



Munich Personal RePEc Archive

Evaluating incentive mechanisms for conserving habitat

Gregory M Parkhurst and Jason F Shogren

Weber State University

2005

Online at <http://mpa.ub.uni-muenchen.de/34552/>

MPRA Paper No. 34552, posted 6. November 2011 16:19 UTC

Evaluating Incentive Mechanisms for Conserving Habitat*

Gregory M. Parkhurst
(gregory@uwyo.edu)

Jason F. Shogren
(jramses@uwyo.edu)

Department of Economics and Finance
University of Wyoming
Laramie, WY 82071-3965

28 April 2003

Abstract

Private lands have an important role in the success of the Endangered Species Act (ESA). The current command-and-control approach to protecting species on private land has resulted in disincentives to the landowner, which have decreased the ability of the ESA to protect many of our endangered and threatened species. Herein we define and evaluate, from an economic perspective, eight incentive mechanisms, including the status quo, for protecting species on private land. We highlight the strengths and weakness and compare and contrast the incentive mechanisms according to a distinct set of biological, landowner, and government criteria. Our discussion indicates that market instruments, such as tradable permits or taxes, which have been successful in controlling air pollution, are not as effective for habitat protection. Alternatively, voluntary incentive mechanisms can be designed such that landowners view habitat as an asset, and are willing participants in protecting habitat. The incentive mechanism best suited for conserving habitat in a given region depends on many factors, including government funding, land values, quantity and quality of habitat, and the regions developmental pressure.

* [Need to put brief biographical note here](#). Thanks to Institute for Environmental and Natural Resources and the Stroock professorship at the University of Wyoming for the financial support.

1. Introduction

The Endangered Species Act of 1973 in the United States exemplifies the private lands-public good challenge that arises when the common good is held in private hands. The ESA protects species on public and private lands because they have "ecological, educational, historical, recreational and scientific value" unaccounted for in the course of "economic growth and development".¹ While thirty years ago this language seemed harmless enough, today the ESA is the front line in the conflict between advocates of private property rights and activists promoting the common good.² Three factors deepen the debate over species protection on private lands. First, most land in the US is privately owned. Second, about half of endangered species rely on this private land for eighty percent of their habitat.³ Third, some landowners fear that strict regulatory enforcement of the ESA may deny property owners valuable uses of their land which rises to the level of a Fifth Amendment "taking"—private property taken for a public use without just compensation.⁴ But the cooperation of private landowners remains critical for the preservation of endangered species. The net benefits of the ESA can be increased if an amended Act provides economic rewards or if states use economic incentives to reward landowners for good stewardship of actual and prospective habitat and species.

In fact the need to provide incentives for private landowners has been long advocated. Aldo Leopold argued that conservation "ultimately boil[s] down to reward the private

¹ Endangered Species Act of 1973, 16 U.S.C. s. 1531 (1998).

² The U.S. Congress who passed the Act with little or no opposition—390-12 in the House and 92-0 in the Senate. See Charles Mann and Mark Plummer, *Noah's Choice: The Future of Endangered Species* (1995).

³ S. Polasky, H. Doremus, & B. Rettig, Endangered Species Conservation on Private Land, 15 *Contemporary Economic Policy* 66, 66-76 (1997); G. Brown & J. Shogren, Economics of the Endangered Species Act, 12 *Journal of Economic Perspectives* 3, 3-18 (1998).

⁴ See Richard Epstein, *Takings: Private Property and Power of Eminent Domain* (1985).

landowner who conserves the public interest”.⁵ Many observers agree. They believe that endangered species inhabiting private land can be better protected if economic incentives encourage landowners to preserve their property. Currently, the ESA provides some regulatory incentive for landowners to cooperate with species conservation policy through Habitat Conservation Plans⁶ (HCP)—plans that allow a landowner to alter habitat under certain management restrictions, Safe Harbor⁷ plans—plans that allow the landowner to improve the habitat quality on his land without suffering additional uncompensated land-use restrictions, and Candidate Conservation Agreements⁸ (CCA)—agreements in which a landowner limits future land use restrictions by forging an agreement with the Fish and Wildlife Service to protect a species and its habitat prior to the listing of the species. But the HCP and Safe Harbors policies provide benefits to landowners only after ESA sanctions have been levied against their land. CCA are only applicable to a select group, landowners that assign a value to protection of a species larger than the lost economic value resulting from voluntary land use restrictions. The incentives for landowners to avoid ESA land-use regulations still exist.⁹ Landowners may minimize the chances of suffering ESA restrictions by preventing government biologists from looking for listed species on private property, or to destroy habitat for listed species, or to “take” listed and potentially listed species. These actions may harm listed species, destroy or reduce the value of habitat, and increase the costs of designating habitat and

⁵ See M. Bean, The Endangered Species Act and Private Land: Four Lessons Learned From the Past Quarter Century, 28 Environmental Law Reporter 10701, 10701-10710 (1998).

⁶ See United States Fish and Wildlife Service, Habitat Conservation Planning and Incidental Take Permit Processing Handbook (2000).

⁷ See United States Fish and Wildlife Service, Safe Harbor Agreements for Private landowners (2002).

⁸ See United States Fish and Wildlife Service, Candidate Conservation Agreements with Assurances for Non-Federal Property Owners (2002).

⁹ See I. Bowles, D. Downes, D. Clark, and M. Guerin-McManus, Economic Incentives and Legal Tools for Private Sector Conservation, 8 Duke Environmental Law and Policy Forum 209, 209-243 (1998).

species recovery. Agencies or private parties can reduce such actions by providing incentives for landowners to cooperate through compensation for “takings,” rather than through permits or penalties.

A variety of compensation schemes are possible: direct compensation from the government to owners of land taken; tradable rights in habitat, under which those who wish to develop land would buy permits from those who would then not be able to develop; insurance programs under which landowners are compensated if endangered species impose costs on them, like the fund created by Defenders of Wildlife under which ranchers are compensated when wolves destroy livestock; or tax breaks to preserve large areas of land, rather than to break them up to pay federal estate taxes.¹⁰

This paper reviews eight incentive mechanisms from an economics perspective—zoning, impact fees, subsidies, tradable development rights, conservation banking, fee simple acquisition, and conservation easements in the form of either purchased development rights or donations for tax relief. Examples exist of nearly all these incentives options, both compensated and uncompensated, and none are simple or straightforward to implement. We then describe each incentive mechanism and provide examples. The following section compares and contrasts each incentive mechanism according to a broad set of criteria that addresses perceived biological needs, landowner interests, and regulatory concerns. The criteria respect Leopold’s evolutionary-ecological land ethic that reflects the scientific notion that nature is not a collection of separate parts but an integrated system of actions, reactions, and feedbacks.¹¹ This notion focuses on defining the natural system within the context of human interaction and well-being. One

¹⁰ Defenders of Wildlife, *Conservation in America: State Government Incentive for Habitat Conservation* (2002).

¹¹ Aldo Leopold, *A Sand Country Almanac, and Sketches Here and There* (1949).

helps promote more understanding by working together to define a set of evaluative criteria that reflects a range of ethical views. We grade each incentive mechanisms on a five point scale, ranging from very high to very low, for eleven criteria: ability to target land specific aspects, permanence, active habitat management, voluntary participation, privacy maintained, stewardship recognized, administrative costs, monitoring and enforcement costs, acquisition costs, information rents (DWL), and risk of habitat destruction. The last section concludes.

2. Incentive Mechanisms

We now evaluate eight incentive mechanisms from an economic perspective — zoning, impact fees, subsidies, tradable development rights, conservation banking, fee simple acquisition, and conservation easements in the form of either purchased development rights or donations for tax relief. Consider each incentive mechanism.

2.1. Zoning

As a comparative benchmark to better understand the usefulness of flexible economic incentive mechanisms, we first discuss the standard approach to land use questions on endangered species—zoning. Local governments, by exercising their police power of command and control, influence activities on private property through zoning ordinances. These ordinances either specify allowable land uses or they enjoin particular activities for specific land regions.¹² Governments have traditionally used zoning to restrict development and other land uses to protect attributes and characteristics of the

¹² United States Fish and Wildlife Service, 341 FW 2, Land Acquisition Planning in Fish and Wildlife Service Manual 11, <http://www.fws.gov/directives>, [cited May 10, 2000], (hereinafter USFWS).

environment the government, acting in the interest of the public, deems desirable.¹³

Governments use zoning to guide development towards existing infrastructure and away from environmentally sensitive areas. Zoning has also been engaged to protect scenic views, open space, vegetation and tree preservation, and river corridors.¹⁴

2.2. Impact Fees

An impact fee is a cash or in-kind payment by a developer to a government as a precondition to receive a development permit. Governments often require developers to expend resources to create a local public good like a park, as a precondition to receiving the necessary permits for development. These expenditures are called exactions, and take the form of a cash payment or a land donation, public parks, streets, or other public goods.¹⁵ Regardless of whether the land use exaction is a cash payment or an in-kind transfer, the developer assigns a cost to receiving the development permit—the impact fee.

Impact fees have become popular in the last two decades. The goal of an impact fee is to offset the negative consequences of development to the surrounding environment and existing infrastructure. Developers pay an impact fee for instance as a condition for receiving permits for new projects that would otherwise increase the demand for existing public goods and services. The revenues received from impact fees finance the provision of new public goods such as parks, recreational facilities, open space acquisition, and to

¹³ A. Miller, Transferable Development Rights in the Constitutional Landscape: Has Penn Central Failed to Weather the Storm, 39 *Natural Resources Journal* 459, 459-516 (1999).

¹⁴ Utah Critical Land Conservation Committee, *Land Conservation in Utah: Tools, Techniques, and Initiatives* (1997), <http://www.governor.state.ut.us/>, (hereinafter UCLCC).

¹⁵ Alan Altschuler and Jose A. Gomez-Ibanez, *Regulation for Revenue: The Political Economy of Land Use Exactions* (1993).

improve roads and telecommunications.¹⁶

Local governments can also issue bonds as an alternative financial tool to fund the acquisition and construction of public goods to satisfy the increase in demand that results from new development. The bonds, upon maturity, are typically paid for through the community's general tax fund, which places the burden of funding on all local residents. In contrast, impact fees are usually paid when the developer obtains his permit, which allows the new public goods to be created before completion of the development project. Impact fees have the additional attribute that those creating the new demand for public goods pay for that demand, allowing existing residents to maintain a level of public good provision by requiring development to "pays it own way".¹⁷

A local government's right to assess an impact fee on new development rests in its regulatory authority, which is authorized by the state. This use of police power by local governments has encountered its share of conflict and litigation has resulted in court rulings that specify that a "rational nexus" between the impact fee and the development's negative impact on the community must exist. The impact fee must exhibit a direct relationship between the externalities caused by the developer's activities and the purpose for which the fees are used to be legal.¹⁸ Establishing such a cause-and-effect is a question of accurately forecasting future demand for a public good, which is always a challenge due to the imprecision of economic information.

Another alternative to impact fees for mitigating adverse environmental effects of new development projects is a performance bond, which are required deposits that

¹⁶ Id. at 15.

¹⁷ J. Brueckner, Infrastructure financing and urban development: The economics of impact fees, 66 *Journal of Public Economics* 383, 383-407 (1997).

¹⁸ For further discussion see Altshuler and Gomez-Ibanez supra note15; see also Miller supra note 13, at 459-516.

developers' pay prior to initiating a project to insure that predetermined onsite quality levels are met. The developer must pay up-front the costs as they arise, and must oversee the project to ensure the quality standards are met. Once the regulator determines that the developer has met the contract conditions, the performance bond is refunded.¹⁹ In contrast, impact fees are paid when the developer purchases his permit, are generally not refundable, and are used for offsite projects that benefit society as a whole. The municipality determines how, where, and for what the impact fees are to be spent, but these projects must be reasonably related to the development and be justified by communities' general plan.²⁰

2.3. Subsidy

Subsidies are financial assistance offered to landowners by regulators. Subsidies can be used to create an incentive that encourages landowners to maintain their land in an undeveloped state or to mitigate the environmental impact of development by helping the landowner meet maintenance and restoration costs of environmentally sensitive areas. Subsidies usually take the form of grants, loans, cash payments, or tax allowances that are offered by federal, state, or nonprofit organizations.²¹ Subsidy programs are funded by numerous methods, including tax revenue, lottery funds, and special permits. We now consider four examples to illustrate how subsidies are used in species protection.

Example #1. Tax Benefits

California's Timber Tax Credit (TTC)

¹⁹ Nick Hanley, Jason Shogren, and Ben White, *Environmental Economics: In Theory and Practice* 58-105 (1997).

²⁰ Altshuler and Gomez-Ibanez *supra* note 15.

²¹ Hanley, Shogren and White *supra* note 19, at 58-105.

The California Department of Fish and Game (CDFG) administer a subsidy program, called the “Timber Tax Credit Program (TTCP).” The TTCP induces private landowners to undertake conservation projects voluntarily to improve habitat, and the probability of survival of the coho and chinook salmon, and the steelhead trout. The TTCP provides a tax credit of up to \$50,000 to a landowner, upon completion of the approved project. Approved projects include the restoration of the stream banks or other improvements to the flow of the stream, revegetating the habitat with indigenous plants, and performing upland work to reduce sediment runoff and to improve the timing and distribution of water returning to the stream. Many projects decrease the speed of the flow of the stream and cool the temperature of the water.²²

A landowner who is interested in participating in the TTCP submits an application listing the applicant’s personal information, a brief description of the proposed project, an estimate of total and qualified project costs, location, directions to the proposed project, estimated time frame, type of fish that will likely benefit from the project, and the tax credit recipient’s name(s) and I.D. number(s). This tax credit information is accompanied by two more pieces of information: a detailed description of the proposed project and a detailed estimation of the project costs.

Upon receipt of the application and attachments, the CDFG determines if the proposed project complies with state and federal law. Projects in compliance are given an initial onsite inspection, and then can be approved for tax credit. A final inspection of the

²² California Resources Agency, Department of Fish and Game, Inland Fisheries Division, Timber Tax Fish (related) Incentives for Sustainable Habitat (2000), www.dfg.ca.gov/timber/ttcp_2.html, (hereinafter CRA).

project completion is conducted within thirty days of completion, and if the project satisfies the inspection, a tax credit certificate is issued within 90 days.²³

Tax credits can be up to 10 percent of the estimated qualified costs of the proposed project, which are the costs for labor, materials, and in some instance the rental rate for heavy equipment. The costs must be incurred for purposes that directly increase the survival rate of salmon and steelhead. Costs associated with the installation of water pumps, well drilling, permanent roads and buildings, and services rendered by professional engineers do not qualify. At the end of the year, the CDFG sums the estimated qualified costs for all of the completed approved projects, and then divides \$500,000 by that summed number to obtain the tax credit percentage, which cannot exceed 10 percent. The estimated qualified costs are then multiplied by the tax credit percentage and the landowner is issued a tax credit in that amount. This tax credit is levied against the net tax, and if not completely used in the year issued, the remaining credit can be applied to tax liabilities in future years. The timber tax credit is funded by a tax placed on timber sales outside of the United States and receives approximately \$500,000 a year, which is entirely issued in credits. The costs of administering the program are covered by a non-dedicated preservation fund.²⁴

Example #2. Cost Share

Idaho's Habitat Improvement Program (HIP)

Idaho's Department of Fish and Game (IDFG) is the administrator of the Habitat Improvement Program (HIP), which is a cost share program that allocates funds for improvements on both private and public lands. The IDFG recognizes the role private

²³ Id. at 22.

²⁴ Id. at 22.

landowners play in providing habitat for both upland game and wild birds. The primary objective of HIP is to encourage private landowners to invest in habitat restoration and enhancement projects that increase the populations of wild birds.²⁵ The IDFG introduced the HIP because changes in the agricultural production practices—both new forms of irrigation and more use of marginal land—affected bird populations.

The IDFG attributes the increased attrition of wild birds, in part, to the farmers' decreased dependence on water canal systems due to new irrigating technologies, such as sprinkling systems, which make canals obsolete. As a result, farmers have lined irrigation ditches with concrete or removed them completely, thereby eliminating habitat areas that provided wild game birds winter homes and nesting areas necessary for reproduction. The threat to the population of wild birds is also impacted by farmers who have increased their usage of the land, becoming more efficient by employing land that was previously idle and often occupied by wild birds.

Landowners interested in participating in HIP can contact the local office of the IDFG, which upon notification makes available a habitat biologist who evaluates the land and designs the habitat restoration project so it benefits upland game and wild birds. Not all landowner requests are funded. For those projects that are funded, IDFG personnel assist the landowner in locating indigenous vegetation and provide other technical information. Accepted projects can encompass revegetating or creating riparian areas, erecting fences to keep livestock away from wild game habitat, creating water sources, establishing windbreaks, or providing wild animals with winter forage. Projects that provide a benefit to the local wildlife can be implemented on land parcels of all sizes and

²⁵ Idaho Department of Game and Fish, Habitat Improvement Program (HIP): Key to the Future for Idaho's Game Birds (2000), www.state.id.us/fishgame/hip.html, (hereinafter IDFG).

shapes, and in conjunction with other government programs such as the Conservation Reserve Program (CRP).²⁶

Landowners with accepted projects enter into an agreement with the IDFG that documents the project plan and specifies the landowner's requirement to maintain the land, which typically extends for a period greater than ten years. The IDFG reimburses up to 75 percent of the landowner's costs, 37.5 percent for projects on lands enrolled in the CRP, with a maximum of \$2000 per project. The IDFG encourages, but doesn't require, project participants to allow public access to their land and landowners can leave HIP at any time by returning the cost share funding.²⁷

Example #3. Cost Share

Washington's Salmon Recovery Funding Board (SRFB)

The Salmon Recovery Funding Board (SRFB) administers a program whose purpose is to “support salmon recovery by funding habitat protection and restoration projects and related programs and activities that produce sustainable and measurable benefits for fish and their habitat.” The board consists of ten members, five appointed by the Governor of the State of Washington, one of which is a representative of the governor's cabinet. State agency directors from the Department of Ecology, the Department of Game and Fish, the Department of Natural Resources, the Department of Transportation, and the State Conservation Commission make up the remaining five

²⁶ Id. At 25.

²⁷ Id. At 25.

board members. Only the five appointed board members are given the right to vote on the procedures and policies associated with obtaining SRFB funding.²⁸

SRFB funds are made available to private landowners, state agencies, cities, counties, conservation districts, special purpose districts, Native American tribes, and nonprofit organizations. The funds are obtained through a two-step process. Step one has the landowner or other interested party submit its proposed projects to the local lead entity, which can be a nonprofit organization, local government, or tribal government, but must be agreed upon by the cities, counties, and tribes located within the region the lead entity is to serve.

The requirements the lead entities place upon the applicant vary from region to region, and must include several SRFB mandated criteria. The minimum costs of a project must be at least \$5,000, and the SRFB requires the applicant provide matching funds of 15 percent of the requisitioned funds to increase the probability of the project being completed. Next, the project proposal should specify the exact location of the project, unless the applicant can prove that the project could be located anywhere within a specified region.

And finally, to be eligible for funding, the project must be one of eight types: 1) acquisition of land in its entirety or acquisition of a purchased development rights (PDR) easement. 2) Improvements to fish migration up and downstream. 3) Screening fish from in-stream diversions such as dams or headgates, or creating a fish by-pass. 4) Improvements to the habitat below the high water mark, including increasing or decreasing the amount of gravel, rocks, wood, and plants in the stream bed, along the

²⁸ Salmon Recovery Funding Board, Report 18, Policies and Project Selection Grants Manual, Second Round, 2000 Cycle (2000), [hereinafter SRFB 18].

stream banks, or in the flood plain. 5) Increasing the quality of the riparian area by planting indigenous habitat, removing evasive plants, fencing the area off from livestock, repairing stream crossings, or improving the quality of the water supply. 6) Improvements to the area outside of the riparian area, or upland, which decrease the sediment runoff, provide shade for cooling the water, and affect the time it takes for water to reach the stream. 7) Projects that are a combination of any of the above, in particular those projects that provide for both the acquisition and restoration of salmon habitat. 8) Evaluations, studies, and reports can be funded if they are justified as needed to improve the administration of the program.²⁹

Step two requires the lead entities across the state to submit a prioritized list of projects to the SRFB. This list is then scrutinized by the SRFB according to the SRFB funding policies and a scientific evaluation and assessment of each project. Each project must be accompanied by a standard application, which includes general information such as the project type, organization type, name, address, phone number of both the organization and the contact person, a description of the project, requested funding, how the requirement for the matching contribution is to be met, project cost estimates, and a biological assessment that addresses species information, habitat factors, necessary permits, and measurement information.³⁰

To aid the SRFB in evaluating projects, each project on the list must also answer three threshold questions and six evaluation questions. The threshold questions address how the project is to be monitored for effectiveness, the long-term plan for managing and maintaining the project, and whether the proposed project is already legally required to be

²⁹ *Id.* at 28.

³⁰ Salmon Recovery Funding Board, Report 18a, Second Round 2000 Salmon Grant Application Forms (2000) [hereinafter SRFB 18a].

undertaken. The evaluation questions provide the board with information concerning the expected benefit of the project to the survival of salmon, how well the project complements other projects or programs for salmon recovery, the scientific basis or conservation plan that supports the project, the cost effectiveness of the project, the ability of the project coordinator to complete the proposed project, and the reason that the project should be undertaken.³¹

Upon receiving the applications and other relevant information, a technical panel of people with experience and expertise in various scientific fields and employees of the USFWS and NMFS evaluate the projects. The evaluation specifies whether the project has a high benefit to salmon, the level of certainty the project exhibits, and the importance of the project on a regional scale. Based upon the evaluation, recommendations are presented to the SRFB in the form of a report, which is used in the decision making process. Once decisions are made the recipients of funding deal directly with the SRFB and the Office of the Interagency Committee for Outdoor Recreation, who are responsible for monitoring and enforcing agreements. Funding is provided on a reimbursement basis and cannot exceed the requested funding allotment.³²

Example #4. Conservation Leasing

The USDA's Conservation Reserve Program (CRP)

The Conservation Reserve Program (CRP) was established when Congress passed The Food Security Act of 1985, with its initial goal to reduce the amount of soil erosion

³¹ see SRFB 18 supra note 28; see also SRFB 18a supra note 31.

³² SRFB 18 supra note 28.

by paying farmers to idle highly erodible lands.³³ The CRP was reauthorized under The Food, Agriculture, Conservation, and Trade Act of 1990, and the goals of the CRP were extended to include environmental concerns and improvements in the quality of water along with the previous goal of reducing soil erosion.³⁴

In 1994, the priority placed on environmental considerations increased, and the CRP was redirected to enlist land that provided for greater environmental benefits. To accomplish the task of increasing the enrollment of environmentally sensitive lands, the USDA announced that owners of less sensitive lands—lands not “devoted to high-priority conservation practices” or lands over 100 feet away from rivers, streams, and other bodies of water—were allowed an early release from CRP contracts. Lands that opted out were replaced with lands along riverbanks or other riparian areas, or lands that served as filter strips. The USDA paid extra for environmentally sensitive lands to encourage landowners possessing the more desirable land to enroll.³⁵

The passage of the Federal Agricultural Improvement and Reform Act of 1996 confirmed the environmental focus of 1994. Under the 1996 law, the enrollment of CRP lands is capped at 36.4 million acres, and the CRP is to be extended through the year 2002. As of 1996, nearly 33 million acres had been taken out of production as a result of CRP enrollment with an average annual subsidy of roughly \$50 per acre, and a total cost of around \$1.8 million per year.³⁶

³³ Environmental Defense, *Progress on the Back Forty: An analysis of three incentive-based approaches to endangered species conservation on private land* (2000), www.edf.org/, [hereinafter EDF].

³⁴ B. Babcock, J. Wu, P. Lakshminarayan, and D. Zilberman, *The Economics of a Public Fund for Environmental Amenities: A Study of CRP Contracts*, 78 *American Journal of Agricultural Economics*, 961, 961-971 (1996).

³⁵ United States Department of Agriculture Farm Service Agency *Online*, Conservation Reserve Program Sign-Up 16: Environmental Benefits Index, Proposed Rule – Long-Term Policy (1997) [hereinafter FSAc].

³⁶ United States Department of Agriculture Farm Service Agency, Conservation Reserve Program: Fact Sheet (1997) [hereinafter FSAa].

Landowners or land tenants interested in enrolling their land in the CRP have two options. The first option is to wait for a CRP sign-up period, in which an interested landowner or tenant submits a bid, which meets certain eligibility criteria, to the local Farm Service Agency (FSA). A considered bid must be for land (1) that has been placed in productive agricultural use for at least two of the last five years and can legally be used for agricultural purposes in future years; or (2) is pasture land enrolled in the Water Bank Program or can be planted to trees to serve as a windshield or buffer for a riparian area. If the land is cropland, it must be considered to be highly erodible, a wetland, have significant environmental benefits restored, be located in a CRP priority region, surround uncultivated wetlands, or be likely to experience scour erosion. Furthermore, the applicant must have been farming the land for the twelve-months prior to the sign-up deadline, unless the applicant acquired the land by deed purchase or inheritance due to the death of the prior owner, the land changed hands due to foreclosure procedures or the FSA is relatively certain that the land was not acquired with the purpose of exploiting the CRP.³⁷

Upon approval for eligibility, the applicant submits a bid that represents the necessary subsidy or lease payment required for the applicant to idle his or her land, which for consideration can't exceed a set maximum rental rate. The applicant also includes a description of restoration projects that are undertaken if the land is approved for CRP funding, in which a cost-share program that reimburses 50 percent of the applicant's restoration costs if approved plants are established on the CRP land, and up to 75 percent of the restoration costs if the restoration project is to occur on wetlands.³⁸

³⁷ *Id.* at 36.

³⁸ *Id.* at 36.

Many more applicants apply for CRP funds than the program can accept. Decisions on what lands to protect are determined by a formula called the Environmental Benefits Index (EBI), which orders projects through a point system that assigns points according to six environmental characteristics and the projects cost. The higher the point total, the better the chance that the applicant's land receives funding under the CRP. The primary factors are the benefits provided to wildlife (in particular existing or restored habitat cover and the significance of the land for listed species), the quality of water, and soil protection, each having the potential for 100 points.

Management and maintenance plans are awarded up to 50 points based on the probability the plans are carried out in the long run. The increased air quality that result from windbreaks and the resulting decrease in land erosion from wind factors account for a maximum of 35 points. The location of the land is valued at most 25 points, with points increasing the more significant or higher priority the region is for state and national conservation efforts. There is no set maximum point allocation for the cost factor, but more points are earned if no cost share dollars are needed, and if the cost per acre is below the Maximum Acceptable Rental Rate (MARR).³⁹ The MARR is determined separately for each county and is based on the soil productivity relative to other counties and the local rental value of dryland.⁴⁰ An applicant's probability of being selected is influenced most by planting the cover mixture scored highest, with other significant factors being sensitive lands and bidding for a lower subsidy.⁴¹

The second option for lands to be entered into the CRP is through the continuous sign-up. This option has the same requirements as the periodical sign-up, with the extra

³⁹ FSAc supra note 35.

⁴⁰ FSAa supra note 36.

⁴¹ FSAc supra note 35.

requirement that the land has to have a high priority for conservation. To satisfy the high priority criterion, the land must be suitable as one of the following: “Riparian buffers; Filter strips; Grass waterways; Shelter belts; Field windbreaks; Living snow fences; Contour grass strips; Salt tolerant vegetation; or Shallow water areas for wildlife.” The applicant is still able to receive 50 percent cost sharing for restoration, and can qualify for additional bonuses of 20 percent and 10 percent of the annual rental rate by providing various lands and land attributes, and for location in a designated EPA “wellhead protection area.” The duration of contracts for both types of sign-ups is 10 to 15 years.⁴²

A criticism of the CRP and other conservation leasing programs is that the funds used to lease the land could have been applied to purchasing conservation easements and the land could have been preserved in perpetuity.⁴³ A response to this critical view is that it is questionable whether one could have secured the same magnitude of land for the cost, and that conservation leasing provides the time necessary to obtain funding and evaluate projects and apply the government’s limited resources more efficiently. Plus conservation leasing provides incentives to landowners to provide and improve habitat for endangered species. Some also argue that the compensation that landowners receive might change their attitudes toward species—they would now see endangered species as an asset rather than a liability.⁴⁴

2.4. Tradable Development Rights (TDR) with Zoning

⁴² United States Department of Agriculture Farm Service Agency, Conservation Reserve Program: Continuous Sign-Up for High priority Conservation Practices (1997) [hereinafter FSA].

⁴³ Keith Wiebe, Ababayehu Tegene, and Betsey Kuhn, Economic Research Service/USDA, AER-744, Partial Interests in Land: Policy Tools for Resource Use and Conservation (1996) [hereinafter Weibe].

⁴⁴ EDF supra note 33.

Tradable development rights (TDR) programs specify a predetermined maximum level of development within a specified region, and then distribute development rights equal to the permissible total amount of development to landowners within the region. Landowners who keep their development levels below their allotted development rights level can sell their surplus development rights to other landowners, or they can use them to offset development on other properties. To ensure that development rights serve their purpose as an incentive to change development control to desired social levels, total development levels within a given region are limited such that the development rights are seen as a scarce resource, which is valuable to developers.⁴⁵

TDR programs ensure that development occurs on the properties with the highest development values, but they do not guarantee that the most environmentally sensitive land is left undeveloped.⁴⁶ This non-targeted result can reduce the net benefits to society when land has a greater habitat value than development value. If this land is still developed under the TDRs, the mechanism has performed poorly. The most common approach to overcome this inefficiency is to combine TDRs with zoning.⁴⁷

Government agencies responsible for land use planning determine which properties within a specified region should be protected for their valuable environmental characteristics and qualities. They then restrict development of these properties, and landowners are provided with development rights to compensate them for the loss of economic use. These rights can then be sold to developers in the less restricted properties

⁴⁵ Hanley, Shogren and White *supra* note 19, at 58-105.

⁴⁶ Boyd, James, Kathryn Caballero, and R. David Simpson, Discussion Paper 99-32, Resources For The Future, The Law and Economics of Habitat Conservation: Lessons from an Analysis of Easement Acquisitions (1999) [hereinafter Boyd].

⁴⁷ D. Mills, *Transferable development Rights Markets*, 7 Journal of Urban Economics, 63, 63-74 (1980); UCLCC *supra* note 14; Miller *supra* note 13, at 459-516.

within the region, where development is more desirable. Those properties that are restricted are called sending zones, and development properties are called receiving zones. Once sending and receiving zones are determined, the regulator decides on a formula for transferring the development rights from one zone to the other. A key feature that ensures developers purchase TDRs from sending zones is that the density of development in receiving zones, prior to acquisition of TDRs, is restricted to less than the demanded density.⁴⁸ The price of a TDR is determined through the open market. To facilitate trading and minimize transaction costs, regulators can establish a TDR bank or exchange, which brings together willing buyers and sellers such that each can find mutual gains through trade.⁴⁹

Tradable development rights can be complex and administratively cumbersome. Establishing this new market involves technical, financial, and legal dimensions that must be addressed prior to the actual trading of development rights. These include: (1) TDR programs should be established with a “clear legal authority”—one way is authorization of TDR programs by state law to minimize costly legal challenges and delays in program implementation; (2) Ensuring that the program meets its goals requires the employment of expert land planners, lawyers, economists, and scientist to perform biological assessments, determine the total number and distribution of TDRs, establish a method by which development rights are transferred, record such transfers, set the initial zoned development density and maximum allowable density after TDRs are purchased, and monitor and enforce all transactions; (3) the TDR program has more effective control over land uses if authority rest with one agency, and all other methods for obtaining

⁴⁸ Miller *supra* note 13, at 459-516.

⁴⁹ J. Tripp and D. Dudek, Institutional Guidelines for Developing Transferable Rights Programs, 6 Yale Journal on Regulation 369, 369-391 (1989).

increases in development density are eliminated—the developer has to purchase TDRs to increase his or her development density; (4) The objectives of the land-planning agency should be clear, concise, and rooted in sound scientific knowledge; (5) The demand for development within the region should be significant and impose a significant threat to the region’s biodiversity; (6) the regulator should set the supply of TDRs below the demand to insure that TDRs are seen as a valuable asset; (7) TDRs should be distributed to landowners in a method as fair and administratively simple as possible; and (8) the regulatory agency should establish a TDR exchange to reduce the friction within the market, which lowers the barriers of bringing together buyers and sellers and increases the efficiency and effectiveness of the program.⁵⁰

TDRs have been used by various states for close to three decades to protect historical buildings and landmarks, agricultural and ranch lands, open spaces and view corridors, and to protect riparian areas, forests, and other ecologically sensitive lands. One of the earliest programs was New York City’s Landmark Preservation Law. The program was initiated in the 1970s to protect historical landmarks by restricting development of air above historical buildings. The law allows the owner to be compensated for the lost right to develop by transferring the development rights for that air space to surrounding buildings that are allowed to build beyond the zoned height restrictions. New York City also allows development rights to transfer hands via zoning lot mergers between adjacent landowners. These landowners can combine their allowed floor area without joining ownership of the properties, provided the total floor area between the two buildings does not exceed the zoned maximum amount of floor area of

⁵⁰ See Tripp and Dudek *supra* note 49, 369-391; D. Sohn and M. Cohen, From Smokestacks to Species: Extending the Tradable Permit Approach from Air Pollution to Habitat Conservation, 15 Stanford Environmental Law Journal 405, 405-451 (1996).

the two properties. This system allows a developer to purchase the floor area not in use by an adjacent landowner and exceed the zoning restriction by that amount.⁵¹

Other TDR programs that have been designed to protect large expanses of environmentally sensitive land from the encroachment of development came into existence in the early 1980s in New Jersey and Maryland. In New Jersey, the Pinelands program encompasses 1.1 million acres of forested expanse, home to several small towns, and over 1000 species of plants and animals. The Pinelands have been targeted for preservation by the state, which used a TDR program to limit development. Landowners whose land is restricted from being developed are issued TDRs, the number of which depends upon the preservation value of that owner's land. The landowner can then sell the TDRs to other landowners in the Pinelands region where development is allowed. These landowners must possess TDRs to develop their land beyond the predetermined housing density. To reduce the transaction costs associated with buyers and sellers locating each other, New Jersey established a TDR exchange. This exchange serves as the catalyst for transactions between willing buyers and sellers, and determines the market price of TDRs.⁵²

Other TDR programs have been authorized by state statute in twenty-two states, including six in the west. Kansas and Washington have passed legislation that approves the use of TDRs for the purpose of general zoning. In Idaho, TDRs are used to protect "designated historic properties." Hawaii has approved use of TDRs for the "protection,

⁵¹ Miller *supra* note 13, 459-516; A. Levinson, Why Oppose TDRs?: Transferable developmental rights can increase overall development, 27 *Regional Science and Urban Economics* 283, 283-296 (1997).

⁵² R. Stewart, Models for Environmental Regulation: Central Planning Versus Market-Based Approaches, 19 *Boston College Environmental Affairs Law Review* 547, 547-562; D. Clark and D. Downes, What Price Biodiversity? Economic Incentives and Biodiversity Conservation in the United States, 11 *Journal of Environmental Law and Litigation* 9, 9-89 (1996); A. Benjamin and C. Weiss Jr., Economic and Market Incentives as Instruments of Environmental Policy in Brazil and the United States, 32 *Texas International Law Journal* 67, 67-95 (1988).

enhancement, preservation, and use of historic properties and burial sites.” Arizona TDRs are used to protect the “public health, safety, and general welfare” of its citizens.

Colorado’s TDR programs are to be used for the protection of species, species habitat, agricultural and ranching lands, and open spaces.⁵³

2.5. Conservation Banking

Developers undertaking a new project are often required to mitigate the adverse effects of their activities, which can be onsite or the developer can purchase development credits to satisfy the regulation on land use. Development credits can be purchased as needed or the developer can purchase excess credits and bank them to fulfill mitigation requirements of future projects. Developers purchase these credits from private or publicly owned conservation banks, which determine the prices of the credits based on demand and supply. The developer purchases credits if and only if the cost of mitigation through credit purchase is less than the costs of alternative approaches to mitigation, such as onsite mitigation or establishing a separate conservation bank. If profits are to be made by bank owners, other conservation bank owners will be attracted into the market, and market competition will lower the price of the credits.⁵⁴

The amount of credits that a conservation bank, also called a mitigation bank, can sell depends upon the quality and type of habitat, and the number of a specific endangered species supported on a specific parcel of land. Bank owners can increase the number of credits at their disposal by engaging in land management activities that increase either the quality of habitat or the ability of the land to protect endangered

⁵³ Miller *supra* note 13, at 459-516.

⁵⁴ For example California Resources Agency, A Catalog of Conservation Banks in California (1995), www.ceres.ca.gov/; California Resources Agency, Private Land Programs and Incentives (1999), www.dfg.ca.gov/.

species or both. For example in Georgia, the Southlands Mitigation Bank, owned by the International Paper Company (IP), is ideal habitat for the red-cockaded woodpecker (RCW). These woodpeckers build nests in pine trees at least a hundred years old and require stands at least thirty years old for the purpose of foraging, of which IP owns 16,000 acres in the Southlands Forest region. In conjunction with the Environmental Defense, International Paper developed an HCP covering 5,300 of the available 16,000 acres. The HCP established a baseline of two pairs of RCWs, and the HCP had a land management plan to meet a goal of increasing the population of RCWs to thirty pairs through techniques such as prescribed fire, creating new or restoring existing nesting cavities, and relocating young RCWs to the region. As each new pair of RCWs is established in the HCP area, International Paper obtains a permit to offset an incidental take on its own property or it can sell the credit to a third party within a specified region and approved by the FWS.⁵⁵

Credits can also be determined according to a particular type and quantity of habitat. The San Vicente Conservation Bank, for example, is a 320-acre parcel in San Diego County, CA. The land cover is primarily coastal sage scrub and southern mixed chaparral, and hosts the California gnatcatcher, listed as a threatened species under the ESA. The habitat is good quality and requires little in the way of management and maintenance. The San Vicente Conservation Bank was approved by the California Department of Fish and Game (CDFG) and the USFWS, and was issued 320 credits.

⁵⁵ Environmental Defense, *Mitigation Banking as an Endangered Species Conservation Tool* (1999), <http://www.edf.org/> [hereinafter EDF].

These credits can be sold to landowners within San Diego County for multi-species mitigation needs and other endangered and threatened species.⁵⁶

The Manchester Avenue Conservation Bank (MACB) is a similar reserve also located in San Diego County, CA, and serves as a corridor for the El Cajon open space. The southern maritime chaparral, a unique habitat, is found on the MACB, which because of its rarity, the MACB was able to negotiate for credits of one-acre for 1.8-credits as compared to the standard ratio of one-acre for one-credit. The MACB is owned by a private enterprise that has used many credits to offset its own development, and has sold the remainder to other developers in the region.⁵⁷ Owners of banks can be developers, environmental entrepreneurs, nonprofit organizations, or government agencies.⁵⁸ Credits can be sold to developers to offset mitigation requirements, used to offset the bank owners' own mitigation requirements, banked for future requirements, and sold to individuals or organizations that wish to retire the credits thereby reducing development.

Conservation banking with the ESA is a relatively recent development, beginning in the mid-1990s. The banking scheme closely follows the earlier program of wetlands mitigation banking, which has been used since the 1980s. Until 1995, wetland banks were primarily owned by state highway departments, and were established to provide credits to mitigate for adverse effects to wetlands as regulated by the Clean Water Act (CWA). In 1995, the Environmental Protection Agency (EPA) and Army Corps of Engineers established guidelines to create and manage wetlands mitigation banks. These wetland banks are designed to provide private landowners certainty regarding assessing land,

⁵⁶ Id. at 55.

⁵⁷ Id. at 55.

⁵⁸ EDF supra note 55; J. Baden and P. Geddes, Environmental Entrepreneurs: Keys to Achieving Wilderness Conservation Goals, 76 Denver University Law Review 519, 519-534 (1999).

earning and selling credits, and defining the present and future obligations and requirements that a bank owner faces. With these guidelines in place, landowners can predict the costs of their present and future regulatory obligations, which decrease the risk to the landowner of investing in a wetlands mitigation bank, and results in landowners supplying conservation.⁵⁹

In 1995, California used conservation banking towards preserving habitat critical to reduce the risks to endangered species. By 1998, forty-three conservation banks were established. Based on their experience, California instituted a plan based on 14 principles for successful implementation of a conservation bank. These principles are:

- In determining mitigation requirements, priority should be placed on protecting the habitat and species in the long run. This is best accomplished off-site and in conjunction with a conservation bank.
- Banks must be established with a legal and enforceable contract or permit.
- A conservation bank can be of any size as long as it is large enough to support an ecosystem approach to conservation. The one exception is when a parcel is one of several parts of a contiguous larger bank reasonably certain to be completed.
- Fee title sale or a conservation easement insuring the land is preserved in perpetuity should be recorded on the title of the land in coordination with the first credit sold.
- Prior to the authorization of a conservation bank, a bank proposal must be approved. For approval the bank proposal must include the assignment of a bank manager, a description of the banks boundaries and the area for which the credits can be used to offset development, management and maintenance requirements including provisions

⁵⁹ See EDF supra note 33.

for how those requirements will be achieved, and the determination of annual reporting responsibilities.

- A plan that details the resources found within the bank, how those resources are to be managed, and how such management is to be funded is required prior to the sale of the first credit.
- An agency should be designated for the long-term management of the bank.
- A plan should detail the steps to be taken in the event of unsatisfactory performance by the bank owner. These steps should ensure the long-term protection of the bank.
- Monitoring and reporting of management activities centered upon listed species and their habitats should be provided.
- Agencies responsible for ensuring compliance should be granted an easement for the right of entry to monitor the agreement.
- Bank credits should be determined in accordance with the initial, or baseline condition. Given the baseline, credits can be earned by preserving the land, enhancing the quality or quantity of a habitat or species on the land, restoring the land to its original condition, or by creating habitat suitable for species preservation where such habitat did not exist prior.
- The number of bank credits awarded to a bank owner is determined on a case-by-case basis, and negotiations are between bank owner and the appropriate regulatory agencies.
- A transaction for credits between a bank owner in one region and a developer in another region (out-of-kind mitigation) may be approved on a case-by-case basis.

- Listing of conservation banks with the California Resource Agency is required to maintain an inventory of banks throughout the state.

This CA process serves two primary purposes—to increase the certainty about present and future obligations of the bank owner; and to ensure that conservation efforts meet the goals of the regulatory agency. The process reduces a regulator’s monitoring and enforcement costs by requiring the bank to submit both an annual report and a contingency plan for bank failure, and by specifying the regulatory agency’s rights to enter the property.

Unlike impact fees, conservation banking compensates landowners for the provision of a public good, and does so by allowing the market to determine the magnitude of the compensation. Conservation banking differs from TDRs because TDRs are an ex-ante approach, in which the proportion of land to be developed is determined before development. In contrast, conservation banking is an ex-post mechanism, in which landowners establish conservation banks in response to developmental pressures. As development increases, the need to purchase credits increases, and the supply of credits should increase to meet the higher priced demand. The regulator can determine the quantity of land to be conserved by controlling the ratio of credits the developer must purchase to offset the development at the time of development, which gives the regulator flexibility to meet its conservation goals.

2.6. Fee Simple Acquisition

Fee simple acquisition is the purchase of land, with all of its inherent property rights. Landowners voluntarily enter into an agreement to sell their land, typically at its fair market value. Local governments often purchase land for public goods such as

playgrounds, nature trails, and other park lands.⁶⁰ Sellers are generally private individuals or organizations; land trusts and other nonprofit organizations do purchase land and then sell or transfer the land to government agencies.⁶¹

One example of a transfer acquisition is Snake Creek Canyon, located on the east side of the Wasatch Mountains, UT. A local ski resort planned to develop the area. Instead, the ski area sold the land to the Nature Conservancy, acting in the interests of several municipalities, a private industry, citizen groups, and a state agency. This group agreed to reimburse the Nature Conservancy for the initial funds to purchase the land. The land has had its development rights severed. The land trust Utah Open Lands holds the conservation easement; the Utah State Division of Parks has taken on the management of the property. This acquisition demonstrates how agencies and organizations can work together to accomplish land use goals.⁶²

Another example of cooperation between government agencies and nonprofit organizations is the California Coastal Conservancy (CCC). The CCC offers a wide array of programs to protect the California coastline and the valuable resources that are found there. Since its inception in 1976, the CCC has helped protect nearly 33,000 acres of wetlands, sand dunes, and farmlands by working with nonprofit land conservation organizations through the Nonprofit Organizations Assistance Program (NOAP). NOAP provides funding to nonprofit organizations for the purpose of acquiring land or interests

⁶⁰ See Boyd *supra* note 46; see also UCLCC *supra* note 14.

⁶¹ Land Trust Alliance, Summary of Data from the 1998 National Land Trust Census (1998), lta.org/consopt.html [hereinafter LTA].

⁶² See UCLCC *supra* note 14.

in land that satisfy CCC objectives, while the ownership and costs of managing the land fall on the shoulders of the nonprofit organization.⁶³

An example is the cooperative effort of the CCC and the Mendocino Land Trust (MLT), which purchased two tracts of land bordering the ocean. The first tract, a 74-acre beach property located in Caspar, California, has a stream that serves as spawning ground for the endangered coho salmon.⁶⁴ The second tract is Navaro Point, a 55-acre expanse of coast and open headlands. The purchase price for the two properties was \$2.9 million, the long-term management of the Navaro Point property is estimated to cost \$300,000; the Caspar Beach property, which allows for public access, has estimated annual maintenance costs of \$12,000. MLT is currently raising money for the management of Navaro Point and working out an agreement to transfer ownership and maintenance of the Caspar property to the California States Park Department.⁶⁵

Land trusts and other nonprofit organizations use fee simple acquisition as a tool to protect land in ecologically sensitive regions, especially focusing on land threatened by urban sprawl. Land trusts originated over one hundred years ago in Massachusetts in 1891. Local citizens sought to protect their landscape from development. Over the last century, land trusts have been used to protect lands ranging from wetlands to ranches, from shorelines to farms, virtually all land valued as open space.⁶⁶ Land trusts have

⁶³ California Coastal Conservancy, About the Coastal Conservancy and Coastal Conservancy Programs (2000), <http://www.coastalconservancy.ca.gov>.

⁶⁴ California Department of Fish and Game, California Code Of Regulations, Title 14, Section 670.5, State and Federally Listed Endangered and Threatened Animals of California (2000), <http://ceres.ca.gov/CRA> [hereinafter CDFG].

⁶⁵ Land Trust Alliance, "Land Trust Success Stories - Pacific Region (2000), lta.org/s_pacific.html [hereinafter LTAA].

⁶⁶ Land Trust Alliance, Land Trusts: The Front Guards of Land Protection (2000), lta.org/whatlt.html [hereinafter LTAb]; Julie Ann Gustanski, Protecting the Land: Conservation Easements, Voluntary Actions, and Private Lands in Protecting the Land: Conservation Easements Past, Present, and Future 9, 9-25 (J. Gustanski and R. Squires ed., 2000).

increased from 53 in 1950 to over 1,200 today, covering all fifty states.⁶⁷

Land trusts acquire land by fee-simple acquisition, donation of land with all property rights intact, and purchased development rights (PDR) and donated easements.⁶⁸ Purchasing the land or obtaining the land in its entirety through donation gives the land trust more control over land uses. The price of this control is the costs to manage the land, which often require significant staff and resources. Land trusts try to reduce management costs by serving as a broker or middleman between the landowner and a larger trust or government agency. Land trusts also avoid management costs by acquiring a conservation easement, purchased development rights (PDR) or donated, which allows the landowner to remain on the land and maintain the land according to the terms of the easement. The land trust is still responsible for monitoring and enforcing the terms of the easement.

While enforcement costs have been relatively low to date, land trusts expect them to escalate as easement-encumbered land passes from the initial landowner to subsequent landowners. Trusts set aside funds now to enforce easements in the future. More than 90 percent of easement-encumbered land remains with the landowner who signed the contract.⁶⁹

Currently in the western US, about 250 land trusts exist to protect over a million acres. Land previously held in private ownership is now solely owned by land trusts or in joint ownership between private landowners and land trusts.⁷⁰ Every western state has at least one land trust, in which the number is correlated with the pressure to develop. For

⁶⁷ See LTA *supra* note 66; Nijhuis, Michelle, Acre by Acre: Can land trusts save the West's disappearing open space?, 32 High Country News, February 28, 2000.

⁶⁸ Michelle Nijhuis, A land-trust toolbox, 32 High Country News, February 28, 2000.

⁶⁹ see Nijhuis *supra* note 67.

⁷⁰ see Nijhuis *supra* note 67.

example, in 1998, California had 119 land trusts protecting 536,922 acres, and Texas protected 11,531 acres with 20 land trusts.⁷¹

A recent trend is the move to more specialization and smaller land trusts. These smaller trusts have clearer ties to the local community, and are finding they can best use their resources by working with landowners, by arbitraging the land or by facilitating trades. Smaller land trusts have fewer resources and are less able to acquire easements and monitor and enforce agreements.

2.7. Conservation Easement

Ownership of land provides the landowner certain rights regarding how the land can be used, which include the right to exclude others from using the land, the right to develop the land, the right to produce commodities, and the right to employ other legal rent-seeking activities. A conventional easement is a legal instrument that serves to separate specific rights in the land and transfer those rights from the landowner to another entity.⁷² A conservation easement serves the same purpose, except that species and habitat protection is the explicit goal.

A conventional easement is generally negotiated between adjacent landowners where both landowners benefit from the agreement. Coase depicted the concept of an easement in his seminal article The Problems of Social Cost.⁷³ Coase addressed how bargaining rather than government taxation could remove the social cost caused by a rancher's cattle trampling a neighbor's crops on their way to a watering hole. Coase argued that the rancher and the farmer could both increase their well-being, assuming the

⁷¹ see Gustanski supra note 66, 19-20.

⁷² See Wiebe supra note 43.

⁷³ Ronald Coase, The Problem of Social Cost in Economics of the Environment: Selected Readings 109, 109-138 (R. Dorfman and N. Dorfman ed., 1993).

farmer holds the property rights and transaction costs are low. If the farmer would accept a payment from the rancher in exchange for the right—the easement—for the rancher’s cattle to cross the farmer’s land.

Conventional easements are typically affirmative and appurtenant. Affirmative means that the easement holder is given the right to conduct specified activities, such as a right-of-way. Appurtenant means that the benefits provided by the easement belong to and are typically realized only by the easement holder.⁷⁴ Such easements have been used to transfer partial interests in land for thousands of years.

Like conventional easements, a conservation easement severs some of the interests in the land and transfers those interests to another party. In contrast to a conventional easement, a conservation easement tends to be negative and in gross. Here negative means that rather than allowing the holder of the easement to engage in specified activities, the holder of the easement can restrict the landowner from engaging in specified activities; in gross means that the easement holder can be someone other than an adjacent landowner. A conservation easement prohibits the landowner from specified uses on his or her land.⁷⁵

Conservation easements are voluntary contracts between a landowner and the government agency or nonprofit organization, in which contracts are negotiated on a property-by-property basis and can be tailored to satisfy individual landowner requirements while maintaining conservation objectives. These contracts typically include a description of the conservation goals for the property, an initial appraisal of the land, acceptable land uses and restrictions on land uses, the landowner’s management

⁷⁴ See Wiebe supra note 43.

⁷⁵ See Wiebe supra note 43.

responsibilities, the conservator's right to access the land, proof of unencumbered ownership, legal requirements in the event of a contract breach, provisions regarding present and future liabilities, and the landowner's requirement of notification when the property is sold.⁷⁶ Contracts also specify duration of the easement as well as compensation to the landowner.

To illustrate, consider a rancher whose land borders Yellowstone Park in Montana and offers excellent habitat for the grizzly bear, a species listed as threatened by the FWS. Suppose this rancher is approached by a nonprofit conservation organization (in Montana, only state and federal agencies or nonprofit organizations that are qualified by the IRS are allowed to own a conservation easement), and the terms of a conservation easement are negotiated. A contract between the rancher and the nonprofit organization is created, in which the rancher agrees to refrain from developing any portion of his land, and further agrees to limit or discontinue grazing on portions of the land deemed to be valuable and sensitive to grazing. In return, the rancher receives payment for his conservation efforts. The land conserved increases the recovery likelihood and, it is hoped, the eventual delisting of the grizzly bear. The conservation easement provides society benefits from the conservation of the land. Possession of the development rights does not give the holder the right to develop the land; in contrast it gives the holder the right to, and the obligation of, restricting development of the land.

In general, conservation easements are classified into two broad categories—purchased development rights (PDR) easement and donated easements. The type of sellers, the type of buyers, the mode of compensation, and the duration of the contract characterize the difference between the two easements. A PDR easement is typically

⁷⁶ See Boyd supra note 46.

entered into by profit-maximizing landowners who require full compensation for their forgone opportunity, the land's development value. The purchaser of a PDR easement is often a government agency, which generally has a larger coffer than most nonprofit organizations and is better able to finance the purchase of the easement. The payment for a PDR easement is typically a one-time lump sum payment and PDR easements can be purchased for limited time periods or in perpetuity.

The donated easement is based on a tax incentive, which typically appeals to landowners who value the preservation of land and are willing to be compensated at less than fair market value for the easement. Federal tax law requires that land must be donated to a nonprofit conservation organization and donated in perpetuity to qualify for tax incentives.⁷⁷ Tax incentives can take the form of a deduction in income taxes, a reduction in the base value for estate or gift taxes, and, if the conservation easement meets certain requirements, an additional reduction in the estate tax base. Consider each type of easement in turn.

2.7.1. PDR Easements

A PDR easement is a conservation mechanism in which the landowner sells the conservation-incompatible uses of the land for a specified period of time for a cash payment, usually at the fair market value of the easement—the difference between the easement-free value and the easement-encumbered value of the property. Determining just compensation is complicated because no easement market exists (that is no comparables), and the value of the land unencumbered is uncertain and likely to change as the developmental pressure it faces changes.⁷⁸

⁷⁷ Stephen Small, *Preserving Family Lands: Book 1, Essential Tax Strategies for the Landowner* i-117 (1998). See Wiebe *supra* note 43, 12.

⁷⁸ See Boyd *supra* note 46; See also Weibe *supra* note 43.

2.7.2. Donated Easements

The US Internal Revenue Service (IRS) offers tax incentives to landowners who donate in perpetuity the development interests in their land for conservation purposes to a qualified nonprofit organization or government agency. The IRS requires the donated easement be for land that provides society with a valued public good and the recipient must be pre-approved by the IRS as tax-exempt and eligible to receive donations used for tax considerations.

Qualifying lands must satisfy one of the following conservation purposes: The conserved land must (1) provide education or outdoor recreation to society; (2) provide protection to species by conserving their natural habitat or ecosystem; (3) provide society a scenic vista by preserving open spaces; or (4) provide for the protection of historically significant lands and buildings. Easements are donated to an organization established for conservation purposes, which can monitor and enforce the terms of the easement, and can only be resold or transferred to a similar agency.⁷⁹

Landowners may receive relief from income tax, gift tax, and estate tax by donating a conservation easement. The deductions provided by a conservation easement to the heirs of an estate are two fold. First, the value of the estate is reduced by the fair market value of the easement. Second, the tax base of the estate may qualify for an additional 40 percent reduction in value up to the exclusion limit, when the land has significant conservation value such that the easement reduces the value of the land by at least thirty percent and the percentage reduction decreases as the value of the easement

⁷⁹ (IRS Pub. 561, 2000; Hunt, 1994) Internal Revenue Service, Pub. No. 561, Determining the Value of Donated Property (2000); Dave Hunt, Wyoming Game and Fish Habitat Extension Bulletin No. 14, Conservation Easements and Donations for Tax Deductions (1994).

decreases in proportion to the total value of the land. The exclusion limit for deaths occurring in the year 2000 is \$300,000 and increases to \$500,000 for the year 2002 and thereafter. To qualify for the additional tax deduction for high conservation value the land must satisfy certain ownership requirements and must be within twenty-five miles of an Office of Management and Budget designated metropolitan statistical area or a federal wilderness area or lie within ten miles of an Urban National Forest.⁸⁰ Of course, the ongoing debate in Congress over taxes policy could change these conditions over the next few years.

These two incentives can be the difference between an estate being maintained in one contiguous area or being broken up and sold to meet estate tax liability. Estates that are valued less than \$675,000 have an estate tax liability of zero. For example, suppose an estate is valued at \$1,500,000, and a landowner or heir donates a conservation easement, to a qualified nonprofit organization, which is valued at \$500,000. The estate also benefits from a \$400,000 deduction due to the high conservation quality of the land. The estate tax would be levied on an estate valued at \$600,000, and the heirs would escape any estate tax liability as a result of the donation.⁸¹

Donated easements may also reduce landowners' income tax liability. A landowner who donates a conservation easement to a qualified agency can deduct the entire value of the easement from his income tax provided it does not exceed 30 percent of his adjusted gross income. If the easement value exceeds this 30 percent threshold, the

⁸⁰ Interanl Revenue Service, P.L. 105-34, The 1997 Tax Payer Relief Act, amended by the Internal Revenue Service Reform Act of 1998; Stephen Small, An Obscure Tax Code Provision Takes Private Land Protection into the Twenty-First Century in *Protecting the Land: Conservation Easements Past, Present, and Future* 55, 55-66 (Julie Ann Gustanski and Roderick Squires ed., 2000).

⁸¹ See Small supra note 77; see also Land Trust Alliance, American Farm and Ranch Protection Act (2000), lta.org/tax97.html [hereinafter LTAc].

landowner can deduct 30 percent of his adjusted gross income for up to six years or until he has exhausted the easement value. The value of the easement is measured as the difference in the land's value with and without the easement.⁸²

3. Incentive Mechanisms: Compare and Contrast

A US Senator once said in private conversation that “if we pay landowners to grow endangered species, we will have more than we know what to do with.” The question is how to do this in the most cost-effective manner such that biological needs are met, landowner concerns are addressed, and government budgets are solvent. In this section we evaluate each economic incentives based on three broad criteria: 1) biological-land targets; 2) landowner interests; and 3) government or regulatory concerns. The incentive mechanisms are rated on a five-point scale—very high, high, medium, low, or very low, according to how well the incentive mechanism satisfies each criterion. Table 1 summarizes our discussion of the mechanisms and criteria.

3.1. Biological-Needs

We consider three policy-orientated biological-needs aimed at retiring and enhancing habitat on private property that shelters endangered species; first is the ability for a mechanism to target specific characteristics of the land—whether it be creating one large preserve with minimal edge, preserving a specific type of vegetation or key species, or preserving several small preserves for meta-population management; second, the likely permanence of the protected habitat; and third, the ability of the mechanism to implement active habitat management techniques. We follow Terborgh's observation that “logic calls for a strategy that minimizes extinctions, and this is best accomplished with large

⁸² Internal Revenue Service, Pub. No. 526, Charitable Contributions (1998).

preserves.”⁸³ Biologists seem to agree with the view that habitat requirements are species specific, and species that are more land sensitive need larger habitat remnants for survival.⁸⁴ Fragmentation increases the risk to species when it alters the microclimate of the habitat and when each fragment remains isolated. We make the presumption that biologists have identified and targeted the private land most suitable to guarantee the safe minimum standard, or maximum viable population, or minimum acceptable probability of survival. We then use the likelihood of satisfying species-specific habitat requirements, which is accomplished through targeting specific land characteristics, compelling landowners to undertake active habitat management, and the probability the habitat reserve is retired and protected permanently as the proxies for the basic biology at work behind these land use decisions.

3.1.1. Odds of Targeting Habitat Characteristics: Species Specific Requirements

Most scientists agree that habitat requirements are species specific, and species that are more land sensitive need larger habitat remnants for survival.⁸⁵ Unfortunately, for most listed species, habitat destruction has reduced the amount of remaining habitat to a level below that necessary for the species survival. In most cases, the remaining habitat is fragmented in several smaller reserves. And although some species thrive on the edges between habitats, biologists believe most endangered species do not. New evidence has

⁸³ John Terborgh, Island Biogeography and Conservation: Strategy and Limitations, 193 *Science* 1029, 1029-1030 (1976).

⁸⁴ See for example Denis Saunders, Richard Hobbs and Chris Margules, Biological Consequences of Ecosystem Fragmentation: A Review, 5 *Conservation Biology* 18, 18-32 (1991) [hereinafter Saunders].

⁸⁵ See Saunders *supra* note 84; E. Willis, Conservation, Subdivision of Reserves, and the Anti-dismemberment Hypothesis, 42 *OIKOS* 396, 396-398 (1984); M. Gilpin and J. Diamond, Subdivision of Nature Reserves and the Maintenance of Species Diversity, 285 *Nature* 567, 567-568 (1980); R. Whitcomb, J. Lynch, P. Opler, and C. Robbins, Island Biogeography and Conservation: Strategy and Limitations, 193 *Science* 1030, 1030-1032 (1976); A. Higgs and M. Usher, Should Nature Reserves be Large or Small, 285 *Nature* 568, 568-569 (1980).

overtaken the Leopold "law of interspersions"—more edge, more population density—with the proposition that edge effects cause extinction.⁸⁶ Edge effects arise from nest parasitism and the penetration of light and wind into the habitat. Species move away from the edge and further into a forest causing a reduction in total area and lower population persistence.⁸⁷

For other endangered and threatened species a large threat to survival is disease. For example, the black-footed ferret is affected by canine distemper and sylvatic plague, among other diseases. The black-tailed prairie dog, the primary diet of the black-footed ferret is also susceptible to canine distemper. If infected by these diseases, an entire colony can be wiped out.⁸⁸ For species of this type, which are sensitive to disease, the biological goal would include preserving several isolated populations as well as meeting a minimum population size or habitat core area. Management of several meta populations would be necessary to meet some minimum probability of survival because as the number of individual populations is reduced, the probability of an epidemic wiping out the species is increased.

Another biological concern that needs to be addressed when planning and designing habitat reserves is preserving land that possess key habitat characteristics that the listed species need for survival. For example, the red cockaded woodpecker requires roughly 100 acres of open pine stands for foraging and roosting. For foraging, pines need to be at least 30 years old, while roosting cavities are typically dug into older pines (over 60

⁸⁶ Aldo Leopold, *Game Management* (1933). L. Mills, Edge effects and isolation: red-backed voles on forest remnants, 9 *Conservation Biology* 395, 395-403 (1995).

⁸⁷ For example P. Vickrey, M. Hunter Jr., and M. Scott, Effects of Habitat Area on the Distribution of Grassland Birds in Maine, 8 *Conservation Biology* 1087, 1087-1097 (1994).

⁸⁸ Black-footed Ferret Recovery Implementation Team, *Black-Footed Ferret: Ferret Facts* (2002), <http://www.blackfootedferret.org/> [hereinafter BFFRIT].

years) that are infected by red-heart disease.⁸⁹ A second example, the black-footed ferret primarily preys on prairie dogs, and requires habitat that provides for its dietary needs.⁹⁰ Each species has its own set of habitat and dietary needs, which must be considered in conjunction with the minimal size of the habitat reserve, when designing mechanisms for protecting species.

An effective conservation strategy needs to address these biological needs, and in doing so should view the landscape as a whole. Targeting species-specific habitat requirements and coordinating landowner conservation efforts to create larger preserves, for most listed species, increases the species probability of survival. Coordinating conservation across landowners, so that two or more fragmented habitats of insufficient size are connected to make one large reserve, may also have the added benefit that in meeting the ESA objective of conserving imperiled species “to the extent practicable”, less total acres are required. By coordinating conservation into larger reserves, especially if the edge to core ratio is minimized, the minimum acceptable probability of survival for a listed species are met with fewer total acres than if conservation is fragmented.

Zoning, TDR, and conservation banks have a very high potential for targeting species-specific habitat needs and coordinating conservation into larger habitat reserves. The regulator, when employing either a zoning or TDR policy, restricts the land desired for conservation from being used for any purpose other than conservation. The regulator can target specific land and land attributes, which include the edge to core ratio of the habitat reserve.

⁸⁹ See USFWS *supra* note 12.

⁹⁰ See BFFRIT *supra* note 88.

Unlike the command and control approaches of zoning and TDR, conservation banking is effective at preserving specific land attributes and at creating one single large habitat reserve because the bank owner is presented with incentives to create the most effective conservation reserve. The number of credits the conservation bank owner can earn per acre is dependent on the quality of the habitat of the conservation bank, the rarity of the species, and the number of listed species that the bank can support. To maximize the number of credits available for sale, the bank owner has an incentive to create a conservation bank which meets the species specific needs best by creating one large contiguous habitat area, employing habitat management techniques like prescribed burnings, or by locating new conservation banks next to existing habitat.⁹¹

Subsidies, fee simple acquisition, and PDR easements are all voluntary incentive mechanisms and as a result the regulators ability to target specific land for conservation is reduced. Some landowners may not want to participate in the program at any price, while other landowners may value their land at a higher price than the regulator is willing to pay. Landowners unwilling to participate may limit the effectiveness of these policy instruments at designing one large habitat reserve.

The benefit of a subsidy program, though limited by the number of willing participants, is the program can be designed to protect specific attributes of the environment. In general, the process to participate in the program includes an application, conservation plan, and an initial and final inspection. For many subsidy programs, landowners are not paid until the final inspection has been conducted and approved, providing the government agency considerable project discretion and oversight.

⁹¹ County of San Diego, Multiple Species Conservation Plan (2000), www.co.san-diego.ca.us/cnty [hereinafter CSD]; EDF supra note 55.

Government agencies are able to choose the projects that satisfy some pre-designed evaluation process, and pick those projects that meet the goals of the program at least cost, examples being the two-stage technical evaluation process employed by the SRFB and the CRPs Environmental Benefits Index.⁹²

The regulator has the least control over the land set aside for habitat protection when a donated easement or impact fee policy is used. When an Impact fee policy is used, the land that remains undeveloped (or conserved) is the land with a development value less than the impact fee. It is unlikely that the conserved land is the land with the highest quality habitat or that the configuration of the habitat reserve would be such that edge effects are minimized.

The problem with donated easements is that they only appeal to landowners that have a high conservation value because typically landowners are not fully compensated for the lost land productivity. Although it is possible that all landowners that find donated easements appealing live in the same area, and their properties border each other in a manner that creates the largest possible core, it is unlikely. The case more likely to occur with donated easements is that habitat reserves might remain fragmented.

3.1.2. Permanency

Land worth conserving today because of the biodiversity benefits the land provides for a species protection is likely to be land worth preserving indefinitely. This concept holds if the regulator is seeking to meet the ESA objective at least cost—where the minimum acceptable probability of survival is just satisfied. A loss of a relatively small portion of the conserved land could send a delisted species back to an imperiled

⁹² See FSA *supra* note 42; see also SRFB 18 *supra* note 28.

status. Three potential pitfalls for permanency in conservation are: 1) short term contracts, because successive negotiations may not be successful; 2) oversight and future land uses are subject to political whims; and 3) contracts are subject to conflict, future litigation, and possible reductions in conservation requirements.

A mechanism does best at avoiding conflict under three conditions: 1) when agreements are mutually beneficial to all participating parties; 2) when contracts are of shorter duration; and 3) the number of participating parties is kept relatively small. Intuitively, the smaller the number of participants involved in the agreement the more likely agreements are mutually beneficial. Furthermore, shorter contracts reduce the number of participating parties by decreasing the probability of land being transferred to another party.

The incentive mechanism best able to guarantee the land stays in conservation in perpetuity is conservation banking. Conservation banks, prior to approval by the regulator and the sell of the first bankable credit, are required to establish a conservator for the bank, fund the management and maintenance of the bank in perpetuity, and if the conservation bank falls short of its conservation goal, the banking instrument specifies the corrective actions that are to be taken.

PDR easements, donated easements, and TDRs with zoning are designed to conserve land in perpetuity but may be shrouded in uncertainty. A TDR with zoning may be susceptible to political pressure, especially if zoning is the only method to ensure development does not occur in sending zones. Since zoning is not a permanent feature of land, the zoned uses can change when political power changes. Some TDR programs require that landowners place a conservation easement on the title of the land,

permanently severing the rights to develop it.⁹³

Conservation easements are not a cure all, however. The easement contract specifies conservation requirements to be forever. But easements are susceptible to subsequent landowners scrutinizing the easement in search of loopholes by which to increase personal returns to the land. The agreements may have to be re-negotiated or the conservator may have to force the landowner to comply by taking legal actions. It is likely the landowners' gain more flexibility in using their land and conservation commitments is reduced as a result. Over time conservation commitments may be reduced sufficiently to render the conservation commitment insufficient to achieve its initial goal, much the same as if the land had been developed completely.

Fee simple acquisition and zoning are less likely to conserve land permanently than easements. These two mechanisms ability to conserve land in perpetuity depends on whether the goals of the government remain constant across time. If the objectives of the government change and species protection becomes less important, the land could be reassigned to other uses or sold to fund other government projects. Fee simple acquisition and zoning are subject to lobbying by special interest groups, interests groups that may represent a relatively small portion of society. If the interest groups are successful in influencing the governments' objectives, it is likely that the costs to society outweigh the benefits to the select few that the interest group represents.⁹⁴

The least effective at preserving land in perpetuity is subsidies and impact fees. Impact fees because in and of themselves they do not restrict land to conservation, only

⁹³ See Tripp and Dudek *supra* note 49.

⁹⁴ Miller *supra* note 13, at 459-516; J. Kayden, Market-Based Regulatory Approaches: A Comparative Discussion of Environmental and Land Use Techniques in the United States, 19 B.C. Environmental Affairs Law Review 565, 565-580 (1992).

keep it from being developed. Subsidies because they are generally paid on an annual basis and landowners have the opportunity to develop their land without repercussion every year. Also, funding the subsidy may prove to be problematic. If the necessary funding is not available, landowners may revert to developing their land.

3.1.3. Implement Active Habitat Management

The ESA prohibits landowners from undertaking activities that harm listed species either directly or indirectly through habitat modification. The ACT does not require landowners to improve the quality of the species habitat on their land. The ACT only serves to conserve habitat. But for many species, simply deterring productive uses of the land is not enough to ensure that a minimum acceptable probability of survival will be met. Species often require landowners to restore or create habitat, or implement active management practices, such as prescribed burnings, alien species control, reduced use of the land for grazing or reduced use of pesticides on the conserved land to maintain habitat suitable for the species recovery. For example, the leading threats to the California red-legged frog are fragmentation of habitat, degradation of water quality, and the introduction of an alien species, the bullfrog. The recovery plan for the California red-legged frog calls for the restoration and creation of habitat as well as controlling the threat posed by the bullfrog. A second example, the Black-capped Vireo requires an open brushy area of young small trees and shrubs for its habitat. In the absence of natural fires, landowners must maintain suitable habitat for the Black-capped Vireo through prescribed burnings. In a study of 305 listed species, better than sixty percent required active habitat management or habitat restoration.⁹⁵

⁹⁵ See EDF supra note 33.

Active habitat management techniques are incorporated in an incentive mechanism best when participation is voluntary, each contractual agreement can be negotiated independently, contracts are of short duration, and assurances are included in the agreement. Voluntary participation insures that the landowner is being fully compensated for the habitat management requirements set forth in the agreement. Negotiating contractual agreements allows the contract to be tailored to each individual landowner and to each specific species. Negotiations allow greater flexibility in designing an incentive package that satisfies both landowner and species-specific needs. Shorter contracts necessitate frequent renegotiations, which subsequently permit the provisions of the contract to be altered to meet changing landowner and species needs. Furthermore, the regulator can monitor the landowner's compliance to previous agreements prior to negotiating new agreements. Assurances provide legal remedies in the event the landowner does not fulfill the agreement. Assurances can require the landowner to set-aside funding sufficient to insure the long-term active management of habitat.

The biggest deterrent to active habitat management is involuntary participation. Involuntary participation is the current approach to endangered species protection and does not provide landowners with any incentives to manage the habitat on their land in the species interest. In contrast, the landowner faces incentives to destroy the species and its habitat to avoid the costs of protecting species. The second deterrent is long-term contracts because the longer the elapsed time between the present and the initiation of the management agreement, the greater the likelihood that the landowner, or a subsequent landowner, violates the agreement in an attempt to increase economic rents. Active

habitat management is costly so landowner's can increase their economic rents by violating the agreement.

The mechanisms that have a very high potential for implementing active habitat management are subsidies, conservation banking, and fee simple acquisition. Subsidies are voluntary short-term contracts, which are typically negotiated between the landowner and the regulator. Subsidies can be tailored to a specific species and to each individual landowner. Because subsidies are short-term contracts, the regulator can ensure that the landowner has fulfilled the habitat management requirements prior to renewing the subsidy.

Conservation Banks are also voluntary and negotiated on a case-by-case basis. The number of credits a conservation bank earns for resell depends partly upon the quality of the habitat.⁹⁶ Conservation bank owners are required to maintain the habitat in perpetuity. To assure that the conservation bank owners fulfill the terms of their contract, the banking agreement requires financial assurances are set-aside to pay for the management of the habitat in perpetuity. Financial assurances can counter the negative effect of long-term contracts.

A fee simple acquisition mechanism purchases the land outright placing ownership and responsibility of managing the land on the government. Implementing habitat management is straightforward and requires the appropriate government agency be notified of the management requirements.

Easements, both PDR and donated, are voluntary long-term contracts negotiated between the landowner and the regulator. In evaluating the ability of the mechanism to implement active habitat management easements are similar to subsidies except that

⁹⁶ See CRA *supra* note 54.

easements are long-term contracts. Unlike conservation banking, easements do not have built in assurances to offset the negative effects of the long-term aspect of the incentive mechanism. Landowners receive payment in full at time of contract initiation, and must satisfy the terms of the agreement in perpetuity. Fulfillment of active habitat management required in the contract depends on the integrity of the landowner, the landowner's conservation value, and the regulators monitoring and enforcement of the agreement. In any event, as time passes, active habitat management is likely to diminish as the encumbered land changes ownership, or the opportunity cost of habitat management increases, or as the regulator relaxes the monitoring and enforcement of agreements.

TDRs, zoning and impact fees all have a very low ability to require landowners to undertake active habitat management because they force landowners to conserve their land involuntarily. Involuntary participation creates resentment and disincentives for landowners to undertake activities that enhance the habitat on their land. Zoning and impact fees both require landowners to conserve habitat without being compensated for lost productivity, any habitat improvements undertaken by the landowner increases his out-of-pocket expenses, costs the landowner is unlikely to incur.

Landowners do receive some compensation with a TDR incentive mechanism, owners of land in the sending zone sell their TDRs to developers in the receiving zone, but the compensation is independent of the opportunity cost of the land. Improving the quality of the habitat only increase the landowner's opportunity cost without effecting his compensation. A landowner incurs fewer opportunity costs by not undertaking active habitat management.

3.2. Landowner Interests

We consider three basic landowner concerns identified over the years in informal and formal discussions with ranchers, developers, and farmers. Landowners want their participation to be voluntary, they want their privacy maintained, and their stewardship toward the land recognized and acknowledged.

3.2.1. Voluntary participation

Designing mechanisms that allow landowners to voluntarily participate, rather than forcing landowners to participate through some type of command and control mechanism, alters the landowners' incentives. When landowners are coerced into conserving their land to protect species and habitat without compensation, the landowners are faced with incentives to destroy the species and habitat prior to government regulation. Alternatively, if the landowner is compensated for habitat conservation, and the compensation is dependent on the quality of the habitat, then landowners are provided the incentive to conserve their land and to do so without force.

Zoning and TDR policies predetermine which land is to be conserved and then force those landowners into conserving their land. For these mechanisms, voluntary participation is almost non-existent.⁹⁷ Fee simple acquisition can also be non-voluntary when the government uses its eminent domain to force the landowner to sell his or her land. Fee simple acquisition can also occur in situations in which the landowner voluntarily sells his or her land to the government agency or other conservator.

When an impact fee policy is used, landowners who choose to develop their land are required to pay an impact fee. A landowner does have the choice to not pay the

⁹⁷ R. Epstein, A Conceptual Approach to Zoning: What's Wrong with Euclid, 5 N.Y.U. Environmental Law Journal 277, 277-291 (1996); see also Boyd supra note 46.

impact fee, but that entails an opportunity cost of foregoing development of his or her land. Only landowners with a conservation value in excess of the opportunity cost of foregone development choose to conserve their land voluntarily.

Regulatory policies of subsidies, conservation banking, and PDR and donated easements all have a very high rank as being voluntary for landowners. Landowners that create conservation banks do so voluntarily with the expectation of turning a profit.

Subsidy programs typically require landowners to apply for the subsidy and to then satisfy specified criteria. The number of applications often exceeds the accepted conservation projects. If the incentives are not sufficient for the landowner, the landowner need not apply. PDR and donated easements require landowner and conservator to negotiate contracts, which specify the obligations and requirements of both the landowner and conservator. If the contract is not satisfactory to the landowner, the landowner can abort negotiations and not conserve his or her land.

3.2.2. Privacy Maintained

Most landowners in the United States want to preserve their right to exclude persons from trespassing on their land. Also landowners want to minimize the rights of a third party from legitimately, through contractual agreement or other arrangement, entering their land. Policies that do not alter or split the property rights to the land are more effective at maintaining privacy. When the property rights remain intact, confusion over who has what rights is avoided. Impact fees maintain the rights to privacy most effectively because upon payment of the impact fee compliance to the policy is satisfied for developed properties. For properties not developed, landowners maintain the right to exclude government regulators from entering their property. Zoning, like an impact fee

policy, also maintains a very high level of privacy. The landowner maintains all rights to the land and can restrict access to his or her land.

Conservation banking and TDR instruments for conserving habitat are highly effective at maintaining the landowner's privacy. Both instruments allow the government regulator access to the land to monitor and enforce the contractual agreements. Access is typically specific. For subsidies, PDR easements, and donated easements the ability to maintain privacy is dependent on the negotiated contracts or the rules of the program. Some subsidy programs require the landowners to permit access to their land to the general public, although the landowner does have the ability to exclude specific individuals. With easements, the property rights are severed and split between the two parties. The landowners' ability to protect their privacy hinges on the contractual agreement and may be low, medium, or high. When the government purchases land through fee simple acquisition, the land becomes the property of the public. The ability to deny the general public access to the land may be limited.

3.2.3. Stewardship Recognized

Is the landowners' effort to preserve or enhance the habitat on their land acknowledged? Acknowledgement can take many forms including public or financial awards, but must create an incentive for the landowner to preserve or enhance the habitat on their land. Conservation banking rewards bank owners for good stewardship by increasing the number of credits that the bank owner can sell to offset development. The bank owner enhances the property, increasing the quality of the habitat or the number of listed species, and as a result increases the number of credits that can be sold, which increases the revenue to the bank owner. Subsidies also reward stewardship, but less

effectively. The subsidy policy can entail that the landowner restore or create habitat or might only be a mechanism to keep the land from being developed.

PDR and donated easement contracts may or may not specify the landowner undertake habitat management techniques. If the contract specifies the landowner maintain the habitat on the land, the extent to which the landowner meets his or her contractual obligations likely depends on the conservator's diligence in monitoring and enforcing the contract. Also, because the landowner receives full payment when the contract is negotiated, the conservator has no leverage to ensure the landowner holds up his or her end of the agreement.

Impact fees, zoning, and TDR policies do not provide landowners with any incentive to enhance and maintain the habitat on the land. In many cases the opposite holds true, to avoid being forced to conserve their land, the landowner may choose to destroy the habitat.⁹⁸ Fee simple purchase is also very low at rewarding stewardship because the land is in public hands, and individuals may see the responsibility of maintaining the land as the government's problem.

3.3. Government Concerns

We consider five general categories of governmental concerns associated with implementing an incentive scheme—administrative costs, monitoring and enforcement costs, acquisition costs, information rents, and risk of habitat destruction.

⁹⁸ Robert Innes, Stephan Polasky, and John Tschirhart, Takings, Compensation and Endangered Species Protection on Private Lands, 12 *Journal of Economic Perspectives* 35, 35-52 (1998); see also Boyd *supra* note 46.

3.3.1. Administrative Costs

Administrative costs are expenditures on the staff necessary to establish conservation plan, process applications, establish markets to facilitate trades between suppliers and demanders of tradable development rights and bankable credits, process and maintain records for property right transfers and land use restrictions, and staff and fund programs that maintain government owned conservation lands. Administrative costs increase as the needed staff, reporting requirements, and other various accounting needs increase.

Administrative costs are lowest for the status quo—zoning. Zoning ordinances have been used to control the shape of growth for a century. The infrastructure necessary to administer a zoning conservation policy is already in place. Administrative costs for zoning ordinances increase as the government planning agency implement more flexible zoning policies. Two examples of flexible zoning include cluster zoning—dividing the land into a high density development cluster and an open space cluster; and performance zoning—a developer provides a certain level of conservation prior to approval of the development plan. Flexible programs usually increase the administration costs to the local government, and subject the developer to more governmental control due to the project-by-project review process.⁹⁹ Impact fees, like zoning, have low administrative costs because the infrastructure necessary to implement an impact fee policy is already established.

Fee simple acquisitions have low to medium administrative costs, which primarily results from the need to manage and maintain land once acquired. Government agencies responsible for managing these lands are largely intact, and only a minimal increase in

⁹⁹ See Miller supra note 13, at 459-516; see also UCLCC supra note 14.

staff may be necessary. Like fee simple acquisition, donated easements also have low to medium administrative costs because the infrastructure necessary to oversee a donated easement policy is already in place. A large portion of the administrative responsibility for donated easements rests in the IRS, which has the economies of scale to deal with the responsibility of oversight of donated easements at a minimal or zero impact on staffing requirements. While donated easements must still be negotiated between the landowner and a conservator, the administrative costs to the regulator are small because the conservator can be an IRS approved nonprofit conservation organization.

Conservation banks are at the other end of the spectrum, exhibiting high administrative costs. Conservation banks require the regulator to staff the oversight of an extensive application process as well as establishing a market for and tracking the transfer of bankable credits. Also having high administrative costs are policies of PDR easements, subsidies, and TDR. For PDR easements, contract negotiations constitute the bulk of the administrative costs. The costs of contract negotiations are high because PDR easements result in the landowner and the regulator having joint ownership in the property. Some agreements on how to split the property rights may require complex and costly negotiations.

Subsidies policies also have high to very high administrative costs because subsidy programs typically require the landowner to submit an application and to satisfy specific requirements. The regulator incurs administrative costs to evaluate applications and to insure that the specified requirements are met. As the application and review process becomes more extensive, the more costly it is to administer the subsidy. By some estimates, administrative costs for subsidy mechanisms have been in the range of ten to

thirty percent of every dollar spent.¹⁰⁰ For TDRs land is allocated for conservation through zoning. Administration costs center around the need to establish a market to facilitate trades and to record transfer of TDRs. Records must be kept to insure that once a landowner has traded (sold) away the development rights in the land, that the land is designated for conservation thereafter. If records are not maintained, the landowner could lobby for future zoning changes, and if successful develop his land.

3.3.2. Monitoring and Enforcement Costs

Monitoring costs are the costs that the regulator accrues in insuring that land use restrictions are not being violated and that contractual conservation agreements are being upheld. When violations of land use restrictions or contractual agreements occur, enforcement costs accrue in correcting the situation. Monitoring and enforcement obligations are perpetual and must be funded annually.

Fee simple acquisition has low monitoring and enforcement costs. Inherent in the purchase of the land is the right to control acceptable land uses and the costs of monitoring and enforcement may be limited to preventing the public from misusing the land. Conservation banking has low to medium monitoring and enforcement costs. The costs to monitor and enforce agreements are low because the banking agreement stipulates reporting and monitoring criteria, establishes a bank manager, and specifies remedies for violations of the agreement. Conservation banks also combine many developers' mitigation requirements reducing the number of mitigation projects requiring regulatory oversight and, because the sole purpose of a conservation bank is to earn

¹⁰⁰ Robert Innes, Takings and Compensation for Private Lands, 76 Land Economics 195, 195-212 (2000).

profits through the provision of conservation, bank owners are unlikely to undertake activities that diminish their potential profits.¹⁰¹

Incentive mechanisms that allow the landowner to remain on the land and retain complete or partial property rights have higher monitoring and enforcement costs. The magnitude of the costs to monitor and enforce conservation requirements is related to many factors including the time frame in which conservation payments are made to the landowner, the length of conservation agreements, and the landowners' range of permissible land uses. Spreading landowner compensation payments over many periods rather than paying the landowner one lump sum payment, is likely to reduce the costs of monitoring and enforcing agreements. The landowner must prove compliance on regular time intervals to receive the periodical conservation payment. Likewise, the shorter the contract duration the lower are the monitoring and enforcement costs likely to be. Monitoring and enforcement costs tend to increase as the time that has lapsed between the present and the time of agreement initiation increases. Furthermore, with longer contracts the probability the land transfers ownership increases. As subsequent landowners take control of the land, the likelihood that conservation agreements will be upheld decreases, and the costs of monitoring and enforcing agreements increases. A larger set of permissible land uses can have either a positive or negative effect on the magnitude of monitoring and enforcement costs. On the positive side, as the landowners freedom to use her land increases the need to violate the agreement decreases. More acceptable land uses provides the landowner with more opportunities to intentionally or unintentionally misinterpret the agreement. Whether the positive or negative effect of

¹⁰¹ Linda Fernandez and Larry Karp, Restoring Wetlands Through Wetlands Mitigation Banks, 12 *Environmental and Resource Economics* 323, 323-344 (1998).

landowner freedom is of more significance is uncertain. Longer contracts that compensate landowners with a one-time lump sum payment, as is the case with both donated and PDR easements, tend to have larger costs to monitor and enforce agreements. To ensure its interests are being fulfilled, the conservator must regularly monitor the landowners' actions. As ownership of the PDR land changes, monitoring and enforcement costs will likely increase.¹⁰² Subsidies, which are shorter length contracts with periodical (typically annual) payments, have lower monitoring and enforcement costs but still exceed the costs of conservation banking and fee simple acquisition.

Involuntary incentive mechanisms also have high monitoring and enforcement costs. Involuntary incentive mechanisms, such as zoning, TDRs with zoning, and impact fees, force strict rules on landowners. Some restricted land uses that require government permits, like the construction of an office building or house, may be easily monitored. Other restricted land uses, such as cultivating crops or clear cutting trees, may require the regulator to engage in more active and costly monitoring and enforcement activity.

For example, a TDR with zoning policy has high monitoring and enforcement costs. Land restricted from development must be monitored to ensure that landowners do not undertake prohibited activities; also developers must be monitored to ensure that the density of development does not exceed their permissible level, zoned plus TDRs. If landowners and developers undertake prohibited activities, the regulator must decide whether and to what degree she enforces the restrictions with the penalties specified by the law.

The main point is that both voluntary and involuntary incentive mechanisms that allow the landowner to stay on the land require the regulator to incur monitoring and

¹⁰² National Research Council, *Setting Priorities for Land Conservation* ix, ix-261 (1993).

enforcement costs. Compensation paid in short term intervals is possibly the only method of reducing these costs.

3.3.3. Acquisition Costs

Acquisition costs are the actual cash outlays required to purchase or otherwise retire land for species protection. Land can be retired through purchase of either full or partial interest in the land, or by a payment that retires the land for a specified term.

Both subsidies and fee simple acquisition have very high costs of retiring land for conservation purposes. Fee simple acquisition has very high costs, because acquiring land in its entirety, with all its rights in tact, is expensive and requires the greatest amount of financial resources initially.

The acquisition costs associated with subsidies are less than the acquisition costs of fee simple acquisition in the short run. In the long run, however, subsidy acquisition costs may exceed those of fee simple acquisition. The primary reason for lower short run and higher long run acquisition costs are that subsidies generally only restrict land activities for a limited time period. The annual payment of the subsidy is less than the costs of purchasing the land fee simple. But if the land is continually conserved through subsidies, the sum of payments over time is likely to exceed the costs of purchasing the land outright. The increased cost for a subsidies mechanism is the price of flexibility. Subsidies provide more flexibility to both the government regulator and the landowner. At the fruition of the subsidy, both the regulator and the landowner can reevaluate their options and determine their best course of action for the next time period. The regulator may prefer a subsidy if limited funds makes it impossible to meet the ESA goal with other incentive mechanisms. The landowner may prefer more flexibility if she is

uncertain about future opportunities. Regardless of who prefers more flexibility, the costs to conserve the land in perpetuity using a subsidy incentive scheme is likely to be greater than the costs of fee simple acquisition.

PDR easements require the regulator to incur acquisition costs. But the acquisition costs of PDR easements are less than for fee simple acquisition because the regulator is only purchasing partial interest in the land. PDR easement acquisition costs have been estimated to be in the range of 20 to 90 percent of the costs of fee simple acquisition.¹⁰³ Donated easements are funded through federal tax deductions, which mean that landowners' typically receive less than the fair market value. Donated easements require less actual cash outlays than does PDR easements. The tax deduction represents a decrease in the federal government's annual budget, funds that must be spread across all worthy projects. Funding a donated easement program reduces the funds available for all federal government programs. A local regulator, using a donated easement mechanism, can conserve land with minimal cash outlays.

Zoning, TDRs with zoning, conservation banking, and impact fees all have relatively low acquisition costs. Under an impact fee scheme, a government funds the acquisition costs by requiring developers to pay a fee to offset the impact of their development. Likewise, TDR with zoning and conservation banking have conservation funded by developers through the purchase of development rights or bankable credits. Zoning forces the costs of conservation on the landowner, incurring acquisition costs in the rare event that a Fifth Amendment property taking has occurred.

¹⁰³ See Boyd supra note 46.

3.3.4. Information Rents

Information rents occur when landowners are paid more than their opportunity cost of the lost land simply because the landowner knows more about themselves than the regulator. Information rents are most prominent when the regulator is confined to conserving specific land parcels and required to use voluntary incentive mechanisms. Landowners can act strategically. The landowner, knowing that the regulator must acquire his land to satisfy the conservation objective, is able to extract from the regulator an extra payment that exceeds his or her actual opportunity cost. The landowner would have sold for less. When the landowner earns information rents, society pays too much for its conservation. The incentive mechanism can be perceived as inequitable from society's point of view.

For zoning, impact fees, conservation banking and TDRs with zoning information rents are very low or nonexistent. Information rents are absent for zoning and impact fees because landowners are not compensated for conserving land. With the latter two, conservation banking and TDRs with zoning, compensation is determined by the market. Landowners' private information is reflected in the market price and information rents are eliminated.

Of the four completely voluntary incentive mechanisms, donated easements have the smallest potential for information rents. Subsidies and fee simple acquisition have high to very high potential for information rents and PDR easements have a medium to high potential for information rents. The ability of landowners to earn information rents is dependent on the value of the compensation paid to the landowner and the ability of the landowner to act strategically in negotiating for compensation. Donated easements have

the lowest compensation and the rules regulating the use of donated easements are well defined reducing the possibility for the landowner to act strategically. Compensation under a PDR easement is greater than under a donated easement and because compensation is negotiated on a case-by-case basis, the opportunity for the landowner to strategically overstate his or her asking price is present. Like PDR easements, the fee simple acquisition incentive mechanism provides the landowner with the opportunity to act strategically. Unlike PDR easements, under a fee simple acquisition, because full interest rather than partial interest in the land is being purchased, landowners receive greater compensation. Because compensation is greater and the opportunity for strategic behavior is equal, information rents are greater.

With a subsidy incentive mechanism, unlike the other three, contracts and payments are negotiated on a regular basis. Furthermore, the opportunity for strategic behavior is present for subsidies just as it is for PDR easements and fee simple acquisition. If subsidies are negotiated annually, the landowner has the opportunity to earn information rents every year.¹⁰⁴ The accumulation of information rents over time could be substantial, and in present value may exceed the information rents of fee simple acquisition.

3.3.5. Risk of Habitat Destruction

When involuntary incentive mechanisms are used, government regulations impose uncompensated out-of-pocket expenses onto landowners. To avoid incurring the

¹⁰⁴ Rodney Smith and Jason Shogren, Voluntary Incentive Design for Endangered Species Protection, 43 *Journal of Environmental Economics and Management* 169, 169-187 (2002); see Rodney Smith and Jason Shogren, *Protecting Species on Private Land in Protecting Species in the United States: Biological Needs, Political Realities*, *Economic Choices* 326-342 (J. Shogren and J. Tschirhart ed., 2001.).

regulatory costs of conserving their land, landowners are faced with the incentive of destroying the habitat on their land prior to regulation. Landowner destruction reduces the amount of land available for species preservation. The quality of land available for conservation could be affected if the landowner perceives that the probability of being regulated increases with land quality, which is likely the case.

Zoning has high DWL if landowners develop their land hastily to escape the high costs that a potential zoning rule would impose. Development that supersedes zoning on environmentally rich land can create a loss of conservation benefits. Landowners that are subject to TDRs with zoning may also face the incentive to prematurely develop their land. Because landowners zoned for conservation under a TDR with zoning incentive scheme are at the least partially compensated, the incentive to destroy land is less than that for zoning alone. The landowner destruction DWL associated with impact fees depends on if the magnitude of the impact fee is set on the habitat quality of the land. If the impact fee is set in conjunction with the conservation value, landowners have an incentive to destroy habitat to escape expensive impact fees.¹⁰⁵ For voluntary incentive mechanisms landowners are fully compensated and the incentive to destroy habitat is low to very low.

4. Concluding Remarks

We conclude by highlighting what we have learned from our review of the economic principles underlying the set of incentive mechanisms. First, market instruments¹⁰⁶ that have been praised for the ability to control air pollution at minimum costs are not as effective for protecting habitat for two reasons. No uniform system of

¹⁰⁵ See Innes *supra* note 98.

¹⁰⁶ for example, TDRs and impact fees.

measuring biodiversity exists; land has heterogeneous habitat quality and as a result market systems have to be combined with other regulatory tools like zoning to be effective. In addition, development results in permanent destruction of habitat, giving the regulator only one chance to get it right. Zoning would be effective on its own if political objectives, economic circumstances, and environmental preferences never changed, which is highly unlikely.

Second, voluntary mechanisms, like fee simple purchase, easements, conservation banking, and subsidies are an effective and flexible method for targeting low cost land with high quality habitat. Extracting landowners' private information, however, regarding both habitat quality and private use value is expensive and politically charged. Third, incentive mechanisms like conservation banking, subsidies, and easements can be designed to induce landowners to both conserve their land, and to invest in the conservation value of their land. This matters when habitat needs exceed the quantity of quality habitat and degraded habitat must be restored to meet the ESA objectives, or where creating or restoring a habitat corridor can expand habitat fragments.

Fourth, establishing a method for measuring biodiversity, which takes an ecosystem approach, aids the cause of spreading minimum conservation dollars across the greatest number of species and habitat acres. By taking an ecosystem approach, rather than species-by-species, economies of scale can be realized since habitat can protect several species. A measure of biodiversity can bring people together to define and work toward meeting common ESA objectives.

Fifth, conservation approaches, like conservation banking and TDRS, can be designed to satisfy both state and federal land use regulations. By bringing all the players

to the table, FWS (ESA), Corps (CWA), state fish and wildlife agencies, as well as other affected state, local and federal entities, the regulatory burden to both landowners and affected agencies can be reduced by giving the landowner regulatory certainty and the regulator access for monitoring land use restrictions and also clear cut recourse in the event the landowner fails to meet stipulated agreements.

Sixth, mechanisms such as donated easements can reduce a regulator's outlays by creating incentives for land trusts and other nonprofit organizations to work together and share the costs of conservation. Cost sharing works in both directions. Land trusts can reduce their costs by purchasing habitat fee simple, placing a conservation easement on the land that they hold, and then donating the land to the government to manage.

Finally, no one incentive mechanism dominates. Factors such as development pressure, or the lack there of, funding, the range of land quality, quantity of suitable habitat, the range of land values, and types of landowners should be considered in determining which mechanism(s) would meet the regulators objectives most efficiently.

When markets have many buyers and seller such that the developmental pressure in the region is strong, conservation banking is the preferred mechanism for species protection. Conservation banking consolidates the conservation requirements of many landowners and places them in the hands of one individual or organization, whose sole objective is to make money by providing conservation. Furthermore, because their profits depend on the quality of the conserved parcel, as well as minimizing the costs of conservation, conservation reserves will likely satisfy the biological criteria and reduce many of the long-term government costs.

When markets have few buyers and sellers, no incentive mechanism stands out as the clear favorite. Each mechanism has its own strengths and weaknesses. If we assume that the government prefers a voluntary incentive mechanism over a command and control mechanism, then the field of potential policies is limited to easements, fee-simple acquisition, subsidies, or any combination thereof. In comparing the three on the basis of government costs it appears to be a wash. The landowner requirements are similar as well. Biological criteria have one important difference—the conservation reserves permanency. Subsidies are by far the least permanent, whereas easements have the potential for the greatest permanency. The problem with easements is that there is no guarantee—landowners may lack sufficient incentives to continue to uphold the contract in the future. A possible remedy to this situation would be to create a policy that combined easements (both PDR and donated) with subsidies.

The conservator could purchase the development rights in the land initially, and negotiate other land use restrictions. Some of these restrictions, in particular land management and maintenance requirements, could be tied into an annual subsidy negotiated periodically. The easement portion would provide permanence, while the subsidy would give the landowner and the conservator some flexibility. The number and types of landowners that this policy would appeal to would likely be more than each mechanism appealed to independently. The potential to create a larger preserve should increase as a result, and because landowners are being paid an additional annual subsidy, for which they can negotiate, the permanence of the conservation should be more secure.

Considering government costs, monitoring and enforcement costs are likely to be smaller for the same reason that the conservation reserve is likely to be more permanent.

Acquisition costs are likely to increase, however, the cost of the easement initially may decrease because of the stream of subsidy payments that follow. Administration of the policy would maintain a similar approach as did a subsidy policy and costs continue to be very high. Information rents are higher, the landowner has two pieces of private information for which to extract rents—the personal value of the easement and the personal value of the annual subsidy.