nesting birds. Between 1992 and 1997, it has been estimated that reserve lands in the prairie pothole region contributed to a 30 percent improvement in duck production. Reynolds (2005) has updated this assessment to indicate that the reserve program has “significantly increased duck productivity from the most important duck breeding area in North America” (p. 38).

Burger (2005) estimated that more than 1.3 million hectares were enrolled in the Conservation Reserve Program

in the Southeast. Because of natural succession, however, the wildlife species that occur on reserve lands will vary over time. The provision and management of wildlife habitat over time requires active management, including the eradication of exotic

“From an economic efficiency perspective, there are both advantages and disadvantages to land rental incentives.”

forage grasses. Burger (2005) concludes that the wildlife habitat values of reserve fields in the Southeast have diminished over time by the selection of cover practices with short duration or minimal habitat value.

In the areas for which land rentals occur through the federal-state partnership of the Conservation Reserve Enhancement Program, no real evaluation of biological effectiveness has been carried out. Nonetheless, research on wildlife responses to conservation buffers, which are an approach commonly available through the enhanced programs, have been assessed based on a review of studies of bird communities in various strip cover habitats (Best 2000). Bird abundances and nest densities were found to be higher in strip-cover habitats than in bloc-cover habitats, but nest success in strip-cover habitats is often very low. However, strip-cover habitats (or buffers) may function as biological sinks that can negatively impact the recovery of a species. Allen (2005) points out that most Reserve Enhancement programs have only been in existence for four years. Monitoring programs to evalu-

ate the performance of the program have been established, but “because of the time needed to establish vegetative covers and the complexities of landscape-level analysis, quantifiable results are limited at this time” (Allen 2005, p. 115).

From an economic efficiency perspective, there are both advantages and disadvantages to land rental incentives. First, from a national perspective, the public faces constantly recurring costs of renting the same amount of ecological services, rather than owning those same services. Shaffer et al. (2002) have shown that for conserving a representative national sample of native biodiversity and wildlife habitats, land acquisition with management and easements are more cost-effective than land rentals. Another economic disadvantage is that rental payments must cover the full value of the productive capacity of the land and therefore can be more expensive on a per unit basis than other types of incentive mechanisms. At the private landowner level, rental rates for irrigated land, and the riparian lands that are crucial to so many species, are not set high enough in comparison to value of land in production.

The Reserve Program has demonstrated some positive public economic benefits. As it is linked to



Farmer and conservation agent, California | Natural Resources Conservation Service

the land rental incentive, conservation compliance has been estimated to provide environmental non-market benefits of about \$1.4 billion per year (Claassen et al. 2001). Erosion reductions on program lands are estimated to provide \$694 million per year in non-market benefits (Claassen et al. 2001). These values include water-based recreation, soil productivity, and industrial and municipal water uses. The value of improvements to wildlife viewing and to hunting induced by the program has been estimated at \$704 million per year. This represents a lower bound estimate of wildlife benefits, because it does not include non-use benefits of increased protection of threatened, endangered and other species that society as a whole values.

There have been some attempts to combine technical effectiveness with economic efficiency in the selection criteria for land rental incentives. Proposed land rental contracts from landowners are ranked according to an Environmental Benefits Index, which

consists of determining a ratio of project costs to estimated benefits generated in the form of wildlife habitat, water quality and soil erosion control. Proposed contracts with the highest benefit-to-cost ratio receive prioritization for funding.

One economic factor that will be important from a public finance perspective is that the land rental agreements on about 28 million Conservation Reserve Program acres will be expiring and up for renewal in 2007-2008. It is possible that the goal of federal budget deficit reduction will result in fewer acres being rented with public funds. While lower enrollment rates will result in some cost savings, there is a concern that the program will be scaled back and the biological gains that have been made will be lost.

• Recommendations

There are a number of recommendations that we can offer which we believe would increase the biodiversity impacts of land rental incentives. These recommenda-

tions are primarily aimed at the Conservation Reserve Program, but they should also be applicable to other programs that offer rental payments, such as the new Grasslands Reserve Program. Perhaps the most important recommendation is to strengthen and enforce the sod-buster provisions of the Farm Bill so that lands under rental agreements are not substituted with new lands that are broken open for production. Second, although it has been demonstrated that certain bird species have benefited from the Conservation Reserve Program, there is a need to evaluate and adjust management practices that are required under rental agreements in order to improve their biodiversity impacts. Third, active management by landowners, including burning, control of invasive species, etc., should be adequately compensated. Biodiversity conservation and enhancement does not stop with the signing of a rental agreement. Fourth, as in our recommendations for other incentive mechanisms, we believe there should be some degree of targeting the Reserve Program to habitats and species identified in the state wildlife action plans as needing attention. To some extent, this is already done by rating applications for the program based on the Environmental Benefits Index described above. What may be useful is to incorporate the priorities of the state wildlife action plans into current indexes for each state. Finally, the “25 percent rule”; that is, that only 25 percent of any one county can be enrolled in the Reserve Program at any one time, should be suspended. This puts an artificial limit on the area that landowners may wish to rent out and may unintentionally lead to habitat fragmentation.

With respect to improved economic efficiency, the fact that private landowners are waiting to get into the program is a sign that the Reserve Program is profitable for them. However, as reported earlier, land rental contracts over a long time horizon are less efficient from the public taxpayer perspective than land purchases. To improve the economic efficiency of land rental incentives we have two recommendations. First, rental rates for irrigated lands need to be raised because current rates based on Midwest cropland are just not competitive with irrigated crop production, especially fruits and vegetables. Second, in order to remain competitive with alternative land uses (including sprawl), rental rates should be based on their fair market value in all uses, not just agriculture.

Conservation Contracts

• Description

Conservation contracts for resource conservation services, between private parties or between public agencies and private parties, can take many forms. Although conservation contracts do not transfer specific ownership rights, they contractually bind the owner to manage his or her property to achieve specific environmental objectives (Brown 1999).

Typically, a landowner who agrees to contract terms may receive a payment in return. All conservation programs managed through the U.S. Department of Agriculture involve a contractual agreement to implement specific conservation practices in exchange for payment. In the private sector, producer-processor contracts can require the use or ban of specific inputs or management practices to improve food safety, improve water quality, or protect species and their habitats (Swinton, et al. 1999).

Contracting for the supply of genetic resources also provides direct financial payments. Biodiversity may be extremely valuable in terms of genetic resources for pharmaceutical and medicinal research, agriculture and industry.

For instance, it is estimated that 25 percent of medicines and pharmaceuticals were originally derived from plant species and another 25 percent from animals and micro-organisms (Meyers 1997). Examples include taxol for cancer and bacterium collected from Yellowstone hot springs that allow for genetic fingerprinting (Brown 1999). These contracting mechanisms provide the means to derive asset values from natural resources and act as an incentive for their conservation.

• Assessment

With respect to the types of private conservation contracts listed above, there has been no empirical analysis of specific projects or programs in terms of biological or economic impacts.

• Recommendation

There is a need to carry out an assessment of conservation contracts and to compare the results to other types of incentive mechanisms. One particular concern from an economics perspective is that incentives reflect multiple non-use values of biological resources, just not their private market value for use in fulfilling some particular human need.

Debt Forgiveness

• Description

The Farm Services Administration of the U.S. Department of Agriculture manages a Debt for Nature Program. The purpose of the debt forgiveness incentive is to help landowners to improve their overall financial stability

and simultaneously improve wildlife habitat, environmental quality and the scenic value of agricultural lands.

The financial incentive is cancellation of a portion of the participant's debt in exchange for conservation activities. Not all agricultural lands are eligible for this incentive mechanism. Only high priority areas composed of wetlands, highly erodible lands or lands in 100-year flood zones may participate.

The amount of debt that can be canceled is calculated by considering the present market value of the farm, the value of the debt itself and the number of acres to be covered by a conservation contract. Borrowers who are up to date on their Department of Agriculture loan payments, or who are receiving a new loan, can have no more than 33 percent of their loan canceled. There are restrictions on the use of enrolled lands, including no construction, timber harvesting or agricultural production. The participant must agree to continue the conservation practices for 10, 30 or 50 years, depending on the loan reimbursement schedule.

• Assessment

As in the case for conservation contracting, there have been no assessments of either the biological effectiveness or economic impacts of debt forgiveness as an incentive measure for habitat and species conservation.

• Recommendations

We would recommend that a subsample of participants be surveyed and field visits made to respond to these information needs. One important question is whether the market and non-market values generated through conservation efforts are comparable to the forgone debt repayments of taxpayer funds.

IX. PUBLIC TAX INCENTIVES³⁰

Tax incentives have long been used by federal and state governments to help achieve conservation objectives. Tax allowances provide a financial benefit to those landowners who maintain or restore land for a variety of conservation purposes. Tax incentives do not seek to balance existing land-based revenues and opportunity costs. They are intended as motivating incentives and economic signals, not as compensation for the effects of lawful and appropriate government regulation (Olson et al. 1993).

The major types of tax incentives allow for reductions in income, property, estate or capital gains taxes. Federal tax incentives

to conserve and protect biodiversity fall into two categories: income tax reductions and estate tax reductions. Reductions in income taxes can come about by donating a conservation easement, excluding conservation cost-share payments from gross income, or deducting conservation expenditures. Most state tax incentive benefits are received in exchange for either passively maintaining property in its current state or actively managing the land as wildlife habitat. Forty-one states provide some form of state tax benefit for citizens that maintain wildlife habitat.

This section is organized a little differently from previous discus-

sions of incentive measures. First, we describe all tax incentives in one sub-section. This is followed by a general assessment for all tax incentive mechanisms and recommendations that are based on individual tax measures.

Income Tax Incentives

Federal income tax incentives to encourage habitat conservation include deductions for donating conservation easements, for incurring conservation expenditures, and from revenue derived on lands that are managed to support natural habitat. The value of a donated conservation easement may be deducted from federal income taxes if the easement is for conserva-



Columbine and Parnassian butterfly | U.S. Fish and Wildlife Service

30. This section on public tax incentives draws from previous papers by Hummon and Casey (2004) and George (2002).



Native grasses in conservation buffer, Iowa | Natural Resources Conservation Service

tion purposes and is transferred to a qualified organization. Landowner expenditures for restoring or creating habitat for endangered species can either be deducted from income taxes or received as a tax credit.

Another strategy is to exempt, or tax at a lower rate, revenues from lands that are managed for endangered species habitat. This incentive currently only exists at the state level. Relief from state income taxes for private landowners to maintain wildlife habitat, though less numerous than property tax programs, is the second most prevalent state incentive mechanism. Eleven states utilize income tax incentives, and they frequently exist in the form of credits or deductions.

The most common state income tax relief programs involve donating an easement to the state or qualified non-profit organization for conservation purposes. These programs typically allow a credit against the state income tax in some proportion to the value of the donation. In Virginia, for example, the Land Conservation Incentives Act of 1999 gives landowners who donate conservation easements a state income tax credit of up to 50 percent of the easement's fair market value.

Donation of a Conservation Easement: A donated conservation easement can qualify as a charitable gift, which entitles the landowner to deductions on his/her federal income tax return. However, there are several conditions that must be met, as defined by Section 170(h) of the Internal Revenue Code. The easement must be perpetual, donated to a qualified organization for conservation purposes and provide some benefit to the general public. The land subject to an easement must either protect a scenic view for the general public, open space, an important, relatively natural habitat, or historic property, or provide public education or outdoor recreation. The landowner retains ownership of the property and may choose to shape the terms of the easement to allow for compatible uses. In addition, the easement does not have to cover all of the property, or allow public access in order to qualify as a charitable gift. Originally, up to 30 percent of a landowner's gross income may be deducted each year for six years. In November of 2005, however, a new tax bill expanded the incentives program for donated easements. This bill extended the deduction period from

1 to 16 years and raised the ceiling for deductions to 100 percent of adjusted gross income for farmers and ranchers (American Farmland Trust 2005).

Exclusion of Cost-Share Payments from Gross Income: Section 126 of the Internal Revenue Code allows landowners to exclude from their gross income all or some of the cost-share payments received from federal and state government conservation programs. In order to do so, two conditions must be met: (1) The Secretary of Agriculture must determine that the payment is primarily for the conservation of soil and water resources, protecting or restoring the environment, improving forests, or providing wildlife habitat; and (2) The Secretary of the Treasury must determine that the payment does not significantly increase the annual income derived from the property (Haney et al. 2001). For qualifying conservation programs on agricultural lands³¹, the Internal Revenue Service and the U.S. Department of Agriculture determine which practices are eligible for exclusion. Government payments for land rentals do not qualify, making the Conservation and Grassland Reserve Program payments ineligible for exclusion from gross income (Haney et al. (2001).

Deductions for Conservation Expenditures; Section 175 of the Internal Revenue Code (Haney et al. 2001), enables landowners who invest in soil or water conservation to deduct relevant expenses on their income tax return, as long as the land is, or was in the past, used for farming. Eligible farms include those producing stock, dairy, poultry, fish, fruit or vegetables. The deduction for soil and water conservation expenses can be no more than 25 percent of the landowner's gross income from farming. If the expenses are greater

31. These programs include the Environmental Quality Incentives Program, the Wildlife Habitat Incentives Program and the Wetland Reserve Program, among others.

than 25 percent, surplus expenses can be carried over to the next year. The deduction can only be made if the expenses are consistent with an approved federal conservation plan or comparable state agency plan. Approved conservation expenditures for deduction include those for (1) treatment or movement of earth, such as leveling, conditioning, terracing, grading, contour furrowing and restoration of soil fertility; (2) the construction, control and protection of diversion channels, drainage ditches, irrigation ditches, earthen dams, watercourses, outlets and ponds; (3) the eradication of brush, and (4) planting windbreaks. Expenses from draining or filling wetlands, and preparing land for a central pivot irrigation system, cannot be deducted as soil and water conservation expenses. If the landowner chooses to deduct soil and water conservation expenses, he/she cannot exclude any cost-share payments received for the expenses from gross income. If the expenses are not deducted, then they must be capitalized. In Florida, landowners who participate in Florida's greenway system are exempted from any state income taxes due on monetary compensation received from conservation activities.

Property Tax Incentives

Property tax incentives are allowable tax deductions at the state and/or local level. This includes tax credits for habitat maintenance or improvement or partial tax credits for Endangered Species Act compliance expenditures. A key complimentary incentive is related to how land values are assessed for appraisal purposes. Several states require appraisal according to current use rather than "highest and best use" to protect agricultural and

ranch lands. A version of this strategy is the Public Benefit Rating System whereby landowners are given tax credits if they restrict the potential development or use potential of their property. For example, the more a landowner does to protect wildlife habitat, the larger the credit.

"Thirty-six states offer property tax incentives for the establishment or maintenance of wildlife habitat."

Thirty-six states offer property tax incentives for the establishment or maintenance of wildlife habitat (George 2002). There are several permutations of state property tax incentives. Common approaches include current use valuation for tax assessment purposes, reduced property taxes or outright exemption from taxation. Less common mechanisms include tax incentives associated with the transfer of development rights, credit for open space or habitat management, or tax relief for property used exclusively for preservation purposes by conservation groups.

Current use assessment comprises the largest group of property tax-based incentive programs. These programs take into account the legal restrictions on land use when calculating the property's value. The most common current use valuation statutes that can benefit wildlife habitat conservation include those for farm, forest, open space and conservation use property. For example, Illinois provides that property dedicated as a nature preserve or as a nature preserve buffer shall be depreciated for assessment purposes.

Seventeen states provide for property tax relief for land subject to a conservation easement. Colorado and South Carolina, for example, allow both income tax benefits and property tax benefits for authorized conservation easements. Property owned by conservation groups and

used exclusively for conservation purposes benefits from outright exemption from property taxes in some states.

All 50 states have preferential property tax programs for agricultural land that can serve as habitat for some species. While some states have pure preferential programs (no penalties for changing land use) other states impose a deferred or "roll-back" tax-plus penalties if land is converted to non-conservation uses.

Estate Tax Incentives

Estate taxes must be paid on the market value of inherited property at its "highest and best use." This usually means the land's development potential in terms of housing. Consequently, an inheritor may need to subdivide, sell and/or develop some or all of the land to pay the tax. The Federal Taxpayer Relief Act provides landowners an incentive for putting land under conservation easement by excluding 40 percent of the land value from the taxable estate under a qualifying easement (Brown 1999). The maximum amount that can be excluded is \$500,000. These

benefits are available for easements that reduce the fair market value of a property by at least 30 percent. Fewer benefits are available for easements that reduce property values by less than 30 percent.

A conservation easement can greatly reduce the fair market value of land, especially in areas facing intense pressures from development. Section 2055(f) of the Internal Revenue Code allows the value of donated easements to be deducted from the taxable estate of the landowner. Thus, estate taxes can be lowered dramatically by the use of easements.

The Internal Revenue Service Restructuring and Reform Act of 1998 amended section 2031(c) to allow an estate tax deduction for a post-mortem easement. This means that the heirs to an estate may be allowed to donate a conservation easement and still receive estate tax benefits. However, no income tax deduction can be made under this option.

There are several conditions that must be met for a donated conservation easement to qualify for the estate tax benefits. First, the land must have been owned by the decedent or family member during the three years prior to the date of death (Haney et al. 2001). The easements must also qualify for a deduction under section 170(h) of the Internal Revenue Code (described above). Furthermore, the easement must prohibit all but “de minimus” commercial recreational activities.

The 2001 tax law works to phase out the estate tax altogether by raising the unified credit to \$1 million in 2002, \$3.5 million in 2009, and no estate tax in 2010. However, in 2011 the estate tax will return, unless Congress takes action to change it before then. There is an on-going debate about whether to permanently repeal the federal estate tax.

At the state level, Virginia allows for personal representatives and trustees to donate a conservation easement on their decedent’s or settler’s property in order to obtain the benefit of the estate tax exclusion of the United States Internal Revenue Code. Montana’s estate tax statute allows a waiver of inheritance and estate taxes by transferring land easements to the state to conserve open space and preserve wildlife habitat.

Capital Gains Tax Incentives

Taxes on capital gains may be avoided when a landowner donates land to a qualifying government agency or nonprofit conservation organization. This allows the landowner to write off a portion of value of the property and simultaneously contribute to environmental protection (Hudson 1993). However, the current exclusion rate from capital gains taxes is only 25 percent of the value of lands with conservation easements. Examples of exemptions from state capital gains taxes include Arkansas and Virginia for the sale or exchange of land or an easement to a public or private conservation agency.

General Assessment of Tax Incentives

There has been little analysis of the effectiveness or efficiency of any public tax incentive to conserve or restore wildlife habitats. The information we present is limited to personal income and property tax incentives. Brown (1999, p. 468) indicated that, in general, tax mechanisms are “one of the most powerful market-based policy tools for providing incentives (or disincentives) for encouraging private landowners to restore or protect biodiversity.” Robles (2000), on the other hand, pointed out that tax

laws are frequently modified, and long-term protection of habitats and species may not be possible through tax incentives. While it is true that tax laws provide important signals to resource managers, the viability of tax incentives to provide for long-term wildlife conservation can be open to question.

McKinney et al. (1993, p. 3) concluded that there are three major economic and equity reasons for “using the federal tax code as a basis for providing incentives to private landowners to conserve and restore wildlife habitat. First, a centralized tax system serves as the mechanism needed to supplement the transfer of money among groups in society. It is more efficient to distribute tax dollars to private landowners attempting to restore and preserve endangered species and their habitats than it is for concerned citizens to write checks to individual landowners. Second, the federal tax code is used regularly to stimulate and shape investment and development decisions for many facets of our economy. Third, the federal tax code is a central locus that reaches all economic agents in the United States, and is therefore equitable.”

Transaction costs associated with property tax incentives include those related to identifying species location, acreage quantification and delineation, management plan development, and compliance monitoring. Biological surveys are needed to identify and delineate habitats. These types of surveys are ongoing and are utilized in current efforts by some states to develop their state wildlife action plans. Transaction costs of property tax incentives can be quite high when additional resources for monitoring and state tax revenue reductions are included.

One major problem facing the application of property tax incentives on private lands is the way that private land is valued. The benchmark for land tax assessments is the “highest and best use” to which land can be put, which means determining its maximum likely revenue potential. In the view of property appraisers, the presence of an endangered species is not considered as part of the revenue potential of a land area, it is considered as decreasing the value of a property. The task is to develop incentives that maximize the value of biodiversity and habitat assets and minimize the private costs of their conservation. Properly structured, the right system of tax incentives could slow the rate of habitat loss and provide economic returns to private landowners (McKinney et al. 1993).

Tax Incentive Recommendations

Tax deductions for maintaining wildlife habitat are needed. Tax deductions and credits shift the burden of the cost of biodiversity conservation from the private to the public sector, providing a more equitable funding source. However, tax deductions and credits do not make the costs go away. Given current federal budget constraints and tax cuts, the goal of a tax-based incentive program should be revenue neutral, where monies from disincentives fund various incentives. However, without data on the acreage levels of private land supporting eligible habitat or the number of landowners who would decide to take advantage of the tax incentives, it is not possible to determine the extent of the revenue shortfall (Olsen et al. 1993).

Income Taxes

There are two types of income tax-related incentive mechanisms for conserving wildlife habitat and species. The first is an income tax *credit* for expenditures to restore and conserve viable wildlife habitat. The second is an income tax *deduction* from revenues that may be earned from economic activities on lands used for habitat conservation (e.g., research, education, wildlife watching, hunting, fishing, etc.).

At the federal level, there is currently no income tax credit for expenditures to protect, create or improve endangered species habitat for landowners to implement protection and conservation measures under the Endangered Species Act. This should be remedied, and we would recommend allowing a premium tax deduction for establishing easements in habitat areas identified by the state wildlife action plans. Federal tax credits could be allowed for expenses incurred in improving degraded habitat, or creating new habitat, for endangered, threatened, or candidate species and for significant biodiversity. Restored and newly created habitat areas could also be eligible for annual property tax credits. Bonus credits could be made available to those restoration efforts resulting in re-colonization by previously extirpated endangered, threatened or candidate species. The disadvantage is that it can involve substantial administrative costs for developing a conservation plan and associated monitoring costs.

Other eligible expenses for an income tax credit could include incurring expenses associated with biological studies and field surveys, labor devoted to habitat protection and conservation, special equipment or construction methods, and fees paid by private landowners to partici-

pate in habitat conservation planning. A cap on the total amount of tax credits may be warranted, because many of these expenses can be simply passed on to consumers in the form of higher timber, commodity, energy or housing prices.

Revenues derived from economic activity on lands that are managed to fully support endangered, threatened and candidate species could be deductible from the earnings that qualify for federal income taxation. Examples of activities would include modified timber, grazing or agricultural practices that sustain native biotic communities, housing developments designed to retain sensitive habitats, or privately managed recreation and hunting lands where fees were collected for wildlife viewing, recreation or hunting access. Only revenues stemming from lands supporting these species would be eligible and would include a habitat management component.

Property Taxes

Local and state property taxes on lands providing habitat for endangered, threatened and candidate species and for significant biodiversity could be offset by an annual federal tax credit. Property taxes are already deductible from federal income taxes, but a tax credit in the amount of the allowable deduction would amplify the tax benefit so that qualifying lands would become completely exempt from property taxes. This would shift the economic burden of reduced taxes from the county to the federal government, which is appropriate for federally listed species and other nationally significant biodiversity.

Reductions in property taxes are a widespread and accepted method for preserving farm and rangelands, open space and historic properties. Proper-



Bird watchers | U.S. Fish and Wildlife Service

ty tax credits may be effective on the fringes of rapidly developing urban and suburban areas where assessed property values increase dramatically and where increased numbers of plant and animal species are being listed as endangered or threatened. However, landowners with primarily financial motivations would choose the profits from development if a package of easements and tax incentives was not competitive.

Estate Tax and Capital Gains Taxes

The allowable reductions in estate and capital gains taxes need to be increased for lands that are put under a conservation easement. A major reason for seriously considering a significant reduction in these tax rates is that land under conservation easements may actually increase in value as a function of its protected status. With respect to the estate tax, we would recommend an

increase in the excludable portion of the land value from 40 percent to 60 percent and a maximum excludable amount that is taxable at the 2009 level of \$3.5 million. These increased benefits are especially important to keep lands in high growth and conversion areas, such as California rangelands, from being sub-divided and developed.

For federal capital gains taxes, we recommend a provision that would exclude all capital gains from the sale of lands for wildlife habitat conservation easements. We believe this would also contribute to supporting rural economies and secure land stewardship over a long time period and would not decrease the local tax base. While there is currently a version of a tax reconciliation bill before the Senate, it does not contain a provision for any exclusion of capital gains from sales of land for conservation easement purposes. We

recommend that a capital gains tax exclusion be incorporated into any future tax legislation or at the very least a decrease in the tax burden of 50 percent.

Research is needed on estimating the benefits and costs of implementing and monitoring tax incentive programs designed to conserve species and their habitats. These activities, which constitute transaction costs, are needed to ensure that incentive programs are an efficient and cost-effective means of safeguarding important biological habitats. By doing this research, we can find out what the demand is for tax incentives and what the public finance implications would be for implementing tax credits. Because equity issues are involved, research needs to be done to determine the distributional impacts from implementing these various tax incentive measures.

X. FACILITATIVE INCENTIVES

Facilitative incentives are defined as those institutional measures that facilitate and assist landowner participation with, and understanding of, various incentive mechanisms and programs. These measures include provision of education and technical assistance, establishment of administrative structures and landowner recognition programs. There are numerous federal, state, local and private sector programs that offer all three facilitative incentive measures.

Education and Technical Assistance

• Description

At the federal and state levels, education and technical assistance are usually offered in a package along with cost-sharing of management practices or some form of land conservation program. Educational programs and technical assistance involve the transfer of conservation information to landowners to improve their decision making and to facilitate the adoption and use of environmental practices. Assistance can range from providing data (e.g., on soil quality), disseminating information about new technologies or practices, helping with grant or permit applications, coordinating projects and helping to prepare conservation plans. The major sources of conservation education and technical assistance at the federal level are the U.S. Department of Agriculture's Cooperative State Research, Education, and Extension Service and the Natural Resource Conservation Service. The cost-share

Landowner Incentive Program managed by the U.S. Fish and Wildlife Service (assessed in Section VIII) also has a major technical assistance component.

In addition to federal programs, state-level education and technical assistance are offered in all but seven states. Often technical assistance is provided along with other incentives. In Missouri, for example, the Landowner Assistance Program offers landowners cost-share funds, in-kind materials, equipment, and labor to install wildlife friendly practices, in addition to providing technical assistance. The program helps landowners install riparian fencing, stabilize stream banks, plant grasses, remove levees, use prescribed burning and install alternative watering systems.

Several private conservation organizations also offer education and technical assistance programs for accessing public incentives and for installing and maintaining conservation practices. These groups include, among others, Ducks Unlimited, Joint Ventures, Pheasants Forever and Environmental Defense.

• Assessment

Although education and technical assistance are crucial to the successful implementation of incentive mechanisms to conserve wildlife habitat and species, there has been no analysis as to whether these incentives have contributed to more biologically effective or economically efficient wildlife habitat conservation and restoration efforts. With respect to technical effectiveness, gather-

ing and distributing information to the public may increase the use of conservation practices by landowners who are either unaware of them or unsure about how to adopt them. Private benefits may include gaining an economic opportunity to directly benefit from a species presence (e.g., ecotourism, etc.). One disadvantage of public education and technical assistance incentives is that accessing these tools is completely voluntary, with effectiveness largely dependent on whether a given practice creates benefits for farmers that offset the costs of adoption (Ribaudo and Caswell 1999).

One major constraint that has become apparent over the last few years is the chronic under-funding of public agencies to provide sufficient biological technical assistance for habitat restoration and conservation. The demand by landowners for technical advice far outstrips the available supply, with the consequence that fewer landowners take advantage of existing conservation incentives than what otherwise might be the case.

With respect to private technical assistance and education programs, it is still too early to tell whether habitat restoration activities have any impacts. There is some evidence, however, that the Landowner Conservation Assistance Program managed by Environmental Defense has provided enough technical assistance to private landowners to restore habitats for some bird species that should be suitable for occupancy by within the next two to three years (Wilcove and



Assessing vernal pool habitat, California | Natural Resources Conservation Service

Lee 2004). As measured by landowner enrollment, as of September 2003, there were 43 individual landowners enrolled with projects covering more than 74,000 acres in the assistance program. Landowner interest in the program exceeds Environmental Defense's capacity to handle requests, which is an indicator that the program is attractive to landowners.

• Recommendations

It is difficult to measure the biological effectiveness or economic efficiency of what are essentially "indirect" incentive mechanisms such as technical assistance and education. Nonetheless, these facilitative mechanisms are crucial to the successful application of all forms of incentives. Thus, our major recommendations with respect to education and technical assistance revolve around increasing the quantity and quality of resources available. Certainly, more funding is necessary to increase the technical assistance

presence for biodiversity conservation. One proposal would be to establish a Resource Conservation Corps that would be made up of three-year volunteers that would receive school loan forgiveness in exchange for providing technical assistance. There is also a crucial need for improved training in biodiversity conservation for field extension agents. One means of controlling the costs of technical assistance would be to form "conservation cooperatives," which could share technical assistance and other resources (Hummon 2005).

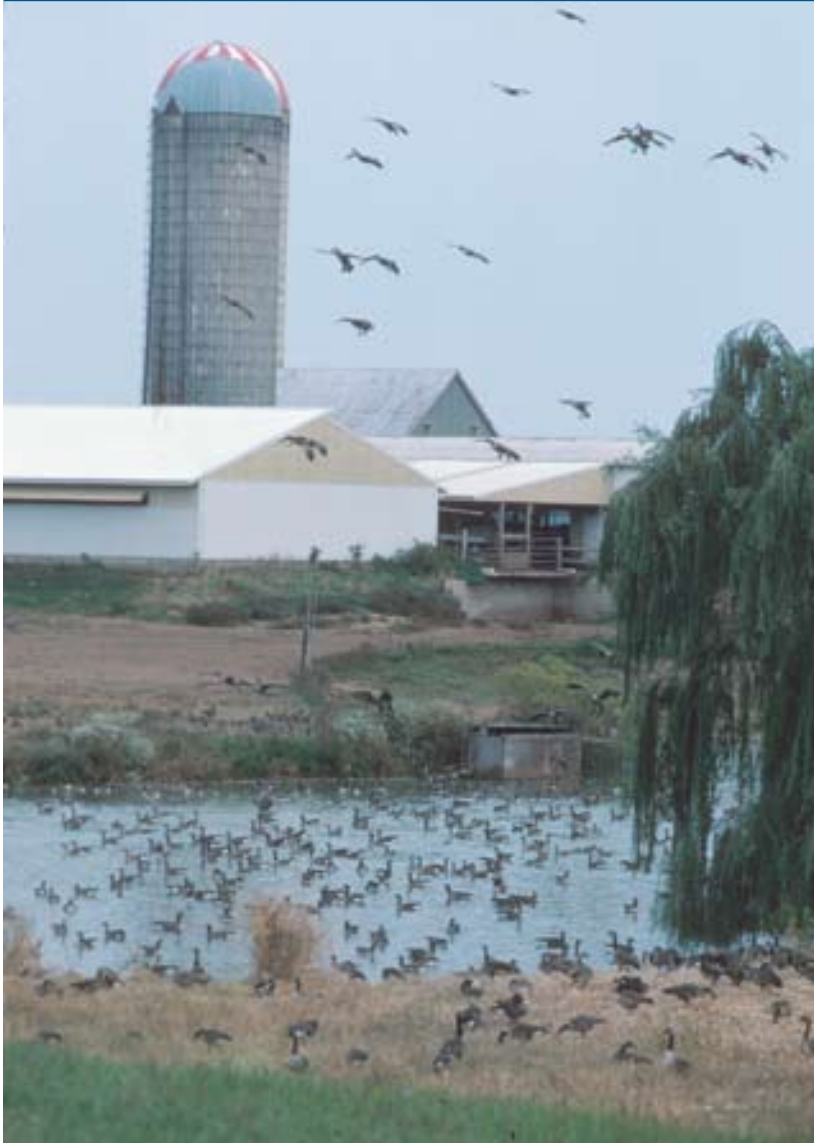
Administrative and Organizational Structures

• Description

Improved administrative and organizational structures also qualify as facilitative incentives in the sense that they encourage landowners to participate in conservation programs by reducing transaction costs. There are two primary types of incentives that

qualify as inducements for greater landowner participation: coordination of incentives through administrative reform and the provision of assistance from non-governmental conservation organizations.

Administrative incentives refer to implementation procedures that encourage landowners to conserve habitat in exchange for simpler and less cumbersome administrative requirements. Coordination is more a reflection of agency policy or individual staff commitments rather than an established incentive program. Nonetheless, it is considered extremely important for encouraging landowner participation in conservation programs. Coordination refers mainly to administrative reforms that make it less complex and costly for landowners to participate in voluntary conservation programs. Examples of coordinated procedures include simpler and faster permitting processes, allowing for management flexibility,



Canada geese on farm, Maryland | Natural Resources Conservation Service

or creation of “one-stop shopping” for applying for conservation programs and environmental permits.

At the federal level, the Forest Taxation Program provides landowners with a consolidated source of information on the complex tax issues associated with forest management. An example of one-stop shopping at the state level is the Idaho OnePlan program that helps landowners to develop a single conservation plan that addresses federal, state and local regulations and to apply for conservation programs

through one state office. However, this program primarily focuses on soil and water resources, with wildlife efforts limited to compliance with federal and state regulations, rather than proactive habitat conservation. Ten other states also offer some form of coordinated environmental permitting. For example, the Arizona Game and Fish Department provides coordinated permitting as part of its Private Lands Stewardship Agreements.

Another example of creating an administrative structure to reduce

private transaction costs is Oregon’s flexible incentives legislation. In 2001, the Oregon Legislature passed a comprehensive conservation incentives bill that included creating a flexible incentives account. The account can serve as a potential mechanism for reducing the administrative complexity and bureaucratic roadblocks with existing programs. Investments from the fund would be used to accomplish high priority actions on private lands consistent with a landscape scale conservation plan. Priorities could change over time as early projects are completed. Landowners (or agency staff) would submit applications that simply describe how a proposed project fits into a regional conservation plan, and what assistance is needed in order to complete the work.

There are several examples of private organizations that facilitate landowner participation in conservation programs. Local land trusts often have the advantage of lowering transaction costs for individuals wanting to engage in conservation through creation of easements. Conservation organizations such as Ducks Unlimited offer technical advice and assistance to landowners for applying to federal conservation programs like the Wetland Reserve Program. Watershed councils and similar local landowner groups offer assistance to landowners for those programs that meet their organization’s mission.

• **Assessment**

To our knowledge, the impact of simplifying administrative and organizational structures to facilitate the delivery of incentive mechanisms has not been assessed in terms of biological effectiveness or economic

efficiency. For a future assessment, important issues to address would include the following: does simplification and coordination of incentive mechanisms in any way compromise their effectiveness in conserving biodiversity and wildlife habitat? To what extent does administrative reform of incentives lower transaction costs for government, non-profits and landowners and encourage more conservation?

• *Recommendation*

We would recommend that current programs such as the one-stop shopping program in Idaho, and various efforts by non-profits and land trusts, be assessed to determine whether and to what extent simplifying administrative structures is effective and efficient in protecting biodiversity.

Recognition Incentives

• *Description*

Recognition incentives are designed to provide public acknowledgment of landowners who maintain and/or restore habitat for wildlife on their property. They are a means of demonstrating public appreciation for landowner efforts to conserve at-risk species and their habitats. The support from recognition programs does not result in direct economic payments, but rather the good will of the local community and the general public. Many of these programs highlight the importance of the family farm to the quality of the environment and the stability of the local community. Types of recognition programs include heritage

and/or some other form of special land designation, publication of innovative approaches towards conservation efforts by landowners, or an annual award program.

At this time, there are no federal recognition programs. However, over one-half of the states offer one or more public recognition incentives. In many states, incentives are offered via the state's Natural Heritage Program, which gives heritage designation for lands of ecological significance. For example, Kentucky's Natural Areas Registry provides recognition and a heritage designation for lands that are unique and ecologically important. The Colorado Division of Wildlife, through its "Landowner of the Year" program, recognizes landowners who make outstanding improvements to wildlife habitat and/or have provided public access to Colorado's wildlife on their private agricultural or forested lands. The program promotes creation and improvement of habitat and provides opportunities for public hunting, fishing and wildlife viewing. Texas recognizes landowners who preserve rare elements of biodiversity through its "Lone Star Land Steward Award."

Private conservation groups have also established recognition programs. One example is a Registry Program sponsored by The Nature Conservancy in Minnesota. This program recognizes landowners that are committed to conservation of natural resources on their land, including the protection of habitat of rare or endangered species. Another, the Minnesota

Valley Heritage Registry Program, creates an honor roll of landowners whose land use practices benefit wildlife and nature. As of 2005, 230 landowners had registered their holdings with the program. Defenders of Wildlife provides letters of recognition to agricultural producers in Wisconsin who restore native wildlife habitat and the shippers and retailers who market a potato crop from farms where restoration activities have taken place. In addition, Defenders informs its membership of the restoration activities these growers are involved in.

• *Assessment*

To date, there have been no formal assessments of recognition incentives as a tool to promote effective and efficient biodiversity conservation. There is no lack of recognition mechanisms that could be addressed, and we suggest that research be carried out to investigate the biological impacts of these programs and their private costs and benefits. Certainly, it would appear that landowners do respond to recognition as indicated by the growth of both state and private involvement in offering recognition incentives, and we would encourage their continuance.

• *Recommendations*

We would recommend that the federal government, especially national fish and wildlife and agricultural agencies, and the non-governmental conservation community, develop private landowner recognition programs to further these efforts.

XI. SUMMARY OF FINDINGS AND RECOMMENDATIONS

In this section we provide a brief overview and assessment summary for all public and private incentive mechanisms. The purpose of this exercise is to illustrate in a compact manner the findings of sections IV through X that described various individual incentive mechanisms. We provide this summary with the understanding that there is no central information base or clearinghouse for public or private incentive programs and that the number of incentive programs is quite large.

Overall Assessment

As a means to summarize the preliminary assessment of stewardship incentive mechanisms presented in the preceding sections, we introduce a simple table that is qualitative in nature. Table 2 presents the taxonomy of incentive mechanisms and provides ranking symbols for two criteria: biological effectiveness and economic efficiency. The economic efficiency criterion is sub-divided into cost-effectiveness and transaction costs. The ranking symbols for biological effectiveness and cost-effectiveness are very general in nature because of the lack of comprehensive data, analysis and testing of the impacts of the various mechanisms. These symbols indicate a positive influence (+), a negative influence (-), a neutral influence (0), and no information at all (?). For some incentive measures, there is a ranking that uses the double symbol of +*. This indicates that while the impact is generally positive,

Table 2. Assessment Summary of Voluntary Stewardship Incentive Mechanisms

Type of Incentive	Biological Effectiveness	Economic Efficiency	Economic Efficiency
		Cost-Effectiveness	Transaction Costs
Institutional Innovation			
Legal/Statutory			
Safe Harbor	+	+	3
Candidate Agreements	?	?	?
Regulatory Relief	?	?	?
Property Rights			
Conservation Easements	+*	+	3
Covenant and Deed Restrictions	?	?	?
Stewardship Exchange Agreements	?	?	?
Market Oriented Institutions			
User Fees	+	+*	1
Ecotourism	+	+	1
Ecolabeling	+*	+*	3
Mitigation Banking	+*	-	3
Conservation Banking	+	+	2
Tradable Development Rights	+	+*	3
Financial Incentives			
Compensation Programs	+*	+	2
Cost-share Incentives	+	+	1
Land Rentals	+*	-	1
Conservation Contracts	?	?	?
Debt Forgiveness	?	?	?
Insurance	+*	+	2
Tax Incentives	+*	0	1
Education, Information, and Tech Asst.	+	+	1
Administration and Organization	?	?	?
Recognition	?	?	?



Great horned owl in restored area, Iowa | Natural Resources Conservation Service

there are circumstances that could compromise the benefits of the incentive mechanism. For example, the biological effectiveness of conservation easements is only positive as long as the habitat management requirements of the easement are adequate and enforced. The ranking for each incentive mechanism is not based on what the impact could theoretically be, but what was learned from existing empirical information regarding the current use of that mechanism.

The ranking for transaction costs under the economic efficiency criteria uses a scale of 1, 2 and 3 to indicate low, moderate and high transaction costs, respectively, relative to other incentive measures. For example, public and private transaction costs are relatively lower for establishing a safe harbor agreement than they are for instituting a conservation easement. Conservation easement agreements must be done for each individual landowner and property, whereas safe harbor agreements can be established for a group of landowners.

The obvious observation from Table 2 is that we still have a lot of questions with respect to the bio-

logical effectiveness and economic efficiency of individual incentive mechanisms to achieve biodiversity conservation. Part of this is due to the stochastic nature of conservation efforts, which may be impacted by other factors beyond the incentive mechanism or program per se. The primary reason is simply the lack of monitoring and evaluation of individual incentive tools.

In terms of biological effectiveness, for at least those incentive mechanisms that have been the subject of research, there have been significant benefits. For many incentives in the property rights, market-based and financial incentive categories, however, there is some question about their effectiveness given the details of their implementation. For example, land rentals under the Conservation Reserve Program are only effective from a biodiversity standpoint if they do not result in additional marginal lands being put to agricultural use. Tax incentives are beneficial so long as they stay in place. Similarly, mitigation banking is only biologically viable if there are procedures and safeguards in place

to maintain a habitat's long-term biological integrity.

With respect to cost-effectiveness of various incentive mechanisms, there are more concrete results. There are several mechanisms that have clear positive private and public impacts above the relative costs of the management practices or services provided. These include safe harbor agreements, conservation easements, ecotourism, compensation programs, cost-share incentives, insurance and the facilitative mechanisms such as education, information and technical assistance. The cost-effectiveness of land rentals and mitigation banking are ranked as negative for different reasons. As was shown in Shaffer et al. (2002), land rental for biodiversity protection is less efficient than easements or land acquisition. For mitigation banking, cost-effectiveness is ranked as negative because of the financial costs associated with maintaining habitats that are not equivalent in their biological function as the habitats that were lost to development. Conservation banking avoids this problem.

There are some incentive mechanisms that generate higher public and private transaction costs relative to others, but for different reasons. The relatively high transaction costs of safe harbor agreements, conservation easements, mitigation banking and tradable development rights are mostly due to the long time frame and detailed nature of negotiation to develop legal agreements over rights and responsibilities on the part of private and public parties. The high transaction costs for establishing a viable eco-label, however, are primarily attributable to the necessary effort to create or find viable markets and to assure consumers that products reflect production

processes that are compatible with habitat and species conservation. Those incentive mechanisms with relatively lower transaction costs (user fees, ecotourism, cost-share, land rentals, and education, information, and technical assistance) indicate that fewer resources and less time are expended by private landowners and public agencies in delivery of the mechanism.

The results in the preceding paragraphs are not meant to indicate that one particular incentive mechanism is superior to another in terms of their biological effectiveness or economic efficiency. As was stated at the outset of this section, there are trade-offs among the various mechanisms in terms of their long-term viability and cost. Furthermore, because of varying physical and economic conditions, landowners should be able to combine various incentive mechanisms into a reasonable and flexible package that meets both the goals of society and the individual. We have no doubts that all existing incentive types at all levels have contributed in some way to biodiversity conservation, both in the private and public sectors. However, we need more precise information with respect to the biological and economic impact of various incentive types on biodiversity conservation.

We think that all mechanisms have a place in the portfolio of tools to achieve the restoration and conservation of our biological heritage at a reasonable cost. The next section outlines some of our recommendations both for individual incentive mechanisms and for specific programs for increasing the effectiveness and efficiency of biodiversity conservation efforts of landowners and the general public.

Recommendations Summary

The recommendations for individual incentives mechanisms discussed in the previous sections are implemented within the context of public or private conservation programs. Thus, there is a need to address ways to improve the programmatic aspects of incentive delivery and administration. The topics addressed in this section include goal setting, planning and targeting; technical, administrative and research capacity; scale of land ownership; incentive funding; geographic and temporal scale; incentive policy consistency; and monitoring and evaluation.

“... all existing incentive types at all levels have contributed in some way to biodiversity conservation...”

Goal Setting, Planning and Targeting

Defining conservation objectives, developing adequate spatial plans to meet those objectives and targeting landscapes are essential if the application of incentive mechanisms is going to be biologically effective. While goal setting, planning and targeting reveal nothing about the inherent effectiveness or efficiency of specific individual incentive mechanisms, these activities nevertheless provide a context within which any incentive mechanism or program can be more efficient and effective. Until recently, there has been a lack of comprehensive goal definition, planning and targeting with respect to conserving biodiversity and at-risk wildlife habitat in the United States.

There are two primary issues related to goal setting. First is identifying which habitats need to be conserved and how much habitat is it necessary in order to achieve biological effectiveness. The second issue is whether incentive mechanisms should be goal-based or practice-based. Goal-based refers to determining whether a particular incentive program results in a specified outcome or performance level. Practice-based links an incentive to the adoption of a pre-determined management practice that is assumed to have a positive impact on biodiversity conservation.

Most public and private habitat conservation incentive mechanisms lack a clear definition of the ecological goals (or outcomes) to be attained at the program, project or geographic level. It is therefore difficult to assess whether there is a strong link between incentive mechanisms and specified goals. Currently, incentive performance is indirectly measured by the number of participants or acres enrolled in a particular program, and not whether the mechanism itself is particularly efficient or effective. Without a clear definition of the desired ecological outcomes, it is difficult for both program administrators and landowners to find the most efficient and cost-effective incentive for achieving biodiversity conservation.



Colorado rangeland | Natural Resources Conservation Service

Where rigorous habitat conservation plans exist, specific goals should be in place or relatively easy to establish. Then, various incentive measures can be compared in terms of their potential contribution to meeting the specified goals. It may be challenging to set goals for individual landowners that are compatible with habitat goals at a larger, more meaningful scale. Doing so will require planning that crosses property boundaries and cooperative management. The most effective incentive measure for each individual landowner may vary according to his or her financial standing or preferences.

One means to define and develop goals is through conservation planning. In the absence of conservation plans, it is difficult to decide where to invest public resources and which incentives to offer to conserve habitat. Ideally, state wildlife action plans would be consistent with national guidelines. Regional conservation plans could link local land use and watershed plans together in a coordi-

nated effort to make strategic, long-term investments in projects that lead to the conservation of habitat, species and ecological processes. Unfortunately, for one area, there are usually several individual plans for different natural resources at different scales, and it is difficult to visualize a coherent approach to habitat conservation. It is clear, however, that planning only for one resource or project at a time can compromise effective wildlife habitat conservation, particularly in developed or developing areas. The lack of coordinated planning complicates the task to define which particular incentive tool(s) may or may not work.

Nearly all current habitat stewardship incentive mechanisms, public and private, are opportunistic. That is, they are based on voluntary decisions by landowners to participate, if they meet minimum program criteria. Proponents of the opportunistic approach appreciate the equity that incentive measures and programs provide. With an opportunistic program, everyone

can participate (in theory) with the prospect that neighbors can be influenced by neighbors, thereby communicating the availability of incentives throughout the wider community. However, given that resources are limited, it may be more effective to focus a portion of incentive funding on priority lands, to target larger parcels, and to ensure that there is some habitat connectivity. A strong case can be made that a strategic approach to defining and applying specific stewardship incentive mechanisms is necessary to maximize the long-term benefits of public investments.

Effective strategic investing (targeting) relies on established conservation goals. Strategic investment is easy with a single funding source, centralized decisions or a coordinating mechanism among all agencies and the private sector. However, this level of coordination does not yet exist with respect to habitat conservation, or the various stewardship incentive mechanisms meant to achieve conservation.³²

³² For some voluntary cost-share and land rental stewardship incentive tools, one means of targeting has been the Environmental Benefits Index employed by the U.S. Department of Agriculture to competitively rank proposed landowner conservation projects for program funding. The index was developed to achieve the maximum environmental improvement per dollar of estimated cost-share or rental payment. Producers can increase their index score (and hence eligibility for federal funding) by maximizing the benefit side or by minimizing the cost side. Although producers score higher on the environmental benefit side if they submit a project that includes the restoration or conservation of habitat for threatened and endangered species, minimizing estimated project costs is a more common strategy for achieving a higher index ranking. Furthermore, the index does not address the issue of giving preference to proposed projects that would target areas that have been identified as priorities in a conservation strategy. Thus, the index does not provide a direct link to determining what particular incentive measure may be the most efficient.

In order for effective targeting of incentive mechanisms to occur, there must be a process for establishing explicit conservation goals that various incentive programs use. One process is to develop a conservation vision at the national and local levels (Defenders 2004).³³ At the national level, broadly defined goals would include ecologically and economically sustainable land uses, with a focus on biological diversity. With respect to the agricultural and forestry sectors, complementary goals would include meeting long-term food supply objectives, helping achieve public health and nutrition goals, assisting rural community stability and small family farmers, and facilitating consumer education. Stewardship incentive mechanisms would have to be compatible with the achievement of these broader goals as well as those established for habitat conservation.

At the local level, the selection of incentive mechanisms can be guided by those with on-the-ground knowledge of the habitats that need to be conserved and what incentive mechanisms landowners may find more attractive. Incentive mechanisms and programs should be partially organized around conserving a native habitat that is important to landowners and the community.

A promising means of achieving national and local biodiversity goals, and better identifying appropriate incentive tools, is to use state wildlife action plans to define conservation objectives and target incentive funding. In order for these plans to be successful, there are certain criteria that need to be met. First, the action plans need to focus on multiple species and habitats, including non-listed at-risk species, and also address plants and invertebrates. Second, states will need to follow an iterative process

with partners, including public agencies, private landowners, non-profits, tribes and other organizations in defining and implementing incentive tools. Furthermore, some funding acquired through state wildlife grants could be used to implement state action plans. Future federal funding for incentives aimed at habitat conservation (state wildlife grants or other federal programs) could be used to reward the best state planning efforts.

“...the selection of incentive mechanisms can be guided by those with on-the-ground knowledge of the habitats that need to be conserved...”

In addition to the national and local level, there is also a need for regional-scale planning to avoid habitat fragmentation. Examples of these types of planning efforts include the Sonoran Desert Conservation Plan and the Lower Mississippi Conservation Plan. Because of the diversity of landowners and land uses, implementation of regional conservation programs would be best served by maintaining a menu of conservation incentive tools to achieve stewardship objectives.

Although strategic planning and targeting of incentives may be the more effective approach, opportunistic conservation projects should also be available and will likely remain important given the voluntary nature of most incentive programs. Important habitats may exist outside of those areas encompassed in a state wildlife action plan, and there are good reasons

to improve habitat conservation management across the landscape. There are workable strategies and incentives for both targeting conservation effort and maintaining opportunistic approaches. For example, owners in higher priority areas might qualify for a menu of enhanced incentive mechanisms. Adjoining landowners who enroll contiguous properties might also qualify for increased incentive benefits for cooperative efforts. To the extent

that agency staff have the resources to solicit participation and manage incentive programs, they might do so primarily in priority areas, while at the same time providing support to landowners seeking assistance from non-priority areas.

To implement a targeted approach, individual landowners could receive financial incentives for developing and adopting a habitat protection and/or restoration plan that is consistent with a statewide habitat conservation plan. With the appropriate incentive program design, landowners could have the opportunity to design, test and implement appropriate management practices and technologies to fit their specific circumstances, therefore adding flexibility to conservation efforts. Additional incentives could be offered for landowners willing to devote resources to monitoring ecological outcomes.

33. Natural habitat protection is defined as leaving key lands in their current natural or near-natural condition where they support occurrences of at-risk elements of biodiversity, as identified by The Nature Conservancy and the network of state Natural Heritage Programs. This approach would involve comprehensive protection and/or restoration of plan communities as well as individual species. At the national level, incentive tools should take into account landscape scale conservation and long-term planning.

Incentive tools and policies that improve habitat conservation on lands in production need to be flexible in order to take advantage of the wide array of physical, environmental and management factors that affect the impacts of production practices on species and habitats. Recognizing the complexities that nature can impose on wildlife protection efforts, biologists have developed some general recommendations to protect and enhance wildlife populations and habitats on working agricultural lands (Leawandroski and Ingram 1999). These recommendations have implications for the incentive policies and mechanisms employed and include: (1) allow conservation programs the flexibility to address local and regional wildlife habitat priorities; (2) reduce chemical use; (3) promote larger contiguous tracts of habitat over smaller isolated tracts; (4) reduce disturbances such as plowing; and (5) encourage conservation tillage on agricultural lands. Habitat conservation incentives on working landscapes could also be applied to control invasive species and to allow the return of ecosystem processes, such as fire and flooding, that are essential to maintaining or restoring populations of at-risk species.

In addition to concentrating on lands with essential wildlife habitat, targeting criteria for incentives could include prioritizing lands where conservation investments result in multiple benefits (e.g., simultaneous improvements in native wildlife habitat, water quality, flood plain functions, non-impact recreation and decreased soil erosion, etc.) and lands with the highest marginal benefit per investment in terms of resource protection.

Facilitative Incentives

Facilitative incentives include technical assistance, administrative flexibility and research capacity. The major issues related to these incentives include the quantity and quality of technical assistance to deliver incentives to landowners, cumbersome administrative procedures, and research programs to improve the effectiveness and efficiency in the application of incentives for habitat conservation.

Technical Assistance

The major problem with technical assistance, with the exception of some states, is that there are few conservation agents or consultants to deliver incentives to private landowners for biodiversity conservation and restoration. Clearly, conservation planning and strategic application of incentives would be more efficient if more expertise were available to assist landowners in deciding what incentive mechanisms and land protection and management strategies are the most appropriate and cost effective. Unfortunately, most habitat conservation incentive programs are understaffed. The funding pattern in recent years at the federal and state levels has been to appropriate money for incentive programs without corresponding funding increases for field and administrative personnel to implement them. Some agencies have been developing the capacity to work with private technical assistance providers to relieve the strain on public personnel, but so far, few outside technical agents with expertise in biodiversity conservation have been available.

In addition to having more public sector staff, there are other ways of delivering incentive tools. Beginning with the identification of important habitats to conserve

or restore, extension efforts could be increased by establishing local conservation groups/cooperatives. There could also be investments in “peer-to-peer mentoring” and the establishment of community conservation assistance networks. There should also be an increase in overall resource conservation program and technical assistance funding. We also recommend initiating a Resource Conservation Corps, similar to AmeriCorps, whereby recent graduates from agricultural and natural resources colleges could participate in a three-year volunteer program in exchange for federal service and repayment of school loans.

Training about the various types of incentive mechanisms, along with their advantages and disadvantages, is essential and could be offered to landowners and agency staff. More opportunities could be provided to landowners and program deliverers to share ideas and experience with respect to incentive tools through site visits.

Communication and coordination between extension staff and researchers, with respect to the costs and benefits of habitat conservation incentives, should be improved. Academic research staff need to communicate better with extension agents in order to have a better understanding of the impacts of various incentive tools and why some landowners may not participate in habitat conservation programs. Extension’s role in bridging the gap and building relationships between landowners and government conservation agencies and programs should be expanded and improved. Lastly, technical information sources (e.g., websites, expert systems, etc.) can be established to increase knowledge about and access to incentive mechanisms.

Administrative Flexibility

In applying for conservation incentive programs, numerous landowners find them cumbersome and expensive in terms of their commitment of time and other resources. This translates into high transaction costs. The plethora of incentive tools and programs means that landowners have to go to several federal, state and private institutions to identify appropriate programs, determine their eligibility and find out how to apply.

There is a means by which cumbersome administration of incentive mechanisms could be improved. “One-stop shopping” could be instituted by coordinating various incentive programs between public and private entities. This could be accomplished by developing a master or umbrella conservation incentive program and then applying a menu of incentives across a larger area (e.g., county, state and watershed). This may be a daunting, long-term task, with improved coordination and access to existing programs a more realistic goal. Consideration should be given to establishing a single point of entry for landowners to apply to incentive programs. Simplifying administrative procedures could result in the reduction of barriers and transaction costs to landowners in accessing incentive programs.

In Oregon, a diverse public/private partnership is initiating the Oregon Sustainable Agriculture Resources Center to provide one-stop shopping to all farmers, ranchers and resource professionals in Oregon. The center will compile and cross-link incentive programs and other funding sources, regulations, certification standards and other technical resources. The center will also provide technical assistance directly to landowners. A longer-term goal is to

identify ways to link, streamline and combine efforts between different agencies and organizations. There is strong support for the center from state and federal agencies, agricultural interests and conservation groups. This center could serve as a model for other states.

Stewardship agreements with one or several landowners have been proposed as an improved means of delivering and administering incentive mechanisms. These agreements could specify what wildlife habitat benefits would be provided by landowners and what types of incentives would be received in exchange. Some experience with forest stewardship agreements in Oregon suggest that they should be offered to landowners willing to exceed minimum regulatory requirements, and that the incentives need to be substantial enough to attract participation.

There are three forms of flexibility that would increase the performance of incentive mechanisms: flexibility in the application of incentives at the landowner level, flexibility in the availability and selection of management practices, and flexibility in funding. With respect to the application of incentive tools, landowners should have some role in defining what incentive mechanisms may be most appropriate for their particular area or financial condition. For states with well-defined (i.e., mapped) state wildlife action plans, many priority areas for conservation will include lands in private ownership. Because these lands will be used in varying degrees of intensity, there is a need for a variety of incentives to promote essential habitat protection and restoration both permanently for natural areas, and as part of the working landscape. A flexible approach to incentives recognizes that the social

and economic factors that influence decisions about habitat conservation are not the same for all landowners. An array of incentives is intended to provide a level of flexibility within which many individuals may find a combination of features that suit the physical and economic conditions of their operation.

Increased flexibility in the application of economic incentives can be achieved by creating a centralized access point that allows individual landowners access to the full menu of possible incentives, so they can apply for the incentive measure that best fits their physical and economic situation. The major types of incentives a landowner could choose from would include term or perpetual conservation easements, land rental payments, stewardship payments for resource management practices, or cost-sharing of management practices. Local, state or federal tax incentives could complement existing incentive options. Secondary incentives would include research and educational opportunities, marketing assistance (e.g., eco-certification and product labeling, preferential government purchasing) and/or stewardship recognition rewards. While centralizing incentive administration could cost more in terms of delivery, it should lower transaction costs for private landowners and could be more biologically effective. Our recommendation is to create a state- or regional-level incentives coordinator, with additional staff located around the state that would coordinate various incentive programs and mechanisms for private landowners.

In the Tualatin River Basin just west of Portland, Oregon, a new innovative partnership is addressing the problem of inadequate incentive levels. Here, farmers were

not participating in the Conservation Reserve Enhancement Program, which in Oregon focuses on riparian restoration to benefit salmon habitat and water quality. The lack of participation occurred because the rental payments were not enough of an incentive to retire land from producing high-value crops. Clean Water Services, which

The fragmented nature of conservation programs has also contributed to complicating producer choice(s) of conservation management practices that are funded with various incentives. For federal programs, resource conservation management practices are first developed and pilot tested. Although management practices may then be partially adapted to local

but also by the administrative agency responsible for their implementation. This situation has led to increased program duplication, complexity and costs. The fragmented nature of existing habitat conservation incentive programs has implications in the form of transaction costs resulting from the complicated and expensive processes producers face to identify and access the incentive mechanism that suits their conditions and needs.

With respect to incentive tools administered by the public sector, the number and eligibility criteria have grown so complex and unwieldy that it is becoming counterproductive to a coherent habitat resource conservation and protection strategy. From the landowner's perspective, the numerous, and sometimes redundant, incentive tools and programs are difficult to understand because each has different information, eligibility and technical assistance requirements.

Consolidating the administration of biodiversity and wildlife habitat incentive programs into one overall effort at the state level could contribute to decreasing the complexity and costs of the current system, and would likely increase landowner participation. A single habitat conservation program, which pooled funding from existing federal, state and private programs, could be more effectively coordinated to allow for "one-stop shopping." This system would facilitate landowner information acquisition and selection of incentives and reduce landowner transaction costs. It could also facilitate monitoring compliance with habitat-related standards and regulations.

Research

Another priority is to develop a clearinghouse of information on

“From the landowner’s perspective, the numerous, and sometimes redundant, incentive tools and programs are difficult to understand...”

provides surface water management and sewage treatment for the urban areas of the Tualatin Basin, needed to reduce the water quality impacts of their treated effluent. They are using customer fees to increase the payments that landowners could receive through the Conservation Reserve Enhancement Program to meet water quality standards in the basin by investing in healthy rural riparian areas. The Tualatin Soil and Water Conservation District, which has a long history of working with rural landowners, delivers the program in coordination with the Farm Service Agency and the Natural Resources Conservation Service. The partnership has also developed a parallel non-federal program for landowners who do not qualify for or prefer not to participate in the federal program. In addition, the partnership is developing a parallel incentive program for forest land and a program to reward landowners who conserve intact habitat.

conditions, incentive mechanisms are not. Thus, selected management practices and their attendant incentive program may still be inappropriate for specific local environmental, ecological and economic conditions. There can be low program participation rates where practices are ill-suited or incentive rates are inadequate, resulting in lower technical effectiveness and higher program implementation costs. For most publicly funded programs, there is no timely process for altering conservation management practices or incentive levels to adjust to dynamic technical and economic constraints.

Section III of this report described the diverse number of public and private voluntary incentive mechanisms for habitat conservation that are currently available to landowners. While the diversity of incentive mechanisms provides a rich mix of approaches, existing incentive tools and programs are fragmented not only by their environmental and ecological purpose

assessments of the impacts of various incentive mechanisms for biodiversity conservation. We believe this would benefit landowners, incentive program delivery agents, and policy makers. The establishment of such a clearinghouse would make it easier to focus on areas that need further research. To a certain extent, this is already being done indirectly through the current Conservation Effects Assessment Program within the U.S. Department of Agriculture. However, this program is solely focused on the biological impacts of conservation practices, not incentive mechanisms. And, it does not address questions of economic efficiency.

The development of a landowner incentive program (through either private market-based or public entities) for providing ecosystem services, including biodiversity, deserves more attention through additional research and pilot testing. As part of this effort, there needs to be an evaluation of the public and private costs and benefits of providing incentives for ecosystem services through private markets, including the maintenance of biodiversity values.

For conservation management practices that are funded through cost-share or other types of incentive tools, agricultural producers should have the flexibility to design, test and implement (with the assistance of qualified government agencies, nonprofit groups and/or certified private consultants) new agro-environmental technologies that are appropriate to restoring and conserving local wildlife habitat. Landowners could also be allowed to modify existing management practices in order to meet habitat conservation goals. One new incentive tool would be to initiate a pilot “safety net program”

whose purpose would be to provide a minimum payment for the risk taken in implementing new conservation practices to protect wildlife habitat or species.

Scale of Land Management

Another important structural consideration is the distribution of incentive resources over different sized landholdings. The basic question is whether incentives should be directed to landowners with large or small holdings, or both. The debate focuses on landowners who may be able to provide large contiguous tracks of habitat versus those that are more scattered across the landscape. Within the forestry sector, research (Hummon 2005) has demonstrated that family forest landowners with smaller holdings place a high value on the environmental, aesthetic and heritage values of their land, while large industrial landowners are more driven by profits. However, industrial landowners tend to own larger parcels, have access to more resources, and may have greater concerns about consumer demands and public perception in their efforts to conserve habitats and species. To address the issue of adequate scale at the small landholder level, additional incentives could be provided to groups of adjacent landowners who agree to provide habitat conservation over a contiguous area. In this case, a bonus incentive could be offered for coordinated efforts. At the federal level, the Conservation Security Program allows for a landowner enhancement payment (bonus) if there is a 75 percent participation rate within a watershed. Given the mosaic of land ownership and use, incentive mechanisms and policies must be designed for both types of landowners.

Incentive Funding

Conservation incentive funding in the public and private sectors is insufficient to meet the demand from private landowners. Additionally, there are issues related to the allocation of available conservation funds and the means to generate additional funding.

Public funding levels (federal and state) for habitat conservation incentives and technical assistance have not been adequate, despite growing demand by landowners. For example, the backlog of applications for federal Farm Bill conservation incentives, across all programs that indirectly or directly benefit wildlife habitats and species, in fiscal year 2004 totaled about \$4.48 billion, which left more than 150,000 landowner applications unfunded. At the federal level, real funding for technical assistance to deliver conservation programs, and for the research and development of new conservation technologies, has actually declined over the last 10 years. This situation has resulted in the inability of reduced staffs to provide effective service to the growing numbers of producers waiting to participate in an increasing array of public resource conservation programs.

Conservation-related public institutions need additional funding to design, test and market innovative habitat conservation incentive programs. Federal and state agencies also need increased financial support for research and development of production practices that, to the extent possible, simultaneously meet profit and production goals and reduce adverse environmental impacts on wildlife habitat. Increased financial resources must also be made available to support biodiversity conservation education for landowners and for program deliverers.



Sandhill cranes | U.S. Fish and Wildlife Service

The allocation of incentive funding needs to be more rational and coordinated between private and public sources. The distribution of incentive funds should be made at two levels: one that focuses on implementing national and local conservation priorities, and a second that provides funding for innovative wildlife conservation activities (special projects). With respect to the implementation of national and local priorities, a portion of federal conservation funding should be allocated to implementing state wildlife action plans. Specifically, incentive payments should be increased for those landowners that implement projects that meet national or local habitat conservation goals or that conserve or restore habitat for more than one species on agricultural or forestry lands. Future public funding for habitat conservation could be linked to areas identified by the Conservation Effects Assessment Program as having positive impacts on wildlife habitat, assuming this program can eventually make the link between funded management practices and biological outcomes.

Increased public and private funding is needed for market-driven incentive approaches (e.g., certification, niche-marketing, ecotourism, etc.) to encourage landowner conservation. Furthermore, a portion of public cost-share funding should be used for landowner and agency staff training/education in biodiversity and habitat conservation. Education efforts could be implemented through financial assistance programs, or if technical assistance funding were augmented. Last, public and private conservation incentive funds should be made available to local community conservation groups to restore or conserve habitats identified in state wildlife action plans.

There is a significant political dimension to the allocation of public incentive funds. Although targeting incentives to those lands with the greatest ecological value for the lowest cost is a good strategy from the biological and economic efficiency standpoint, allocations may be determined for other reasons. For equity concerns, political pressure may force expenditures on to lands that are less ecologically valuable and more expensive. An effective and efficient strategy will focus incentives in rural

areas. However, resistance may be intense to the removal of land from tax roles or from commodity production to accommodate habitat conservation. Also, urban residents may resist channeling all funds to rural agricultural and forestry lands at the expense of local parks and green spaces that have less ecological significance.

Federal incentive funds to protect and conserve wildlife habitat could be provided, in part, through state grants with federal monitoring and oversight. States would decide how to allocate incentive funds among priority resource conservation areas identified in their state wildlife action plan. State eligibility for incentive funding would be contingent on the capacity to effectively implement the habitat conservation strategy and on the allocation of adequate resources to monitor the effectiveness of incentive programs and conservation results.

In addition to the array of public and private incentive mechanisms already in existence, tiered compensation structures for the provision of on-going public environmental benefits could be an additional incentive for habitat conservation. Sometimes called “green payments,” the compensation goes to landowners for on-going and effective management of their lands to provide habitat benefits. For example, landowners using conventional intensive agricultural or forest management techniques that provide no conservation value would not be eligible for incentive green payments. Operations deemed “sustainable,” meaning that they sustain ecological values within a production context, would be entitled to partial payments. The highest payments would be made to landowners in priority conservation areas who agree to manage lands primarily for ecological values, thereby reducing or forgoing

opportunities to generate revenue from commodities. The relatively new U.S. Department of Agriculture Conservation Security Program could be called a precursor to a “green payments” incentive program that could become increasingly important in light of potential future restrictions imposed by the World Trade Organization on U.S. agricultural commodity price and marketing supports.

Geographic and Temporal Scale

In order for incentive mechanisms to be effective, their structure and funding mechanisms must be consistent with two issues related to the scale of conservation effort. One scale is geographic, the other is temporal. With respect to geography, scale issues confound incentive programs because current incentives tend to be focused on individual landowners, while effective habitat conservation needs cross multiple jurisdictions, economic sectors and land uses. In order to conserve enough habitat of the right kind, in the right place, and with an appropriate configuration for wide-ranging species, it is necessary that incentive mechanisms and programs be applicable across multiple types of land ownership. The exception, of course, is where individual owners have significant acreages that encompass a representative portion of a particular habitat. An inherent dilemma in this arrangement is that with some exceptions, the larger the owner (especially for industrial landowners), the greater the pressure to manage the land for maximum commodity production. Owners of smaller parcels may be more receptive to the notion of managing land for biodiversity values, but the fragmented pieces, often found in rural residential areas, have less potential ecological value.

With respect to the geographical scale issue for the recovery of biological function, we recommend that regional or watershed level projects should be encouraged. This approach could offer additional incentives for landowner cooperation and coordination that could have a larger impact

The temporal scale is equally important. Restoration and conservation of wildlife habitat requires a long-term commitment to be successful. With the exception of permanent easement options, most publicly funded habitat incentive mechanisms are temporary in nature, employing

“...the Conservation Security Program has the potential to provide landowner incentives on an on-going basis to manage their land for ecosystem services...”

on conservation targets. Some public stewardship programs already offer additional incentives to encourage cooperative conservation efforts between individual landowners.

Examples of regional conservation initiatives include the Malpai Borderlands in the Southwest and the Chesapeake Bay region on the East Coast. Also, both the U.S. Fish and Wildlife Service and the U.S. Department of Agriculture manage conservation incentive programs that can be applied on a regional basis across many landowners. For example, various U.S. Department of Agriculture incentive programs have used some funds to target sage grouse habitat throughout 11 states in the West. The Partnerships and Cooperation Program established in 2002 under the U.S. Department of Agriculture is an example of a conservation program that implements specific projects with the goal of encouraging conservation across multiple jurisdictions and natural resources.

predominately cost-share or land rental tools. These incentives are not geared to the long-term goal of permanently conserving biodiversity values. For so-called working lands, the Conservation Security Program has the potential to provide landowner incentives on an on-going basis to manage their land for ecosystem services that include species and habitat protection. This program recognizes that resource conservation should not end after cost-sharing the adoption of a conservation practice within a short-term contract. In addition, there is a need to continue incentives for the purpose of ongoing conservation management.

Incentive Policy Consistency

The consistency, and therefore the effectiveness, of wildlife and conservation incentives is confounded by two problems. These problems reside more in the public, especially federal, domain, although consistency and compatibility between public and private incentive mechanisms and

programs also needs to be addressed. The first consistency issue stems from the interplay between incentive measures. Although one set of incentive mechanisms may be aimed at protecting and conserving wildlife habitat, another incentive set may actually encourage destruction of habitat. For example, while some U.S. Department of Agriculture or U.S. Fish and Wildlife Service incentives are aimed at conserving specific habitats, other federal subsidies available through the transportation, housing or energy sectors may actually result in adversely altering these same habitats.

To address the issue of consistent policies between federal and state agencies, the agencies responsible for wildlife conservation should coordinate with other public agencies on a regular basis on the location and numbers of at risk species and their habitats. To a limited extent, this coordination already takes place with the framework of the National Environmental Policy Act and the Endangered Species Act. However, it is becoming increasingly necessary to make sure that habitat conservation incentives are being applied effectively and efficiently within the context of incentives offered in the trade, energy, commerce, housing and transportation sectors. Even between federal natural resources agencies, coordination has been minimal. For example, implementation is generally not coordinated between the Clean Water Act and the Endangered Species Act. The Environmental Protection Agency would not consider impacts of pesticides on listed salmon until a lawsuit forced the agency to comply.

The second consistency issue involves incompatible incentive programs within the same agency. There is a lack of coordination between the conservation objectives of the Farm

Bill and the production objectives of the commodity and risk management programs. The interplay of these various Farm Bill Titles is important in determining how effective habitat conservation incentives can be. In some circumstances, production incentives may prove to be counterproductive to habitat conservation. For example, although an increase in the subsidy on federal crop insurance can decrease a producer's financial risk, it can also act as an inducement to put unused marginal lands into production, thereby impairing their value as habitat for at-risk native animal and plant species (Adams et al. 1999; Wu 1999). There are also inherent conflicts within Farm Bill policy concerning commodity production and wildlife habitat conservation. The commodity title of Farm Bill subsidizes eight commodity crops, resulting in more land being converted or put into more production for these crops, all of which are extremely intense with respect to resource use. It is estimated that almost 300,000 acres of native grassland were converted to cropland between 2002 and 2005 in North and South Dakota and that annual loss rates of grassland since 2000 exceed 2 percent per year (Argus Leader 2005). Increased production intensity can lead to a direct loss in biodiversity on commodity croplands and to the impairment of ecosystems due to the intense use of fertilizers, pesticides and other inputs.

There are several ways that policies affecting habitat conservation can be consistent and coordinated within individual agencies. The U.S. Department of Agriculture serves as a good example. The basic objective with respect to farm policy is to strike a better balance between production capacity of the land and resource conservation. This is a balance between encouraging

landowners to stay on the farm and assisting them in adverse economic conditions in a way that does not result in habitat degradation. Biologists have been challenged in determining how much production, and at what intensity level, is consistent with habitat conservation and protection. Commodity-related income support payments (incentives to produce) need to be explicitly linked to the adoption of conservation practices and strategies (cross-compliance), including a prohibition against the exploitation of ecologically vulnerable lands (rare habitats, highly erodible soils, wetlands, riparian buffers, etc.). In addition to incentives embedded in the commodity title of farm legislation, incentives with other titles (e.g., trade, energy, rural development) need to be consistent with habitat conservation incentives. Examples of achieving more cross-title consistency would be to reshape organic certification and marketing programs towards attaining a high level of habitat conservation, and to encourage the use of food stamps to purchase locally grown food produced in a habitat-friendly manner.

Monitoring and Evaluation

The implementation of habitat conservation programs has a fairly long history, but we do not know much about their physical contribution to biodiversity conservation. There is an absence of defined processes to monitor conservation incentives and to link them with project outcomes. The lack of monitoring data makes it difficult to address dynamic environmental and ecological problems or to identify more appropriate incentive mechanisms. Monitoring is required to determine the biological impacts of the economic incentives employed to achieve defined restoration and conservation goals.

There are many approaches to measuring conservation program outcomes. One approach is implementation monitoring, which measures the degree to which steps have been taken to carry out a program (e.g., how many trees were planted). The second is effectiveness or outcome monitoring, which measures the impact of an incentive mechanism

at-risk species by “x” percent over a specific time period. For water quality, specific goals should be consistent with existing national standards or objectives. Outcome measurement should not only address the technical effectiveness of recommended management practices but also the cost-effectiveness of incentive instruments selected by landowners.

“Conservation goals should be set at the state or regional level and then implemented at the local level..”

on the ground (e.g., how many trees survived, and how was the population of species x affected). The problem with implementation monitoring is that it assumes there is a relationship between programmatic activities (i.e., landowner participation rates, acres enrolled) and biological results, which may not be an accurate assumption.

The challenge for effectiveness monitoring of incentives is that there is considerable natural variability in ecosystems, and significant ecological changes may not take place for decades. What is needed is an intermediate measurement system and indicators for determining the impacts of incentive measures that’s easy to understand and administer and that provides useful information and feedback to inform and guide incentive program management over time.

Conservation goals should be set at the state or regional level and then implemented at the local level, where habitat conservation projects specify clear outcomes to be achieved. For example, a wildlife habitat project goal may be to increase habitat for an

The Natural Resources Conservation Service of the U.S. Department of Agriculture is attempting to measure the effectiveness of conservation practices. Under its Conservation Effects Assessment Program, the Natural Resources Conservation Service is investigating the viability of and measuring various “outcome” indicators that could serve as the basis for evaluating resource conservation efforts for the technical effectiveness of specific management practices.

Except in a very indirect way, the Conservation Effects Assessment Program does not address the appropriateness or efficiency of the economic incentives used to encourage conservation behavior. If individual practices or levels of participation are deemed to be effective in conservation efforts, then by default, the incentive mechanism for a particular program is considered efficient. This conclusion may be unfounded, because although landowners may participate in a conservation program, they may do so for other reasons than finding a particular incentive mechanism or payment level worthwhile.

In addition, the Natural Resource Conservation Service will also be implementing a monitoring system that uses data from their Natural Resources Inventory to determine the impacts of agricultural land use on wildlife habitat composition and configuration (Brady and Flather 1995). To the extent that land use is impacted by specific conservation incentive mechanisms, this monitoring program may or may not tell us anything about the effectiveness or the efficiency of individual incentive tools in conserving wildlife habitat.

Clearly, public efforts need to be expanded to include the monitoring and evaluation on incentive mechanisms in terms of biological conservation the economic efficiency. There is a need for a dedicated amount of funding in all public programs for monitoring and evaluation of incentive mechanisms.



Lark Bunting | Natural Resources Conservation Service

XI. CONCLUSIONS

In the future, the habitats and species in greatest need of conservation attention will increasingly be on private lands. Recognizing that private landowners will play a key role in biodiversity conservation, we can and should encourage

policy should encourage restoration without penalizing landowners who have a history of good stewardship by limiting assistance to those whose lands have been damaged.

There are incentive mechanisms for which no formal biological or

are important for establishing a workable framework for incentive delivery and management. First, establishing a market structure for landowners to capture the public benefits of wildlife conservation can be just as important as financial incentives. Second, administrative ease for accessing incentive mechanisms by landowners is important. Third, there is a great potential for merging public and private incentive tools to encourage landowners to conserve biodiversity values.

Landowners need access to a bundle of institutional, market-oriented, financial and facilitative incentives. One-stop shopping that offers landowners a clear picture of the full range of options, incentives, permit requirements, funding sources and other information applicable to their individual situations could result in both higher levels of participation and improved administrative efficiencies. We also need to find ways to build more flexibility into actual incentives used and into the management practices those incentives are meant to encourage. While flexibility comes at a higher price in terms of transaction costs, the tradeoff with effectiveness is likely to be positive.

An incentive tool that deserves further exploration is an ecosystem services marketplace that promotes both biological integrity and economic efficiency. Although the concept is just beginning to gain some traction, primarily in the realm of compensatory mitigation, the potential exists for much broader application.

“An effective long-term conservation policy will require both active ecological restoration and continuing stewardship.”

these efforts. However, in addition to positive, voluntary incentives, there is clearly a need for conservation regulations that set a minimum performance level to guide landowner decision-making. In other words, there is a need for both the “carrot” and the “stick.”

We also need to establish a clear boundary between the regulatory approach and the role of incentives. We should not pay landowners to obey the law. Regulations define the baseline for protection of ecological values. Incentives should encourage landowners to pursue more ambitious goals. Simply preventing additional ecological damage is insufficient, given the nation’s history of biodiversity losses and the strength of the forces that are still driving that trend. An effective long-term conservation policy will require both active ecological restoration and continuing stewardship. Conservation incentives

economic appraisal has been done, and there are others where very little has been done. This does not mean that we should not support current incentive programs, but rather we should find ways to make them work better. Indeed, without these programs, habitat and species loss would now be more severe than it currently is. However, more research is required to measure the comparative advantages of various incentive mechanisms. One area of immediate action is to find ways to decrease the private and public costs of accessing and implementing landowner incentive programs. Research on these issues can be implemented through the U.S. Department of Agriculture’s Economic Research Service, the land grant university system or by non-governmental organizations.

There are particular themes that emerge from our assessment that

Proposals to shift Farm Bill funding from “brown box” commodity support programs to “green box” conservation programs that provide payments for ecosystem services could have a profound effect on the scope and scale of this emerging ecosystem marketplace. However, there is much to be done in terms of defining what “service” is actually being furnished, what metrics are used to measure that service and what the appropriate method of economic valuation should be.

Regardless of the mechanism, incentives will be most effective if they are implemented within the context of specific biodiversity conservation goals or outcomes that allow us to measure progress against these goals and adapt incentive types and levels over time. Investments in conservation incentives need to be made strategically. Few policy makers would accept the notion that the government should invest its limited funding for conservation land acquisitions in purchasing property from any landowner who stepped forward. Yet most incentives have been treated that way for years—made available to a broad spectrum of landowners and allocated on a first-come, first-served basis. We now have tools that allow incentives to be targeted more strategically, based on comprehensive conservation assessments such as the states’ new wildlife action plans, The Nature Conservancy’s ecoregional assessments and other science-based conservation strategies. Monitoring, implemented by third parties at a watershed or ecoregional scale, can be used to gauge effectiveness, guide improvements in the way incentives are formulated and delivered, and provide accountability for public investments.



Three generations of farmers, Iowa | Natural Resources Conservation Service

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