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ARTICLE: CONSERVING BIODIVERSITY ON PRIVATE LAND: INCENTIVES FOR MANAGEMENT OR COMPENSATION FOR LOST EXPECTATIONS?

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LEXISNEXIS SUMMARY:

... Characterizing the destruction of biodiversity as the "fourth horseman" of the environmental apocalypse runs counter to traditional perceptions of nature conservation. ... Nature conservation is increasingly being redefined in terms of biodiversity conservation -- the protection of ecosystem and species diversity and genetic diversity within species. ... Biodiversity conservation must be integrated with private land management. ... Even when management ostensibly focuses on nature conservation, it may emphasize the management of particular species valued for recreational or commercial purposes over management of the entire ecosystem. ... Biodiversity conservation on private land must focus on ongoing management rather than rely solely on traditional land-use restrictions. ... In most cases, however, the land will not be managed in a manner sensitive to biodiversity conservation unless the body obtaining the easement reserves access and takes management responsibility itself, or unless the landholder agrees to manage and is paid for doing so. ... Its conservation easement program is squarely committed to the protection of endangered species and natural communities (plant associations/assemblages) on privately owned land. ... The loss should be seen as even less sustainable when it is considered that the calculations of annual wetland acreage lost do not reveal the significance of lost areas in terms of biodiversity conservation. ...

TEXT:

[*304] I. INTRODUCTION

Characterizing the destruction of biodiversity as the "fourth horseman" of the environmental apocalypse runs counter to traditional perceptions of nature conservation. In the past, nature conservation has been justified in terms of the provision of recreational opportunities and the advancement of aesthetic values, such as scenic protection. Our attitudes towards nature, however, are currently in a state of transition. Nature conservation is increasingly being redefined in terms of biodiversity conservation -- the protection of ecosystem and species diversity and genetic diversity within species. n2

[*305] Although this transition in the way we view and interact with nature is by no means complete, the new perspective is no longer solely the preserve of conservation biologists and radical environmentalists. The language of governments and the world community increasingly reflects a concern with biodiversity. The transition can be characterized as a movement away from simply valuing the contribution of nature to *life-style* and toward acknowledging biodiversity as vital to human *life-support*. Just as water and air are seen as scarce resources that need to be rationed, biodiversity is now viewed as a scarce resource. Nevertheless, two characteristics of biodiversity set it apart from these other resources. Its destruction is irreversible, and humanity knows little about the attributes or significance of what is being destroyed.

In narrow anthropocentric terms, biodiversity is important for two reasons. First, in the *future*, biodiversity may be the source of new substances whose uses will benefit human beings, such as food and pharmaceuticals. Second, biodiversity is a source of *current* benefits, such as water purification, soil fertilization and groundwater recharge. These current benefits are created by natural ecosystem processes that are not yet fully understood. Some people may resist the conclusion that the destruction of a particular element of diversity should be classified as "harm" outweighing the immediate benefits of the destructive activity when all that is at stake is a possible future contribution to human welfare. It is [*306] harder, however, to avoid the conclusion that the destruction of existing ecosystem services amounts to immediate harm. n3

The United Nations Convention on Biological Diversity recognizes the importance of preserving biodiversity on a global scale. n4 The Convention contains detailed provisions relating to commercial access to genetic resources n5 and commits signatory nations, "as far as possible and appropriate":

- . to "[r]egulate or manage biological resources (including genetic resources and populations) important for the conservation of biological diversity whether *within* or *outside* protected areas, with a view to ensuring their conservation and sustainable use;" n6
- . to identify types of activities likely to have significant adverse impacts on the conservation of biodiversity, monitor the effects of these activities n7 and "regulate or manage" them; n8
- . to adopt "economically and socially sound measures that act as incentives" for the conservation of biodiversity. n9

This Article addresses two important issues raised by the Convention. The first concerns the Convention's recognition that it is inadequate to restrict the process of conserving biodiversity to protected areas of public land, such as national parks and wildlife refuges, which have been set aside for this purpose. Biodiversity conservation must be integrated with private land management.

[*307] The second issue concerns the significant tension, apparent in the Convention, over whether "command-and-control" regulation or incentive-based private management is the appropriate means of securing biodiversity conservation outside of protected areas. The Convention expressly refers to the use of incentives, n10 while regulation and management are juxtaposed as an alternative. n11 The latter option is misleading insofar as it suggests that regulated land-use restrictions can alone achieve biodiversity conservation on privately owned land. Regulation is only effective when used in tandem with incentive-based ongoing management and restoration of ecosystems. On the other hand, it is theoretically possible for countries to achieve their objectives solely by providing

landowners with incentives to manage their land in a way that is sympathetic to biodiversity conservation.

In the United States, the implementation of programs to address these two issues is hampered by traditional notions of conservation and private property. In contrast to the United Kingdom, where private landholders are expected to play the major role, public land managers bear the bulk of the responsibility for conserving nature in the United States. n12 When it comes to private land, conservation is equated with two objectives that fall far short of meeting demands for biodiversity conservation. The first of these objectives is the prevention and remediation of land degradation as a means of ensuring the continued productivity of the land and preventing pollution. The second is wildlife conservation, narrowly conceived as game conservation, where land is managed for the benefit of certain species, frequently to the detriment of natural ecosystems.

In addition, American society is grounded in a private property ideology that espouses the notion that private landowners may use land as they see fit, at least insofar as their use does not spill over [*308] to neighboring areas. This theory of property rights limits the ability of a government to regulate activity on private land for the sake of conservation. Although protection of private landowner rights via the Fifth Amendment falls considerably short of providing complete landowner autonomy, the precise limits of government interference with these rights are uncertain and must be decided by the courts on a case-by-case basis. n13

While governmental testing of such constitutional limits in order to prevent "harm" is seen to be legitimate (as where private development is responsible for water pollution or beach erosion), this is not the case when an activity is perceived as providing a "benefit" to the community. Although the idea that we can draw value-free distinctions between preventing harm and conferring benefits is coming under increasing critical scrutiny, n14 the fact remains that such distinctions are regularly drawn by the wider community; governments ignore them at their own peril. Nature conservation has traditionally been defined as involving the provision of a benefit to the wider community. Landowners can be ordered to prevent harm, but not to provide benefits. Benefits must be paid for. n15

This Article will focus on some of the major formal mechanisms that the federal government n16 and private organizations are [*309] employing to induce private landholders to conserve biodiversity in the United States. n17 In particular, the Article will contrast symbolically coercive command-and-control regulation with incentivebased market mechanisms. n18

Existing initiatives fail to address adequately the issue of biodiversity conservation on private land. Shortcomings in the legislation and its implementation are partly to blame. Beyond this, however, the experience of the United States suggests that exclusive reliance on either land-use regulation or voluntary cooperation is inadequate. The American public will not tolerate command-and-control initiatives that stringently regulate land use to conserve biodiversity because of its perception that such efforts violate private property rights. On the other hand, initiatives based on voluntary cooperation are too dependent on individual landowners' choices and the willingness of the government to commit the resources necessary to induce cooperation.

Effective biodiversity conservation policy requires a combination of carrots and sticks. Regulations must set appropriate landuse contours. At the same time, incentives should be delivered to landholders in the form of stewardship payments for positive land management that would be sensitive to the conservation of biodiversity, rather than traditional compensation payments for the imposition of land-use restrictions.

[*310] II. THE INADEQUACY OF LAND IN PUBLIC OWNERSHIP

Existing areas of publicly owned land are inadequate to conserve representative ecosystems. However, over one-third of the United States is federal land, n19 and this has generated a good deal of complacency among policy-makers:

For more than a century, the policy of habitat and nature conservation essentially has been a policy of

withdrawing federal lands from the possibility of private ownership and use and reserving them for conservation purposes. It has not been primarily a program of regulation or land acquisition. n20

For example, one study concluded that at least twenty-four percent (33 out of 135) of major terrestrial and wetland ecosystems were inadequately represented on land managed by federal agencies and Indian land, and about seven percent (9 out of 135) were not represented at all. n21 Moreover, the study almost certainly understated the lack of representation because it was based on vegetation maps. As a result, it measured only *potential* natural vegetation, proving nothing about the current condition of the ecosystems and the extent to which they have been modified by human activity. In addition, the study found large gaps in the ecosystem coverage of individual agencies. Of those areas of public land expected to play a leading role in the conservation of biodiversity, the National Wildlife Refuge System included less than half of the major ecosystems, and the National Park System was missing a third. On the other hand, the study found the best coverage on lands under the control of the U.S. Forest Service. n22

[*311] Although wetlands provide a significant portion of both ecosystem and species biodiversity, n23 it has been estimated that about seventy-five percent of wetlands in the lower forty-eight states are located on private property. n24 Similarly, many individual species are inadequately protected. Only about half of the species listed as endangered or threatened under the Endangered Species Act have been recorded on federal lands. n25 Only a quarter of listed species are found almost exclusively on federal land. n26 Well over 350 listed species have not been recorded on federal lands at all. n27 Only 34% of the occurrences of listed species are on federal lands, including only 17% of the locations of invertebrate species, and 26% of the locations of plant species. n28

A. The Fragmentary Nature of the Public Lands

Some commentators have argued that land set aside for conservation has no economic value (the "worthless lands" thesis). n29 Whatever the merits of this argument, it is certainly true that this [*312] land has been set aside on an ad hoc basis, and factors other than wildlife conservation have dominated set-aside decisions. n30 One theory is that the primary motivation for establishing national parks in the United States was "monumentalism" -- the protection of scenic wonders. Initially, this was based on a desire for an indicator of antiquity that would serve as a substitute for Europe's architectural heritage and assist in the development of a distinct American cultural identity. n31 It was not until the authorization of the Everglades National Park in 1934 that ecological considerations were treated as pre-eminent for the first time. n32

During homestead settlement, farmers and ranchers selected fertile tracts of land with highly productive ecosystems, such as riparian areas and low elevation grasslands. n33 As a result, these areas are inadequately represented in the public estate. In addition, the boundaries of areas set aside for conservation frequently do not [*313] correspond to natural boundaries of ecosystems and watersheds, n34 and the areas protected are simply not large enough to sustain protected species. Over half of the national parks in the United States are smaller than 1000 hectares, n35 and contain very little habitat. n36 Working with estimates of minimum viable populations of large vertebrate species and the areas needed to sustain them ("minimum dynamic area"), a number of researchers have concluded that existing protected areas are too small to maintain minimum viable populations of wide-ranging, large vertebrate carnivores and herbivores in the long term. n37 For example, one author has concluded:

The assumption that our current parks and preserves are in any meaningful sense protecting large, wide-ranging native mammals has little factual basis. For most areas (100,000 ha or less) this lack of protection seems to include the short term (decades). For the long term (centuries), it is likely that all current reserves are incapable of supporting minimum viable populations of large carnivores and herbivores. n38

[*314] Furthermore, when it comes to ongoing management of protected areas, nature conservation is being compromised by other activities. n39 Although no objectives for the national wildlife refuge system have been established by legislation, regulations provide that all refuges are "maintained for the primary purpose of developing a

national program of wildlife and ecological conservation and rehabilitation." n40 However, one author has pointed to the difficulties of sustaining this mandate, given that the various units in the system historically have been set up on an ad hoc basis to serve a range of purposes, and that the Fish and Wildlife Service ("FWS") must share authority with another body in some reserves. n41

For example, refuges can be managed to allow public recreation only where it is an "appropriate incidental or secondary use," "not inconsistent" with primary objectives. n42 Other uses, including hunting, are allowed to the extent that they are "compatible with [*315] the major purposes for which such areas were established." n43 Nevertheless, evidence suggests that the protection of fish and wildlife is being compromised by other uses that are either introduced in response to external political pressures or supported on nonbiological grounds. n44

For other public land designations, nature conservation is only one of several competing objectives identified by legislation. The Bureau of Land Management, the Federal government's largest landholder, for example, must manage public lands under its control "under principles of multiple use and sustained yield." n45 This allows for a range of uses that compete with biodiversity conservation -- including grazing, forestry, mining, and recreation. n46 The National Forest Service manages its land according to the same principles. n47

[*316] Even national park managers must balance wildlife conservation and sustainable recreational demand. n48 Tourism has become the means by which national parks can justify their existence economically, and it provides a supportive political constituency. However, tourism has also created tensions for conservation management. n49 So far as wilderness areas are concerned, one author argues that land managers evaluate the need for wilderness in terms of recreational demand and neglect the scientific and ecological values of wilderness. n50 Furthermore, wilderness area legislation merely prohibits human uses that interfere with wilderness values; it does not mandate the positive management of ecosystems. n51

Even when management ostensibly focuses on nature conservation, it may emphasize the management of particular species valued for recreational or commercial purposes over management of the entire ecosystem. n52 For example, a "hands off" management approach to "wildlife conservation" allows certain species popular with tourists or hunters to thrive in the absence of natural predators that were driven out long ago. This approach leads to fundamental distortions in ecosystems. n53

[*317] *B. Managing the Landscape*

As a result of the factors described above, we cannot afford to focus attention narrowly on particular protected areas. We must instead consider the broader context of the landscape in which these isolated land parcels are located and manage biodiversity conservation at this level, regardless of land ownership. n54 The ghetto approach to conservation, with its virtually exclusive focus on the management of land within the public domain, is not sustainable.

1. Filling in the Gaps?

One proposed solution is to fill the gaps in representativeness n55 on public lands and adjust management regimes to give greater prominence to the conservation of biodiversity at a regional level. In particular, adjacent federal lands under the control of different federal agencies could be managed in terms of ecosystems rather than according to artificial political boundaries. n56 There are three major difficulties with this proposal.

First, pressures for continued ad hoc reservations still exist. These pressures result from political considerations. It is easiest to focus on reserving those areas that have public support and are economically unproductive. In addition, the lack of scientific knowledge about the ecological value and current condition of natural areas, combined with competing priorities of lobby groups and land management agencies (for example, the focus of some groups on wilderness rather than biodiversity conservation), further complicates the situation. n57

The second problem with relying solely on public lands is that some unprotected ecosystems comprise no more

than fragments on private land. Assuming federal agencies will be able to bring these [*318] areas back into the public domain -- a dubious assumption where landholders refuse to cooperate and funds are limited -- these agencies will find it difficult to provide disparate areas with the intensive management that fragments require. Moreover, "protected area[s] are] set up to protect wildlife *from* something." n58 It would be preferable to spend some of the funding to combat these threats directly rather than on "'reactive' measures," such as expanding reserve networks. n59

Finally, the implicit suggestion that public access to public lands should be restricted in the interests of biodiversity conservation is controversial. For example, the politics surrounding national parks will probably always require public access to maintain a supportive constituency. In contrast, the right of private landholders to exclude others is regarded as one of the key characteristics of private property. n60 Unlike some extreme theories of unrestricted land use, n61 the right of exclusion is uncontroversial. If it becomes possible to induce private landowners to relinquish some degree of autonomy and manage their lands in a manner consistent with biodiversity conservation, we will be able to appeal to their right to exclude where demand for widespread public access threatens the attainment of biodiversity goals.

2. *The Need for Linkages and Buffers*

As the scientific literature increasingly indicates, privately owned land is indispensable to any comprehensive strategy for addressing biodiversity conservation. n62 Preserving species and ecosystems will [*319] require fragments of public land to be linked together through corridors and protected by buffers on private land.

The fragmented landscape model indicates that connecting *corridors* are necessary to allow species to migrate between fragments. n63 Connecting corridors are necessary to link areas of protected land with each other and with fragmented remnant habitats on private land. n64 Ecosystems now found only in vegetation fragments [*320] on private land are frequently too small to support viable populations of even smaller species.

Large protected ecosystems in public ownership are vulnerable to edge effects from surrounding areas. n65 Urban and agricultural encroachment present barriers to migratory species and species with large home ranges. Water extraction outside a protected area can also have significant implications for hydrology within it. Consequently, substantial *buffers* are needed. n66 These will frequently have to be on private land. Conservation networks are necessary to conserve biodiversity on a regional level through integrated landscape management. This will require cooperation between managers of core conservation areas requiring high levels of protection and surrounding private landholders. n67

Integrating parks and surrounding areas through concentric zoning represents a useful approach. One possible model is the "biosphere reserve." n68 Ideally, a biosphere reserve consists of three zones: (1) a "core area" of strictly protected natural or minimally [*321] disturbed ecosystems; (2) a strictly delineated "buffer zone" around the core, where only activities compatible with the protection of the core are allowed; and (3) a "transition area," which is not strongly delineated but would limit edge effects. The transition area would serve sustainable development within the reserve through cooperation with the local population. All functions of the reserve, including the transition area, should be coordinated through a comprehensive management plan. n69

Another benefit of an integrated approach to nature conservation is its tendency to encourage community interest and support. The conservation literature on developing countries highlights local resistance and resentment stemming from the traditional conception of reserves as "fortress parks" that are off-limits to people. n70 [*322] This dilemma is replicated in more developed countries. As a potential solution, some writers have proposed programs enabling parks to provide services for local residents in return for conservation management on private land. n71 Linking private landowners with their surrounding environment is essential to providing them with adequate incentives to undertake conservation management on their own land. Habitat transition areas can play an important role in facilitating the positive cultural linkages between human beings and wildlife necessary to create attitudes sympathetic to biodiversity conservation. n72

The Greenhouse Effect represents yet another reason why a more integrated approach to biodiversity conservation is necessary. n73 Increasing evidence suggests global warming will have dramatic effects on ecosystems and ecosystem boundaries. Vegetation will have insufficient time to adapt, and animal species will attempt to migrate. n74 However, the fragmentary nature of the landscape will pose a barrier to migration:

Protected areas have been set up to reflect natural conditions that are fast disappearing. So a rainforest park might soon start to desiccate into woodland, leaving its rainforest species high and dry. A desert reserve might be overcome by more moist conditions to which its desert-type creatures are not adapted. In [*323] each case, the protected area's creatures will seek refuge elsewhere. But they will find themselves thwarted by the protected area's boundaries and the alien, human-dominated lands beyond. What was once a sanctuary will become a trap. n75

3. Assessment

For the reasons discussed above, society cannot rely on the public lands when it comes to biodiversity conservation. "Islands of antidevelopment" n76 contained within a landscape otherwise devoted to commercial production cannot conserve biodiversity in the long run. The solution is to address the issue of conservation on private land.

The literature is largely silent, however, on methods to achieve adequate levels of biodiversity conservation on private land. It generally suggests that if we utilize the full range of policy instruments available, something should work. n77 This approach shows little appreciation of the complexity of problems associated with biodiversity conservation on private land, the potential conflicts between different instruments, and existing evidence of the shortcomings of particular instruments.

III. THE NEED FOR POSITIVE MANAGEMENT

Biodiversity conservation on private land must focus on ongoing management rather than rely solely on traditional land-use restrictions. Commentators disagree about the extent to which human [*324] beings should actively manage large areas of public land in an attempt to address alleged imbalances caused by earlier human interventions. n78 When it comes to small areas of remnant vegetation, however, there is a general consensus among conservation biologists that active human management is crucial. n79 The literature emphasizes the need to manage external influences, in contrast to the past policy of reserve management that stopped at reserve boundaries. The smaller the area of land, the greater the vulnerability to external threats. n80 These external threats include invasion by exotic fauna and flora; climatic and hydrological changes; air, water, and noise pollution; and disease and infestation. Potential management techniques include fire, mowing, grazing, cautious use of herbicides, and the culling or transfer of individuals. n81 In addition, land management will frequently require extensive restoration n82 to expand existing remnants and link them together.

[*325] The problem of how much management and what kind of a management regime to implement is complex. n83 In the past, interventionist management was often based on the assumption that its focus should be on maintaining or restoring an equilibrium in the face of human disturbance. n84 The aim was to stabilize ecosystems by, among other things, maintaining the persistence of particular animal and plant species, and ensuring that they were spread evenly over the area being managed. However, some have argued that the most complex ecosystems are markedly unstable even when they have not been disturbed by human activity. There is scant evidence that ecosystems were ever in equilibrium, and instability may be responsible for the continued existence of many species. n85 Therefore, the objective of management should be to maintain the diversity of processes that determine ecosystem dynamics, particularly ecosystem resilience, rather than to maintain the diversity of species. This requires a long-term perspective on ecosystem dynamics. n86 We must no longer manage for constancy, which has traditionally led to a hands-off approach, but must manage in terms of change, risk, and complexity. Change is a natural phenomenon, leaving human managers with decisions to make about the nature and rate of change:

There are both natural and unnatural changes, and there are natural and unnatural rates of change. To recognize that melodies and themes are made up of changing tones does not imply that any noise is music. The key to a new but wise management [*326] of nature is to accept changes that are natural in kind and in frequency, to pick out the melodies from the noise. n87

This perspective leaves biodiversity managers with a degree of discretion that may make many preservationists uncomfortable. It raises the fundamental issue of "the proper role for humanity in nature." n88 This involves questions of values as much as science, vividly illustrated by the dispute since the late 1960s as to whether the declining grizzly bear population in Yellowstone National Park should be fed by artificial means given that habitat beyond the Park's borders had been significantly reduced. n89 Yet the disagreement is increasingly about the objective of management -- the extent to which we can return ecosystems to some kind of natural balance -- rather than whether management (as distinct from a hands-off approach) is necessary. n90 Accordingly, any policy instrument designed to address the issue of biodiversity conservation on privately owned land must go beyond ensuring that destructive or damaging activities are prevented and deal with the goals and mandates of ongoing management.

The challenge is to devise ways to modify the behavior of private landholders. Education alone will not change attitudes in the short term, n91 and market forces generally provide little incentive to conserve biodiversity. n92 Even where market incentives do exist, such as potential revenue from hunting and recreation permits, landholders may be slow to take advantage of them, n93 or they may produce distortions in the management of ecosystems and actually diminish diversity. n94

[*327] The following Parts of this Article analyze a number of legal policies and programs designed to influence the behavior of private landholders in the United States. They range from command-and-control regulation under the Endangered Species Act ("ESA") n95 and the Clean Water Act ("CWA"), n96 at one extreme, to incentives and voluntary agreements, including conservation easements, at the other. Some of these programs began with objectives other than the conservation of biodiversity -- for example, the remediation of land degradation, the prevention of water pollution, and the reduction of agricultural surpluses. Only recently has biodiversity conservation been included as an objective in established regimes that have been serving very different goals. The fact that these programs were originally designed to reflect other environmental priorities should be kept in mind when levelling accusations of regulatory failure. n97 Theoretically, legislation could be amended to fill in loopholes or approaches to implementation could be adjusted. We need to question, however, whether existing programs can be made sensitive to biodiversity conservation concerns through minor alterations, or whether we need to implement a fundamentally different strategy.

This Article argues that neither command-and-control initiatives nor strategies based on inducing landholders to enter into voluntary agreements will ever satisfactorily address the problems associated with biodiversity conservation on private land. An alternative model, based on the integration of command-and-control regulation and payment for stewardship, is outlined in Part VII.

IV. CONSERVATION BY CONSENSUS UNDER FEDERAL LEGISLATION

One approach to the modification of private land use is for governments to operate in the marketplace themselves, not by purchasing title to land but by purchasing land-use obligations designed to modify land-use practices. These arrangements can take the form either of simple contractual agreements, or conservation [*328] easements that will bind all who obtain title to the land in the future. n98 Federal legislation has created many such programs in the United States. n99 This Article will focus on the more important programs created (1985) and reimplemented (1990) by "Farm Bill" legislation, n100 first discussing the Environmental Conservation Acreage Reserve Program ("ECARP"), which consists of the Conservation [*329] Reserve Program ("CRP") n101 and the Wetland Reserve Program ("WRP"), n102 and then turning to the Sodbuster n103 and Swampbuster n104 programs.

A. The Conservation Reserve Program

In terms of resource allocation, the CRP is the most significant program of its type. About 36.5 million acres n105 have been enrolled in the CRP in the first twelve sign-ups, representing a total financial commitment by the Federal government of over \$ 19.5 billion, and an annual commitment peaking at \$ 1.9 billion in 1996. n106

The CRP pays landholders to let their land lie fallow. The general position is that harvesting, grazing, or commercial use of vegetation are prohibited on land under a CRP agreement, n107 and [*330] agricultural production is not allowed. n108 Under the terms of a CRP agreement, an approved conservation plan must be implemented to convert eligible agricultural land to a less intensive use, n109 and to establish approved vegetative cover. n110 This can include the establishment of permanent wildlife habitat. n111 In return for these commitments, the landholder receives rental payments and technical assistance, and, where appropriate and in the public interest, a fifty percent share of the costs of agreed conservation measures. n112 Costshare arrangements under the CRP ordinarily focus on the *establishment* of conservation measures, not on the crucial dimension of ongoing *maintenance* and *management*. n113 Rental payments are specifically designated as compensation for the conversion of the land to a less intensive use. In practice, they have been large: in some states, the rental payments have exceeded the cost to purchase land and manage it for a considerable period. n114

The CRP did not originate as a program to conserve biodiversity. Its mandate was to reduce surplus supplies of certain agricultural commodities, n115 to prevent further degradation of highly erodible crop land, n116 and to support farmers' incomes. n117 The CRP became marginally more sensitive to biodiversity conservation in 1990 when the goal of wildlife conservation was added.

Most significantly, an amendment to the legislation expanded eligible categories of land beyond highly erodible cropland to include [*331] croplands devoted to permanent wildlife habitat. n118 Another amendment set a goal of reserving at least an eighth of the land placed in the CRP after 1990 for trees, noncrop vegetation, or water, in an effort to provide a permanent habitat for wildlife. n119 In addition, the cover on highly erodible land under CRP contracts made before 1990 could be converted to hardwood trees or wildlife corridors. n120 Finally, certain watershed areas and areas of "special environmental sensitivity" could be designated as conservation priority areas, not only on water quality grounds, but also if agriculture had impacted the habitat. The aim was to promote enrollment of lands in the CRP so as to maximize water quality and habitat benefits. n121

Despite the potential use of these provisions for biodiversity conservation, their effect has been limited. The bulk of CRP land was enrolled prior to the 1990 amendments, n122 ostensibly on the grounds that it was highly erodible. It is unlikely that there is a high correlation between susceptibility to land degradation and value in terms of biodiversity conservation. In practice, the preponderance [*332] of acres actually enrolled in the CRP are not even those considered least suitable for cropping as a result of erosion problems; eligibility standards have been modified in order to meet acreage requirements for reducing crop production. n123

Although the focus of the CRP has shifted significantly following the amendments, it has shifted towards water quality issues, not wildlife conservation. Bids are now ranked on the basis of the ratio of an environmental benefits index ("EBI") to the contract's cost to the government. The EBI incorporates a number of water quality goals, including surface water quality improvement and groundwater quality protection. It does not specifically embrace wildlife habitat conservation. n124 In practice, there has been an eastward shift in terms of the area taken into the program, away from the Great Plains and towards the Midwest. n125 The overall result has been an increased focus on wetlands and riparian areas, rather than on land affected by wind-caused erosion. Such a focus has potential benefits for biodiversity conservation. The downside, however, is that there has been a significant change in the types of vegetation used to provide cover on the land. Introduced species have been used, as distinct from the native species predominantly used on the Great Plains. n126 Introduced species have little to offer in terms of biodiversity conservation. They cannot be used as a basis for restoring original ecosystems, however helpful they may be in addressing water quality issues.

The CRP has another serious flaw. It relies on vulnerable short-term contracts instead of perpetual easements that will bind not only the current landholder but future purchasers as well. n127 [*333] Conservation Reserve Program contracts ordinarily run for ten years. n128 Originally, land taken into the CRP to be devoted to permanent wildlife habitat (as distinct from being highly erodible) had to be made subject to a "useful life" easement, even though rental payments were only to be made for the first ten years. n129 Because this acted as a disincentive to enrollment in the program, the requirement was dropped in 1992. n130 Landholders are still required under the contract to maintain the practice for its useful life, but this will not guarantee that the obligation will be honored when the land changes hands. The CRP is essentially a short-term land retirement program. n131

Despite these shortcomings, the CRP has provided some benefits in terms of biodiversity conservation. n132 But these gains have been [*334] made through an ad hoc, entirely voluntary, competitive bidding process on a farm-by-farm basis, substantially driven by the geography of land degradation, and more recently, water quality. The CRP is not a carefully planned attempt to conserve representative ecosystems by linking degraded areas in need of restoration with relatively undisturbed areas. It suffers from the shortcomings of a program that has tacked on a veneer of concern with biodiversity after starting out with a very different focus.

B. The Wetlands Reserve Program

The Wetlands Reserve Program is more directly relevant to biodiversity conservation, n133 although its impact is confined to a narrow category of ecosystems and it operates under a smaller budget than the CRP. n134 Unlike the CRP, which reveals its land [*335] conservation origins by aiming simply to get some sort of vegetative cover back on to the land, the WRP is concerned with restoring to their original condition wetlands n135 that have been modified by agricultural activity (farmed wetland) or completely converted to agricultural production (converted wetland) n136 before December 23, 1985. n137 The likelihood and cost of successful restoration must be considered in deciding which areas to enroll. n138

The owner of the land must be prepared to grant a perpetual or thirty year easement, or for the maximum duration allowed by state law. n139 Priority is to be given to easements based on their value for protecting and enhancing habitats for migratory birds and other wildlife. n140 Easements provide for both negative land-use restrictions and a commitment by the landowner to restore and manage the land in accordance with a plan of operations, with the aim of reviving and protecting functional wetland values. n141 Cropping [*336] is entirely prohibited, n142 as are a range of other activities unless specifically permitted by the plan. n143 The plan can permit compatible economic uses. n144 In terms of restoration and management, the landowner can be required to establish trees and other vegetation, control weeds, and ensure that adequate arrangements are made for hydrology where natural runoff is no longer adequate to support natural wetland vegetation. n145 Restrictions can also be imposed on activities on adjacent land owned by those with land enrolled in the WRP where these activities would diminish the functional value of the enrolled land. For example, restrictions could be imposed on activities on adjacent land that cause pollution or alter the flow of surface or subsurface water. n146

There are a number of incentives designed to encourage landowners to grant easements. n147 Compensation is paid, n148 and there is provision for technical assistance and cost-share payments where appropriate and in the public interest. n149 These payments are for the "establishment of conservation measures and practices, and the protection of the wetland functions and values." n150 This suggests that payments could be made for ongoing management in addition [*337] to the costs of the initial restoration, but the regulations make it clear that this will be exceptional. n151

C. Sodbuster and Swampbuster

The retention of relatively undisturbed areas is addressed by the Sodbuster and Swampbuster provisions of the Farm Bill.

Sodbuster n152 threatens farmers with loss of agricultural subsidies under federal programs n153 for all program crops that they grow if any agricultural commodity is produced "on a field on which highly erodible land is predominate," n154 unless this is in accordance with an approved "conservation system." n155 The focus here is squarely on the prevention of land degradation (land conservation) as distinct from the conservation of biodiversity. Sodbuster does not stand in the way of the conversion of land that is not highly erodible, but that might nevertheless have significant biodiversity value.

On top of this, the operative assumption behind Sodbuster is that highly erodible land can be brought into production, with biodiversity substantially destroyed in the process, as long as there is a conservation plan in place designed to conserve the land base. In practice, most plans rely simply on leaving increased amounts of crop residue on the soil surface at planting time, through reduced or conservation tillage, to achieve erosion control. n156 This offers little in terms of biodiversity conservation.

Swampbuster n157 also threatens landholders with loss of agricultural subsidies. n158 After November 28, 1990, subsidies will be forfeited [*338] if wetland is converted n159 "for the purpose, or to have the effect, of making the production of an agricultural commodity possible." n160 The issue is whether destructive activities, such as clearing and draining, have made the production of an agricultural commodity *possible*, not whether there is an intention to produce a crop or whether a crop is actually produced. n161

Swampbuster has no equivalent to the substantial exemption in Sodbuster that allows cropping on highly erodible land to proceed provided that it is in accordance with an approved conservation plan. To this extent, Swampbuster is more sensitive to the demands of biodiversity conservation. There are, however, other [*339] exemptions from Swampbuster. n162 One allows the Secretary of Agriculture to exempt a farmer from program ineligibility where the action in question, both individually and cumulatively, "will have a minimal effect on the functional hydrological and biological value of the wetland." n163

Another provision allows landholders to trade off conversion of a wetland protected under Swampbuster against restoration of wetland converted before December 23, 1985. n164 The effect of this provision for what has come to be known as "wetland compensation" is substantially more limited than the provisions under section 404 of the Clean Water Act. n165 The tradeoff may only be exercised where the otherwise protected wetland has been frequently cropped in the past (i.e., it is farmed rather than pristine wetland), and mitigation must be by restoration of what was once a wetland, rather than the creation of an artificial wetland from scratch. n166 Nevertheless, there are significant scientific problems associated with wetlands restoration in terms of biodiversity conservation. n167

Aside from this, the impact of Swampbuster is fundamentally limited by the fact that it ignores those converting wetland for purposes other than cropping. n168 While a landholder may be discouraged [*340] from converting wetland for cropping by the threat of loss of program benefits, only the command-and-control provisions of section 404 of the Clean Water Act n169 stand in the way of the landholder selling the same land for real estate development, developing it for fish or tree production, or improving pastures and destroying a great deal of its biodiversity value in the process. The message that comes out of Swampbuster is not "don't develop wetlands," but "don't develop them for particular purposes," ultimately betraying its origins as a device for limiting agricultural production.

D. Assessment

Overall, these voluntary government programs are doing little to advance biodiversity conservation objectives.

The CRP and the WRP are targeting the wrong types of land. Not only is the geography of the CRP wrong in terms of conservation priorities, n170 but both programs focus exclusively on converting existing intensive land uses to more environmentally sensitive uses. The aim is to restore land already in agricultural production, rather than seeking to dissuade landholders from bringing land into production in the first place. Biodiversity conservation requires that we give priority to the conservation of relatively undisturbed land rather than attempting to restore degraded or even

destroyed ecosystems. n171

The programs that address undisturbed land, Sodbuster and Swampbuster, are equally inadequate when it comes to conserving [*341] biodiversity. The programs have no hold over landholders who do not grow program crops or are prepared to forego program benefits. n172 Nor do they attempt to modify existing uses that may be damaging to biodiversity, such as overgrazing. Neither program provides for the payment of incentives to landholders for ongoing management -- they are purely restrictive. In addition, there is substantial evidence that the benefits the programs can provide are undermined by noncompliance. Although only 544 farms have been found to be in violation of Swampbuster since 1986, leading to a denial of just over \$ 6 million in benefits, n173 this appears to be substantially the result of lax enforcement rather than widespread compliance with the provisions. n174

[*342] Landholders' perceptions of Sodbuster and Swampbuster also undermine the effectiveness of the programs. Beneath the rhetoric of command-and-control contained in both programs is the reality of an environmental protection strategy that is initially dependent on voluntary agreement, offering program benefits on certain conditions. This is known as "conditionality" or "cross-compliance." n175 As with the CRP and WRP, landholders have an initial choice of whether to incur binding obligations through a statutory version of the law of contract. But this is not how landholders perceive the position. Sodbuster and Swampbuster present themselves to farmers, accustomed to receiving program benefits and dependent upon them, as command-and-control regulation rather than as something to which they have voluntarily committed themselves by agreement. The language of the legislation reinforces the message that landholders will be punished if they are not sensitive to certain environmental concerns. The result is that the programs have all of the disadvantages associated with command-and-control regulation, particularly landholder hostility and enforcement problems, and none of the advantages possessed by policy instruments that are based on incentives.

V. CONSERVATION THROUGH PRIVATE AGREEMENT

In addition to government initiatives designed to influence land use through voluntary agreements with private landholders, conservation easements based on agreements between landholders and private nonprofit organizations, such as the Nature Conservancy and land trusts, regulate activities on a large area of land in the United States. n176

[*343] A. *Conservation Easements*

Conservation easements are the result of statutory modifications to the common law doctrines of real covenants, easements, and equitable servitudes. n177 These doctrines were originally unsuited for addressing the issue of conservation on private land because courts were suspicious of obligations created "in gross" n178 and cautious when it came to imposing positive obligations on landholders. Legal requirements for a valid conservation easement vary from state to state. n179 The Uniform Conservation Easement Act of 1981, which forms the basis for a number of state initiatives, gives this definition of a conservation easement:

a nonpossessory interest of a holder in real property imposing limitations or affirmative obligations the purposes of which include retaining or protecting natural, scenic, or open-space values of real property, assuring its availability for agricultural, forest, recreational, or open-space use, protecting natural resources, maintaining or enhancing air or water quality, or preserving the historical, architectural, archaeological, or cultural aspects of real property. n180

The Act emphasizes that the obligations imposed by an easement bind not only landowners who actually agree to them, but their successors in title. Overriding common law concerns, the easement is valid regardless of whether a party to the covenant has any nearby land that would benefit from the covenant obligations or whether the obligations are positive or negative. n181

The case for and against allowing private, as distinct from public, organizations to enter into arrangements with private landholders [*344] that will bind future generations has been addressed by Korngold. n182 Conservation

easements set the principle of freedom of contract against objections to long-term restrictions on land. Foremost among the latter is the fear of one generation imposing its wishes on future generations' use of a scarce commodity -- so-called "dead hand control" over land. n183 Such an argument is ironic in the current environmental context, where non-sustainable *development* is responsible for reducing the choices available to future generations. Development has a much greater capacity to impose dead hand control over land than does the use of conservation easements -- it substantially confines the possible uses of land through degradation and destruction of ecosystems. In most cases, these changes will be substantially irreversible. Therefore, those who restrict development through easements actually keep open options for future generations. Legal arrangements, unlike physical modification, can always be reversed.

Those who oppose allowing private organizations to take conservation easements also point to the lack of public accountability. n184 In his 1984 survey of twenty-six state statutes authorizing private conservation easements in gross, Korngold found that only two states -- California and Massachusetts -- provided for effective public participation in the acquisition process. n185 From the perspective of biodiversity conservation, the public interest lies not simply in protecting land indefinitely from development pressures, but rather in the precise purposes for which it is set aside, and, in particular, the way it is managed.

In practice, tax concessions are frequently instrumental in persuading landholders to enter into agreements. n186 Consequently, it is [*345] misleading to characterize initiatives pursued by land trusts as being purely private. There is an important public dimension to and public interest in conservation easements that makes it legitimate to ask whether the particular use for which land is being conserved by a private organization is appropriate, and whether the granting of tax concessions on a case-by-case basis, as distinct from the development of an effective public planning mechanism, is the best way to ensure an adequate level of public accountability. n187

[*346] *B. The Role Played by Land Trusts*

The sheer number of land trusts obtaining conservation easements on an ad hoc, reactive basis, along with the multitude of purposes for which easements are sought, n188 make very difficult any attempt to produce integrated and coordinated planning. As of 1992, there were close to 900 local and regional land trusts, unevenly distributed throughout the country. For example, even though the New England states constitute only 1.7% of the land area of the United States, n189 they are home to forty-two percent of the nation's land trusts. In many other States, the number of land trusts is in single figures. n190 There are also wide variations in terms of areas of land conserved, with forty-one percent of trusts protecting fewer than 100 acres each and only thirty-six trusts protecting more than 10,000 acres each. n191 The objectives of these trusts range from biodiversity conservation to the preservation of farmland. n192 Groups in some areas may even compete with one another, not only for resources but for projects. n193 The Land Trust Alliance, originally formed as the Land Trust Exchange in 1981, facilitates communication between trusts and acts as a clearinghouse for information, n194 but this is far removed from the coordinated planning needed to conserve biodiversity.

Land management objectives adopted by a particular trust may conflict with desirable land use from a public interest perspective. For example, an easement might be taken over land in order to gain or maintain public access, or to preserve it for agriculture, when the public interest favors restrictions on access and farming activities. [*347] Even scenic easements may fall short of addressing the concerns of biodiversity conservation by tolerating substantial development. n195

In addition to adequate planning, another crucial issue in developing conservation easements to conserve biological diversity is provision for ongoing management of the land. n196 There are legal obstacles where state enabling legislation only contemplates the imposition of land-use restrictions, n197 whereas the Uniform Conservation Easement Act specifically allows the imposition of affirmative obligations. n198 In spite of the Act, however, conservation easements in practice focus narrowly on the imposition of land-use restrictions and fail to take adequate account of the need for ongoing management. n199

In some situations, management for biodiversity conservation may be compatible with productive activity, such as limited grazing. In most cases, however, the land will not be managed in a manner sensitive to biodiversity conservation unless the body obtaining the easement reserves access and takes management responsibility [*348] itself, or unless the landholder agrees to manage and is paid for doing so. n200 The danger is that land trusts will focus only on placing land under a conservation easement in the first place, with scant attention paid to continuing stewardship responsibilities. Even if the issue of management is raised, small organizations will simply not have the expertise or resources to set up and implement the detailed monitoring and management mechanisms required to promote biodiversity conservation. Only thirty percent of trusts have full-time staff, and fifty-four percent have annual budgets of less than \$ 10,000. n201

Even in terms of the imposition of land-use restrictions, easements generally have limited aims. The driving concern is the protection of land from development pressures that would degrade or destroy existing ecosystems n202 rather than the restriction of existing uses of the land. n203 To this extent, the approach has some similarities to the Sodbuster and Swampbuster programs, n204 but easements are not restricted to reducing the threat of intensified agricultural land use. Easements are particularly concerned with restricting real estate development n205 while allowing existing agricultural activities to continue. This approach may not go far enough. Grazing and intensive cropping can significantly damage ecosystems. n206 However, even if landowners would agree to restrictions on the modification or even complete cessation of existing agricultural [*349] uses, this would drive up the price of an easement to such an extent as to make outright purchase a more attractive alternative. n207

Finally there is the matter of enforcing easements. Even if an agreement is crafted by consensus, it may later appear to the landowner as coercion. This becomes increasingly likely where the landowner who originally granted a conservation easement sells the land to a third party, who then becomes bound. n208 Handbooks dealing with conservation easements emphasize the crucial importance of addressing the question of enforcement, both in terms of the initial drafting of the easement n209 and the setting aside of funds for monitoring and enforcement. n210 Treasury Regulations, however, provide no incentive to fund enforcement: for tax purposes, conservation groups receiving gifts of easements do not need to set aside funds to enforce restrictions. n211 In practice, enforcement is likely to present a major problem. Easement holders may go out of business or lack the resources to take enforcement seriously. n212 Moreover, land trusts emphasize the voluntary nature of a strategy based on conservation easements. Formal legal proceedings are viewed only as a last resort. n213

The Nature Conservancy, one of the foremost organizations involved in the creation of conservation easements, believes that by the time the problem of enforcement arises, it is already too late, because the damage has been done and restoration is extremely [*350] difficult or impossible. Although the Conservancy monitors easements, such monitoring is usually only possible on an annual basis, and sometimes only from the air. The Conservancy primarily emphasizes maintaining good relationships with landholders to forestall easement transgressions. n214

C. The Nature Conservancy

The Nature Conservancy is in a special position because of its size and level of expertise. It currently holds nearly 600 conservation easements. n215 Its conservation easement program is squarely committed to the protection of endangered species and natural communities (plant associations/assemblages) on privately owned land. Unlike the CRP and the WRP, n216 which focus on restoring land degraded by cultivation, the Conservancy concentrates its efforts on protecting areas that currently provide habitat for rare species, as well as natural communities. These areas are identified by using information from the Conservancy's Natural Heritage Programs -- elaborate inventories of the biological and ecological features of a particular region n217 -- and selected for protection by an elaborate ranking system. n218

A private organization such as the Conservancy has the unique advantage of being able to negotiate with private landholders against the backdrop of government regulation, while still remaining committed to a philosophy of voluntariness and cooperation. The existence of command-and-control legislation (such as the Endangered Species Act)

may play a vital role in bringing landowners to the bargaining table. By contrast, government will never be able to escape completely from being perceived in terms of its regulatory persona, even where it approaches with offerings rather than threats.

[*351] The primary aim of the Conservancy's easements is to protect land from development pressures that will degrade or destroy existing ecosystems; it is particularly concerned with restricting real estate development. n219 In practice, the Conservancy seldom manages to secure an agreement relating to existing farming or ranching activities, such as fencing river banks or committing the landholder to a particular grazing regime. n220 While conservation easements reserve to the Conservancy a right of entry to monitor ecosystems and compliance with the terms of the agreement, the issue of management arrangements is generally left to be negotiated on a case-by-case basis. The expectation is that "passive management" by the landholder will continue. The more active the management required, the more likely the Conservancy will be to purchase title to the land, instead of an easement. n221

Currently, Nature Conservancy activities on private land provide a valuable adjunct to government initiatives. It is important to recognize, however, that they are only a part of the solution. There are fundamental problems with any strategy that would largely disavow command-and-control regulation and leave the ultimate decision on whether to participate in conservation programs with the individual landholder. Ecosystems cut across property boundaries. Remnants are scattered across the landscape. By refusing to cooperate, one person with a strategic landholding can effectively destroy a wildlife corridor or leave a destructive gap in a buffer zone. This potential problem of non-cooperation is accentuated where the policy is to rely primarily on gifts of easements rather than purchase, which is the approach generally taken by the Nature Conservancy. n222

In addition, it is unlikely that there will ever be enough funding either from private or public sources to pay for adequate biodiversity conservation through entirely free-market mechanisms. n223 [*352] For those who will not cooperate with voluntary initiatives, there must be a regulatory fall-back position. It remains crucial that regulations continue to set the parameters within which negotiations are conducted and bargains reached, and that they take a form that ensures that the focus of those negotiations goes beyond landuse restriction and addresses management issues.

VI. THE COMMAND AND CONTROL ALTERNATIVE

Both the wetlands protection provisions of section 404 of the Clean Water Act ("CWA") n224 and the "taking" provisions of section 9 of the Endangered Species Act ("ESA") n225 set up regulatory systems based on command and control. These provisions combine a broad prohibition of activities on private land with a range of sanctions. The overall impact, however, is substantially softened by permitted exceptions that are available on a case-by-case basis. n226

At first sight, these statutes appear promising as tools for preserving biodiversity. Experience teaches us, however, that where the commitment of the community to a legal obligation is equivocal, agencies will search for some level of flexibility in implementing that obligation as a means of political survival. Such is the case with command-and-control legislation in the United States. Landuse regulation supporting environmental conservation clashes with [*353] deeply held values about the sanctity of private property. In addition, beneficiaries are diffuse and numerous whereas the regulated class is well-organized. n227 All of this places obstacles in the way of an agency achieving the goals of the legislation. Regulatory "flexibility" can become a euphemism for regulatory failure.

"Flexibility" in the environmental context has traditionally meant placing certain conditions on projects that are allowed to proceed, as distinct from simply saying "no" to a project. The focus of regulatory systems addressing environmental problems has been on *how* we can allow development to proceed on a particular site, not on *whether* we should allow it to go ahead. This approach may be acceptable when dealing with land degradation or water pollution, n228 but it may be inappropriate when it comes to the conservation of biodiversity. It is time for a paradigm shift. We need to base decisions on the level of development that is compatible with the conservation of biodiversity, rather than asking how we can retain the maximum level of biodiversity consistent with development.

Such a shift will require fundamental changes in our approach to land management. There will still be instances where the desires of landholders can be satisfied, such as by allowing development to proceed on degraded areas that offer little in terms of both existing biodiversity conservation and restoration potential. In addition, limited development may be allowed on areas that serve as buffers rather than conservation cores. There may be other situations where the most appropriate form of management for biodiversity conservation contemplates some level of productive use, as where modified grazing may be a vital part of ecosystem maintenance. n229 But the reformulation of land management policy could well mean that the conditions attached will be more stringent than [*354] those that have traditionally been used to address the problems of land degradation and industrial pollution. Productive activity may have to be significantly modified. Instead of the primary purpose being commercial production, with biodiversity conservation served through conditional constraints, biodiversity conservation may have to become the dominant land use, with some conditional limits being placed on it to allow *compatible* productive activity.

There will, however, be other situations where such compromises will not be an option if biodiversity is to be conserved. In these situations, command-and-control regulation will have to live up to its name by functioning as prohibition rather than compromise. The analysis presented below suggests that, in the real world, command-and-control regulation on its own is almost certainly incapable of achieving this.

A. *The Clean Water Act*

The Clean Water Act ("CWA") n230 was enacted "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." n231 Congress sought to achieve this objective primarily through limitation of the discharge of pollutants into the country's navigable waters. n232

1. *Section 404 as a Tool for Biodiversity Conservation on Wetlands*

Under the CWA, "discharge of dredged or fill material" into "navigable waters" is prohibited n233 unless a permit has been granted pursuant to section 404 of the Act. n234 The Corps of Engineers has the primary responsibility for issuing permits, but in doing so, it [*355] is required to apply "guidelines" developed by the Environmental Protection Agency ("EPA") in conjunction with the Corps. n235 In addition, the EPA can veto the granting of permits by the Corps on the grounds that the discharge will have "an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas." n236

The origins of section 404 and its placement in legislation purporting to deal with clean water do not suggest any commitment to the conservation of biodiversity. n237 The provision has, however, proved to be a flexible instrument on a number of levels. The ability of the EPA to veto a permit on the grounds of adverse effects on wildlife has led the EPA to develop section 404 as a tool for achieving biodiversity conservation on wetlands located on private land. n238

The EPA's approach is apparent in the detailed provisions of the EPA Guidelines, which are based on a broad ecosystem conservation perspective. n239 The Guidelines focus on the provision of ecosystem services, including not only those of immediate economic benefit to human beings, such as nutrient recycling/assimilation, maintenance of water quality (through filtration, flushing and aquifer recharge), and flood mitigation, but also the less tangible benefits associated with wetlands in terms of habitat and biological productivity. n240 In addition, against consistent resistance from the Corps, the EPA has striven to have the ostensibly narrow wording of the prohibition interpreted generously so as to expand both the areas and the types of activity covered by the section 404 program. n241

[*356] The EPA has had mixed success in its attempts to have the concept of wetland interpreted expansively. In *United States v. Riverside Bayview Homes, Inc.*, n242 the Supreme Court held that the scope of section 404 includes wetlands adjacent to rivers, regardless of whether water from the adjacent water body actually floods or permeates into them. n243 The Court left open the question of whether non-adjacent or isolated wetlands, such as prairie potholes, vernal pools and playa lakes, are covered. n244 More recently, the Seventh Circuit Court of Appeals held that isolated wetlands are covered by the existing rule n245 if it is proved that the particular wetlands in question represent potential

habitat for migratory birds. n246 On the other hand, as a result of a recent rule, section 404 no longer applies to 53 million acres n247 of "prior converted cropland." n248

[*357] In terms of the range of activities covered by section 404, the statutory prohibition against discharges into navigable waters has been expanded by regulation to include "any addition, including any redeposit, of dredged material, including excavated material, into waters of the United States which is incidental to any activity, including mechanized landclearing, ditching, channelization, or other excavation." n249 In theory, an escape route exists for those wishing to engage in these activities without securing a permit, provided that they prove in advance to the Corps and the EPA that a proposal would not destroy or degrade any waters of the United States. n250 Apart from this exception, the general position is that any land-degrading activities that stir up and move around the surface of wetlands will constitute a prohibited discharge of dredged material, even if this displacement involves no more than soil and sediment from the roots of an uprooted tree falling to the ground. n251

[*358] There are, however, exemptions from the section 404 permit requirements for a range of activities. These include "normal farming, silviculture, and ranching activities such as plowing, seeding, cultivating, minor drainage, and harvesting . . . or upland soil and water conservation practices," but not where discharge is incidental to the conversion of an area to a new use. n252 The courts have held that this land conversion exception means that a permit is still required for changes within broad categories of agricultural use (for example, from grazing to arable agriculture), and for intensification of arable use (but not for change of crops). n253

In practice, nearly all individual permit decisions are made by the Corps of Engineers. As of mid-1994, the EPA had exercised its veto only eleven times since the legislation was enacted in 1972, and only twice since 1989. n254 The Corps has its own set of guidelines that it applies when making decisions under section 404, with failure to satisfy these being an independent basis for refusal of a permit regardless of the position under the EPA Guidelines. n255 However, it is the application of the EPA Guidelines which has become crucial in the environmental context. n256 At first sight, the EPA Guidelines appear to take a cautious approach. They pronounce in clear terms that activities covered by the Guidelines will not proceed "unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern." n257

The Fourth Circuit Court of Appeals recently held that even where there are no practicable alternatives available (to satisfy a community's need for water, for example), the EPA can veto a permit solely on the basis of the unacceptability of the adverse [*359] environmental impact. n258 Under the Guidelines, a permit must be refused if there is a practicable alternative that would have less adverse impact on the aquatic ecosystem and would not have other significant adverse environmental consequences. n259 Practicable alternatives include avoiding discharge into wetlands altogether (as by locating an alternative upland site), n260 or discharging into another wetland location. n261 Where a project is not water-dependent, it is presumed, "unless clearly demonstrated otherwise," that practicable alternatives not involving wetlands are available. n262 It is also presumed that all practicable alternatives to discharge into a wetland [*360] will have less adverse impact on the aquatic environment than the discharge for which a permit is sought. n263

2. Assessing the Success of Section 404

Despite the precautionary measures that have been built into the decision-making process, there are consistent allegations that the section 404 program is failing to stem the flow of wetland conversion. These allegations focus on the large proportion of permits granted. n264 In response, it has been argued that the figures on permits denied fail to take into account those who, as a result of preliminary discussions, are discouraged from applying in the early stages of developing a proposal and those who later withdraw their applications. n265

The real issue from the perspective of biodiversity conservation, however, is not how many proposals receive approval, but rather the significance of the cumulative impacts of the activities given approval. Research by the Fish

and Wildlife Service ("FWS") indicates that between the 1780s and the 1980s, fifty-three percent (117 million acres) of the original wetland acreage in the conterminous United States was lost. n266 2.6 million of these acres were [*361] lost between the mid-1970s and the mid-1980s. n267 This figure, however, does not take into account human conversion of wetlands from one category to another: for example, over 1.3 million acres of swamp were lost in this way. n268 Freshwater wetlands accounted for ninety-eight percent of actual losses. n269 Conversions to agricultural land uses were responsible for fifty-four percent of the overall loss, although this represented a significant decline from previous periods. n270 In fact, wetlands losses as a whole appear to have slowed since the mid-eighties, as programs like Swampbuster n271 began to take effect and public awareness of the significance of wetlands increased. n272

Data collected by the Corps of Engineers between October 1, 1992 and September 30, 1993, indicates that during this period applicants for permits under section 404 were granted permission to impact about 11,600 out of the 14,600 acres for which applications were made. n273 This figure includes not only acreage lost through individual permits, but also an estimate of losses attributable to general permits subject to notice requirements. General permits are available to all those who are prepared to bring their activities within specified conditions, n274 thereby freeing them from the need [*362] to go through the individualized assessment ordinarily associated with a permit application. Of particular significance for biodiversity conservation is Nationwide Permit 26, n275 which authorizes discharges into headwaters n276 of nontidal streams and adjacent wetlands, and into isolated waters that do not form part of a surface tributary system, provided that the resulting loss n277 does not involve more than ten acres. n278

[*363] The Corps of Engineers data suggests that permits issued under section 404 are responsible for only a relatively small proportion of overall wetland loss. Yet when the cumulative losses of acreage over time is considered, the loss is substantial and certainly not sustainable. The loss should be seen as even less sustainable when it is considered that the calculations of annual wetland acreage lost do not reveal the significance of lost areas in terms of biodiversity conservation.

Although the EPA has worked hard to have biodiversity conservation placed on the agenda when it comes to decision-making under section 404, it remains only one of a number of factors that have to be taken into account when decisions are made. n279 It is also the most recent consideration and has the lowest public profile and acceptance. Section 404 began life as a device for allowing exceptions to be made to the general prohibition in section 402 of the Clean Water Act against polluting discharges into waters. n280 Because biodiversity conservation has been tacked on to an established regime operating under very different assumptions, we might expect it to lose out when it comes to the process of case-by-case decision-making. Insofar as other objectives, particularly the protection of water quality, can be met by the grant of conditional permits that allow development to proceed without fundamental adjustment, decision-makers would not likely undertake the radical reorientation that is almost certainly required to achieve biodiversity conservation. Biodiversity conservation will be achieved at the level of case-by-case decision-making, to the extent to which it is achieved at all, as a side-effect, consistent with decisions substantially reached on other grounds.

Finally, empirical research on the operation of one section 404 program points to serious flaws in implementation. n281 Corps personnel [*364] reviewing permit applications had neither sufficient time nor information on the sites in question to evaluate likely environmental impact. They failed to take advantage of rapid assessment techniques, and they failed even to consult their own records of permits already issued in a watershed to assess cumulative impact. n282 Yet they continued to grant individual permits in nearly eighty-two percent of applications that went to a decision, covering 422 acres. n283

3. Regulatory Flexibility or Regulatory Failure?

A closer look at the regulations indicates that there is in fact plenty of opportunity for the Corps to undermine the ostensibly precautionary elements built into the decision-making process and to pursue a policy of regulatory "flexibility" when making decisions.

When dealing with applications for individual permits, the Corps must take into account cost, existing technology, and logistics "in light of overall project purposes" in deciding whether an alternative is "practicable." n284 The fact that an alternative non-wet-land site is more expensive is a relevant factor. Alternative sites not currently owned by the applicant must also be reasonably obtainable. n285 The assumption is that this particular applicant must be given the opportunity of carrying out the activity, rather than leaving it to someone else. Moreover, in the past at least, the permit applicant has been allowed to define the nature and purpose of the project. n286 This approach effectively allows landowners to delimit the range of available alternative sites and effectively nullifies the requirement to seek out practicable alternatives.

Houck, in an incisive analysis of this problem, develops an approach to defining projects more broadly so as to breathe life into the search for alternatives. He proposes that agencies should [*365] identify the public purpose within a proposal and look for alternatives within this framework. n287 The problem with this suggestion is that once a project has reached the stage of permit application, it is simply too late to assert the predominance of the public definition of the project over the private. The developer is already proposing a particular use for a particular site and has a definite idea about the nature and shape of the project. The agency's assertion of a public element needs to be done well beforehand, at the stage of forward planning. The focus would then be on the optimum uses not only for the site in question, but for all others in the area. This would give developers a clear indication of how they could pursue their private interests within the broad framework of public need. Only at this early point in the process can the Corps realistically address the cumulative effects of a project n288 and begin to cut down the regulatory "flexibility" that endangers biodiversity values.

Another prominent device used by the Corps during the Reagan years to enhance flexibility was the "mitigation-buy-down." This device allowed the Corps to consider proposals to restore or create wetlands at another site so as to be able to reach the conclusion that no practicable alternative would have less adverse effect on the aquatic ecosystem. n289 Complete avoidance or minimization of environmental impact was thereby bypassed in the stampede to facilitate attempts at so-called "compensatory mitigation."

This practice has now been abandoned as a result of a Memorandum of Agreement ("MOA"), between the Corps and the EPA [*366in] 1990, on the application of the practicable alternatives test. n290 The agreement commits the Corps to a sequencing process whereby the option of compensating for wetland values only becomes available after potential impacts have been avoided to the maximum extent practicable n291 and those that cannot be avoided have been minimized "to the extent appropriate and practicable." n292

The EPA Guidelines n293 do not give prominence to wetlands compensation. Compensation is considered immediately after a provision that counsels avoidance of sites having "unique habitat or other value," n294 and is only referred to in the narrow context of minimizing impact on populations of plants and animals. The product of wetlands compensation must be of "higher ecological value," and the approach is to proceed cautiously in the face of scientific uncertainty: "[w]here proposed development and restoration techniques have not yet advanced to the pilot demonstration stage, initiate their use on a small scale to allow corrective action if unanticipated adverse impacts occur." n295 Moreover, a recent decision upholding an exercise of the EPA's veto power shows that the agency's approach is to contemplate compensatory mitigation only in exceptional circumstances, and then only where the mitigation is undertaken in the same watershed and will replace the functional values that will be lost. n296

Recent developments, however, reinforce the suspicion that wetlands compensation will be used to ensure the "flexibility" needed to allow development to proceed in most cases by legitimizing further destruction of existing wetlands. Although the possibility of compensating for wetland values has been downgraded [*367] by the MOA, n297 it still remains an option. While the MOA emphasizes the scientific uncertainty associated with wetland *creation* and the need for long term monitoring and possible remedial action, n298 it is more optimistic about wetland *restoration*. Compensatory actions on adjacent or contiguous areas are preferred, but where this is not feasible, it is to be undertaken in the same geographical area "if practicable." n299 In-kind replacement of functional values lost as a result of the proposed activity is "preferable," not required. n300 Although the goal is no overall net loss of wetland

values and functions, there is no guarantee that this goal will be achieved in every permit decision. n301 In the face of scientific uncertainty about wetland functions and values, functional replacement means replacement of an equivalent area. n302

From one perspective, this is the language of "flexibility." n303 From another, it is an indication of potential regulatory failure. Provided that avoidance and minimization have been fully explored, there is a strong suggestion that the Corps will routinely approve projects on the basis that loss of wetland values and functions will be compensated. The possibility of outright refusal is confined to a footnote in the MOA. n304

[*368] The suspicion that compensation through creation and restoration of wetlands is to be the new technological fix to the wetlands problem is reinforced by the Clinton Wetlands Plan of 1993. This document is as much about protecting landholders from regulatory burdens as it is about protecting wetlands from landholders. The emphasis in the Plan is on flexibility and compromise. n305 In most situations "the federal agencies can work with permit applicants to design projects that meet the requirements of the law and protect the environment and public safety, while protecting the property rights of the applicant." n306 The Plan endorses the use of mitigation banks, composed of wetlands restored or created expressly for the purpose of providing compensation in the future, to help attain the interim goal of no overall net loss of wetlands. n307 Statistics confirm that there is a considerable amount of wetland creation and restoration taking place, some of which is being implemented under the section 404 program. n308

It is one thing to espouse the restoration of degraded wetlands, or even the creation of new ones, as a means of recovering the values and functions that have already been lost, with a long-term goal of increasing the wetlands resource. n309 It is quite another to advocate restoration and creation as devices to excuse and legitimate the continued destruction of relatively undisturbed wetlands. [*369] At this point, scientific evidence (examined below) indicates that regulatory flexibility becomes regulatory failure.

4. Replacing Certain Losses with Uncertain Gains

The whole idea of wetlands restoration and creation as compensation for further destruction of wetland values is riddled with problems. The science of wetlands mitigation is still in its infancy, and the creation of wetlands substitutes are frequently not successful. A report by a team of experts assembled through the EPA's Wetlands Research Plan found significant variations in information about restoring and creating wetlands, depending on type, ecological function, and region of the country. n310 Total failures in replicating ecosystems have been common for certain types of wetlands, n311 with failure particularly related to problems in restoring or creating the correct wetland hydrology. n312 Other important variables to consider in attempting to create or restore wetlands include the complexity of vegetation and the availability of seeds and plant stock.

There have been severe methodological problems in past projects, including both a lack of monitoring and an inadequate definition of success. Success has often been assessed on the basis of compliance with permit requirements or establishment of vegetation in the short term, rather than on whether natural wetland functions have been replaced and will persist over time. A major problem is the difficulty in measuring the functions provided by [*370] natural wetlands. n313 The most that can be hoped for is "approximation" of some wetland types, and the restoration or creation of certain wetland functions. Little is known about the extent to which restored or created wetlands will provide suitable habitat for animal species, n314 or whether they will be as persistent as natural wetlands. In terms of regulatory policy, the Wetlands Research Plan report argues that proposals "must be viewed with great care, particularly where promises are made to 'restore' or 'recreate' a natural system in exchange for a permit to destroy or degrade an existing more or less natural system." n315 Due to the lack of knowledge in this field, wetland restoration should be preferred over wetland creation, and adequate provision must be made for management over time. n316

As recently as 1992, another publication n317 continues to emphasize problems of monitoring. Past projects are essentially regarded as experiments from which we will be able to learn, n318 but we will only learn from them if we have adequate monitoring arrangements in place. n319 An analysis of section 404 permits granted in the 1970s and

1980s reveals a very poor monitoring record of mitigation projects. Less than fifty-five percent of the permits analyzed required that the project be monitored through a site visit. Assessment of success was also problematic, particularly the failure [*371] to consider the fact that wetlands types introduced through mitigation frequently differed from those destroyed and resulted in net losses in area of certain wetland types. n320

5. Assessment

Some argue that the problems with the section 404 program arise from a failure of implementation, which is best dealt with by changing the enforcement agency or further restricting its discretion by closing down loopholes that weaken regulatory control. Blumm and Zaleha, for example, have argued that the central impediment to "an effective regulatory program" has been the unwillingness of the Corps of Engineers to carry out aggressive implementation, n321 and they recommend that its role in granting permits should be terminated. n322 Houck contemplates this possibility, but then questions whether the EPA would have the resources or "the political will to make significantly different decisions on permits once it had the responsibility not simply to comment but rather to decide." n323 The answer is almost certainly no. Houck instead recommends restricting the discretion of the permit-granting agency. n324

Neither of these approaches goes to the root of the problem. The flaws with the section 404 program involve much more than implementation failure -- they lie in the very structure of legislation based exclusively on command and control. n325 The analysis of the Endangered Species Act below will show that the regulatory failure [*372] of section 404 of the Clean Water Act is replicated in other biodiversity conservation strategies rooted in command and control.

B. The Endangered Species Act

The Endangered Species Act of 1973 ("ESA") n326 was adopted in response to Congressional findings that some fish, wildlife, and plant species had become extinct or were in danger of extinction due to unregulated economic growth and development. n327 Its goals are to provide "a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the [conservation] treaties and conventions" entered into by the United States and the international community. n328

1. The Taking of Endangered Species and the Concept of Harm

The direct relevance of the ESA to private landholders is that it makes it unlawful to "take" a species of fish or wildlife, n329 listed as endangered or threatened, n330 anywhere in the United States, n331 unless the "taking" is incidental to, and not the purpose of, an otherwise lawful activity, and an incidental taking permit has been granted under section 10. n332 From the perspective of biodiversity conservation, the most obvious shortcoming of this provision, apart [*373] from the narrow species focus, is that it offers no direct protection to plants. n333 It is only unlawful to damage or destroy plants on private land where this involves a knowing breach of state law (or is a violation of state criminal trespass laws). n334

Whether or not the destruction of habitat amounts to a taking of endangered species has recently become controversial as a result of the decision of the D.C. Circuit Court of Appeals in *Sweet Home Chapter of Communities for a Greater Oregon v. Babbitt*. n335 For some time, the Fish and Wildlife Service ("FWS") has operated on the assumption that habitat destruction can constitute a taking in certain circumstances. The ESA defines a taking to mean, among other things, "harm." n336 The FWS has in turn defined harm as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering." n337

In *Palila v. Hawaii Department of Land and Natural Resources*, n338 the Ninth Circuit Court of Appeals held that

habitat destruction that could drive a species to extinction constituted "harm" and therefore a prohibited taking under section 9 of the ESA. n339 Even [*374] failure to carry out appropriate management activities may constitute a taking. The Fifth Circuit, in *Sierra Club v. Yeutter*, n340 held that failure by the Forest Service to implement management obligations approved by the FWS in a biological opinion issued under section 7 of the Act was a taking. n341 However, in *Sweet Home* the D.C. Circuit held that the definition of "harm" in the regulations was invalid because the concept of "harm" does not include habitat modification. n342 Relying on the context of the other criteria in the ESA definition of a "taking," the Court found that "the words of the definition contemplate the perpetrator's direct application of force against the animal taken." n343 If the *Sweet Home* standard of harm survives, n344 the taking provisions of the ESA will be rendered substantially impotent with regard to the conservation of biodiversity. On the other hand, if the FWS definition of harm is ultimately upheld, the ESA, at least on its face, would appear supportive of biodiversity conservation on private land.

2. ESA Section 10 and Incidental Taking

Section 10 of the Act allows a permit to be issued for the incidental taking of listed species under certain circumstances. An incidental taking is defined by the ESA as "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." n345 As under section 404 of the Clean Water Act, n346 the provisions are framed in precautionary terms. In order for an applicant to obtain a section 10 permit, he or she must submit a conservation plan that specifies:

- [*375] . the likely impact of the taking;
- . steps to be taken by the applicant to minimize and mitigate impact;
- . funding available to implement such steps;
- . procedures to be used to deal with unforeseen circumstances;
- . alternative actions to the incidental taking considered by the applicant, n347 and the reasons why they are not being taken;
- . any other measures required. n348

Rather than placing the burden of devising an adequate conservation strategy on the agency responsible for issuing a permit, the ESA imposes this burden on the applicant through the conservation planning requirement. In practice, however, the FWS attempts to ensure that planning initiatives are carried out at a regional level. n349 Initiatives seek to cover all habitat of a listed species in the proposed development area n350 and provide for extensive public scrutiny. n351

Before granting a permit, the Secretary of the Interior must be satisfied that (1) the applicant will minimize and mitigate the impacts of the incidental taking "to the maximum extent practicable," (2) adequate funding for the plan will be provided, and (3) procedures will be established to deal with unforeseen circumstances. n352 This precautionary approach in the decision-making process is reinforced by the requirement that the taking must not "appreciably [*376] reduce the likelihood of the survival and recovery of the species in the wild." n353

Early results appear to show that the permit system has been rigorously implemented. Very few conservation plans have been completed and, as of the beginning of 1994, only twenty-one incidental taking permits had been issued. n354 There have been some indications, however, that this situation is changing. n355 In addition, plans that have been approved involved significant compromise in terms of loss of habitat of listed species. n356

[*377] 3. Section 7: No Jeopardy or a Real Threat?

An unknown proportion of activities on private land are escaping the constraints of Section 10 because they are being channeled through the "no jeopardy" provisions of ESA section 7. Section 7 requires federal agencies to ensure that their activities are not likely to jeopardize the continued existence of endangered and threatened species, or result in the destruction or adverse modification of critical habitat. n357 The section 7 procedures cover not only activities

carried out directly by federal agencies, but also activities of private landholders with a federal nexus. This nexus exists where private action requires the prior authorization of a federal agency, n358 for example, where activity on privately owned wetlands requires a permit under CWA section 404. n359 It is estimated that approximately one-half of the animals and almost one-third of the plants currently listed as endangered or threatened in the United States depend on wetlands for their survival. n360

If there is a jeopardy finding under section 7, the Secretary can still suggest any "reasonable and prudent alternatives" that will allow the agency to comply with its duties to avoid jeopardy and adverse modification. n361 If these alternatives involve an incidental taking, the FWS must provide a statement with its biological opinion specifying the impact of the taking, reasonable and prudent measures needed to minimize harm, and conditions that must be [*378] complied with to implement these measures. n362 If an activity is approved under the "no jeopardy" provisions and complies with the conditions designed to minimize the incidental taking of species, it does not constitute a prohibited taking under section 9. n363

The significance of the movement of projects on privately owned land into the section 7 procedure arises from the fact that section 7 places fewer demands on the applicant n364 and also provides for a tighter time schedule. Under section 10 it is the applicant's duty to create an acceptable habitat conservation plan, however long it takes. In contrast, under section 7 this burden is shifted to the authorizing agency and the FWS, n365 and they must normally conclude formal consultations within 90 days. n366 There is no provision for public participation in the section 7 assessment process, [*379] as exists in section 10. n367 After the consultation under section 7 has been completed, the Service has only forty-five days in which to make a finding (the "biological opinion") as to whether there is likely to be jeopardy to the continued existence of listed species. n368 This period cannot be extended without the applicant's agreement. n369 In practice, these procedures are diluted even further because most proposals are dealt with under provisions that allow informal consultations without producing formal biological opinions. n370 When formal consultations are carried out, jeopardy opinions are rare, and even when jeopardy is found, "reasonable and prudent" alternatives are usually identified. n371

4. Flexibility as Failure Under the ESA

The tendency for projects on private land to be diverted into the less demanding section 7 procedure is one illustration of the regulatory "flexibility" that is the hallmark of command-and-control environmental regulation in practice. n372 Yet the ESA provides [*380] more significant opportunities for regulatory flexibility that adversely impacts biodiversity conservation. In particular, the process by which a species is placed on the endangered species list in the first place is flawed. Even though the prohibition on taking species might "bite like a pit bull" when it does bite, in reality its protective bite is very selective. It affects only a narrow class of species that have been identified in advance and listed n373 after a cautious and lengthy planning process. The potential problems that have arisen under CWA section 404, n374 stemming from uncertainty in the precise areas covered by the regulatory system and lack of specific and detailed justification for conservation in particular instances, have been addressed in the ESA through the inclusion of a for-ward-planning process based on individual listings. However, this has resulted in "front-end" regulatory failure under the ESA.

As with the section 404 permitting program, some writers attribute these failings to a lack of administrative will in the implementation of the legislation. Houck argues that even though the listing provisions are not subject to the loopholes and qualifications found in other parts of the Act, the regulatory agencies have exploited the little flexibility that does exist to avoid creating listings. n375 Although he acknowledges that there has been a shortage of funds for the listing process, he argues that this has not been a genuine constraint, but rather "an opportunity to limit the Act." n376 In particular, provisions of the legislation that allow conservation arrangements already in place to be taken into account in making listing decisions n377 have been relied upon to avoid creating a listing or to downgrade a listing from endangered to threatened. n378 In [*381] addition, a considerable number of species have remained in the "warranted but precluded" category for lengthy periods of time. n379 In these "precluded" cases, the Secretary has decided that listing is justified but that formal processing should be delayed because resources are limited and other

pending listing proposals are more urgent. n380

The situation has changed substantially since Houck's research was completed. The FWS, in an out-of-court settlement with a number of conservation groups, has made a commitment to propose for listing by September 1996, or to make judicially reviewable its decisions not to list, 401 species for which there appears to be enough scientific data to support listing, but that have not been formally processed because of other demands ("category 1 candidate species"). n381 In addition, within a set time frame, the FWS will either review species that have been previously classified as "warranted but precluded," or classify them as category 1 candidate species and assign them a listing priority number in accordance with the Service's priority system. n382

[*382] *5. The Quest for Proof as Regulatory Failure*

Front-end regulatory failure under the ESA also arises from the difficulties created by the requirement that a special, scientifically grounded case be made before protected status is conferred on a species. While Houck focuses on the scandal of those species that remain unlisted even though there is scientific proof that they are endangered or threatened, n383 there are other species that are not included in the listing process because of a lack of adequate scientific evidence. Houck has suggested that the criterion for listing is "simple and unexceptional: the decision need only be scientifically sound." n384 Yet behind the apparently simple facade of scientific soundness lies a whole realm of scientific uncertainty n385 with which the legislation fails to grapple. The seeds of regulatory failure are sewn into the very structure of the ESA and cannot be explained away as a failure of implementation.

The magnitude of this problem becomes apparent when viewing the list of "category 2 candidate species" kept by the FWS. These are species native to the United States for which a listing proposal is "possibly appropriate," but "sufficient data on biological vulnerability and threat are not currently available to support [*383] proposed rules." Further biological research and field study are needed, and it is hoped that the periodic notices issued by the FWS will encourage this. n386 The most recent listings of species native to the United States falling into this category contain 1840 vertebrate and invertebrate animal taxa and 1700 plant taxa. n387

Listing decisions must be made "solely on the basis of the best scientific and commercial data available . . . after conducting a review of the status of the species." n388 "[S]ubstantial scientific or commercial information" must be produced by a petitioner before the FWS is required to conduct a formal review. n389 This threshold test is defined as "that amount of information that would lead a reasonable person to believe that [listing] may be warranted." n390 Only eighteen percent of petitions have failed to satisfy this test. n391 The legislation is silent, however, on the standard of scientific proof that must be satisfied before a species can be listed. n392 Ultimately, the FWS is free to conclude that there is insufficient evidence to justify a listing, n393 but there remains no indication of the standard by which sufficiency is determined.

Ostensibly technical uncertainties, such as the threats to which a species is exposed and its current population status, pervade the listing process. Determining accurate population estimates is particularly problematic as statistically significant samples of individuals spread over a large area are difficult to obtain. The fact that many species are very sensitive to human contact exacerbates this [*384] problem. n394 In theory, these uncertainties can be resolved by more and better research, but in practice, it is not quite so simple, as shown by the following examples.

The technical question that arose in listing the Louisiana Black Bear was whether it had crossbred with other subspecies of American black bears that had been transplanted into its historic range. The decision to list was preceded by a peer-reviewed study that found no available data to indicate that it was not a valid subspecies. An internal panel of FWS specialists was supportive of the listing but considered the data weak and deserving of further study. Additional studies provided no significant new data. n395 In another case, the fate of the Steller's eider hung on a difference of opinion as to the adequacy of the available biological data between the Alaska Regional Director of the FWS and the Assistant Director for Fish and Wildlife Enhancement. n396

Since the mid-1960s, studies had documented the vulnerability of the Jemez Mountain salamander to forest management practices, and its susceptibility to extinction. It was listed as endangered under New Mexico state law in 1975. n397 Between 1986 and 1992, biologists sampled over 200 sites that were likely habitat for the salamander, and found five or more of them at only 21 sites. n398 Nevertheless, the lead FWS biologist found that the biological evidence was not convincing because the data did not sufficiently establish a causal link between modifications to the salamander's habitat, particularly those resulting from logging, and the declining populations. Another biologist regarded the biological data as clearly supporting listing. n399

These examples indicate that, in practice, the question of whether there is enough evidence to justify listing is not a purely technical [*385] question. The process tolerates substantial differences of opinion, and there is no "correct" answer. There is a large element of discretion, the exercise of which can be influenced by personal values, organizational priorities, and political considerations. n400

The FWS has responded by attempting to ensure the reliability of the scientific evidence that goes into listing decisions. It has recently announced that the data and assumptions relating to taxonomy, population models, and supportive biological and ecological information for species under consideration for listing, are to be peer reviewed by three independent experts. n401 In addition, a number of other steps are to be taken to ensure the reliability and credibility of information used in the listing process. FWS biologists must document their evaluation of information that supports or fails to support a proposed official agency position. The evaluations are then subjected to management level review. n402

This emphasis on ensuring the reliability of data will inevitably result in more species not being listed because of a lack of adequate scientific information. Organizations in search of ways to avoid conflict and uncertainty will use scientific uncertainty to justify delay in taking action. n403 An ill-defined standard of scientific proof can be used to legitimate decisions motivated by quite different factors, ranging from an agency's natural desire to avoid conflict and the loss of public and political support, to direct political interference. n404 In addition, the scientific method is inherently conservative and scientists are loathe to make unequivocal statements, emphasizing instead the need for more research. n405

As well as meaning that some species do not get listed at all, the quest for adequate scientific proof delays listing for other species. [*386] Amassing adequate scientific proof is a time-consuming procedural obstacle course that must be navigated before a species is listed. The agencies do not have the resources to gather evidence themselves, so they must rely on an information network comprising the scientific community, state game and fish agencies, and interest groups. n406 The search for all available scientific evidence requires procedures to ensure opportunities for experts to contribute to the scientific debate. n407

Where listing proposals are triggered by a petition, n408 the Service has ninety days, "to the maximum extent practicable," to decide whether the threshold test has been satisfied. If the threshold is met, the FWS has an additional nine months to complete a review of the status of the species. n409 If the Secretary decides upon review that listing is warranted, its formal processing can still be delayed because other pending listing proposals are regarded as more urgent. n410 The opportunity for public comment can further delay listing for up to a year. n411 In spite of the clear direction to base a decision on the best data *available*, n412 the FWS can extend the period of review from one year to eighteen months to solicit additional data, not only where there is substantial disagreement among knowledgeable scientists over the accuracy of the available data, [*387] but also when there is dispute over its sufficiency. n413 In practice, the FWS is frequently in breach of some of these time limits due to the need for further study and additional biological data. n414 One writer has concluded:

In short, the changes since 1966 have altered the burden-of-proof requirements associated with the listing process . . . the evidentiary requirements have multiplied. Decisions are far more technically and procedurally elegant than they were in the past. In contrast, the additional listing requirements probably reduce the likelihood that many vulnerable species will receive the benefits of any doubt. When doubt

exists or when sufficient information is unavailable, the existing listing requirements encourage delay or additional research. n415

6. *Applying a Precautionary Approach to Scientific Proof*

A fundamentally different approach from one that demands a high degree of scientific proof before listing would instead *presume* listing is required when faced with scientific uncertainty. In other words, in a situation of potential irreversible loss, we should proceed cautiously n416 and be prepared to carry out protective action even though the threat to the species concerned cannot be proved according to traditional canons of scientific proof. This approach to decision-making is encapsulated in the moderate version of the precautionary principle found in the Preamble to the United Nations Convention on Biological Diversity: "where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing [*388] measures to avoid or minimize such a threat." n417 If the process of listing endangered or threatened species risks potentially irreversible mistakes instead of erring on the side of caution, then the precautionary approach embodied in the permit system for incidental takings under section 10 of the ESA n418 simply shuts the stable door after the horse has already bolted. n419

One author has taken the further step of suggesting a complete reversal of the burden of proof: lack of evidence about a species' conservation status would be regarded as evidence of endangerment until proven otherwise. n420 From another perspective, difficulties of scientific proof stem directly from the narrow focus of the legislation upon individual species rather than entire ecosystems. n421 It is obviously impossible to produce scientific proof of the conservation status of the many invertebrate species not yet known to science. Yet many of these may be playing vital roles in ecosystems. If the focus was on the conservation of ecosystems or landscapes rather than species, it would be much easier to satisfy even a demanding burden of scientific proof. n422

[*389] 7. *Assessment*

The failure of the Endangered Species Act, as with the Clean Water Act, lies not simply in a failure of administrative will, but in the very structure of the legislation. The first step in remedying this flaw involves reconceptualizing the problem to focus on early protection of ecosystems rather than last minute resuscitation of individual species. n423 This, however, is only the first step.

VII. A NEW PARADIGM FOR BIODIVERSITY CONSERVATION

A. *Lessons to be Learned from Existing Strategies*

There are fundamental difficulties with the use of command-and-control regulation given the specific contours of the problem of biodiversity conservation on private land. We have seen that regulatory agencies will exploit to their limits any opportunities for "flexibility" in command-and-control systems. On top of this, simple restrictions on land use will not suffice. The land must be managed positively on an ongoing basis. Regulation may succeed in restricting activities, but it is incapable of generating positive activity. The sensitive management of land for biodiversity conservation in the context of widespread scientific uncertainty will not be brought about through commands backed by threat alone. Moreover, even the use of regulation to impose land-use restrictions [*390] faces insuperable enforcement problems. The areas to be policed are large and often remote, and the problems of proof are daunting. n424 Yet a great number of landowners will only cooperate with command regulation if it is accompanied by realistic threats of vigorous enforcement. We cannot expect them to comply out of commitment to the values that the law embodies. These are important strategic considerations to be considered in designing effective policy instruments.

Rather than trying to close loopholes in the existing command-and-control system, we must begin to question the very use of this form of regulation in its pure form as a policy instrument to address the problem of biodiversity

conservation on private land. Society is not yet ready for vast regulatory incursions into the historically privileged realm of private property n425 without some *quid pro quo*, at least when these incursions are carried out in the name of biodiversity conservation.

Purely voluntary programs, on the other hand, could buy management in addition to land-use restrictions, but the cost of paying compensation as well as management fees is likely to be prohibitive. Further, we cannot afford to leave the choice of areas to be protected to the whims of the marketplace, and particularly to those prepared to hold out for ever-larger sums, even where government is the major player. n426 If the objective is to reduce surplus supplies of agricultural commodities, it does not matter which producers from which areas of land are induced to cooperate, so long as enough of them do so. Even with the additional objective of reducing soil erosion or water pollution, flexibility still exists in terms of the precise areas protected. Such flexibility is not available, however, if remnant habitat, buffer zones around core conservation reserves, or wildlife corridors exist on private parcels belonging to uncooperative landholders.

[*391] *B. Combining Sticks and Carrots*

If biodiversity is to be protected, the focus of conservation cannot be restricted to species. The vision must encompass whole ecosystems. We can no longer confine our attention to wetlands, as when the primary concern was water quality and quantity. We must look to the uplands. We must move away from development control and incentives delivered on an ad hoc basis. Instead, interventions should be targeted through careful forward planning that takes a precautionary approach, while avoiding the extremes represented by the constipated listing process of the Endangered Species Act and the uncertainty of wetlands delineation under the Clean Water Act. Yet these fundamental changes to command-and-control policy are inconceivable in the current environment in which conservation groups are fighting to retain what they have gained through regulation against a sustained assault from a private land lobby set on replacing the Supreme Court's Fifth Amendment takings jurisprudence with statutory guarantees of compensation where land-use restrictions are imposed. n427

As we have already seen, however, command-and-control regulation is insufficient on its own. It needs to be combined with financial incentives to induce landholders to manage their land. The provision of incentives seems likely to make the fundamental changes to command-and-control regulation outlined above more palatable to landowners and politically more attractive. We cannot abandon command and control altogether. It must at least form the backdrop to voluntary negotiations between landowners and the community, and work to undermine the ideology of private property by setting the basic ground rules within which voluntary negotiations are conducted.

[*392] *C. Paying Compensation?*

One approach to conserving biodiversity on private land would combine regulation with compensation in those situations where land use is actually restricted. n428 The existing United States approach could be characterized in this fashion. n429 Under the *Fifth Amendment to the United States Constitution*, private land-use regulation at a certain level of impact must be accompanied by just compensation. n430 In practice, however, those seeking some *quid pro quo* for the imposition of land-use restrictions will ordinarily have [*393] no clear rule on which to fall back. n431 They must pursue the holy grail of compensation through case-by-case adjudication in the courts, and they will usually fail. n432 The ultimate decision will depend on weighing factors such as the economic impact of the regulation on the applicant, particularly the extent to which it interferes with distinct investment-backed expectations, and the character of the government action. n433 The resulting uncertainty significantly decreases the efficiency of Fifth Amendment adjudication as a method for delivering effective incentives to private landholders to change their behavior. As a result, the regulatory response loses all of the advantages associated with a system that softens the blows of the stick by offering an easily grasped carrot in the form of an up-front financial inducement.

Following the U.S. Supreme Court's decision in *Lucas v. South Carolina Coastal Council*, n434 we can at least be sure that a taking occurs when regulation deprives a landowner of all economically [*394] beneficial or productive use of the land in question, unless the proposed use violates background principles of nuisance or property law. n435

Regulations designed to conserve biodiversity, however, will not necessarily mean sterilization of the land, in the sense that it cannot be used for any economically productive use. Some land uses may be consistent with conservation, while others may simulate natural conditions. n436 Human hunters may provide an effective substitute for large predators, such as the wolf, which have been driven out of some ecosystems. Heavily restricted recreational opportunities may still be compatible with the primary objective of biodiversity conservation. Areas that are designed as buffers rather than core conservation areas will be able to tolerate limited agricultural and residential development. There is nothing in *Lucas* that would mandate compensation in such situations.

Apart from this, the Federal Circuit has recently emphasized that, in determining whether land has effectively been deprived of all market value by a permit denial under section 404 of the Clean Water Act, the presence in the market of speculators who do not want to develop immediately, but are prepared to hold the land for a period of time, must be taken into account. n437 Even if land speculators do not have extensive knowledge of the regulatory impact of the wetland provisions on development potential, assessors cannot ordinarily discount their purchases as "aberrational" when determining the market value of the land. n438 This suggests that decisions by courts that land has been deprived of all economically beneficial use and is therefore a compensable taking will be the exception rather than the rule. If greater cooperation from landowners requires financial inducements, the Fifth Amendment has little to offer.

Commenting on the rule in *Lucas*, Sax has argued that the significance of the decision lies in the implicit conclusion that compensation is due even if the regulation in question has an important ecological purpose. n439 This represents a reassertion of the [*395] conventional view of private property within "the transformative economy," where undeveloped land is perceived as essentially inert until it is put to use. n440 An alternative ecological view of property is now emerging, with land conceived as part of "the economy of nature" as well as the transformative economy. The *Lucas* decision represents an attempt to limit the legal foundation for such a conception.

According to Sax, this new perspective acknowledges that land is already delivering ecosystem services to human beings and performing public functions in its natural state. n441 In these circumstances, compensation ought not to be paid, even where the regulated landowner is left with no economically viable use of land. n442 Sax recognizes some of the problems with this approach n443 and envisages an obligation on the part of government to alleviate the pain of the innocent, n444 but there are more fundamental objections to a regulatory approach that offers nothing at all to landowners who are subjected to significant land-use restrictions.

Evidence suggests that regulatory agencies faced with making case-by-case decisions on permissible land use are less likely to compromise where they have something to offer as a palliative for decisions that bear harshly on individuals. An example from outside the United States is instructive.

Prior to the enactment of the Native Vegetation Management Act of 1985, n445 land clearing on private land in South Australia was regulated through a command-and-control regime, with an exception for landholders who successfully applied for a permit. n446 The [*396] 1985 legislation prohibited land clearing without consent from the Native Vegetation Authority, subject to a number of exemptions, including grazing by domestic stock and clearance of regrowth and shrub invasion in certain carefully defined circumstances. n447 For nonexempt activities, owners of land who were given a conditional approval or were refused consent could generally insist that the Minister enter into a heritage agreement. Once this had been concluded, the landowner was entitled to the payment of "a sum of money" based on diminution in the market value of the land. n448 The most notable effect of this approach was a significant decline in the number of permits granted. Of the total area for which applications were made between 1986 and 1989 involving broadacre clearing, over ninety-three percent was protected by outright refusals. Under the previous command-and-control regime, eighty percent of applications had been approved. n449

This example suggests that the availability of some form of financial inducement makes it politically easier for regulatory agencies to say "no" to development. They are less likely to seek the "flexibility" that they have discovered in the provisions of the Endangered Species Act and the Clean Water Act when they can soften the blow of outright refusal by offering something to landowners in return. However, there is a competing scenario: if regulators have to

reach a financial settlement when they regulate, they may be more *reluctant* to regulate. This is clearly the concern of those who fear a greater preparedness by the courts to find compensable regulatory takings under the Fifth Amendment. n450

[*397] There are three responses to this suggestion of increased regulatory reluctance. First, such an effect could be mitigated if the circumstances under which payments need be made were delineated clearly and made an integral part of statutory programs. Second, much may depend on the precise form that the financial payment takes. Agencies that believe they are getting something worthwhile from the landowner over and above restrictions on land use are less likely to view the payment negatively. Finally, the availability of a financial return in some shape or size will lessen the hostility of landowners to regulation and make enforcement of land-use restrictions easier. Disgruntled landowners make poor conservationists. Besides, the imposition of land-use restrictions is only the first step in conserving biodiversity. Active management and restoration are crucial, and the degree to which management objectives have been achieved needs to be continually monitored. n451

In light of these considerations, the real issue may not be whether landowners should receive some form of financial payment in conjunction with command-and-control regulation, but whether that payment should be delivered in a form different from compensation. By offering to pay compensation, we actually put landowners in a better position by reducing the element of individual risk frequently associated with investment in development, particularly agricultural activities. n452 We also allow landowners to externalize the problem and deny that they have any responsibility for the conservation of biodiversity. Compensation is backward-looking and has nothing to say about the future management of land. Instead of landowners being given some degree of ownership of the issue of biodiversity conservation and a real stake in addressing it, we allow them to wash their hands of it.

[*398] A potentially crucial distinction may have to be drawn between regulations that require the modification or abandonment of existing uses, such as grazing and hunting, and those that merely interfere with speculative uses, such as real estate development. In several instances the Supreme Court has upheld legislation that constrained existing land uses against accusations of regulatory taking. n453 On the other hand, in the absence of a speculative land market, a regulation that requires termination of existing grazing and hunting activities may come perilously close to a *per se* taking under the rule in *Lucas*. The approach usually taken in land-use planning legislation has been to grandfather existing uses by excluding them from new regulations, or by allowing landowners time to adjust. n454 The expectation is that the market itself will ultimately make it worthwhile for landowners to abandon existing uses and bring land use into conformity with the plan.

In the present context, financial inducements delivered to landowners in the form discussed in the following Part -- as payments for biodiversity management rather than compensation -- may prove sufficiently attractive to make voluntary abandonment of the existing use a viable proposition. Yet suppose that they are not attractive enough, and society cannot afford to wait? Where the conservation of biodiversity demands that an existing operation be shut down altogether, there should be compensation *for the loss of that operation*. The disruption to lifestyle and expectations involved in terminating an existing activity is of a fundamentally different nature from the disappointment stemming from a lost opportunity to make speculative gain.

To those who would counter that speculators may lose the premium that they have paid for land based on its development value, the response must be that the market will quickly adjust and factor into prices any significant new risk of development not being [*399] allowed because of biodiversity considerations. No equivalent comfort can be offered to those who have already invested not simply in the purchase of land, but in a way of life.

Even if the payment of compensation is conceded in the limited context of existing uses, it is nevertheless important to pay careful attention to the question of quantum. There is a strong argument that, in determining the amount of compensation, the private benefit foregone, in terms of loss of the existing use, should be *discounted* to take into account the *public* costs that have been avoided by termination (for example, in terms of prevention of pollution and loss of biodiversity). This is simply an extrapolation of the "polluter pays" principle. n455 As increasing

recognition is given to the hidden subsidies represented by the currently externalized public costs resulting from activities carried out for private gain, and as regulatory legislation moves towards adopting the "polluter pays" principle, market values will inevitably adjust to internalize these costs. In the meantime, it is important to remember that the United States Constitution refers to "just compensation," not market value. n456

D. Paying for Management

The jurisprudence of regulatory takings under the Fifth Amendment attempts to balance the legitimate claims of the public interest in a scarce resource against interference with private expectations relating to land use. It is extremely doubtful, however, whether current doctrine represents an adequate resolution of this conundrum. Those who win, by just managing to drag themselves over the regulatory takings line, take all, without incurring any future stewardship responsibility in relation to their land, while those who fall short get nothing, even when the land's value has been substantially reduced. n457 An alternative approach would be to pay landowners [*400] whose land is subject to land-use restrictions designed to promote biodiversity conservation to manage their land in a way that is sensitive to the achievement of this objective.

Unlike compensation, stewardship payments are forward-looking. They are based on the extent of management activity required and carried out, rather than on the reduction in market value of the land. They are more equitable than compensation because they constitute payment for work performed, rather than being based on what are frequently chance factors relating to the development value of land. Basing payments on management for biodiversity production would encourage landowners to perceive elements of biodiversity, such as endangered species, as assets, rather than the liabilities that they currently represent. n458

Stewardship payments are also congruent with justifications for private property that emphasize its role not only in respecting the individual's sense of dignity, but also in developing a sense of personal responsibility to the community. n459 Instead of telling landowners that they are being compensated to keep their destructive hands off the land, the message is that they have a vital role to play, a role that the community regards as sufficiently important that it is prepared to pay for it. The symbolism inherent in the language is crucial.

Claims of economic hardship n460 are also addressed by such a scheme. Payments to many farmers and ranchers can be depicted as a response to existing hardship arising from low prices for traditional agricultural commodities. Moreover, in some situations management for biodiversity conservation may tolerate some degree of productive use. Those whose primary objective is to develop land rather than to sustain a threatened lifestyle may be dissatisfied, but frustrated expectations are much less compelling than the concrete losses experienced when an existing operation is [*401] scaled back. By making the conservation of biodiversity viable as an alternative, economically beneficial use of the land, we specifically address the scenario contemplated by the *Lucas* decision. A market for land that attracts stewardship payments will inevitably develop, and frustrated developers will be able to sell to those seeking an alternative lifestyle, albeit at a price that, in present circumstances, is likely to be heavily discounted.

Paying farmers on marginal land to manage it for biodiversity conservation would be attractive from a political perspective. This policy would work best on small farms with areas of remnant vegetation or areas suitable as buffers or corridors, where existing operations are economically marginal. Many small landowners prefer to remain on the land, and social policy favors such a result. n461 The crucial variable becomes the degree of management activity carried out by a landowner rather than the amount of land under his or her control: small areas of remnant vegetation, for example, are likely to require more intensive management than large ones. In essence, society is simply paying for the production of an alternative commodity -- biodiversity.

As demands for economically efficient and self-reliant agriculture develop, this approach will provide an alternative and more politically palatable form of income support than current agricultural price support schemes, n462 which contain basic flaws from the perspective of environmental policy. n463 The cornerstone of current [*402] U.S. commodity programs is the guarantee of "deficiency payments," n464 based on yield, to farmers of certain

commodities such as corn, wheat, rice, and cotton, in return for annual reductions in the amount of acres planted ("set-aside"). In order to preserve their "base" acreage for a specific crop, on which deficiency payments are made, farmers must ordinarily continue to plant the crop in question whether or not it is in market demand. This leads to overproduction and discourages crop rotation practices. n465

Set-aside encourages farmers to retire their least productive land first, while farming their remaining land more intensively through the use of fertilizers. Because the commitment is determined from year to year, they can shift the area set aside around their farm, with consequent disadvantages in terms of habitat creation. n466 This approach fails to leave any land or ecosystems undisturbed. Moreover, the significance of "base" acreage in determining the amount of agricultural support encourages the accumulation of large landholdings, n467 thereby undermining any social policy objective of encouraging small family farms.

The proposed stewardship payment has the significant advantage of "decoupling" farmer income support from production of agricultural commodities, while "recoupling" n468 it to a "green" commodity that is in increasingly short supply but that the market offers little incentive to produce. By basing payment on actual work performed, stewardship payments escape the stigma associated with schemes that, in essence, pay farmers for idling land.

[*403] One author cautions against attempts to manage land on the basis of "any large, prioritized, single-protocol, single-theory, generalized management scheme" n469 because this neglects the complexity of ecosystems and the fact that our current knowledge is very limited. n470 Instead, to obtain the active management required for fragmented landscapes, we should give land managers maximum independence and allow them to take into account the distinctive characteristics of each piece of land. n471 This argument does not identify who should be responsible for carrying out this detailed management and associated monitoring in situations where fragmented landscapes are located on privately owned land, but it inevitably raises the possibility that private landowners themselves should play an active role. n472 In the current political climate, they are the only ones in a position to play such a role.

Remnants require more intensive management than larger areas because of the impact of external spillovers n473 and the loss of habitat connectivity resulting from fragmentation. Management must take into account the singularities of each piece of land in light of the complexity of ecosystems and the limits of our current knowledge. Management practices must also adapt to new information. n474 From this perspective, building on the knowledge base of individual landowners, advised and supported by the expertise of government, would prove a more efficient strategy than handing over complete management responsibility of scattered patches to government agencies. Private management effectively gives greater responsibility for the issue of biodiversity conservation to those who have an ongoing relationship with the land.

This is not to suggest that individual landowners should operate in isolation. A broader perspective that focuses on regional [*404] ecosystems is crucial if we are to engage the problems created by isolated populations of species on habitat that has been fragmented by the erection of human barriers. n475 The objective must be to maintain biodiversity at a regional level, as distinct from maximizing it on specific sites. n476 This means that there must be both adequate forward planning and ongoing management coordination between landowners themselves and between landowners and managers of public land at the regional level. n477

By providing positive incentives to landholders, we have a better chance of fostering the development of a "land ethic" n478 among them than if we simply appeal to their better nature. n479 Such [*405] an approach also responds to an argument that originated in the literature on biodiversity conservation in developing countries, but is equally applicable once we go in search of conservation outside park boundaries in the developed countries. This argument contends that power must be both decentralized and based on existing local conditions and institutions. n480 This suggests that management payments should be delivered by government through locally based bodies. These might even be private organizations, better able to distance themselves from a government that will inevitably be tarnished by its association with the imposition of the necessary regulatory ground rules.

VIII. CONCLUSION

Increasing recognition that biodiversity conservation objectives will not be met by setting aside areas of public land forces us to ask how private landowners can be induced to cooperate. The policy response must be sensitive to the contours of the specific problem. Crucial here is the fact that an effective strategy for biodiversity conservation requires active management and restoration of ecosystems. Once this is recognized, it becomes clear that biodiversity conservation on private land cannot be achieved by command-and-control regulation alone.

Even where land-use regulations are only concerned with the imposition of restrictions, the evidence examined in this Article suggests that there are significant problems standing in the way of converting symbolic legal commands into effective controls. These problems are multiplied where the aim is to make landholders take positive action. If the community expects landowners to manage their land actively in a context where the market offers few incentives, it is going to have to pay for it. Appeals for the development of a land ethic among private landholders may be attractive from a theoretical perspective that sees landowners as privileged custodians of a scarce resource, with duties as well as rights. However, these appeals will continue to fall on deaf ears unless some incentive [*406] is provided. Financial inducements should be delivered to landholders through management fees, which essentially pay landholders to "produce" biodiversity, rather than through backward-looking compensation that denies landholder responsibility for ongoing land management and provides landholders with no stake in addressing the issue of biodiversity conservation.

Beyond this basic framework, there are many unknowns. We do not know at what level management fees will have to be fixed to make them attractive to those whose activities on land are substantially restricted or even frozen altogether. Management fees must not simply encourage grudging acceptance. They must be sufficient to attract the allegiance and commitment of landowners to the enterprise of biodiversity conservation. Even then, management payments will not be large enough to satisfy those who have purchased land in order to develop it -- who see their land as a commercial enterprise rather than relating to it as a way of life. It is inevitable that, at least in the short-term, privately owned land that has been targeted for biodiversity management will experience a decline in market value. Some land developers may sell at a loss to those prepared to commit themselves to becoming biodiversity managers, but it is equally clear that some will hang on to land that they own, speculating that the scheme will ultimately collapse and that development will be allowed to go ahead. For the foreseeable future, however, the availability of a subsidized alternative land use is going to make it easier for regulatory agencies to reject development proposals that are incompatible with biodiversity conservation. Leaving land in the hands of speculators in the short term, unmanaged but subject to restrictions, is far from ideal. In terms of biodiversity conservation, however, it is better than having the land developed as a golf course.

We do not know what the overall cost of the proposal will be. This depends on how much private land is in a condition that makes it worth conserving, and how much, as a matter of both scientific and political judgment, needs to be conserved. These questions are necessarily beyond the scope of this Article. However, there are a number of answers to those who are concerned about the costs of implementing such a strategy. In the first place, the time is ripe for a dramatic reallocation of resources available under Farm Bill programs. At present, those who have retained natural areas on their land are in a much worse position in terms [*407] of obtaining assistance than those who have converted them to agriculture and already benefited in the short term by doing so. Second, the proposed strategy will certainly be cheaper than Congress's current extravagant proposals for compensating private landowners where land use is restricted n481 (although, of course, the objective of those advocating these schemes is not to pay compensation but to discourage policy initiatives that confront the ideology of private property). Third, the strategy proposed will be much less expensive than one that relies on bribing landowners to cooperate by negotiating entirely voluntary agreements in the marketplace, or on bringing land of high biodiversity conservation value into the public domain through purchase.

Finally, and most importantly, we may have to be content with small beginnings. This proposal involves a fundamental reorientation of how society achieves conservation on private land. It will be resisted not only by those who have become used to being bribed to take action that is entirely voluntary, but also by those who continue to

believe against all the evidence that orders backed by threats must work. Faced with the unknown, there is a natural temptation for conservationists to hope that government agencies will eventually start saying "no" to permit applicants, and that landholders will ultimately bow to the community's land-use commands. Orders backed by threats, however, will only be obeyed where the threats can be made real through enforcement. In light of the problems with enforcement in this context, landholders have a clear incentive to shoot, shovel, and shut-up when they find something of biodiversity conservation value on their land. This is not a recipe for successful biodiversity conservation.

We must find the middle-ground between the extremes of voluntarism, where landholders are left with complete freedom to choose whether or not to accept inducements offered to them, and coercion, where they are expected to do as they are told. This middle-ground must have its roots in respect for the land, those who own the land, and future generations. We must commit ourselves to an approach that compromises in terms of spreading the cost-burden rather than in terms of achieving conservation objectives. The question is whether we can afford *not* to experiment with a radically different approach. Whether it will cost more than the [*408] current approach ultimately depends not on the value we attribute to endangered species of fauna and flora, but on how much we value the survival of future generations of our own species.

Legal Topics:

For related research and practice materials, see the following legal topics:

Environmental Law
Natural Resources & Public Lands
Fish & Wildlife Protection
Governments
Public Lands
Forest Lands
Governments
Public Lands
National Parks

FOOTNOTES:

n2 The concept of biodiversity encompasses four distinct notions. Genetic diversity within and between populations of particular species is the most basic element of biodiversity. This affects a species' physical characteristics, viability, productivity, resilience, and adaptability to change. Genetic diversity is necessary for the continued evolution of new forms of life and for life's responses to variables such as climate change. A second type of biodiversity is represented by the existence of distinct species. A third form involves associations of species, or biological communities (e.g., old-growth forests, riparian areas and wetlands), which form the biotic parts of ecosystems. Finally, on a large geographic scale, there is diversity in terms of ecosystems, from deserts to watersheds to the entire biosphere. *See* KEYSTONE CENTER, BIOLOGICAL DIVERSITY ON FEDERAL LANDS, REPORT OF A KEYSTONE POLICY DIALOGUE 6-8 (1991) [hereinafter KEYSTONE REPORT]. In the absence of information about the levels or distribution of biodiversity, the suggestion is made that we should presume that populations are, more or less, genetically distinct and conserve genetic diversity by maintaining representative communities. *See id.* at 29. On the anthropocentric significance of genetic diversity, see S.J. McNaughton, *Ecosystems and Conservation in the Twenty-First Century*, in CONSERVATION FOR THE TWENTY-FIRST CENTURY 109, 117 (David Western & Mary C. Pearl eds., 1989) ("Genotypic differentiation within species includes such fundamental traits as growth form and such fundamental physiological properties as nutrient uptake capacity and regulation of that capacity by the defoliation regime experienced. These represent fundamental adaptive traits of such potential economic importance to agriculture that their preservation might be of great future significance.").

n3 One author draws attention to the provision of these beneficial services in arguing that it is misleading to characterize land-use regulation that deprives land of all economically productive value as pressing private property into public service. All land, by definition, is already in public service. *See* Joseph L. Sax, *Property Rights and the Economy of Nature: Understanding Lucas v. South Carolina Coastal Council*, 45 *STAN. L. REV.* 1433, 1446 (1993). *See also* James P. Karp, *A Private Property Duty of Stewardship: Changing Our Land Ethic*,

23 *ENVTL. L. 735, 751 (1993)* (arguing that land is different from other forms of property and that landowners have no inherent right to abuse it).

n4 United Nations Convention on Biological Diversity, *opened for signature* June 5, 1992, S. TREATY DOC. NO. 20, 103d Cong., 1st Sess. (1993), *31 I.L.M. 818 (1992)* [hereinafter UN Convention]. The Convention entered into force December 29, 1993 upon ratification by thirty countries, in accordance with Article 36(1). Australia ratified the treaty on June 18, 1993. Treaty Action 1993, 1993 AUSTL. T.S. No. 1, at 17. Though the United States is a signatory to the Convention, Congress has not yet ratified it.

n5 *See* U.N. Convention, *supra* note 4, Art. 15.

n6 *Id.* Art. 8(c) (emphasis added). "Biological resources" include genetic resources and populations. *Id.* Art. 2.

n7 *Id.* Art. 7(c).

n8 *Id.* Art. 8(1).

n9 *Id.* Art. 11.

n10 *See supra* text accompanying note 9.

n11 *See supra* text accompanying note 8.

n12 This Article will focus on the implementation of biodiversity conservation in the United States. However, the argument that policy instruments designed to conserve biodiversity on private land should combine command-and-control regulation with fiscal incentives (*see infra* part VII) is equally applicable in Australia, where similar issues have arisen concerning the need to conserve biodiversity beyond the public lands. It is much less relevant to a country such as the United Kingdom, which has no substantial areas of public land set aside for nature conservation and where there is a well-established tradition of using predominantly voluntary measures to persuade private landholders to conserve nature and landscapes.

n13 *See infra* part VII.C.

n14 *See, e.g., Lucas v. South Carolina Coastal Council, 112 S. Ct. 2886, 2897-99 (1992);* Frank I. Michelman, *Property, Utility, and Fairness: Comments on the Ethical Foundations of "Just Compensation" Law, 80 HARV. L. REV. 1165, 1196-1200 (1967);* Sax, *supra* note 3, at 1452.

n15 Where the objective of retaining native vegetation is the prevention of land degradation and diffuse pollution rather than the conservation of nature per se, it is much easier to define the program in terms of the prevention of harm rather than the provision of a benefit. In practice, however, society glosses over the similarities between land degradation and industrial pollution and thereby avoids any discussion in relation to land degradation of the principle that "the polluter should be charged with the cost of whatever pollution

prevention and control measures are determined by the public authorities, whether preventive measures, restoration, or a combination of both." ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT, THE POLLUTER PAYS PRINCIPLE: DEFINITION, ANALYSIS, IMPLEMENTATION 6 (1975). This is generally referred to as the "polluter pays" principle. "In other words, the cost of [prevention and control] measures should be reflected in the cost of goods and services which cause pollution in production and/or consumption. Such measures should not be accompanied by subsidies that would create significant distortions in international trade and investment." *See id.* at 13. Indeed, the United States historically has been much more inclined to pay for land conservation than to regulate the forces leading to land degradation or to make the polluter pay. *See* John Bradsen, *Perspectives on Land Conservation*, 8 ENVTL. & PLAN. L. J. 16, 20 (1991).

n16 For a discussion of existing and potential initiatives undertaken by local governments, see A. Dan Tarlock, *Local Government Protection of Biodiversity: What Is Its Niche?*, 60 U. CHI. L. REV. 555 (1993).

n17 This Article does not discuss the other branch of the debate about biodiversity conservation policy regarding the prioritization of areas of private land containing species and ecosystems. That analysis assumes that the measures that need to be taken will be so expensive that hard choices must be made.

n18 There is extensive literature advocating the use of incentives as an alternative to command-and-control regulation, but this has been largely confined to their use in relation to pollution control and waste management. *See, e.g.*, Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law: The Democratic Case for Market Incentives*, 13 COLUM. J. ENVTL. L. 171 (1988); Robert W. Hahn & Robert N. Stavins, *Incentive-Based Environmental Regulation: A New Era from an Old Idea?*, 18 ECOLOGY L.Q. 1, 7-15 (1991); Richard B. Stewart, *Antidotes for the "American Disease"*, 20 ECOLOGY L.Q. 85, 93-100 (1993). The current use made of incentives to influence land use and the potential they may have in this area have been largely neglected. *But see* John Charles Kunich, *The Fallacy of Deathbed Conservation Under the Endangered Species Act*, 24 ENVTL. L. 501, 574-78 (1994) (suggesting number of ways biodiversity preservation could be accomplished more effectively under incentive-based system rather than command-and-control mechanisms traditionally used under Endangered Species Act).

n19 Joseph L. Sax, *Nature and Habitat Conservation and Protection in the United States*, 20 ECOLOGY L.Q. 47 (1993), *citing* 175 BUREAU OF LAND MANAGEMENT, PUBLIC LAND STATISTICS 5 (1990) (Table 4). Significant areas are also owned by the States. *Id.* at 48-49.

n20 *Id.* at 48.

n21 *See* David W. Crumpacker et al., *A Preliminary Assessment of the Status of Major Terrestrial and Wetland Ecosystems on Federal and Indian Lands in the United States*, 2 CONSERVATION BIOLOGY 103, 111-14 (1988).

n22 *See id.* at 111-14. A number of ecosystems were almost exclusively under the management of a single agency. For example, the Bureau of Land Management had almost exclusive responsibility for four ecosystems within the public domain. *See also* CONGRESS OF THE UNITED STATES, OFFICE OF TECHNOLOGY ASSESSMENT, TECHNOLOGIES TO MAINTAIN BIOLOGICAL DIVERSITY 111, 227 (1987) [hereinafter OFC. OF TECHNOLOGY ASSESSMENT]; C.R. Margules & J.L. Stein, *Patterns in the Distributions of Species and the Selection of Nature Reserves: An Example from Eucalyptus Forests in South-eastern New South*

Wales, 50 BIOLOGICAL CONSERVATION 219 (1989); C.R. Margules et al., *Selecting Networks of Reserves to Maximize Biological Diversity*, 43 BIOLOGICAL CONSERVATION 63, 71-72 (1988); J. Michael Scott et al., *Status Assessment of Biodiversity Protection*, 3 CONSERVATION BIOLOGY 85 (1989); J. Michael Scott et al., *Species Richness*, 37 BIOSCIENCE 782, 784-85 (1987).

n23 Wetlands are frequented by more than 50% of 800 or more species of protected migratory birds, support the majority of coastal fisheries, and provide important habitat for about one-third of species listed as endangered or threatened. See U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE, WETLANDS: MEETING THE PRESIDENT'S CHALLENGE, WETLANDS ACTION PLAN 17 (1990) [hereinafter FWS WETLANDS PLAN].

n24 WHITE HOUSE OFFICE OF ENVIRONMENTAL POLICY, CLINTON ADMINISTRATION PROPOSAL ON PROTECTION OF U.S. WETLANDS, Section I (Aug. 24, 1993), *reprinted in* 24 Env't Rep. (BNA) 793 (Aug. 1993) [hereinafter CLINTON PROPOSAL].

n25 See THE NATURAL HERITAGE DATA CENTER NETWORK, PERSPECTIVES ON SPECIES IMPERILMENT 9 (1993) [hereinafter NATURAL HERITAGE DATA CTR.].

n26 See *id.*

n27 See *id.* at 12.

n28 See *id.* at 15. Again it is the Forest Service which has the most listed species located on land that it manages (nearly 150). National Parks and National Wildlife Refuges each have about 100 listed species, roughly the same number that occur on land managed by the Bureau of Land Management and Department of Defense land. See *id.* at 11. Nearly 45% of listed endangered and threatened species occupy habitats that include either cropland or pastureland. These two forms of agriculture constitute about 60% of the nation's land base. See Jana Nelson, *Agriculture, Wetlands, and Endangered Species: The Food Security Act 1985*, ENDANGERED SPECIES TECHNICAL BULL., May 1989, at 1.

n29 See ALFRED RUNTE, NATIONAL PARKS: THE AMERICAN EXPERIENCE 48-64 (1987). For a brief survey of the resulting literature, see R.L. Pressey, *Ad Hoc Reservations: Forward or Backward Steps in Developing Representative Reserve Systems?*, 8 CONSERVATION BIOLOGY 662 (1994).

n30 See Pressey, *supra* note 29.

n31 See RUNTE, *supra* note 29, at 11-18; David Hales, *Changing Concepts of National Parks*, in CONSERVATION FOR THE TWENTY-FIRST CENTURY 139 (David Western & Mary C. Pearl eds., 1989).

n32 See RUNTE, *supra* note 29, at 130-37. See also *id.*, ch. 11 (discussing use of ecological arguments from 1960s onward to justify further expansion of national parks system in face of concerns about decline in quality of areas set aside). Nevertheless, in the protection of wilderness areas, the legislation mentions ecological significance only as an optional extra:

A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this chapter an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) *may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.*

The Wilderness Act, 16 U.S.C. § 1131(c) (1988) (emphasis added).

n33 Restricted by the General Homestead Act of 1862 in the amount of land they could obtain in fee ownership, ranchers established their base ranches on rich creekside bottom land where they had access to water for irrigated pasture. This was supplemented with grazing rights on the uplands, which remained in public ownership. See CHARLES F. WILKINSON, *CROSSING THE NEXT MERIDIAN: LAND, WATER, AND THE FUTURE OF THE WEST* 83 (1992).

n34 See William D. Newmark, *Legal and Biotic Boundaries of Western North America National Parks: A Problem of Congruence*, 33 *BIOLOGICAL CONSERVATION* 197 (1985). See also RUNTE, *supra* note 29, at 46, 66-68 (suggesting that park boundaries are often based on preserving focal scenic wonders rather than protecting ecosystems); CHARLES F. WILKINSON, *THE EAGLE BIRD: MAPPING A NEW WEST* 170-71 (1992) (pointing out that "[l]ittle was known about the Yellowstone terrain and the park had been set up as a perfectly rectangular area, almost square, with no regard to natural topography; boundaries ran up and down mountain ranges, across rivers and valleys, with no regard for the problems of administration and protection").

n35 A hectare is equivalent to 2.471 acres.

n36 See Christine M. Schonewald-Cox, *Conclusions: Guidelines to Management: A Beginning Attempt*, in *GENETICS AND CONSERVATION: A REFERENCE FOR MANAGING WILD ANIMAL AND PLANT POPULATIONS* 414, 420-21 (Christine M. Schonewald-Cox et al. eds., 1983).

n37 See, e.g., Larry Harris & John Eisenberg, *Enhanced Linkages: Necessary Steps for Success in Conservation of Faunal Diversity*, in *CONSERVATION FOR THE TWENTYFIRST CENTURY* 166 (David Western & Mary C. Pearl eds., 1989); William D. Newmark, *A Land-Bridge Island Perspective on Mammalian Extinctions in Western North American Parks*, 325 *NATURE* 430 (1987); Newmark, *supra* note 34, at 197; Schonewald-Cox, *supra* note 36, at 416.

n38 R. Edward Grumbine, *Viable Populations, Reserve Size, and Federal Lands Management: A Critique*, 4 *CONSERVATION BIOLOGY* 127, 129 (1990). For a discussion of the size of national wildlife refuges and the unlikelihood of the system being substantially expanded, see Richard J. Fink, *The National Wildlife Refuges: Theory, Practice, and Prospect*, 18 *HARV. ENVTL. L. REV.* 1, 106-07 (1994).

n39 See, e.g., ALSTON CHASE, *PLAYING GOD IN YELLOWSTONE: THE DESTRUCTION OF*

AMERICA'S FIRST NATIONAL PARK chs. 11-12 (1986) (discussing conflict between grizzly bear management and tourism); KARL HESS JR., ROCKY TIMES IN ROCKY MOUNTAIN NATIONAL PARK: AN UNNATURAL HISTORY 85 (1993) (addressing political disincentives that Rocky Mountain National Park Superintendents face with respect to controlling elk overpopulation); R. GERALD WRIGHT, WILDLIFE RESEARCH AND MANAGEMENT IN THE NATIONAL PARKS 154-61 (1992) (discussing the problems associated with wildlife/human interactions in the national parks); Steven C. Buttrick, *Habitat Management: A Decision-Making Process*, 94 RHODORA 258, 261-62 (1992); Duncan T. Patten, *Human Impacts in the Greater Yellowstone Ecosystem: Evaluating Sustainability Goals and Eco-redevelopment*, 5 CONSERVATION BIOLOGY 405 (1991); Peter S. White & Susan P. Bratton, *After Preservation: Philosophical and Practical Problems of Change*, 18 BIOLOGICAL CONSERVATION 241, 247-48 (1980). For a critical analysis of policies and practices of agencies in relation to biodiversity conservation on federal lands under their control, see KEYSTONE REPORT, *supra* note 2, at Appendix C. A meeting of about sixty people concerned about biodiversity conservation on federal lands, including individuals from federal agencies, congressional committee staffs, environmental organizations, commodity groups, professional associations and academia could not agree on how to ensure that biodiversity was an important consideration for federal agencies. Some believed that sufficient legislative authority and administrative direction already existed and that the process was already in hand, while others thought that a clear signal was needed through either an Executive Order or legislation. *Id.* at 13.

n40 50 C.F.R. § 25.11(b) (1993). "[R]efuges are established for the restoration, preservation, development and management of wildlife and wildlands habitat; for the protection and preservation of endangered or threatened species and their habitat; and for the management of wildlife and wildlands to obtain the maximum benefits from these resources." *Id.*

n41 See Fink, *supra* note 38, at 22-23, 25-30, 112.

n42 16 U.S.C. § 460k (1988) (requiring that special determination that recreational use "will not interfere with" primary purposes be made in each fiscal year, unless form of recreation is "directly related" to those purposes). See also 16 U.S.C. § 668dd(h) (1988); 50 C.F.R. § 26.31 (1993).

n43 16 U.S.C. § 668dd(d)(1)(A) (1988). See also 50 C.F.R. §§ 29, 32 (1993).

n44 Such uses include mining, grazing, off-road vehicles, recreational boating, and water skiing. RICHARD J. TOBIN, THE EXPENDABLE FUTURE: U.S. POLITICS AND THE PROTECTION OF BIOLOGICAL DIVERSITY 44 (1990). See Charles G. Curtin, *The Evolution of the U.S. National Wildlife Refuge System and the Doctrine of Compatibility*, 7 CONSERVATION BIOLOGY 29 (1993). See also Fink, *supra* note 38, at 63-76 (pointing out that Fish and Wildlife Service does not have any authority to control some secondary uses, for example, where there are private interests in subsurface minerals, or another federal agency has jurisdiction). But see *National Audubon Society v. Babbitt*, 23 Envtl. L. Rep. (Envtl. L. Inst.) 10,735 (W.D. Wash. 1993) (suggesting that FWS now has legal duty to stop activities incompatible with wildlife protection). For a more optimistic assessment of the role played by National Wildlife Refuges, see Mary Anne Young, *The Role of the National Wildlife Refuge System in Endangered Species Management*, ENDANGERED SPECIES UPDATE, May 1993, at 1.

n45 43 U.S.C. § 1732(a) (1988). For definitions of "multiple use" and "sustained yield," see 43 U.S.C. § 1702(c), (h) (1988). See also 43 U.S.C. § 1701(a)(8) (1988) (declaring that it is United States policy that "the

public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use"). *But see* 43 U.S.C. § 1701(a)(12) (1988) (stating that public lands must also "be managed in a manner which recognizes the Nation's need for domestic sources of minerals, food, timber, and fiber . . ."). For a discussion of the Forestry Service's role in conserving biodiversity, see Comment, *A "Hard Look" at Biodiversity and the National Forest Management Act*, 6 TUL. ENVTL. L.J. 157 (1992) [hereinafter Comment on Biodiversity].

n46 For a discussion of the literature relating to the Bureau of Land Management, see TOBIN, *supra* note 44, at 40-42. Tobin discusses a number of studies that support the conclusion that BLM land management practices relating to grazing and mining are harmful to wildlife and fisheries. *Id.*

n47 16 U.S.C. §§ 529, 1607 (1988). For definitions of "multiple use" and "sustained yield," see 16 U.S.C. § 531(a)-(b) (1988). *See also* 16 U.S.C. §§ 472(a), 475, 528, 1600(3) (1988).

n48 The fundamental purpose of the national parks system is "to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." 16 U.S.C. § 1 (1988).

n49 *See, e.g.*, RUNTE, *supra* note 29, at 155, chs. 8-9. One writer has gone so far as to suggest that one should have to earn the right to be a tourist by showing familiarity with the natural environment of the place where you come from. David Ehrenfeld, *Hard Times for Diversity*, in CONSERVATION FOR THE TWENTY-FIRST CENTURY 247, 250 (David Western & Mary C. Pearl eds., 1989).

n50 Reed F. Noss, *Sustainability and Wilderness*, 5 CONSERVATION BIOLOGY 120 (1991).

n51 For example, commercial enterprises and roads. *See also* 16 U.S.C. § 1133(d)(1) (1988) (stating that measures can be taken to control fires, but making no reference to fire *management*).

n52 *See* KEYSTONE REPORT, *supra* note 2, at 17. One author points out that because of staff shortages within the Fish and Wildlife Service, there is considerable reliance on state wildlife agencies in the management of federal wildlife refuges. These state organizations traditionally have a bias, due to local political pressures, toward game species such as ducks. TOBIN, *supra* note 44, at 44, 52.

n53 *See, e.g.*, CHASE *supra* note 39, chs. 6-8 (discussing application of theory of "natural regulation" to elk management in 1970s and consequent distortions in elk populations in Yellowstone National Park).

n54 *See* Reed F. Noss & Larry D. Harris, *Nodes, Networks, and MUMs: Preserving Diversity at All Scales*, 10 ENVTL. MGMT. 299, 300-03 (1986). *See also* Hales, *supra* note 31, at 141 (pointing out way in which, at international level, influence of professionals from developing countries has changed focus of debate about national park management, so that it is no longer based on view from park border, looking inwards, but questions "whether one should focus outward from the border, or whether borders exist at all").

n55 See, e.g., Pressey, *supra* note 29.

n56 See, e.g., Sax, *supra* note 19 (arguing that land management can and should be approached in terms of ecosystems rather than ad hoc boundary lines).

n57 See Pressey, *supra* note 29, at 665.

n58 See Norman Myers, *Questions of Mass Extinction*, 2 BIODIVERSITY AND CONSERVATION 2, 12 (1993) (emphasis added).

n59 See *id.*

n60 The Supreme Court has referred to the right to exclude others as "one of the most essential sticks in the bundle of rights that are commonly characterized as property." *Kaiser Aetna v. United States*, 444 U.S. 164, 176, quoted with approval in *Loretto v. Teleprompter Manhattan CATV Corp.*, 458 U.S. 419, 433 (1981); *Nollan v. California Coastal Commission*, 483 U.S. 825, 831 (1986). One author has drawn attention to the importance of private property in terms of privacy: "Property rights protecting private autonomy are closer to the speech, religion, and association rights that Americans hold as fundamental. They are all classic minority rights. Development property rights, on the other hand, have never been regarded as fundamental rights, probably because they involve one person exercising economic power over others." Michael C. Blumm, *Property Myths, Judicial Activism and the Lucas Case*, 23 ENVTL. L. 907, 916 (1993).

n61 See *supra* note 13 and accompanying text.

n62 This issue was recognized as long ago as 1947 by Aldo Leopold, who wrote: "At what point . . . will governmental conservation, like the mastodon, become handicapped by its own dimensions? The answer, if there is any, seems to be in a land ethic, or some other force which assigns more obligation to the private landowner." ALDO LEOPOLD, A SAND COUNTY ALMANAC 213 (Oxford Univ. Press 1987) (1947), quoted in DONALD WORSTER, THE WEALTH OF NATURE: ENVIRONMENTAL HISTORY AND THE ECOLOGICAL IMAGINATION 109 (1993). See generally, David Western et al., *An Agenda for Conservation Action*, in CONSERVATION FOR THE TWENTY-FIRST CENTURY 304 (David Western & Mary C. Pearl eds., 1989) (pointing out crucial conservation issues for 21st century and suggesting various policy solutions). One author has argued that "[c]onservationists have ignored the non-park areas in favor of saving nature by segregating it from humanity. The trouble is that species segregation, like racial segregation, gives the subordinate party, nature, small fragments of usually inferior land." David Western, *Conservation Without Parks: Wildlife in the Rural Landscape*, in CONSERVATION FOR THE TWENTY-FIRST CENTURY 158 (David Western & Mary C. Pearl eds., 1989).

n63 See, e.g., Michael E. Soule, *Theory and Strategy*, in LANDSCAPE LINKAGES AND BIODIVERSITY 91, 91-92 (Wendy E. Hudson ed., 1991); Reed F. Noss, *Corridors in Real Landscapes: A Reply to Simberloff and Cox*, 1 CONSERVATION BIOLOGY 159 (1987); Reed F. Noss, *Protecting Natural Areas in Fragmented Landscapes*, 7 NATURAL AREAS J. 2, 5 (1987) [hereinafter *Protecting Natural Areas*]; Reed F. Noss, *A Regional Landscape Approach to Maintain Diversity*, 33 BIOSCIENCE 700, 703-04 (1983) [hereinafter *Regional Landscape Approach*]. But see Robert L. Harrison, *Toward a Theory of Inter-Refuge Corridor Design*, 6 CONSERVATION BIOLOGY 293 (1992) (arguing that science of corridor design is still

rudimentary and that more data on migratory patterns of species through landscapes would be helpful in developing it); Amy McEuen, *The Wildlife Corridor Controversy: A Review*, ENDANGERED SPECIES UPDATE, Sept.-Oct. 1993, at 1 (arguing that we know little about minimum width of effective corridors for different species, for example, and that we cannot automatically assume that riparian zones are used as corridors); Daniel Simberloff and James Cox, *Consequences and Costs of Conservation Corridors*, 1 CONSERVATION BIOLOGY 63 (1987) (stressing that connecting corridors may have costs, such as increased risk of disease, and that their value must therefore be determined on case-by-case basis); Daniel Simberloff et al., *Movement Corridors: Conservation Bargains or Poor Investments?*, 6 CONSERVATION BIOLOGY 493 (1992) (arguing that cost-effectiveness of corridors must be continually questioned and that unconnected patches may also be important in some situations). On a more positive note, however, see Andrew F. Bennett et al., *Corridor Use and the Elements of Corridor Quality: Chipmunks and Fencerows in a Farmland Mosaic*, 68 BIOLOGICAL CONSERVATION 155 (1994) ("There is a growing literature on the value of corridors to wildlife . . . evidence . . . is also accumulating on the role of corridors in assisting the movements of animals through inhospitable landscapes, and facilitating continuity between otherwise isolated populations The potential values of corridors for conservation are also being recognized by theoretical approaches"); William F. Laurance, *Ecological Correlates of Extinction Proneness in Australian Tropical Rain Forest Mammals*, 5 CONSERVATION BIOLOGY 79, 87 (1991) (arguing that preservation of primary forest corridors connecting tropical nature reserves are vital to preservation of forest "species having large area requirements").

n64 The significance of corridors has been recognized by the courts. *See, e.g., Marble Mountain Audubon Society v. Rice*, 914 F.2d 179 (9th Cir. 1990) (holding that Forest Service environmental impact statement did not adequately deal with proposed destruction by logging of corridor between two wilderness areas).

n65 Edge effects can stem from increased radiation loads. *See, e.g., Glenn R. Matlack, Microenvironment Variation Within and Among Forest Edge Sites in the Eastern United States*, 66 BIOLOGICAL CONSERVATION 185 (1993). They are also caused by pollution, soil erosion, and other spillovers from surrounding areas. *See, e.g., Christine M. Schonewald-Cox & Jonathan W. Bayless, The Boundary Model: A Geographical Analysis of Design and Conservation of Nature Reserves*, 38 BIOLOGICAL CONSERVATION 305 (1986); JOHN C. FREEMUTH, ISLANDS UNDER SIEGE: NATIONAL PARKS AND THE POLITICS OF EXTERNAL THREATS (1991); Tormod Vaaland Burkey, *Edge Effects in Seed and Egg Predation at Two Neotropical Rainforest Sites*, 66 BIOLOGICAL CONSERVATION 139 (1993); Fink, *supra* note 38, at 77-82 (discussing external threats to national wildlife refuges).

n66 "This often will not be a series of concentric rings around a single core reserve, but rather a patchwork of well-designed land ownerships and activities." KEYSTONE REPORT, *supra* note 2, at 22.

n67 *See Protecting Natural Areas, supra* note 63, at 2. *See also* Hal Salwasser et al., *The Role of Interagency Cooperation in Managing for Viable Populations*, in VIABLE POPULATIONS FOR CONSERVATION 159, 161 (Michael E. Soule ed., 1987) ("[T]here are two levels of cooperation necessary for effective conservation -- among government agencies and between agencies and private (non-governmental) groups."). For a detailed attempt to develop these ideas in the context of the current inadequacies of the national wildlife refuge system, see Fink, *supra* note 38. *See also Protecting Natural Areas, supra* note 63 (arguing that strategies to preserve natural areas must have landscape context to deal with habitat fragmentation); Denis A. Saunders et al., *Biological Consequences of Ecosystem Fragmentation: A Review*, 5 CONSERVATION BIOLOGY 18 (1991) (concluding that since most impacts on remnant natural areas originate from surrounding areas there is a need for integrated landscape management).

n68 Some, however, doubt the feasibility of implementing concentric zoning in practice. One author has argued that this approach will be successful in protecting park values only if it is *core dominant*. See Hales, *supra* note 31, at 139, 142 ("[A]ctivities in outer zones must be limited by compatibility with activities of inner zones.").

n69 The biosphere reserve concept originated in the UNESCO Man and the Biosphere Programme ("MAB"). For a detailed discussion of the MAB and the development of the concept of a biosphere reserve at an international level, see Michel Batisse, *Developing and Focusing the Biosphere Reserve Concept*, 22 NATURE & RESOURCES 2 (1986). He points out that in the early stages of the development of the idea, the conservation role was prominent and the areas nominated as biosphere reserves were already under protected designations, for example, as national parks. *Id.* at 4. This neglected their sustainable development role in relation to the surrounding area and their logistic role as part of a network for research and monitoring. *Id.* To move forward, the Scientific Advisory Panel for Biosphere Reserves has suggested the version presented in the text. *Id.* at 7-8. As of 1993, 311 biosphere reserves in 81 countries have been reported, representing about one half of the world's biogeographical provinces. See George Francis & Neil Munro, *A Biosphere Reserve for Atlantic Coastal Plain Flora, South-Western Nova Scotia*, 68 BIOLOGICAL CONSERVATION 275, 276 (1994). A consistent theme in the literature is that the concept has still not been adequately implemented. See G. Carleton Ray & William P. Gregg Jr., *Establishing Biosphere Reserves for Coastal Barrier Ecosystems*, 41 BIOSCIENCE 301, 305 (1991) ("biosphere reserve concept has yet to be fully implemented, especially in coastal-marine areas"); John Hough, *Biosphere Reserves: Myth and Reality*, ENDANGERED SPECIES UPDATE, Nov.-Dec. 1988, at 1. Hough points out that in their ideal form, reserves represent a departure from the concept of setting humans apart from nature, but this objective has not been achieved in the past in situations where transition zones are absent and local people have been viewed as agents to be consulted, rather than being allowed to participate. *Id.* at 4. See also Gary W. Mullins & Hans Neuhauser, *Public Education for Protecting Coastal Barriers*, 41 BIOSCIENCE 326 (1991) (suggesting ways in which public education and community participation can be used "to foster a strong sense of biosphere-reserve community," or community involvement in management of the environment). Noss and Harris have argued that the biosphere reserve model should extend beyond the protection of the best known examples of ecosystem types. They advocate a system of interconnected "multiple-use modules" at a landscape level in which corridors and buffers protect "nodes" of high conservation value. See Noss & Harris, *supra* note 54, at 303-07. See also LARRY D. HARRIS, THE FRAGMENTED FOREST: ISLAND BIOGEOGRAPHY THEORY AND THE PRESERVATION OF BIOTIC DIVERSITY 160-62 (1984) (explaining concept of "multiple-use modules" (MUMs), which consist of "medullary" area, where preservation is objective, surrounded by "cortex" areas, where uses are varied).

n70 See Hales, *supra* note 31, at 142.

n71 See Harris & Eisenberg, *supra* note 37, at 180.

n72 See *id.* at 179.

n73 See Robert L. Peters & Joan D.S. Darling, *The Greenhouse Effect and Nature Reserves*, 35 BIOSCIENCE 707 (1985).

n74 See Robin L. Graham et al., *How Increasing CO₂ and Climate Change Affect Forests*, 40 BIOSCIENCE 575, 575-87 (1990); William H. Romme & Monica G. Turner, *Implications of Global Climate Change for Biogeographic Patterns in the Greater Yellowstone Ecosystem*, 5 CONSERVATION BIOLOGY

373 (1991).

Increasing relative speed of temperature shifts will leave vegetation with insufficient time to adapt. *See* Myers, *supra* note 58. It has been suggested that the most vulnerable species or populations will fall into one of the following categories: peripheral populations of plants and animals that are at the contracting edge of a species range; many endangered species that have extremely limited habitats; highly specialized species, such as those dependent on another species for food or dispersal; poor dispersers, such as trees with heavy seeds; montane and alpine communities; Arctic communities; and shoreline communities, which will become inundated as seas rise. *See* R.L. PETERS & T.E. LOVEJOY, *GLOBAL WARMING AND BIOLOGICAL DIVERSITY* (1992), *cited in* DAVID M. GATES, *CLIMATE CHANGE AND ITS BIOLOGICAL CONSEQUENCES* 166 (1993).

Because trees are long-lived and take a long time to reproduce, they do not adapt quickly to change, though reproduction failure may not become apparent for many decades. *See id.* at 109. Mobile animal species, by contrast, should adapt more quickly, depending on the availability of food sources. *See id.* at 166.

n75 MYERS, *supra* note 58, at 8.

n76 Jeffrey A. McNeely, *Protected Areas and Human Ecology: How National Parks Can Contribute to Sustaining Societies of the Twenty-first Century*, in *CONSERVATION FOR THE TWENTY-FIRST CENTURY* 150, 157 (David Western & Mary C. Pearl eds., 1989).

n77 *See, e.g.*, Fink, *supra* note 38, at 122-31. While Fink perceives the need for a regional landscape planning approach that locates individual refuges in the broader context of a "wildlife reserve network" based on the biosphere reserve model, he is quite vague when it comes to suggesting how private landowners are to be induced to cooperate. At one point he lists fee simple acquisition, conservation easements, management agreements, coordinated state and local zoning, and land exchanges. *See id.* at 126. Later he acknowledges that "[s]ome degree of legal coercion, albeit indirect, will be required" and refers with approval to the Endangered Species Act. *See id.* at 129. Finally, he argues that legislation should authorize cooperation with non-governmental organizations, including land trusts and private landowners. *See id.* at 130. *See also* Karp, *supra* note 3, at 750 (discussing development of conservation ethic among private landowners and need for this to be "facilitated and backed up by the imposition of a legal duty of stewardship where someone falters").

n78 Several authors have criticized the policy of hands-off management, or "natural regulation," implemented by the National Parks and Wildlife Service in relation to elk and bears. *See* CHASE, *supra* note 39, chs. 6-7, 11-12; HESS, *supra* note 39, at 22-23, 39, 82-83, 88-92. *See also* Otto H. Frankel, *The Place of Management in Conservation*, in *GENETICS AND CONSERVATION: A REFERENCE FOR MANAGING WILD ANIMAL AND PLANT POPULATIONS* 1, 12 (Christine M. Schonewald-Cox et al. eds., 1983) ("While I tend to side with the laissez faire philosophy of conservation, I have no philosophical objection to man's 'taking a hand' in evolution . . . I see no reason why man should not play a positive and creative part in evolution to supplement or . . . supplant organic evolution.").

n79 *See Regional Landscape Approach, supra* note 63, at 704; Noss & Harris, *supra* note 54, at 302. One commentator recommends a low-management option for large blocks of protected land, because manipulation is likely to increase the risk of normal accidents. However, he argues for active management of fragmented landscapes. He suggests maximum flexibility of management techniques in response to the singularities of each piece of land. *See* David Ehrenfeld, *The Management of Diversity: A Conservation Paradox*, in *ECOLOGY*,

ECONOMICS, ETHICS: THE BROKEN CIRCLE 26, 38 (F. Herbert Bormann & Stephen R. Kellert eds., 1991).

n80 See KEYSTONE CENTER, *supra* note 2, at 63.

n81 See Robert M. Pyle, *Management of Nature Reserves*, in CONSERVATION BIOLOGY: AN EVOLUTIONARY-ECOLOGICAL PERSPECTIVE 319, 324 (Michael E. Soule & Bruce A. Wilcox eds., 1980). Other management issues include: the maintenance of successional stages; coping with the effects of past alterations -- particularly soil changes -- and the absence of key species such as predators. See Charles C. Mann & Mark L. Plummer, *The Butterfly Problem*, ATLANTIC MONTHLY, Jan. 1992, at 47, 67-68 (discussing vegetation management needed to conserve threatened Oregon silverspot butterfly). See also Buttrick, *supra* note 39; Michael A. O'Connell & Reed F. Noss, *Private Land Management for Biodiversity Conservation*, 16 ENVTL. MGMT. 435 (1992); White & Bratton, *supra* note 39, at 245-49.

n82 Note, however that one reviewer has described restoration ecology as "a bastard child slowly clawing its way to legitimacy." Rob Blair, Book Review, ENDANGERED SPECIES UPDATE, Nov.-Dec. 1989, at 5 (reviewing REHABILITATING DAMAGED ECOSYSTEMS (John Cairns Jr. ed.), a collection of works on restoration ecology). A crucial issue is whether by preserving gene pools, through the currently available method of captive breeding, or futuristic scenarios such as the development of DNA banks, it would be possible to reconstruct nature by simply releasing representative gene pools at some time in the future. This will not likely be possible if ecosystem organization depends on the development of specific, dynamic relationships between organisms interacting through the food web and the physical environment. If transfer of learned behavior is an important component of such adaptive behaviors as resource utilization and predator avoidance, then ecosystem reconstruction through release of captive genotypes will be more difficult. See McNaughton, *supra* note 2, at 120 ("Genetic diversity cannot be retained for all practical purposes, without preserving the ecosystems of which it is a part.").

n83 See White & Bratton, *supra* note 39.

n84 For a historical treatment of the concept of equilibrium in the ecological literature and the increasing challenges to which it has been exposed by evidence of heterogeneity generated by natural disturbances such as fire, see WORSTER, *supra* note 62, ch. 13. See also CHASE, *supra* note 39, ch. 17.

n85 See, e.g., DANIEL B. BOTKIN, DISCORDANT HARMONIES: A NEW ECOLOGY FOR THE TWENTY-FIRST CENTURY, 33, 41-48, 155 (1990); Brian Walker, *Diversity and Stability in Ecosystem Conservation*, in CONSERVATION FOR THE TWENTY-FIRST CENTURY 121, 122-24 (David Western & Mary C. Pearl eds., 1989) (outlining current hypotheses concerning diversity and stability).

n86 See Walker, *supra* note 85, at 129-30.

n87 BOTKIN, *supra* note 85, at 71. But see HESS, *supra* note 39, at 89-90 (arguing that "natural" is an ambiguous term).

n88 CHASE, *supra* note 39, at 320.

n89 *See id.* ch. 11-12.

n90 *See* White & Bratton, *supra* note 39.

n91 *See, e.g.*, Richard P. Reading & Stephen R. Kellert, *Attitudes toward a Proposed Reintroduction of Black-Footed Ferrets (Mustela nigripes)*, 7 CONSERVATION BIOLOGY 569, 578 (1993) (concluding from survey of rancher attitudes that simply providing more information to landholders will not necessarily result in attitudes supportive of biodiversity conservation, because knowledge is only one of several variables influencing attitudes).

n92 *See* Pierre Crosson, *Agricultural Land: The Values at Stake, in PUBLIC INTEREST IN THE USE OF PRIVATE LANDS* 83, 87 (Benjamin C. Dysart III & Marion Clawson eds., 1989).

n93 Early experience with the Conservation Reserve Program (*see infra* part IV.A) indicated that landholders were slow to take advantage of opportunities to manage land for wildlife habitat so as to be able to charge access fees for hunting and fishing. Rhonda Bucklin, *The CRP and Wildlife Habitat*, AGRIC. OUTLOOK, Apr. 1990, at 30.

n94 *See supra* text accompanying notes 42-53.

n95 16 U.S.C. §§ 1531-1544 (1988 & Supp. V 1993).

n96 33 U.S.C. §§ 1251-1387 (1988 & Supp. V 1993).

n97 On the difficulties of developing reliable indicators of regulatory failure, including the problems arising from different views of the appropriate goals and scope of regulation, see CASS R. SUNSTEIN, *AFTER THE RIGHTS REVOLUTION: RECONCEIVING THE REGULATORY STATE* 75-76, 84 (1990).

n98 For a discussion of private conservation easements, see *infra* part V.

n99 Programs not discussed in this Article include the Environmental Easement Program ("EEP"), 16 U.S.C. § 3839 (Supp. V 1993), the Forest Legacy Program ("FLP"), 16 U.S.C. § 2103c (Supp. V 1993), the Stewardship Incentive Program ("SIP"), 16 U.S.C. § 2103b (Supp. V 1993), and the Partnerships for Wildlife Program ("PWP"), 16 U.S.C. §§ 3741-3744 (Supp. V 1993).

The EEP is designed "to ensure the continued long-term protection of environmentally sensitive lands or reduction in the degradation of water quality . . . through the continued conservation and improvement of soil and water resources." 16 U.S.C. § 3839(a) (Supp. V 1993). The land eligible is cropland that either contains riparian corridors, is an area of critical wildlife habitat (particularly habitat of threatened or endangered species), or contains other environmentally sensitive areas. 16 U.S.C. § 3839(b)(1) (Supp. V 1993). Under the EEP, the landowner must agree not only to the imposition of land use restrictions through an easement, but also to ongoing management responsibilities contained in a natural resource conservation management plan. 16 U.S.C. § 3839a(a)-(b) (Supp. V 1993). As of November 1993, funds had still not been appropriated for the Program. Richard Magleby and Stan Daberkow, *Glossary of Conservation Programs*, AGRIC. OUTLOOK, Nov. 1993, at

38.

The FLP has the specific purpose of "protecting environmentally important forest areas that are threatened by conversion to nonforest uses," and the more general purpose of "promoting forest land protection and other conservation opportunities" through acquisition of conservation easements from private landowners and other mechanisms. 16 U.S.C. § 2103c(a) (Supp. V 1993). To be eligible, areas must have significant environmental value or be threatened by present or future conversion to nonforest uses. 16 U.S.C. § 2103c(e) (Supp. V 1993). For more on the FLP, see Laura S. Beliveau, *The Forest Legacy Program: Using Conservation Easements to Preserve the Northern Forest*, 20 B.C. ENVTL. AFF. L. REV. 507 (1993).

The SIP relies not on easements but on an agreement to implement a forest stewardship plan for at least ten years. Unlike the FLP, eligibility is ordinarily restricted to owners of no more than 1,000 acres of non-industrial forest land, although there is provision for exceptions to be made. 16 U.S.C. § 2103b(b)(1)-(2) (Supp. V 1993); 36 C.F.R. § 230.5 (1994). The objective is to encourage long-term stewardship through more active management. 16 U.S.C. § 2103a(a), b(a) (Supp. V 1993).

The FLP and the SIP are designed not only to enhance timber production, but also to achieve environmental objectives, including fish and wildlife management. 16 U.S.C. § 2103b(b)(4), (c) (Supp. V 1993); 36 C.F.R. § 230.7, .9 (1994). For details of amounts appropriated to the SIP and the FLP, see CENTER FOR RESOURCE ECONOMICS, FARM BILL 1990 REVISITED 20 (Mar. 1992) [hereinafter FARM BILL 1990 REVISITED], where it is argued that the FLP is "grossly under-funded."

The aim of the PWP is to develop partnerships with the states and private bodies to fund projects "to conserve the entire array of diverse fish and wildlife species in the United States and to provide opportunities for the public to use and enjoy these . . . species through nonconsumptive activities." 16 U.S.C. §§ 3741-3744 (Supp. V 1993). The extent to which landowners who receive funds are required to enter into binding legal obligations will depend on arrangements made within particular states.

n100 Food Security Act of 1985, Pub. L. No. 99-198, 99 Stat. 1354; Food, Agriculture, Conservation and Trade Act of 1990, Pub. L. No. 101-624, 104 Stat. 3359.

n101 16 U.S.C. § 3831 (Supp. V 1993).

n102 16 U.S.C. § 3837 (Supp. V 1993).

n103 16 U.S.C. §§ 3811-3812 (Supp. V 1993).

n104 16 U.S.C. §§ 3821-3824 (Supp. V 1993).

n105 This represents eight percent of total crop land. See Tim Osborn, *The Conservation Reserve Program: Status, Future, and Policy Options*, 48 J. SOIL & WATER CONSERVATION 271, 272-73 (1993).

n106 The total commitment comprises rental payments of over \$ 18 billion, and cost share payments for establishment of conservation practices of close to \$ 1 billion. See U.S. GENERAL ACCOUNTING OFFICE, CONSERVATION RESERVE PROGRAM: COST EFFECTIVENESS IS UNCERTAIN, REPORT TO THE CHAIRMAN, SUBCOMMITTEE ON AGRIC., RURAL DEVELOPMENT, FOOD AND DRUG ADMIN.,

AND RELATED AGENCIES, COMMITTEE ON APPROPRIATIONS, HOUSE OF REPRESENTATIVES 4 [hereinafter GAO REPORT ON CRP]. In comparison, a total expenditure of approximately \$ 176.8 million on endangered and threatened species was reported for the fiscal year 1991 by federal and state agencies. *See Report to Congress Lists Fiscal Year 1991 Expenditures for Endangered Species*, ENDANGERED SPECIES TECHNICAL BULL., Dec. 1992, at 7. In 1991 the FWS was given the largest amount it had ever received to administer the Endangered Species Act: \$ 38.7 million, making a total amount of \$ 337 million appropriated to the Service in the entire history of the Act, with another \$ 59 million provided to the states in grants to support their endangered species programs. *See Michael J. Bean, Issues and Controversies in the Forthcoming Reauthorization Battle*, ENDANGERED SPECIES UPDATE, Nov.-Dec. 1991, at 1, 2. The budget was again increased to \$ 42.3 million for fiscal year 1992, with another \$ 8.2 million going to the National Marine Fisheries Service. *See U.S. GENERAL ACCOUNTING OFFICE, ENDANGERED SPECIES ACT: TYPES AND NUMBER OF IMPLEMENTING ACTIONS, BRIEFING REPORT TO THE CHAIRMAN, COMMITTEE ON SCIENCE, SPACE, TECHNOLOGY, HOUSE OF REPRESENTATIVES 9* [hereinafter GAO REPORT ON ESA IMPLEMENTATION].

n107 *See 16 U.S.C. § 3832(a)(7)* (Supp. V 1993); *7 C.F.R. § 1410.109(g), .110(d)* (1994). There are exceptions to deal with emergencies, and to allow grazing of grassed waterways incidental to the gleaning of crop residues, in certain circumstances. Under the Regulations, there is a general power to permit the production of an agricultural commodity in any one year. *See 7 C.F.R. § 1410.116(a)(2)* (1994). Landholders are allowed to charge access fees for hunting, but early experience suggested that few of them were actively managing land for wildlife and gaining benefits from hunting and fishing fees. *See Bucklin, supra* note 93.

n108 *See 16 U.S.C. § 3832(a)(3)* (Supp. V 1993).

n109 *See 16 U.S.C. § 3832(a)(1)* (Supp. V 1993); *7 C.F.R. § 1410.111* (1994).

n110 *See 16 U.S.C. § 3832(a)(4)* (Supp. V 1993).

n111 *See 7 C.F.R. § 1410.112(a)(1)* (1994).

n112 *See 16 U.S.C. §§ 3833, 3834(b)(1)* (1988 & Supp. V 1993); *7 C.F.R. § 1410.110(a)-(b)* (1994).

n113 *See 16 U.S.C. § 3834(b)(1)* (Supp. V 1993); *7 C.F.R. § 1410.118(b)* (1994). Only where land is set aside for the production of hardwood trees, windbreaks, shelterbelts or wildlife corridors is allowance made for ongoing maintenance and management. *See 16 U.S.C. § 3834(b)(3)* (Supp. V 1993); *7 C.F.R. § 1410.118(f)* (1994).

n114 *See KENNETH A. COOK, SO LONG CRP 33* (1994). *See also* GAO REPORT ON CRP, *supra* note 106, at 4.

n115 *See WILLARD W. COCHRANE & C. FORD RUNGE, REFORMING FARM POLICY: TOWARD A NATIONAL AGENDA 81* (1992). This is achieved through reducing the base acreage (which determines the amount of agricultural support the landholder is entitled to receive in the form of deficiency payments) by the acreage enrolled in the CRP over the term of the contract. *16 U.S.C. § 3836(a)* (Supp. V 1993). The authors

point out that in practice, the acreage involved is so small that the program will only "modestly affect commodity supplies." *See* COCHRANE & RUNGE, *supra*.

n116 *See* 16 U.S.C. § 3801(a)(6)-(7) (1988).

n117 *See* GAO REPORT ON CRP, *supra* note 106, at 2.

n118 *See* 16 U.S.C. § 3831(b)(4)(C) (Supp. V 1993); 7 C.F.R. § 1410.103(d)(2) (1994). Another category of eligible land added in the 1990 amendments to the legislation was marginal pasture lands converted to wetlands or established as wildlife habitat prior to November 28, 1990. *See* 16 U.S.C. § 3831(b)(2) (Supp. V 1993). The inclusion of marginal pasture land in the Program has since been abandoned. To be eligible under the Regulations, land must have been annually planted or considered planted with an agricultural commodity in two of the five crop years from 1986 through 1990. 7 C.F.R. § 1410.103(a)(1) (1994). Agricultural commodities are defined as any crop planted or produced by annual tilling of the soil or on an annual basis by one trip planters, or sugar cane planted or produced in a state, or alfalfa and other multiyear grasses and legumes in rotation as approved by the Secretary. 7 C.F.R. § 1410.3(b) (1994). *Cf.* 16 U.S.C. § 3801(a)(1) (1988). The reason given for the exclusion of marginal pasture land is that conservation on such lands can be achieved "more efficiently" under other programs, including the America the Beautiful Program. *See* 56 Fed. Reg. 15,983 (1991).

n119 *See* 16 U.S.C. § 3832(c) (Supp. V 1993). "Wildlife" includes migratory waterfowl.

n120 *See* 16 U.S.C. § 3835a (Supp. V 1993); 7 C.F.R. § 1410.107 (1994).

n121 *See* 16 U.S.C. § 3831(f) (Supp. V 1993); 7 C.F.R. § 1410.105 (1994). Three areas were originally designated in the 1990 Farm Bill, but new areas were established in 16 states prior to the 12th CRP sign-up. Bids to enter the program may be submitted in these areas from producers whose land is not highly erodible, and these will be weighted more highly in terms of the environmental benefits index used to decide among bids. Seventeen percent of acres tentatively admitted into the CRP in the 12th sign-up came from these areas. Tim Osborn & Dwight M. Gadsby, *Farmers Sign on to Wetlands Program*, AGRIC. OUTLOOK, Oct. 1992, at 24, 26.

n122 About 34 million acres were enrolled before the 1990 amendments. *See* 56 Fed. Reg. 15,980 (1991). Another 2.6 million acres were enrolled in three sign-ups through fiscal year 1992. There was no sign up in 1993. *See* Osborn, *supra* note 105, at 272-73.

n123 *See* GAO REPORT ON CRP, *supra* note 106, at 3. By 1989, 28 million acres had been enrolled, but only about 30% of the 9.1 million acres of the most highly erodible cropland were in the Program. *Id.* at 6.

n124 *See id.* at 12-13; Osborn, *supra* note 105, at 276; Osborn & Gadsby, *supra* note 121, at 26.

n125 Fifty-nine percent of the acreage enrolled between 1986 and 1989 was in the Great Plains States, but only 27% of land in post-1990 sign-ups was located in this area. *See* Osborn, *supra* note 105, at 273.

n126 Telephone Interview with Jack Webb, acting assistant deputy administrator for state and county operations, Agricultural Stabilization and Conservation Service (July 13, 1994).

n127 See GAO REPORT ON CRP, *supra* note 106, at 7. Of 375,205 contracts entered into during the first 12 sign-ups, only 1751 involved easements. See COOK, *supra* note 114, at 4. On the importance of securing easements, see David H. Behm, *An Alternative Approach to Administering Federal Land Retirement Programs in Minnesota*, 49 J. SOIL & WATER CONSERVATION 426 (1994) (discussing Minnesota's Conservation Easement Programs: the Reinvestment in Minnesota Reserve and Permanent Wetland Preserves).

n128 See 16 U.S.C. § 3831(e) (Supp. V 1993); 7 C.F.R. § 1410.104 (1994). Contracts can run up to fifteen years where the land is devoted to hardwood trees, shelterbelts, windbreaks, or wildlife corridors. In practice, the vast majority of contracts are for 10-year terms. Of 375,205 contracts entered into during the first 12 sign-ups, only 2709 were for 15 years. See COOK, *supra* note 114, at 4.

n129 Even useful life easements were in no sense designed to be permanent. They were defined as being for either 15 or 30 years. 7 C.F.R. § 1410.3(b) (1994). They did, however, have the crucial advantage of binding successors in title to the original landholder.

n130 See 16 U.S.C. § 3831(b)(4)(C) (Supp. V 1993); 7 C.F.R. § 1410.103(d)(2) (1994).

n131 Significant problems are anticipated as land starts to come out of contract after 1995. In a recent survey by the Soil and Water Conservation Society, 46% of respondents indicated that they planned to use their CRP acres after contracts expired. See Osborn, *supra* note 105, at 274. One major question is what effect the "conservation compliance" provisions of the Farm Bills, which apply to highly erodible land in production, will have on a landholder's decision about whether to bring land back into production. See *FARM BILL 1990 REVISITED*, *supra* note 99, at 7. Under conservation compliance, agricultural program benefits are forfeited unless owners of highly erodible land comply with a conservation plan. 16 U.S.C. §§ 3811-3812(a) (1988 & Supp. V 1993). Much of the land coming out of the CRP will become subject to these provisions. See 16 U.S.C. § 3812(a)(4) (Supp. V 1993). Where the plan involves structural measures, there is a grace period. 7 C.F.R. § 12.23(b) (1994). One author suggests that conservation compliance will not be a disincentive for returning land to crop production: one quarter of the CRP acres will be exempt from the requirement, and, of the remaining amount, only one half will require substantial expenditures to come into compliance. See Osborn, *supra* note 105, at 273. In addition, there is evidence that enforcement of conservation compliance in the past has been lax. See *FARM BILL 1990 REVISITED*, *supra* note 99, at 7-11; KENNETH A. COOK & ANDREW B. ART, *COUNTDOWN TO COMPLIANCE: IMPLEMENTATION OF THE RESOURCE CONSERVATION REQUIREMENTS OF FEDERAL LAW* (1993); KENNETH A. COOK ET AL., *SUBSIDIZING SOIL LOSS: USDA'S LAX ENFORCEMENT OF THE FEDERAL CONSERVATION COMPLIANCE POLICY* (1992). Regardless of enforcement, conservation compliance has little to offer in terms of biodiversity conservation because most conservation plans rely on conservation tillage. See COOK ET AL., *supra*, at 5.

n132 A number of bird species that had seriously declined in abundance between 1966 and 1990 were common in CRP fields. See Douglas H. Johnson & Michael D. Schwartz, *The Conservation Reserve Program and Grassland Birds*, 7 CONSERVATION BIOLOGY 934 (1993). See also H.A. Kantrud, *Duck Nest Success on Conservation Reserve Program Land in the Prairie Pothole Region*, 48 J. SOIL & WATER CONSERVATION 238 (1993).

Nearly two and a half million acres of CRP land have been planted with trees, two million acres are subject to special wildlife practices, and over 400,000 acres are wetlands. Since the 1990 amendments to the Program, the percentage planted with trees has doubled. See Osborn, *supra* note 105, at 273. In the 10th sign-up, for example, the percentage of land to be planted with trees rose from an average of 6% during previous sign-ups to 18%. Tim Osborn, *Revamped CRP Growing Again*, AGRIC. OUTLOOK, June 1991, at 22, 24.

One author has pointed to evidence of significant gains arising from the plantings of various mixtures of tame and native grasses, representing over 85% of all acres planted. This has provided buffer zones around wetlands as well as enhanced habitat for a number of species. Arthur W. Allen, *Conservation Reserve Program (CRP) Benefits to Wildlife: A National Perspective*, 38 LAND & WATER 23 (1994).

For a brief summation of the ways in which the CRP could have been made more sensitive to wildlife conservation if there had been greater involvement of wildlife professionals, see Mel Schamberger, *Viewpoints*, 48 J. SOIL & WATER CONSERVATION 279 (1993).

n133 The legislation refers to "wetland values." 16 U.S.C. § 3837(c)(2) (Supp. V 1993). The regulations include as wetland functions and values: improvement of habitat, protection and improvement of water quality, flood prevention, groundwater recharge, protection and enhancement of open space and aesthetic quality, and educational and scientific values. 7 C.F.R. § 703.7(e)(2) (1994). The factors to be taken into account in deciding whether to enroll land include "the on-farm and off-farm environmental threats" stemming from its use for agricultural production. 16 U.S.C. § 3837(c)(3) (Supp. V 1993).

n134 A pilot program was initiated in 1992, covering the states of California, Iowa, Louisiana, Minnesota, Mississippi, Missouri, New York, North Carolina, and Wisconsin. 7 C.F.R. § 703.1(a) (1994). The program attracted proposals for 250,000 acres for restoration from over 2300 farmers. Of these, nearly 50,000 acres were selected at a total cost of \$ 46.4 million. No additional funding was made available in fiscal year 1993. The 1994 appropriations conference report provides funding of \$ 66.7 million for an additional 75,000 new acres to be enrolled in fiscal year 1994, increasing the number of participating states to 20. A total of 55.6 million acres of cropland converted from wetlands, two-thirds of which is in the Lake and Corn Belt states, is potentially eligible for the 1994 round. See CLINTON PROPOSAL, *supra* note 24, at 797; Ralph E. Heimlich & Dwight M. Gadsby, *Strategies for Wetlands Protection and Restoration*, AGRIC. OUTLOOK, Sept. 1993, at 32, 32-34. The proposed budget for the WRP in fiscal 1996 is \$ 210 million, up from the program's 1995 budget of \$ 83.9 million. Funding at this 1996 level would enable the Department of Agriculture to permanently remove an additional 300,000 acres of wetlands from agricultural production. See Bob Benenson, *Function by Function: Environment*, 53 CONG. Q. WKLY. REP. 420 (1995). Note that ordinarily there are acreage limits on the area in individual counties that can be included in ECARP, except where the local economy would not be affected. 7 C.F.R. §§ 703.4, 1410.4 (1994).

n135 16 U.S.C. § 3801(a)(16) (Supp. V 1993). Adjacent lands that are functionally dependent on wetlands and riparian areas linking enrolled wetlands can also be included. See 16 U.S.C. § 3837(c)(1), (d)(3) (Supp. V 1993); 7 C.F.R. § 703.7(d) (1994).

n136 For the definition of "converted wetland," see 16 U.S.C. § 3801(a)(4) (1988). There is no definition of "farmed wetland" in the statute, but see the discussion *infra* at note 159 and the Clean Water Act definition *infra* at note 248. See also 7 C.F.R. § 703.7(a)(2) (1994).

n137 16 U.S.C. § 3837(c)(1) (Supp. V 1993); 7 C.F.R. § 703.7(a)(1)(i) (1994).

n138 *16 U.S.C. § 3837(c)(2)* (Supp. V 1993); *7 C.F.R. § 703.2(f)(1), 703.7(a)(1)(ii)*, (e) (1994).

n139 *16 U.S.C. § 3837a(a)*, (e) (Supp. V 1993). Priority is ordinarily to be given to perpetual easements. *See 16 U.S.C. § 3837c(d)* (Supp. V 1993). *See also 7 C.F.R. § 703.17 (1994)* (containing provisions relating to arrangements where land is sold).

n140 *16 U.S.C. § 3837c(d)* (Supp. V 1993). This appears to have been watered down in the regulations. *See 7 C.F.R. § 703.10(d)(1) (1994)*. In the first sign-up, the "cost effectiveness of restoring each parcel of land was measured and ranked based on its easement and restoration cost compared with the expected effectiveness of the restoration, contribution to the surrounding ecological complex, and other benefits." Heimlich & Gadsby, *supra* note 134, at 32.

n141 *See 16 U.S.C. § 3837a(a)-(c)* (Supp. V 1993); *7 C.F.R. § 703.12(a)(1)(ii)*, (a)(15) (1994). Although the landholder can seek the assistance of government and private organizations, the ultimate responsibility for management is placed very firmly on him or her.

n142 *7 C.F.R. § 703.12(a)(13) (1994)*.

n143 Prohibited activities include altering wildlife habitat and other natural features of the land, chemical spraying, mowing, and grazing. *16 U.S.C. § 3837a(b)(2)* (Supp. V 1993); *7 C.F.R. § 703.12(a)(6)*, (b) (1994).

n144 Compatible uses include hunting, fishing, managed timber harvesting, and periodic haying and grazing. *16 U.S.C. § 3837a(d)* (Supp. V 1993); *7 C.F.R. § 703.15(a)(3) (1994)*. This should keep the cost of easements down. Heimlich & Gadsby, *supra* note 134, at 32.

n145 *7 C.F.R. § 703.15 (1994)*.

n146 *16 U.S.C. § 3837a(b)(2)(C)* (Supp. V 1993); *7 C.F.R. § 703.12(b)(3) (1994)*.

n147 However, there are also limits on the area within individual counties that can be placed under easement, unless a determination is made that the local economy will not be affected. *See 7 C.F.R. § 703.4 (1994)*.

n148 This must not exceed the difference between the fair market value of the land before and after it was encumbered with the easement. It could in practice be less because of the system of competitive bidding. *See 7 C.F.R. § 703.11 (1994)*. Payment is to be by not less than 5 nor more than 20 annual installments, unless the easement is perpetual, in which case the parties may agree on a single lump sum. *16 U.S.C. § 3837a(f)* (Supp. V 1993); *7 C.F.R. § 703.13(c) (1994)*. There is an overall limit to compensation of \$ 50,000, except where a perpetual easement is involved. *16 U.S.C. § 3837d(c)(1)* (Supp. V 1993); *7 C.F.R. § 703.14 (1994)*.

n149 *16 U.S.C. § 3837c(a)* (Supp. V 1993).

n150 *Id.* The proportion paid varies, depending on whether the easement is perpetual (75-100%) or not

(50-75%). 16 U.S.C. § 3837c(b) (Supp. V 1993); 7 C.F.R. § 703.13(a) (1994). In the 1992 pilot program, easement payments totaled \$ 37 million. Total easement payments were greatest in California, where easement values were highest, and in Mississippi, where the largest acreage was accepted. See Heimlich & Gadsby, *supra* note 134, at 32-34.

n151 See 7 C.F.R. § 703.13(a)(4), (b) (1994).

n152 Sodbuster applies to over 220 million acres of land in grass or trees. See COOK & ART, *supra* note 131, at 1.

n153 These include price support payments, crop insurance, and disaster payments. See 16 U.S.C. § 3811(1) (1988 & Supp. V 1993).

n154 *Id.*

n155 16 U.S.C. § 3812(c)(1) (Supp. V 1993); 7 C.F.R. § 12.5(a)(2)(ii) (1994). For a discussion of the development and aims of conservation systems, see 7 C.F.R. § 12.23 (1994).

n156 See *FARM BILL 1990 REVISITED*, *supra* note 99, at 12.

n157 See James W. O'Brien, *Federal and State Regulation of Wetlands in Iowa*, 41 *DRAKE L. REV.* 139, 150-61 (1992) (providing general overview of Swampbuster provisions). For an attempt to estimate the area of land affected by the Swampbuster provisions, see Ralph E. Heimlich, *New Wetland Definition Debated*, *AGRIC. OUTLOOK*, Nov. 1991, at 24-25.

n158 See 16 U.S.C. § 3821 (Supp. V 1993); 7 C.F.R. § 12.4 (1994). There is provision for reinstatement of eligibility for some of the program benefits withdrawn as a result of breach of the Swampbuster provisions where: (1) the wetland is being actively restored; (2) there have been no other breaches in the last ten years; and (3) the conversion was done in good faith, without the intention to violate the provisions. See 16 U.S.C. § 3822(h) (Supp. V 1993); 7 C.F.R. § 12.5(b)(7) (1994). Program benefits can be restored in subsequent years if a farmer restores the converted wetland to its prior wetland state. See 16 U.S.C. § 3822(i) (Supp. V 1993).

n159 Conversion is defined to include draining, dredging, filling, leveling or any other means that allows agricultural production to be carried out. See 16 U.S.C. § 3821(b) (Supp. V 1993). "Wetland" is broadly defined. See 16 U.S.C. § 3801(a)(16) (Supp. V 1993); 7 C.F.R. § 12.2(a)(29), .31 (1994). This definition must be set alongside the definition of "converted wetland," which specifically excludes wetland on which agricultural activities have only been carried out in dry years without destroying natural wetland characteristics. See 16 U.S.C. § 3801(a)(4) (1988). Prairie potholes, for example, are dry enough to plant wheat in most years. See Heimlich, *supra* note 157, at 23. Wetlands that have been cropped in these circumstances, along with other wetlands that have been manipulated to some degree but still meet wetland criteria, are commonly referred to as *farmed wetland*. See 7 C.F.R. § 12.32(a)(3), (b) (1994). Wetland protected under Swampbuster includes not only natural wetlands that have not been drained or cleared to any appreciable degree, but also farmed wetlands. See Heimlich, *supra* note 157, at 23. The latter can continue to be cultivated provided that they are not subjected to further modification that would destroy their wetland characteristics, through enhanced drainage,

for example. *See* 16 U.S.C. § 3822(b)(1)(D) (Supp. V 1993); 7 C.F.R. § 12.5(b)(1)(iv)(C), .32(b), .33(a) (1994). Converted wetland is not affected by Swampbuster. *See* 16 U.S.C. § 3822(b)(1)(A) (Supp. V 1993); 7 C.F.R. § 12.5(b)(2)-(5) (1994). *See also* Barnaby J. Feder, *Crop Subsidies: Help and Headaches*, N.Y. TIMES, July 5, 1994, at D1-2 (discussing general farm subsidies and compliance).

n160 16 U.S.C. § 3821(b) (Supp. V 1993); 7 C.F.R. § 12.4(a)(3) (1994).

n161 Under the original 1985 provisions, a farmer who *produced* an agricultural commodity on a converted wetland after December 23, 1985 became ineligible for program benefits. *See* 16 U.S.C. § 3821 (1988) (current version at 16 U.S.C. § 3821(a) (Supp. V 1993)). After November 28, 1990, a farmer is ineligible if he or she converts a wetland so as to *make possible the production* of an agricultural commodity. *See* 16 U.S.C. § 3821(b) (Supp. V 1993). The amendments prevent farmers from giving up their subsidies in good years by planting on wetland, but then collecting subsidies in bad years when they do not plant. *See* Dalana W. Johnson, *Saving the Wetlands from Agriculture: An Examination of Section 404 of the Clean Water Act and the Conservation Provisions of the 1985 and 1990 Farm Bills*, 7 J. LAND USE & ENVTL. L. 299, 309 (1992). The Sodbuster provisions, however, continue to define breach in terms of the production of a crop, as distinct from the initial conversion of the land. *See* 16 U.S.C. § 3822(b) (Supp. V 1993).

n162 *See* 16 U.S.C. § 3822(b), (e)-(f), (h)-(i) (Supp. V 1993); 7 C.F.R. § 12.5 (1994).

n163 16 U.S.C. § 3822(f)(1) (Supp. V 1993); 7 C.F.R. § 12.5(b)(1)(iii), .31(d) (1994).

n164 *See* 16 U.S.C. § 3822(f)(2), (g) (Supp. V 1993); 7 C.F.R. § 12.5(b)(6), .30(b) (1994). The restored wetland must be in the same general area of the local watershed, unless it is part of a regional mitigation bank. It must provide the equivalent functions and values that will be lost as a result of the wetland conversion, and this could involve greater than one for one replacement acreage, although the assumption is that this will not usually be necessary. The owner of the land on which restoration takes place must grant an easement for the *maintenance* of the restored wetland until the converted wetland is itself fully restored. *See* 16 U.S.C. § 3822(f)(2)(A)-(F) (Supp. V 1993); 7 C.F.R. § 12.5(b)(6)(A)-(F) (1994). At least one author suggests that little wetland mitigation is being carried out under these provisions. *See* Ann Y. Robinson, *Wetlands Protection: What Success*, 48 J. SOIL & WATER CONSERVATION 267, 269 (1993).

n165 *See infra* part VI.A.3.

n166 On the other hand, there is no provision for "sequencing." *See infra* text accompanying notes 291-292.

n167 *See infra* text accompanying notes 310-315.

n168 Breach occurs where production of an "agricultural commodity" is made possible. *See* 16 U.S.C. § 3822(b) (Supp. V 1993). "Agricultural commodity" is defined to mean "any agricultural commodity planted and produced in a State by annual tilling of the soil, including tilling by one-trip planters," or sugarcane, 16 U.S.C. § 3801(a)(1) (1988), thus excluding perennial pasture species. *Cf.* 16 U.S.C. § 3831(g) (Supp. V 1993) (including multi-year grasses and legumes as agricultural commodities). The regulations specifically exempt conversions for fish production, trees, vineyards, shrubs, cranberries, and building and road construction. *See* 7 C.F.R. §

12.5(b)(1)(ii) (1994). On the other hand, if the landholder converts land so as to make the production of any agricultural commodity possible, whether or not a program crop, he or she stands to lose benefits in relation to all other program crops grown on other land. *See* 16 U.S.C. § 3821 (Supp. V 1993); 7 C.F.R. § 12.4(a)-(b) (1994).

n169 *See infra* part VI.A. For a recent attempt to clarify the relationship between section 404 of the Clean Water Act and Swampbuster in relation to wetland determinations, see Interagency Memorandum of Agreement Concerning Wetlands Determinations for Purposes of Section 404 of the Clean Water Act and Subtitle b of the Food Security Act, 59 *Fed. Reg.* 2920 (1994).

n170 COOK, *supra* note 114, at 37.

n171 *See* Heimlich, *supra* note 157, at 22, 25 (suggesting that highest priority in WRP would be given to restoring prior converted wetlands, as distinct from farmed wetlands, which again makes little sense from the perspective of biodiversity conservation).

n172 Figures for 1987 and 1988 show that roughly two-thirds of all U.S. farms, accounting for about half of all land in farms, received no direct program payments. *See* Bob Reinsel, *Farms Without Program Payments*, AGRIC. OUTLOOK, Oct. 1991, at 36. This was usually because they produced commodities, such as fruits, nuts, berries, nursery and greenhouse products, livestock, and dairy products, which are not eligible for program payments. *See id.* at 38. These farms were generally small in acreage, had low cash farm income, and earned a large share of their total income outside of the farm. *See id.* at 37. However, over half of the very largest farms in terms of sales volume also received no payments. In contrast, only 13% of cotton farms and 29% of grain farms did not receive payments in 1987. *See id.* at 38. No evidence has been found to suggest that farmers have left the commodity programs to escape the demands of Sodbuster and Conservation Compliance. *FARM BILL 1990 REVISITED*, *supra* note 99, at 14.

n173 *See* COOK & ART, *supra* note 131, at 19. Nearly \$ 12 million in benefits were originally denied, but slightly under half of this amount was subsequently restored. Figures for 1991 indicate that 135 farms breached Swampbuster, with \$ 2.5 million in benefits initially denied, and \$ 851,000 later restored. *See id.* at 21. Separate enforcement figures for Sodbuster are not kept, but USDA statistics indicate that in 1992, 2.5% of highly erodible land tracts subject to either conservation compliance provisions or Sodbuster were not actively applying conservation plans. This compared with 1.6% for 1991. *See id.* at 4. Most of these determinations came from ten states. *See id.* at 11. A significant proportion of determinations of active appliance of conservation plans in both years, moreover, were attributable to the grant of variances (in 1991, on the basis that the plan was unclear, and in 1992, on the basis that an adequate substitute practice had been applied). *See id.* at 6-7. Figures for actual loss of benefits show that 1953 farms have been found to be in violation of conservation compliance and Sodbuster combined since 1986, and \$ 10.8 million in benefits have been denied (\$ 4.6 million of which have since been reinstated). Prior to 1990, when Sodbuster alone operated, only 328 farms were found to be in violation. *See id.* at 17.

n174 *See id.* at 1 ("In our view, it is highly probable that in 1992 as in 1991, tens of thousands of farmers received hundreds of millions of dollars in farm program benefits for which they should not have been eligible because they were not complying with sodbuster [sic], swampbuster [sic], or conservation compliance provisions of federal law. We predict that continued lax enforcement of the law will severely undermine public support for farmers and farm programs . . .").

The tone of this, the most recent publication of a series of publications of the Center for Resource Economics, is more moderate than earlier publications. See COOK ET AL., *supra* note 131, at 5 (suggesting that weak enforcement record is attributable to widespread unwillingness to enforce law rather than lack of federal funds, and referring to culture of Soil Conservation Service as rooted in voluntary era of soil conservation).

Other writers support the allegation of lax enforcement. See COCHRANE & RUNGE, *supra* note 115, at 136. For an example of the approach taken by the Soil Conservation Service in the context of the conservation compliance provisions, see Feder, *supra* note 159, at D2.

n175 See C. Ford Runge, Environmental Incentives for Agriculture: Carrots, Sticks, and Conditionality 31 (May 1, 1994) (unpublished report prepared for Environment Directorate, Organization for Economic Cooperation and Development, on file with *Harvard Environmental Law Review*).

n176 Conservation easements taken by land trusts and federal and state government agencies cover more than 2.7 million acres of land in the U.S. JOHN B. WRIGHT, ROCKY MOUNTAIN DIVIDE: SELLING AND SAVING THE WEST 14 (1993).

n177 See Judith S.H. Atherton, *An Assessment of Conservation Easements: One Method of Protecting Utah's Landscape*, 6 J. ENERGY L. & POLY 55, 56-62 (1985). See also Gerald Korngold, *Privately Held Conservation Servitudes: A Policy Analysis in the Context of Gross Real Covenants and Easements*, 63 TEX. L. REV. 433 (1984).

n178 A covenant "in gross" is a purely personal interest, neither appurtenant to any estate in land nor belonging to a person by virtue of his or her ownership of an estate in land. See BLACK'S LAW DICTIONARY 510 (6th ed. 1990).

n179 For a survey of the main requirements, see Atherton, *supra* note 177, at 63-67.

n180 UNIFORM CONSERVATION EASEMENT ACT § 1(1), 12 U.L.A. 66 (Supp. 1994) [hereinafter U.C.E.A.]. This Act has been adopted by 16 states and the District of Columbia. For a sampling of those state statutes, see ARIZ. REV. STAT. ANN. § 33-271 to -276 (1985); IND. CODE ANN. § 32-5-2.6-1 to .6-7 (West 1984); KAN. STAT. ANN. § 58-3810 to -3817 (1992).

n181 U.C.E.A. § 4.

n182 See Korngold, *supra* note 177, at 448-63.

n183 Korngold regards this as the "most compelling reason for the antirestrictions policy." *Id.* at 457.

n184 See *id.* at 469, 489-90.

n185 See *id.* at 489. The Massachusetts legislation requires a "conservation restriction" taken by a charitable

organization to be approved both by the local council and the Secretary of Environmental Affairs. In reaching a decision, they must take into account, *inter alia*, the public interest and any comprehensive land use plan. *See MASS. GEN. L. ch. 184, § 32* (1994). Under the California provisions, an open-space easement taken by a nonprofit organization must be approved by the governing body of the county or city. Before granting approval, this body must find that the easement is consistent with the general plan and that it will serve the public interest. *See CAL. GOVT CODE §§ 51083.5, 51084* (West 1983).

n186 Note, however, that a tax deduction is only available where there is an intent to give (a donative intent), without any expectation of a substantial benefit as a *quid pro quo*. Those granting easements must not be primarily motivated by tax concerns, and would be wise not to raise this issue until after the easement has been granted. *See McLennan v. U.S., 24 Cl. Ct. 102, 106-07* (1991).

A detailed consideration of the relevant tax law is beyond the scope of the present Article. The basic position is that the grant of an easement to a qualified organization exclusively for conservation purposes can be deducted as a charitable deduction for income tax purposes. *See I.R.C. § 170(f)(3)(B)(iii)*, (h) (1994); *Treas. Reg. § 1.170A-14* (1994). There must be a transfer of value, but this requirement has been found to have been satisfied where restrictions on land use were imposed that adequately preserved the scenic quality of a property, even though the landowner retained significant development rights. These rights included the right to subdivide the property into eight parcels, to build four new family residences and roads to the residences, and to cut timber for residential structures. *See McLennan v. U.S., 23 Cl. Ct. 99, 103-04* (1991).

The grant of an easement may also reduce the value of a deceased estate for the purposes of estate tax. *See I.R.C. § 2055(a)*, (f) (1994). Conservation easements are not subject to gift taxes. *I.R.C. § 2522(a)*, (d) (1994). Finally, the existence of a conservation easement may lead to a reduced assessment of the value of the land for the purposes of local property taxes.

n187 The conditions imposed by the income tax system do not adequately address the concerns raised here. Although the easement must be granted in perpetuity, *I.R.C. § 170(h)(2)(C)*, (h)(5)(A) (1994), the range of organizations that can qualify as appropriate recipients is broad. *See I.R.C. §§ 170(h)(3), 501(c)(3)* (1994). So too is the list of conservation purposes for which easements can be taken. *See I.R.C. § 170(h)(4)* (1994). In addition to the protection of "relatively natural habitat" and ecosystems, valid purposes include the preservation of land for outdoor recreation, the preservation of open space, including farmland, for scenic enjoyment, and the preservation of land as open space where this is pursuant to clearly defined federal, state or local government conservation policy (for example, the preservation of farmland pursuant to a state program for flood prevention and control). *Treas. Reg. § 1.170A-14(d)(4)(iii)(A)* (1994). Where the basis of an easement is preservation of open space, it must also provide a "significant public benefit." *I.R.C. § 170(h)(4)(A)* (1994); *Treas. Reg. § 1.170A-14(d)(4)(iv)* (1994). On the positive side, Treasury regulations do provide that a deduction will not be allowed for tax purposes if, although accomplishing one of the designated conservation purposes, the easement would "permit destruction of other significant conservation interests." *Treas. Reg. § 1.170A-14(e)(2)* (1994). The example given, however, refers to the use of harmful pesticides on preserved farmland, and the regulations are deliberately vague when it comes to other agricultural activities that might be incompatible with biodiversity conservation. *See id.* Note that the definition of eligible conservation purposes in *I.R.C. § 170(h)(4)(A)* (1994), with the limitations that this implies, does not apply to deductions claimed in relation to estate and gift taxes. *See I.R.C. §§ 2055(f), 2522(d)* (1994).

n188 In one practical manual, land trusts are defined as "local, state, or regional nonprofit organizations directly involved in protecting land for its natural, recreational, scenic, historical, or productive value." THE LAND TRUST ALLIANCE, STARTING A LAND TRUST: A GUIDE TO FORMING A LAND

CONSERVATION ORGANIZATION 1 (1990). Some trusts claim to pursue a whole range of objectives. *See generally id.* at app. G.

n189 *See* THE TIMES ATLAS OF THE WORLD xiii (1990). The New England states are Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

n190 For example, Utah has one land trust, New Mexico has five, while Colorado has 27. There are a total of 43 land trusts in the Rocky Mountain States and another 116 in the Far West. *See* WRIGHT, *supra* note 176, at 17.

n191 John B. Wright, *Cultural Geography and Land Trusts in Colorado and Utah*, 83 GEOGRAPHICAL REV. 269, 270-71 (1993).

n192 *See* Chris Elfring, *Preserving Land Through Local Land Trusts*, 39 BIOSCIENCE 71 (1989).

n193 *See* WRIGHT, *supra* note 176, at 25.

n194 *See id.* at 15.

n195 *See McLennan v. U.S.*, 23 Cl. Ct. 99 (1991) (holding transfer of scenic easement to be transfer of value despite substantial owner-reserved rights to farm and develop).

n196 This is neglected by one analyst, who emphasizes the restrictive aspect of easements by referring to them as LUREs ("land use restriction easements"). Karen A. Jordan, *Perpetual Conservation: Accomplishing the Goal Through Preemptive Federal Easement Programs*, 43 CASE W. RES. L. REV. 401, 406 (1993).

n197 *See, e.g., MASS. GEN. L. ch. 184, § 31* (1994), which specifically labels instruments "conservation restrictions"; *CAL. GOV'T CODE § 51075(d)* (West 1983).

n198 *See supra* text accompanying note 180. For an example of a state that did not adopt the Uniform Conservation Easement Act, but does allow the imposition of affirmative obligations on landowners through conservation easements, see *COLO. REV. STAT. ANN. § 38-30.5* (West 1990).

n199 *Cf. WRIGHT, supra* note 176, at 20-21. The Handbooks produced by the Land Trust Alliance emphasize the restrictive role of conservation easements and do not appear to countenance substantial management obligations resting with the landowner. *See, e.g., BRENDA LIND, THE CONSERVATION EASEMENT STEWARDSHIP GUIDE: DESIGNING, MONITORING, AND ENFORCING EASEMENTS* 8 (1991) [hereinafter LIND] ("Consider whether the conservation objectives for the property can be met using easement restrictions, or whether some other protection method would work better. For example, if the easement is intended to protect critical habitat for an endangered species, can it be crafted to provide adequate protection of the habitat? Or will only the management control afforded by fee ownership maintain the habitat?"). At a later point, Lind even recommends that the *holder* of the easement be wary of undertaking management responsibilities unless they have the expertise, time and the money needed. *See id.* at 10. *See also* JANET

DIEHL & THOMAS S. BARRETT, *THE CONSERVATION EASEMENT HANDBOOK: MANAGING LAND CONSERVATION AND HISTORIC PRESERVATION EASEMENT PROGRAMS* 5 (1988) [hereinafter DIEHL & BARRETT] (defining conservation easement as "a legal agreement a property owner makes to restrict the type and amount of development that may take place on his or her property").

n200 There is an argument that by encouraging landowners to undertake responsibility for ongoing management, we not only acknowledge their possession of a certain level of knowledge, but also provide them with a continuing stake in biodiversity conservation, initially through management payments, but in the longer term through association with the management process and the development of expertise. Landholders should have an active role, rather than the purely passive role associated with agreements to restrict land use. *See infra* part VII.D.

n201 WRIGHT, *supra* note 176, at 18.

n202 *See* DIEHL & BARRETT, *supra* note 199, at 7.

n203 *See id.* at 181. *See* also the recitals in Diehl and Barrett's Model Easement. *Id.* at 156-57. The authors comment: "The more sensitive the resource to be protected, of course, the tighter the controls, but the grantee should make every effort to understand the resource, determine its tolerance to use, and give as much latitude for permitted uses, including economic uses, as possible. The less burdensome an easement's requirements, the less occasion there will be for conflict and the easier in the long run the easement will be to enforce." *Id.* at 179.

n204 *See supra* part IV.C.

n205 *See* DIEHL & BARRETT, *supra* note 199, at 179-80.

n206 *See* Thomas L. Fleischner, *Ecological Costs of Livestock Grazing in Western North America*, 8 CONSERVATION BIOLOGY 629 (1994). *See also* George Wuerthner, *Subdivisions Versus Agriculture*, 8 CONSERVATION BIOLOGY 905 (1994) (comparing adverse effects of agriculture on biodiversity with effects of urban development).

n207 In Utah, the Division of Wildlife Resources must require public access and cessation of grazing as terms of easements, with the result that the cost of an easement could be close to the purchase price of the land. WRIGHT, *supra* note 176, at 212 (citing Ralph Miller, Utah Division of Wildlife Resources land acquisitions specialist).

n208 *See* LIND, *supra* note 199, at 43 (indicating that it is experience of easement holders that most easement violations are caused not by original grantor, but by subsequent owners). *Cf.* DIEHL & BARRETT, *supra* note 199, at 90 ("The further an easement passes down the line from the original grantor to subsequent property owners, the greater seems the chance that the new owners will ignore the terms of the easement. There is too little experience with easements to generalize as to whether or not this is true.").

n209 At this point, however, there is a tension between the desire for precision for enforcement purposes

and the fear that too much precision will alienate the landholder. See DIEHL & BARRETT, *supra* note 199, at 176-77.

n210 See, e.g., *id.* at 102. Lind quotes one public official as stating his firm conviction that "the human animal is never more creative than when it is to his economic advantage to try to get around the terms of an easement," and goes on to advise that easements should be drafted with the hostile property owner in mind. LIND, *supra* note 199, at 15.

n211 See *Treas. Reg. § 1.170A-14(c)(1)* (1994).

n212 Lind suggests strategies for dealing with these issues, including asking for tax deductible donations from grantors of easements. See LIND, *supra* note 199, chs. 7-8.

n213 See DIEHL & BARRETT, *supra* note 199, at 92.

n214 See Letter from Will Murray, director, Conservation Programs, Western Regional Office, The Nature Conservancy, to David Farrier (June 28, 1994) (on file with *Harvard Environmental Law Review*).

n215 See Letter from Will Murray, director, Conservation Programs, Western Regional Office, The Nature Conservancy, to David Farrier (May 18, 1994) (on file with *Harvard Environmental Law Review*).

n216 See *supra* parts IV.A and IV.B.

n217 See R.F. Noss, *From Plant Communities to Landscapes in Conservation Inventories: A Look at The Nature Conservancy (USA)*, 41 *BIOLOGICAL CONSERVATION* 11 (1987). See generally KEYSTONE REPORT, *supra* note 2, app. E.

n218 See *NATURAL HERITAGE DATA CTR.*, *supra* note 25.

n219 Interview with Will Murray, director, Conservation Programs, Western Regional Office, The Nature Conservancy, in Boulder, Colo. (May 9, 1994).

n220 *Id.*

n221 *Id.*

n222 Nearly 90% of the conservation easements held by the Nature Conservancy were obtained through gifts. See Letter from Will Murray, *supra* note 215.

n223 For more optimistic assessments of the ability of conservation easements to achieve conservation goals, see generally Jordan, *supra* note 196, at 423-38; Comment, *The Endangered Species Act Under Attack*:

Could Conservation Easements Help Save the ESA?, 13 N. ILL. U. L. REV. 371 (1993) [hereinafter Comment on ESA]. Jordan concludes that conservation easements are more "fiscally manageable" than command-and-control regulation. *See id.* at 435. Jordan's conclusion appears to rest on an assumption that the latter will frequently constitute a regulatory taking under the Fifth Amendment, whereas this is clearly not the case. *See infra* text accompanying notes 430-438. The fact is that, apart from some situations where landowners are prepared to grant conservation easements as a result of a personal commitment to conservation goals, compensation in one form or another will *normally* have to be paid to induce a landowner to grant an easement that significantly interferes with land use, whether directly, or indirectly through tax deductions. For a helpful discussion of the likely cost of easements in comparison with purchase of the fee simple, *see* Atherton, *supra* note 177, at 74-77. Atherton suggests that the cost may vary from as little as 10% of fee simple value to 110%. *See id.* at 77. A crucial factor is the extent of the land use restrictions imposed on the landowner by the easement.

n224 33 U.S.C. § 1344 (1988).

n225 16 U.S.C. §§ 1538(a)(1)(B), 1539(a) (1988).

n226 Command-and-control regulation at the local level through subdivision regulation and zoning is beyond the scope of the present Article. *See* Tarlock, *supra* note 16. On the practical significance of these forms of regulation, *see* WRIGHT, *supra* note 176, at 10. ("Subdivision regulations in most parts of the country are treated like Prohibition Era edicts against having a drink. Zoning is often just wishing. Variances and rezonings are routine facts of political life."). For an example of the failure of such regulation to ensure adequate review of projects, *see id.* at 39. *Cf. id.* at 207 (finding Utah has succeeded in using zoning to control growth).

n227 SUNSTEIN, *supra* note 97, at 102.

n228 The threat of soil erosion, for example, can frequently be prevented by requiring land cleared of native vegetation to be immediately sown with pasture. Similarly, mechanical measures, such as sediment traps, can be used to prevent the polluting impact of run-off from urban development.

n229 *See, e.g.,* S.B. Weiss et al., *Grazing and Endangered Species Management*, ENDANGERED SPECIES UPDATE, June 1991, at 6 (discussing grazing as necessary component of many ecosystems, suggesting use of carefully managed domestic grazing, and advocating experimentation in relation to controls over grazing patterns). For a detailed review of the literature, suggesting a much more cautious approach, *see* Fleischner, *supra* note 206, at 636-37 (pointing specifically to inappropriateness of this form of management in arid and semi-arid ecosystems west of Rockies, where bison were historically rare or absent). *See also* WILKINSON, *supra* note 33, at 104-06; WILKINSON, *supra* note 34, at 151.

n230 Federal Water Pollution Control Act (commonly referred to as the Clean Water Act), Pub. L. No. 95-217, 91 Stat. 1566 (1977) (codified as amended at 33 U.S.C. §§ 1251-1387 (1988 & Supp. V 1993)).

n231 33 U.S.C. § 1251(a) (1988).

n232 *See* 33 U.S.C. § 1251(a)(1) (1988).

n233 33 U.S.C. § 1311(a) (1988).

n234 33 U.S.C. § 1344(a) (1988). There is a range of sanctions available. 33 U.S.C. § 1319 (1988 & Supp. V 1993). First offenders who knowingly violate the prohibition, or the terms of a permit, for example, can be punished with a daily fine of not less than \$ 5,000, nor more than \$ 50,000 while the violation persists, and imprisonment of up to three years. 33 U.S.C. § 1319(c)(2) (1988 & Supp. V 1993).

n235 33 U.S.C. § 1344(b) (1988).

n236 33 U.S.C. § 1344(c) (1988); 40 C.F.R. § 231 (1994).

n237 It was not until the 1977 amendments that wetlands were directly referred to in the legislation. *See* 33 U.S.C. § 1344(g)(1) (1988); Michael C. Blumm & D. Bernard Zaleha, *Federal Wetlands Protection Under the Clean Water Act: Regulatory Ambivalence, Intergovernmental Tension, and a Call for Reform*, 60 U. COLO. L. REV. 695, 707 (1989).

n238 For a detailed discussion of the criteria used to identify wetlands, and the attempts made in recent years to make adjustments to these criteria, see Michael S. Nagy, *The Definition of "Wetlands" Under Section 404 of the Clean Water Act: Past, Present, and Future*, 3 U. BALT. J. ENVTL. L. 92 (1993).

n239 *See* 40 C.F.R. § 230.11(e) (1994). The provision refers to the "aquatic ecosystem" but this includes anything falling within the "wetland" definition. 40 C.F.R. § 230.3(c) (1994).

n240 *See* 40 C.F.R. § 230.10(c), .41(b) (1994).

n241 *See* CLINTON PROPOSAL, *supra* note 24, at 793 (referring to "feuding" and "warring" federal agencies). *See also* Blumm & Zaleha, *supra* note 237; Eric W. Nagle, *Wetlands Protection and the Neglected Stepchild of the Clean Water Act: A Proposal for Shared Custody of Section 404*, 5 VA. J. NAT. RESOURCES L. 227 (1985).

n242 474 U.S. 121 (1985). For a further discussion, see Blumm & Zaleha, *supra* note 237, at 713-20 (noting judicial trend toward greater deference to Corps jurisdictional decisions and tension over scope of jurisdiction between Corps and EPA).

n243 474 U.S. at 134.

n244 474 U.S. at 131 n.8.

n245 The existing rule is that EPA has jurisdiction under the CWA if the body of water concerned has an effect on interstate commerce. 33 C.F.R. § 328.3(a) (1994); 40 C.F.R. § 230.3(s)(3) (1994).

n246 See *Hoffman Homes v. EPA*, 961 F.2d 1310 (7th Cir. 1992), *reh'g granted*, 975 F.2d 1554 (7th Cir. 1992), *decision on reh'g*, 999 F.2d 256 (7th Cir. 1993). The court, however, found no substantial evidence to support such a finding on the facts of the case. 999 F.2d at 261. Note that the validity of the regulation was not challenged, i.e., whether the inclusion of isolated wetlands was authorized by the Clean Water Act, or whether the Commerce Clause of the United States Constitution empowered Congress to regulate isolated wetlands on the sole basis that they may provide habitat for migratory birds. See Stephen M. Johnson, *Federal Regulation of Isolated Wetlands*, 23 ENVTL. L. 1 (1993); Dennis J. Priolo, *A Cumulative Approach to Regulation*, NAT'L WETLANDS NEWSLETTER, July-Aug. 1994, at 10. See also CLINTON PROPOSAL, *supra* note 24, at 799-800.

n247 CLINTON PROPOSAL, *supra* note 24, at 796-97.

n248 33 C.F.R. §§ 323.2(a), 328.3(a)(8) (1994); 40 C.F.R. § 232.2 (1994). The policy was jointly created by the EPA and the Army Corps of Engineers. See CLINTON PROPOSAL, *supra* note 24, at 797. The claim made is that this simply serves to codify existing agency policy. See 58 Fed. Reg. 45,034 (1993). The policy is set out in Corps of Engineers Regulatory Guidance Letter 90-7, 58 Fed. Reg. 17,210 (1993). The aim of the rule is to bring section 404 in line with the Swampbuster provisions of the Farm Bill, which exclude wetland converted to cropland prior to the passage of the Food Security Act of 1985. See 58 Fed. Reg. 45,031 (1993); *supra* part IV.C. The Corps and the EPA will use the definition found in the National Food Security Act Manual. 58 Fed. Reg. 45,031-32 (1993).

The distinction drawn under Swampbuster, and to be drawn under section 404, is between wetland that has been so significantly modified as to have lost its natural hydrology or vegetation (prior converted cropland) and "farmed wetland." See *id.* Farmed wetlands comprise potholes and playas with seven or more consecutive days of inundation, or 14 days of saturation during the growing season, and other areas with 15 or more consecutive days (or 10% of the growing season, whichever is shorter) of inundation during the growing season. See 58 Fed. Reg. 45,032. The EPA and the Corps acknowledge that a distinction between those areas that have retained sufficient wetland characteristics and those that no longer do, based on number of days inundated, is a difficult exercise in line drawing. See *id.* Farmed wetland continues to retain wetland characteristics in spite of having been cropped, and it will remain subject to the provisions of both section 404 and Swampbuster. See 58 Fed. Reg. 45,032-33 (1993).

See *supra* note 159 for the origins of the concept of "farmed wetland."

n249 33 C.F.R. § 323.2(d)(1)(iii) (1994); 40 C.F.R. § 232.2 (1994). Placement of pilings also requires a permit when it would "have the effect of" a discharge of fill material. 33 C.F.R. § 323.3(c) (1994). This rule was the result of a settlement in *North Carolina Wildlife Federation v. Tulloch*, No. C90-713-CIV-5-BO (E.D.N.C. Feb. 28, 1992) noted in CURRENT DEVELOPMENTS, 24 Env't Rep. (BNA) 1856 (Feb. 25, 1994). It is currently subject to legal challenge in *American Mining Congress v. EPA*, No. 93-1754 (D.D.C. Aug. 24, 1993) noted in CURRENT DEVELOPMENTS, 24 Env't Rep. (BNA) 1681 (Jan. 21, 1994). On the background to the settlement and its effects, see Michael Lenetsky, *President Clinton and Wetlands Regulation: Boon or Bane to the Environment?*, 13 TEMP. ENVTL. L. & TECH. J. 81, 88-91 (1994).

n250 33 C.F.R. § 323.2(d)(3)(i) (1994); 40 C.F.R. § 232.2 (1994). Degradation is defined so as to exclude *de minimis* effects; the activity must cause "an identifiable, individual or cumulative adverse effect on any aquatic function." 33 C.F.R. § 323.2(d)(5) (1994); 40 C.F.R. § 232.2 (1994). This exception is intended to be a narrow one, the objective being to reduce administrative load. See 58 Fed. Reg. 45,020, 45,022 (1993).

n251 *See 58 Fed. Reg. 45,019 (1993)*. Activities that involve simply cutting or removing vegetation above the ground without disturbing the soil do not fall within the regulatory regime unless the severed vegetation is left on site and used as fill material. *33 C.F.R. § 323.2(d)(2)(ii) (1994)*. *See Avoyelles Sportmen's League v. Marsh, 715 F.2d 897, 922-25 (5th Cir. 1983)*. This position is inadequate from the perspective of biodiversity conservation. Although clearing of the tops of vegetation without subsequent removal of roots and levelling will not allow development in many cases, this exception allows disaffected landowners to legally destroy biodiversity. Similarly, pumping of water from a wetland is not regulated by section 404 even though it would have the same effect on biodiversity as draining. *58 Fed. Reg. 45,025 (1993)*.

n252 *33 U.S.C. § 1344(f) (1988); 33 C.F.R. § 323.4(a)(1) (1994); 40 C.F.R. § 232.3(c)(1), .3(d) (1994)*.

n253 *See United States v. Akers, 785 F.2d 814, 819-20 (9th Cir. 1986), cert. denied, 479 U.S. 828 (1986)*.

n254 *FWCA Permit Veto, 24 Envtl. L. Rep. (Envtl. L. Inst.) 10346 (1994)*. *See, e.g., James City County v. EPA, 12 F.3d 1330 (4th Cir. 1993), cert. denied, 115 S. Ct. 87 (1994)* (reversing District Court's issuance of Army Corps of Engineers permit over EPA's veto).

n255 *See 33 C.F.R. § 320.4(a) (1994)*.

n256 *See 33 C.F.R. § 320.4(a)(1) (1994)*, indicating that a permit will be denied if the EPA Guidelines are not complied with. *See also Blumm & Zaleha, supra note 237, at 736-37*.

n257 *40 C.F.R. § 230.1(c) (1994)*.

n258 *See James City County v. EPA, 12 F.3d 1330, 1335-36 (4th Cir. 1993), cert. denied, 115 S. Ct. 87 (1994)*.

n259 *See 40 C.F.R. § 230.10(a) (1994)*. A permit must also be refused where there is insufficient information to make a reasonable judgment as to whether the proposal complies with the Guidelines. *See 40 C.F.R. § 230.12(a)(3)(iv) (1994)*.

n260 An area not currently owned by the applicant can be considered as a practicable alternative if it "could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity." *40 C.F.R. § 230.10(a)(2) (1994)*. The issue is whether there was an alternative site available at the time that the developer entered the market to look for a site, not the time that it applied for a permit. *See Bersani v. EPA, 850 F.2d 36, 38 (2d Cir. 1988)* (holding that EPA's market entry theory is consistent with regulations and past practice).

But compare the following statement by the Assistant Chief Counsel, Environmental Law and Regulatory Programs, U.S. Army Corps of Engineers, albeit made subject to a disclaimer that his views do not represent those of the Army:

Surprising as this fact may be to some, the Corps personnel who make virtually all of the decisions for the section 404 program base their decisions not on what EPA has said in any section 404(c) case, nor on what a federal court may have said in upholding or setting aside any

section 404(c) veto. Instead, the Corps' decisions are based on the regulations and guidance for the regulatory program promulgated by the headquarters of the Department of the Army and the Corps, and on the professional judgment of Corps district and division office personnel. For example, some persons believe that EPA's section 404(c) veto of the proposed Attleboro, Massachusetts, shopping mall and the upholding of that veto by the Second Circuit Court of Appeals in *Bersani v. Robichaud [sic]*, 850 F.2d 36 (2d Cir. 1988), changed the course of the section 404 program and established the "market entry" principle as governing the section 404(b)(1) alternatives analysis. In fact, the Corps has never adopted, and generally does not use, the "market entry" theory advanced by EPA in the Attleboro section 404(c) action.

Lance D. Wood, *Section 404: Federal Wetland Regulation is Essential*, NAT. RESOURCES & ENVT., Summer 1992, at 7, 55.

n261 See 40 C.F.R. § 230.5(c), .10(a)(1) (1994).

n262 40 C.F.R. § 230.10(a)(3) (1994). Where a project is water dependent, the presumption does not apply. See *James City County v. EPA*, 955 F.2d 254, 260 n.6 (4th Cir. 1993) (Remanded to EPA to reexamine veto of permit for water-dependent project. On subsequent decision of EPA to uphold veto a new case was filed: *James City County v. EPA*, 12 F.3d 1330 (4th Cir. 1993), cert. denied, 115 S. Ct. 87 (1994).).

n263 See 40 C.F.R. § 230.10(a)(3) (1994).

n264 See Blumm & Zaleha, *supra* note 237, at 729, 756. See also Oliver A. Houck, *Hard Choices: The Analysis of Alternatives Under Section 404 of the Clean Water Act and Similar Environmental Laws*, 60 U. COLO. L. REV. 773, 787-88 (1989).

n265 National statistics for the period Oct. 1, 1988 to Sept. 30, 1993 show that 56% of applications under section 404 were withdrawn, 39% issued with permits, and 5% were denied. CORPS OF ENGINEERS HEADQUARTERS CONSOLIDATED QUARTERLY REPORTS, cited in VIRGINIA S. ALBRECHT & BERNARD N. GOODE, WETLAND REGULATION IN THE REAL WORLD 23 (1994). This converts to a denial rate of about 11% when permit applications actually do go forward. Allegations of regulatory failure might become more muted if it became clear that these withdrawals were the result of the Corps stepping in at an early stage and making it clear that the project in question had no chance of receiving a permit because of the likely environmental impact or the availability of practicable alternatives. What little information is available on this is ambiguous. Albrecht and Goode examined the decision documents in 1992 on individual applications under section 404 that they identified as involving "target actions" -- activities such as road construction and residential, commercial and industrial projects on wetlands, excluding activities in open water. These target actions constituted approximately 10% of section 404 individual permit actions taken in 1992. They were able to examine decision documents in 410 cases out of a total sample drawn of 590, which meant that about 30% were not analyzed. See ALBRECHT & GOODE, *supra*, at 13-14. They found that of the withdrawals, 20% were withdrawn by the applicant, while 53% were withdrawn by the Corps itself because of insufficient evidence or inadequate response to objections. See *id.* at 26. See also Lawrence R. Liebesman & Philip T. Hundemann, *Regulatory Standards for Permits under Section 404*, NAT. RESOURCES & ENVT., Summer 1992, at 12-13.

n266 See THOMAS E. DAHL, WETLANDS: LOSSES IN THE UNITED STATES, 1780'S TO 1980'S,

REPORT TO CONGRESS 5 (1990). "Ten states -- Arkansas, California, Connecticut, Illinois, Indiana, Iowa, Kentucky, Maryland, Missouri, and Ohio -- have lost 70% or more of their original wetland acreage." California has lost 91%. *Id.* The Farm Belt states of Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin have lost over 36 million acres. *Id.* at 10.

n267 THOMAS E. DAHL & CRAIG E. JOHNSON, WETLANDS: STATUS AND TRENDS IN THE CONTERMINOUS UNITED STATES, MID-1970'S TO MID-1980'S 1 (1991).

n268 *See id.* at 13.

n269 *See id.* at 1.

n270 *See id.* at 1-2.

n271 *See supra* part IV.C.

n272 *See id.* at 2. A recent analysis of wetland losses on nonfederal rural lands between 1982 and 1987 confirmed this slowdown. It concludes that there was an annual loss of 72,600 hectares (179,402 acres) during this period. *See* Stephen J. Brady & Curtis H. Flather, *Changes in Wetlands on Nonfederal Rural Land of the Conterminous United States from 1982 to 1987*, 18 ENVTL. MGMT. 693 (1994). A significant proportion of these wetlands were converted to open water by natural flooding in western inland basins. Human-induced land-use conversions accounted for 50,200 hectares (123,944 acres) per year, a total of 251,200 hectares (620,464 acres) over the five-year period of the study. Forty-eight percent of this conversion resulted from urban, industrial and residential development, while agriculture was responsible for 37% of wetland losses, a significant decline from previous years. *Id.* *See also* Frederick W. Cabbage & Curtis H. Flather, *Forested Wetland Area and Distribution*, J. FORESTRY, May 1993, at 35.

n273 *See* ALBRECHT & GOODE, *supra* note 265, at 22. These figures do not include substitute acreage of created or restored wetlands, which actually exceeded the lost acreage by a ratio of 1.31 to 1.

n274 General permits, including nationwide permits and regional permits can be issued for any category of activities that are "similar in nature, will cause only minimal adverse environmental effects when performed separately, and will have only minimal cumulative adverse effect on the environment." 33 U.S.C. § 1344(e) (1988); 40 C.F.R. § 230.7 (1993). They last for up to five years, but expiration of a permit does not affect the validity of activities completed under it while it was in force. 33 C.F.R. § 330.6(b) (1994). For regulations relating to general permits, see 33 C.F.R. § 330 (1994). Note that activities that jeopardize endangered or threatened species that have been listed or proposed for listing, or adversely modify their critical habitat, cannot be authorized by a nationwide permit. 33 C.F.R. § 330.4(f) (1994). *See* Blumm & Zaleha, *supra* note 237, at 725-27, 766. Over 90% of activities authorized under section 404 between Oct. 1, 1988 and Sept. 30, 1993 were authorized by nationwide permits (79%) and regional general permits (12%). *See* ALBRECHT & GOODE, *supra* note 265, at 27.

n275 It has been suggested that in the mid-1980s, this permit exempted 17.4 million acres of wetlands in the contiguous states from the need to apply for an individual permit. *See* Nagle, *supra* note 241, at 237, citing

Thomas G. Tomasello, *Section 404 of the Clean Water Act: Risks of Regulatory Reform*, 58 FLA. BAR J., Apr. 1984, at 232.

n276 Defined as being that part of the surface tributary system upstream of the point at which the average annual flow is less than five cubic feet per second. 33 C.F.R. § 330.2(d) (1994).

n277 Loss includes the filled area, plus flooded, excavated or drained areas. 33 C.F.R. § 330 app. A (1994).

n278 *See id.* Even though an individual permit is not ordinarily required, those proposing to take advantage of Nationwide Permit 26 must give advance notification where the wetland loss would be greater than one acre, and this notification must include a delineation of affected wetland sites. 33 C.F.R. § 330.1(e) (1994). *But see* Thomas Addison & Timothy Burns, *The Army Corps of Engineers and Nationwide Permit 26: Wetlands Protection or Swamp Reclamation*, 18 *ECOLOGICAL L.Q.* 619 (1991). The authors point to the lax approach taken by the Corps in monitoring activities permitted under Nationwide Permit 26; the conciliatory attitude taken to enforcement, including the grant of after-the-fact permits; the inadequacy of the information generated in relation to the evaluation of individual and cumulative environmental impact; and the absence of any real opportunity for other agencies to comment in situations where the Permit requires advance notification. *See id.* at 666-69. Since Addison and Burns completed their research, changes have been made to the regulations dealing with nationwide permits. *See* 33 C.F.R. § 330 (1994). The time allowed for other agencies (such as the Fish and Wildlife Service and State natural resources agencies) to comment on the notification is now only 5 days. 33 C.F.R. § 330 app. A (1994). Where the adverse environmental effects are more than minimal, the applicant can now remain within the Nationwide Permit by offering mitigation that would reduce the effects to minimal. 33 C.F.R. §§ 330.1(e)(3), 330 app. A (1994). However, note that mitigation does not affect the acreage limits imposed by Nationwide Permit 26. 33 C.F.R. § 330 app. A (1994). After-the-fact authorizations have been legitimated. *See* 33 C.F.R. § 330.6(e) (1994). On the positive side, the amendments to the regulations appear to contemplate much greater resort to individual permit applications, for example, in relation to high quality wetlands. The discretion to require application for an individual permit in relation to activities otherwise covered by Nationwide Permit 26, on the grounds of environmental impact or any other public interest factor, now resides with the District, rather than the Division, Engineer. *See* 33 C.F.R. § 330.1(d) (1994). This discretion can be exercised on a case-by-case basis, following review of the notification and the wetland delineation that the applicant must forward to the Corps under Nationwide Permit 26. It can also be exercised more generally in relation to a specific geographic area, a type of activity, or a class of waters within a particular division. *See* 33 C.F.R. §§ 330.1(d), 330.4(e), 330.5(d), 330 app. A (1994).

n279 *See* text accompanying notes 238-241.

n280 *See* Addison & Burns, *supra* note 278, at 626-27.

n281 The analysis covered a district in Wisconsin during a six-month period in 1988. *See* Catherine R. Owen & Harvey M. Jacobs, *Wetland Protection as Land-Use Planning: The Impact of Section 404 in Wisconsin, USA*, 16 *ENVTL. MGMT.* 345 (1992).

n282 *See id.* at 350.

n283 *See id.* at 347. Seven of the 10 denials involved less than 0.5 acres.

n284 See 40 C.F.R. § 230.3(q), .10(a)(2) (1994).

n285 See 40 C.F.R. § 230.10(a)(2) (1994).

n286 See Houck, *supra* note 264, at 782-88. Houck does, however, identify a substantial change of tack in a memorandum from the Director of Civil Works to the New Orleans District of the Corps in April 1989. See *id.* at 795-98. See also Robert Uram, *The Evolution of the Practicable Alternatives Test*, NAT. RESOURCES & ENVT., Summer 1992, at 15, 16-17.

n287 See Houck, *supra* note 264, at 834. At the same time, he acknowledges that there will be some small-scale projects that are essentially private.

n288 See generally Nagle, *supra* note 241, at 247-56 (arguing for reliance on work of National Wetlands Inventory in mapping wetlands and development of process for ranking wetlands). The legislation does in fact provide for advance planning. The EPA can take the initiative and "prohibit the specification . . . of any defined area as a disposal site," rather than simply reacting to permit applications. 33 U.S.C. § 1344(c) (1988); 40 C.F.R. § 231 (1994). The EPA Guidelines provide for the possibility of advance planning by the EPA and the Corps. 40 C.F.R. § 230.80 (1994). In practice, however, the agency has not devoted significant resources to this task. See Blumm & Zaleha, *supra* note 237, at 745, 769. More recently, the Clinton Wetland Plan has emphasized the need for more advance planning to be carried out. While it has rejected as impractical the proposal to map and rank wetlands on a national basis in terms of conservation value, it does advocate advance planning at a watershed level by States and localities, providing greater certainty by allowing likely regulatory responses to be identified in advance of specific applications for permits and enabling cumulative effects to be taken into account. See CLINTON PROPOSAL, *supra* note 24, at 795-97, 800-01.

n289 See Uram, *supra* note 286, at 15, 17.

n290 See Memorandum of Agreement Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines, 55 Fed. Reg. 9210 (1990). The Memorandum contains a clear statement that "[c]ompensatory mitigation may not be used as a method to reduce environmental impacts in the evaluation of the least environmetnally [sic] dammaging [sic] practicable alternatives." *Id.* at 9212.

n291 See *id.* at 9211-13.

n292 See *id.* at 9212. On the implications of the MOA, see Margot Zallen, *The Mitigation Agreement -- A Major Development in Wetland Regulation*, 7 NAT. RESOURCES & ENVT., Summer 1992, at 19, 21 (arguing that "[m]itigation that passes muster under the MOA and the guidelines could result in the loss of wetland values. The MOA is not a 'no net loss of wetlands' policy.").

n293 See *supra* text accompanying notes 235-240, 256-263.

n294 See 40 C.F.R. § 230.75(c) (1994).

n295 40 C.F.R. § 230.75(d) (1994).

n296 See *James City County v. EPA*, 12 F.3d 1330, 1337 n.2 (4th Cir. 1993), cert. denied, 115 S. Ct. 87 (1994).

n297 See *supra* text accompanying notes 290-292.

n298 In the same year as the MOA was concluded, the position of the FWS was that "the many technical problems affecting the success of wetlands creation projects (e.g., suitable hydrology, availability of hydric soils) makes [sic] wetlands creation a tool of limited application at this time." FWS WETLANDS PLAN, *supra* note 23, at 18. See also THE INTERAGENCY COMMITTEE ON WETLANDS RESTORATION AND CREATION, A NATIONAL PROGRAM FOR WETLANDS RESTORATION AND CREATION, Aug. 1992, at 11 (arguing that funding priority should be given to restoration and enhancement programs over wetland creation) (on file with *Harvard Environmental Law Review*) [hereinafter INTERAGENCY COMMITTEE REPORT].

n299 55 Fed. Reg. 9212 (1990).

n300 See *id.*

n301 See *id.* at 9211.

n302 See also Corps of Engineers Regulatory Guidance Letter RGL 93-2, 58 Fed. Reg. 47,719 (1993). This makes it clear that the "preference for on-site, in-kind mitigation does not preclude the use of wetland mitigation banks" where this would be an appropriate method of offsetting environmental impacts. "Compensation for wetland impacts should occur, where appropriate and practicable within the same watershed." *Id.* at 47,721. Generally, mitigation banks should be functional before credits may be drawn, but "it may be appropriate to allow incremental distribution of credits corresponding to the appropriate stage of successful establishment of wetland functions." *Id.* Another way of enabling credits to be drawn from wetland banks that are not fully functional is to require a higher contribution of bank acreage to impacted wetland acreage. See *id.*

n303 58 Fed. Reg. 47,719 (1993) (stating that "Subject" of Letter is "Guidance on Flexibility of the 404(b)(1) Guidelines and Mitigation Banking").

n304 "It is important to recognize that there are circumstances where the impacts of the project are so significant that even if alternatives are not available, the discharge may not be permitted regardless of the compensatory mitigation proposed." 55 Fed. Reg. 9212 n.5 (1990).

n305 See 58 Fed. Reg. 47,719-21 (1993) (outlining opportunities for increasing flexibility for projects having potential for only minor impacts on aquatic environment). For example, it suggests that the level of documentation demanded of applicants should reflect the significance and complexity of the proposal. *Id.* at 47,720.

n306 CLINTON PROPOSAL, *supra* note 24, at 802.

n307 *Id.* at 799. For a discussion of the difficulties that currently exist in relation to wetland mitigation banking, see Michael G. Le Desma, *A Sound of Thunder: Problems and Prospects in Wetland Mitigation Banking*, 19 *COLUM. J. ENVTL. L.* 497, 502 (1994) (pointing out that at present there are no regulatory guidelines addressing this issue). *But see* Corps of Engineers Regulatory Guidance Letter RGL 93-2, 58 *Fed. Reg.* 47,719 at 47,721-22 (1993).

n308 Federal agencies have reported that in fiscal years 1989-1992, their programs would lead to the restoration or enhancement of over 550,000 acres of wetlands on non-federal land (not including wetlands under the CRP or WRP). INTERAGENCY COMMITTEE REPORT, *supra* note 298, at 9-10. Corps of Engineer figures for fiscal year 1993 indicate that mitigation requirements exceeded the acreage of wetland impact permitted under section 404 by a ratio of 1.31 to 1. *See* ALBRECHT & GOODE, *supra* note 265, at 22.

n309 *See* CLINTON PROPOSAL, *supra* note 24, at 799-800.

n310 *See* JON A. KUSLER & MARY E. KENTULA, *Executive Summary of WETLAND CREATION AND RESTORATION: THE STATUS OF THE SCIENCE* xvii-xxv (Jon A. Kusler & Mary E. Kentula eds., 1990). The least amount of information was known about inland wetlands. *Id.* *See also* INTERAGENCY COMMITTEE REPORT, *supra* note 298, at 11 (concluding that "except for certain site-specific purposes, wetlands creation has a high risk of failure and often involves trade-offs between upland and wetland ecosystems").

n311 Certain forested wetlands and seagrasses are specifically mentioned. KUSLER & KENTULA, *supra* note 310, at xviii. *See also* LINDA A. MALONE, ENVIRONMENTAL REGULATION OF LAND USE § 4.11, at 4-73 n.6 (1994) (citing study by Fla. Dept. of Environmental Regulation that concluded only 4 of every 34 constructed freshwater wetlands work as well as natural wetlands and that saltwater wetlands have a 50% success rate). For a relatively optimistic discussion of mitigation and wetlands banking in Oregon, see Philip L. Jackson, *Managing Oregon's Estuarine Resource Lands*, 46 *J. SOIL & WATER CONSERVATION* 23 (1991). The examples of successful mitigation discussed, however, are of restored wetlands, rather than created substitute wetlands. The author acknowledges literature critical of marsh creation techniques that emphasizes that mitigation is not based on empirical research, but rather hope.

n312 Relevant factors include water depths, velocity, salinity, nutrient levels, sedimentation rates, and levels of toxics. KUSLER & KENTULA, *supra* note 310, at xxiv.

n313 *See* Ross A. Dobbertein & Norton H. Nickerson, *Use of Created Cattail (Typha) Wetlands in Mitigation Strategies*, 15 *ENVTL. MGMT.* 797, 803-04 (1991). The Wetlands Research Plan report states that "[r]estoration or creation of a wetland that 'totally duplicates' a naturally occurring wetland is impossible" because of the "subtle relationships of hydrology, soils, vegetation, animal life, and nutrients that may have developed over thousands of years in natural systems." KUSLER & KENTULA, *supra* note 310, at xviii.

n314 *See* Blumm & Zaleha, *supra* note 237, at 763 (discussing inability of created and restored wetlands to replace certain natural wetlands functions, such as wildlife habitat). For a discussion of some of the problems associated with wetland restoration projects from the perspective of biodiversity conservation, see William R.

Jordan III et al., *Ecological Restoration as a Strategy for Conserving Biological Diversity*, 12 ENVTL. MGMT. 55, 61-64 (1988). These problems include plantings based on only a few species, with little attempt to introduce rarer or more difficult plants; little planning for transplanting of animal species that may not be able to recolonize themselves; and failure to use genetic material from local sources. *Id.* at 62-63.

n315 KUSLER & KENTULA, *supra* note 310, at xxiii.

n316 For example, water level manipulation, control of exotics, controlled burns, predator controls and periodic sediment removal may be necessary. *Id.* at xxv.

n317 MARY E. KENTULA ET AL., WETLANDS: AN APPROACH TO IMPROVING DECISION MAKING IN WETLAND RESTORATION AND CREATION (1992).

n318 *See id.* at 132. *See also* KUSLER & KENTULA, *supra* note 310, at xxv.

n319 Regarding the need for monitoring and the need for remedial action to be taken in light of monitoring results, see FWS WETLANDS PLAN, *supra* note 23, at 47.

n320 KENTULA ET AL., *supra* note 317, at 17.

n321 Blumm & Zaleha, *supra* note 237, at 699. *See also* Addison & Burns, *supra* note 278, at 655. Addison & Burns describe the model of regulatory style that best explains the approach taken by the Corps to the administration of Nationwide Permit 26 as "Dig They Must." *Id.* The agency's style reflects an organizational ideology and culture committed to the manipulation of nature that is rooted in the history of the organization. *Id.*

n322 Blumm & Zaleha, *supra* note 237, at 771.

n323 Houck, *supra* note 264, at 827.

n324 First, permits would not be given for development that is not water-dependent. *See id.* at 829-31. Houck, however, allows for two narrow exceptions: (1) where a more harmful upland alternative is involved, or (2) where factors other than property ownership or economic advantage show that an activity is, in fact, water-dependent, even though it has not been declared as such. *See id.* at 830. Second, compensatory mitigation would be at a ratio of three acres to one. *See id.* at 838-39. Third, proof of "regional or national significance" would be required before a permit is granted. *See id.* at 834.

n325 For a discussion of the difference between implementation failure and regulatory failure stemming from the original provisions of the legislation ("government failure"), see SUNSTEIN, *supra* note 97, ch. 3.

n326 Pub. L. No. 93-205, 87 Stat. 884 (codified as amended at 16 U.S.C. §§ 1531-1544 (1988 & Supp. V 1993)).

n327 16 U.S.C. § 1531(a)(1)-(2) (1988).

n328 16 U.S.C. § 1531(a)(5)-(b) (1988).

n329 Defined to mean "any member of the animal kingdom." 16 U.S.C. § 1532(8) (1988).

n330 The prohibition on takings in the legislation has been extended to most threatened species by regulation. See 16 U.S.C. § 1533(d) (1988); 50 C.F.R. § 17.31(a) (1993). The general extension does not apply if there is a special rule in place dealing with the species. See 50 C.F.R. 17.31(c) (1993) (e.g., the Louisiana black bear or the American alligator). This general regulation was upheld in *Sweet Home Chapter of Communities for a Greater Oregon v. Babbitt*, 1 F.3d 1 (D.C. Cir. 1993), decision on reh'g, 17 F.3d 1463 (D.C. Cir. 1994), reh'g denied, 30 F.3d 190 (D.C. Cir. 1994), cert. granted, 115 S. Ct. 714 (Jan. 6, 1995).

n331 See 16 U.S.C. § 1538(a)(1)(B) (1988); 50 C.F.R. § 17.21(c) (1993) (as well as U.S. territorial waters and high seas).

n332 16 U.S.C. § 1539(a)(1)(B) (1988).

N333 "Conservation policy is generally blind to the two classes of organisms most important to human welfare: plants and microbes. These are the crucial, indispensable components of every ecosystem; human society, life itself, is based on them. Plants are essential to ecosystems because they are the most abundant organisms capable of capturing the sun's energy in forms that are stable and transferable through the food web." McNaughton, *supra* note 2, at 115.

n334 16 U.S.C. § 1538(a)(2)(B) (1988). There is, however, provision for the degree of protection to be extended by regulation. See 16 U.S.C. § 1538(a)(2)(E) (1988). Plants may acquire indirect protection to the extent that a "taking" includes the destruction of habitat.

n335 1 F.3d 1 (D.C. Cir. 1993), decision on reh'g, 17 F.3d 1463 (D.C. Cir. 1994), reh'g denied, 30 F.3d 190 (D.C. Cir. 1994), cert. granted, 115 S. Ct. 714 (Jan. 6, 1995).

n336 See 16 U.S.C. § 1532(19) (1988). In an attempt to provide greater certainty for landowners, the FWS has recently committed itself to identifying to the maximum extent practicable at the time of listing those activities that would or would not constitute a taking of each listed species. See Notice of Policy Statement, 59 Fed. Reg. 34,272 (1994).

n337 50 C.F.R. § 17.3 (1993).

n338 852 F.2d 1106 (9th Cir. 1988).

n339 See 852 F.2d at 1108-09. The Court did not reach a decision on whether harm included habitat degradation that merely prevents recovery of a listed species. See also *Palila v. Hawaii Dep't of Land and Natural Resources*, 639 F.2d 495 (9th Cir. 1981) (holding that Hawaii Department of Land and Natural

Resources' maintenance of feral goats and sheep in Palila's critical habitat endangered Palila and thus constituted unlawful taking under the Endangered Species Act). For an analysis of the precise circumstances in which habitat disturbance will constitute a taking, see Federico M. Cheever, *An Introduction to the Prohibition Against Takings in Section 9 of the Endangered Species Act of 1973: Learning to Live with a Powerful Species Preservation Law*, 62 U. COLO. L. REV. 109, 179-96 (1991).

n340 926 F.2d 429 (5th Cir. 1991).

n341 See 926 F.2d at 438-40. The Forest Service had permitted clearcutting within a prohibited area around nesting trees of the red-cockaded woodpecker and failed to control encroachment of hardwoods around softwood nesting sites. See *id.* at 438. On the extent to which a failure to carry out appropriate management activities may constitute a taking, see Cheever, *supra* note 339, at 191-94.

n342 See 17 F.3d 1463, 1465 (D.C. Cir. 1994).

n343 17 F.3d at 1465.

n344 Oral arguments before the Supreme Court were held on April 17, 1995. The decision was not available at time of publication.

n345 16 U.S.C. § 1539(a)(1)(B) (1988).

n346 See *supra* part VI.A.1.

n347 Note that it is only alternatives *considered by the applicant* which have to be explained. Compare this with the phrase "alternative *courses of action*" (not used in this context), which is defined to mean "all alternatives and thus is not limited to original project objectives and agency jurisdiction." See 16 U.S.C. § 1532(1) (1988).

n348 See 16 U.S.C. § 1539(a)(2)(A) (1988); 50 C.F.R. § 17.22(b)(1), .32(b)(1) (1993).

n349 See Marc Ebbin, *Looking at the Big Picture*, NAT'L WETLANDS NEWSLETTER, Sept.-Oct. 1994, at 5.

n350 See Christopher H.M. Carter, *A Dual Track for Incidental Takings: Reexamining Sections 7 and 10 of the Endangered Species Act*, 19 B.C. ENVTL. AFF. L. REV. 135, 158 (1991).

n351 See Oliver A. Houck, *The Endangered Species Act and its Implementation by the U. S. Departments of Interior and Commerce*, 64 U. COLO. L. REV. 277, 354 (1993).

n352 See 50 C.F.R. § 17.22(b)(2)(i)-(iii), .32(b)(2)(i)-(iii) (1993). The applicant must also provide adequate assurances that the conservation plan will be implemented. See 16 U.S.C. § 1539(a)(2)(B) (1988); 50 C.F.R. §

17.22(b)(2)(vi), .32(b)(2)(vi) (1993). In addition, a condition may be attached to the permit providing for monitoring arrangements. *See* 50 C.F.R. § 17.22(b)(3), .32(b)(3) (1993). The applicant must also finance both the initial planning process and subsequent implementation. *See* 16 U.S.C. § 1539(a)(2)(B)(iii) (1988); 50 C.F.R. § 17.22(b)(1)(iii)(B) (1993).

n353 50 C.F.R. § 17.22(b)(2)(iv), .32(b)(2)(iv) (1993).

n354 *See* Robert Melz, *Where the Wild Things Are: The Endangered Species Act and Private Property*, 24 ENVTL. L. 369, 382 (1994) (citing telephone interview with FWS source). For critical reviews of habitat conservation planning initiatives, see MICHAEL J. BEAN ET AL., RECONCILING CONFLICTS UNDER THE ENDANGERED SPECIES ACT: THE HABITAT CONSERVATION PLANNING EXPERIENCE 7-18, 51-104 (1991), and Robert D. Thornton, *Searching for Consensus and Predictability: Habitat Conservation Planning Under the Endangered Species Act of 1973*, 21 ENVTL. L. 605, 620-56 (1991). *See also* Lindell L. Marsh, *A Paradigm for Biodiversity Conservation*, NAT'L WETLANDS NEWSLETTER, Sept.-Oct. 1994, at 7-8; Melinda E. Taylor, *Promoting Recovery or Hedging a Bet Against Extinction: Austin, Texas's Risky Approach to Ensuring Endangered Species' Survival in the Texas Hill Country*, 24 ENVTL. L. 581 (1994).

n355 FWS is attempting to establish greater parity between the procedures under sections 7 and 10, including producing an internal handbook to provide guidance for streamlining the habitat conservation planning process. *See* THE NATURE CONSERVANCY, PRIVATE PROPERTY RIGHTS 6 (1994) [hereinafter NATURE CONSERVANCY]. The Coastal Sage Scrub Natural Community Conservation Plan program to protect the California gnatcatcher in southern California is expected to take five years to develop. *See* Tarlock, *supra* note 16, at 610-12. The Secretary of the Interior has proposed a special rule under 16 U.S.C. § 1533(d) (1988) extending the prohibition against takings to the California gnatcatcher, which has been listed as threatened. Despite this prohibition, incidental taking of the bird would be allowed during the interim period while the Plan is being prepared, provided that activities are carried out in accordance with conservation guidelines developed by a Scientific Review Panel, and concurred in by the FWS. *See* 58 Fed. Reg. 16,758-59 (1993).

n356 *See* Houck, *supra* note 351, at 355-58. For a detailed case study of one plan, see Timothy Beatley, *Balancing Urban Development and Endangered Species: The Coachella Valley Habitat Conservation Plan*, 16 ENVTL. MGMT. 7, 12-18 (1992). The study looks at the Coachella Valley Habitat Conservation Plan, which set aside only 10% of the Coachella Valley fringe-toed lizard's occupiable habitat existing at the time the plan was prepared. *Id.* at 12. Members of the scientific community interviewed admitted that the plan was a gamble because of the limited scientific information available about the lizard. *Id.* at 16. Beatley draws attention to the tensions arising from the length of time needed for adequate scientific research and the short timeframe of the development community. *Id.* *See also* Tarlock, *supra* note 16, at 608-10 (discussing Balcones Canyonlands Conservation Plan and arguing that socioeconomic criteria were given more weight than biological criteria in designation of reserves, resulting in only minimum scientifically defensible area being reserved, and mandating need for especially active management); Taylor, *supra* note 354, at 601 (pointing out that in spite of compromises made, proposed regional plan foundered when it failed to attract financial support); BEAN ET AL., *supra* note 354, at xi ("Most of the HCPs [habitat conservation plans] examined in this study rely on biological assumptions that are at best unproved, on conservation measures that are relatively untested, or on both. As a result, the likelihood that an HCP will benefit a species has often been somewhat speculative.").

n357 *See* 16 U.S.C. § 1536(a)(2) (1988). The FWS assists in this process. *See id.* "Critical habitat" is defined as areas within the current geographical range of the species on which are found "those physical or

biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection," as well as those areas outside of this range that are essential for the conservation of the species. *16 U.S.C. § 1532(5)* (1988). *See 50 C.F.R. § 424.02(d), .12(b)-(e)* (1993) (explaining definition of critical habitat).

n358 *See 50 C.F.R. § 402.02* (1993). The authorizing agency faced with an application from a private landholder must carry out a biological assessment if any species already listed or proposed to be listed could be present in the area. The decision on whether such an assessment is needed is ultimately made by the regional director of the FWS. The object of the biological assessment is to identify any endangered or threatened species likely to be affected by the proposed activities. *See 16 U.S.C. § 1536(c)(1)* (1988); *50 C.F.R. § 402.12(a)* (1993). The biological assessment is used to determine whether a formal consultation is necessary. *See 50 C.F.R. § 402.12(k)* (1993).

n359 *See 33 C.F.R. § 330.4(f)(2)* (1994). For other examples of a potential federal nexus, see Carter, *supra* note 350, at 153-55, 164.

n360 *See Nelson, supra* note 28, at 1.

n361 *16 U.S.C. § 1536(b)(3)(A)* (1988); *50 C.F.R. § 402.14(h)(3)* (1993).

n362 *16 U.S.C. § 1536(b)(4)* (1988); *50 C.F.R. § 402.14(i)* (1993).

n363 *16 U.S.C. § 1536(o)(2)* (1988); *50 C.F.R. § 402.14(i)(5)* (1993).

n364 There are a number of qualifications to the suggestion that private landholders are better off when there is a federal nexus and as a result fall under the jeopardy provisions of section 7. First, on the face of the legislation, the ambit of the prohibition in section 7 is broader than that found in section 9 because it includes threatened as well as endangered species. In practice, however, this is not significant because the prohibition on takings has been extended to threatened species by regulation. *See 16 U.S.C. § 1533(d)* (1988); *50 C.F.R. § 17.31(a)* (1993). More importantly, the section 7 protection covers plants as well as animals, whereas under section 10 plants are only protected from takings on private land where this is in violation of state law. *See 16 U.S.C. § 1538(a)(2)(B)* (1988). Finally, section 7 requires authorizing agencies to "confer" with the FWS about species and habitat that have merely been proposed for listing or designation in the Federal Register, with a view to anticipating future problems. *See 16 U.S.C. § 1536(a)(4)* (1988); *Enos v. Marsh*, 769 F.2d 1363, 1368-69 (9th Cir. 1985) (The ESA "requires that a federal agency 'confer' with the FWS on action likely to adversely impact 'any species proposed to be listed' or 'critical habitat proposed to be designated for such species.'"); *50 C.F.R. § 402.10(a)* (1993). For further discussion of the above subject, see generally Carter, *supra* note 350, at 135.

n365 The applicant is not even required to participate in the consultation, although it can submit information for consideration. *50 C.F.R. § 402.14(d)* (1993). The applicant may have to assist in implementing and funding any additional studies that the authorizing agency decides to carry out. *50 C.F.R. § 402.14(f)* (1993).

n366 The agency has to provide the Service with the best scientific and commercial data available, or that can be obtained during this limited period. *50 C.F.R. § 402.14(d)* (1993). The applicant's consent is required

before the period can be extended to 150 days or longer. *16 U.S.C. § 1536(b)(1)(B)* (1988); *50 C.F.R. § 402.14(e)* (1993). If the FWS feels that further studies are needed and that these require an extension of the period, the onus lies on the authorizing agency to carry them out. The authorizing agency can defeat this process simply by refusing to agree to an extension of time. *See 50 C.F.R. § 402.14(f)* (1993). Time limits are also placed on the time taken by the authorizing agency to carry out its prior biological assessment. The assessment must ordinarily be completed within 180 days, and can only be extended after the applicant has been provided with a written statement giving reasons for the proposed extension and its estimated length. *16 U.S.C. § 1536(c)(1)* (1988); *50 C.F.R. § 402.12(i)* (1993).

n367 *16 U.S.C. § 1539(a)(2)(B), (c)* (1988); *50 C.F.R. § 17.22(c)* (1993).

n368 *50 C.F.R. § 402.14(e)* (1993). There is no requirement in the legislation that the proposal must not "appreciably reduce the likelihood of the survival and *recovery* of the species in the wild," as there is with proposals dealt with under section 10. *See 16 U.S.C. § 1539(a)(2)(B)(iv)* (1988) (emphasis added). However, the regulations define "jeopardize the continued existence of" to mean: "engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." *50 C.F.R. § 402.02* (1993). Note, however, that this would not include actions that jeopardized the recovery of a species without being a threat to its survival.

n369 *50 C.F.R. § 402.14(g)(5)* (1993).

n370 *See 50 C.F.R. § 402.13* (1993). Eighty-nine percent of all consultations between 1987 and 1991 were disposed of informally. *See GAO REPORT ON ESA IMPLEMENTATION, supra* note 106, at 30.

n371 Of consultations conducted formally that resulted in a biological opinion, over 90% found no jeopardy. In almost 90% of the 181 biological opinions where potential jeopardy was found, reasonable and prudent alternatives were identified, thereby allowing the project to proceed. *See id.* at 31-32. Tobin has pointed out that the most probable explanation for this is the desire of the FWS to avoid conflict with other agencies. There is also evidence that the FWS has not effectively monitored projects to determine whether its recommendations have been carried out. *See TOBIN, supra* note 44, at 187-88, 194, 199, 262-63. Even where a finding of likely jeopardy stands because the Secretary of the Interior cannot come up with any "reasonable and prudent alternatives" to the agency action, there remains an opportunity to apply to the high level Endangered Species Committee for an exemption from the requirements of section 7. *See 16 U.S.C. § 1536(e)-(1)* (1988). Although in practice this escape hatch has rarely been used, there is not even a paper equivalent provided where an application under section 10 is refused.

n372 *See* the discussion of regulatory flexibility, *supra* text accompanying notes 227-228 and part VI.A.3.

n373 Species can be listed either as endangered or threatened. A species is endangered if it is "in danger of extinction throughout all or a significant portion of its range." *16 U.S.C. § 1532(6)* (1988). A species is threatened if it is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." *16 U.S.C. § 1532(20)* (1988). As of Sept. 1, 1993, 627 U.S. species were listed as endangered (303 animals -- including 56 mammals, 73 birds, 15 insects, and 5 arachnids -- and 324 plants), and 187 as threatened, producing a total of 814 listed species. *See* U.S. Fish & Wildlife Service, U.S. Dep't of Interior, *Box Score Listings and Recovery Plans, ENDANGERED SPECIES TECHNICAL BULL.*, June-Oct.

1993, at 24.

n374 *See supra* part VI.A.

n375 "Over the years, the Departments of Interior and Commerce . . . have converted an act of specific stages and clear commands into an act of discretion." Houck, *supra* note 351, at 279.

n376 *Id.* at 294.

n377 *See 16 U.S.C. § 1533(b)(1)(A)* (1988); *50 C.F.R. § 424.11(e)-(f)* (1993).

n378 *See* Houck, *supra* note 351, at 287-91. *See also* U.S. GENERAL ACCOUNTING OFFICE, ENDANGERED SPECIES ACT: FACTORS ASSOCIATED WITH DELAYED LISTING DECISIONS, REPORT TO THE CHAIRMAN, COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY, HOUSE OF REPRESENTATIVES 2 [hereinafter GAO REPORT ON ESA DELAY]. In detailed case studies of the listing process in relation to six species, the GAO found that in two cases the negotiation of conservation agreements had been in part responsible for delays. *See id.* at 6. It also found that the agreements developed did not conform to FWS guidelines. The agreements either did not provide for the species the level of protection called for in FWS policy, were not implemented by the time a listing decision was required, or lacked monitoring provisions. *See id.* at 2.

n379 *See* Houck, *supra* note 351, at 285-86.

n380 *See 16 U.S.C. § 1533(b)(3)(B)(iii)* (1988); *50 C.F.R. § 424.14(b)(3)(iii)* (1993). Since the warranted but precluded category was introduced in 1982, 114 species have been placed in it for two or more years. Note that even where there has been a finding of warranted but precluded, the decision might still be made at a later point that the species should not be listed. This has happened to 16 species that were originally placed in this category. *See* GAO REPORT ON ESA IMPLEMENTATION, *supra* note 106, at 22-23.

n381 *See* Eric R. Glitzenstein, *On the USFWS Settlement Regarding Federal Listing of Endangered Species*, ENDANGERED SPECIES UPDATE, Mar. 1993, at 1; U.S. Fish and Wildlife Service, U.S. Dep't of Interior, *Agreement Sets Timeframe for Protecting Listing Candidates*, ENDANGERED SPECIES TECHNICAL BULL., Dec. 1992, at 3. This settlement commits the service to issue about 100 listings a year. It compares with the previous target of 50, and an average achieved total of less than 40 since enactment of the legislation. *See* Glitzenstein, *supra*, at 1.

n382 In the past, some "warranted but precluded" species had been categorized as category 2 candidate species that are not assigned formal priority numbers. *See* Glitzenstein, *supra* note 381, at 2. The FWS assigns priority for listing species on the basis of three factors: magnitude of threat, immediacy of threat, and the taxonomic level at which an item is recognized (for example, species or subspecies). The third factor focuses on those species representing highly distinctive or isolated gene pools. *See* U.S. Fish and Wildlife Service, *Endangered and Threatened Species Listing and Recovery Priority Guidelines*, 48 *Fed. Reg.* 43,098, 43,102 (1983).

n383 It is these cases on which the case law focuses, as distinct from situations where the allegation is that a species has been listed even though the scientific proof is inadequate. *See, e.g., Northern Spotted Owl v. Hodel*, 716 F. Supp. 479 (W.D. Wash. 1988).

n384 Houck, *supra* note 351, at 281. *See also* George Cameron Coggins, *An Ivory Tower Perspective on Endangered Species Law*, 8 NAT. RESOURCES & ENV'T 3, 57 (1993) (arguing that Congress "intentionally phrase[d] the most important provisions of the ESA in sweeping and near-absolute terms. Unlike earlier ESA versions, the operative language of the 1973 Act is not qualified by escape-hatch terms such as 'practicable'").

n385 We know there is some redundancy in the apparatus, and that it will continue to function even after sustaining considerable damage. We also know that if it is not protected, sooner or later it will break down with catastrophic consequences. No one knows exactly when that breakdown will occur. Conventional economic wisdom advises us, in the absence of a certain date for collapse, to persist in behavior that involves dealing our life-support apparatus ever stronger blows. It is as if people are prying the rivets, one by one, from the wings of an airplane in which we all are riding. They refuse to stop unless we can prove that the removal of any given rivet will cause the wing to fail.

Paul R. Ehrlich, *The Strategy of Conservation, 1980-2000*, in CONSERVATION BIOLOGY: AN EVOLUTIONARY-ECOLOGICAL PERSPECTIVE 329, 341 (Michael E. Soule & Bruce A. Wilcox eds., 1980).

n386 A species can still be a candidate for listing and named in a notice of review published by the FWS even though there is insufficient scientific or commercial information available to warrant a proposal to list. *See* 50 C.F.R. § 424.15(b) (1993).

n387 *See* 50 C.F.R. 424.15 (1993); 56 Fed. Reg. 58,806 (1991); 58 Fed. Reg. 51,145 (1993). The GAO has indicated that the Nature Conservancy has a list of over 5000 domestic species that may be threatened or endangered. *See* GAO REPORT ON ESA IMPLEMENTATION, *supra* note 106, at 39.

n388 16 U.S.C. § 1533(b)(1)(A) (1988); 50 C.F.R. § 424.11(c) (1993). Economic considerations are not relevant. 50 C.F.R. § 424.11(b) (1993).

n389 *See* 16 U.S.C. § 1533(b)(3)(A) (1988).

n390 50 C.F.R. § 424.14(b)(1) (1993). With a view to satisfying this test, the petition must, *inter alia*, contain "detailed narrative justification . . . describing, based on available information, past and present numbers and distribution of the species involved," provide information regarding its conservation status, and enclose supporting information. 50 C.F.R. § 424.14(b)(2) (1993).

n391 *See* GAO REPORT ON ESA IMPLEMENTATION, *supra* note 106, at 21. Decisions had not been made on another 17%.

n392 The regulations simply provide that in the event of a decision not to list, the Secretary must set out "the basis upon which the proposed rule has been found not to be supported by available evidence." 50 C.F.R. §

424.17(a)(3) (1993).

n393 16 U.S.C. § 1533(b)(6)(B)(ii) (1988).

n394 See STEVEN LEWIS YAFFEE, PROHIBITIVE POLICY: IMPLEMENTING THE FEDERAL ENDANGERED SPECIES ACT 70, 75-82 (1982); Holly Doremus, *Patching the Ark: Improving Legal Protection of Biological Diversity*, 18 *ECOLOGY L.Q.* 265, 314-15 (1991).

n395 See GAO REPORT ON ESA DELAY, *supra* note 378, at 22-23. On the question of whether hybrids can be listed as species, see Kevin D. Hill, *The Endangered Species Act: What Do We Mean By Species?*, 20 *B.C. ENVTL. AFF. L. REV.* 239 (1993); Andrew E. Wetzler, *The Ethical Underpinnings of the Endangered Species Act*, 13 *VA. ENVTL. L.J.* 145 (1993).

n396 See GAO REPORT ON ESA DELAY, *supra* note 378, at 28-29. The latter's opinion in favor of listing prevailed, but a decision that listing was warranted but precluded was ultimately made by officials at FWS headquarters. See *id.* at 29.

n397 *Id.* at 30.

n398 *Id.* at 31.

n399 See *id.* at 32.

n400 See YAFFEE, *supra* note 394, at 70, 87.

n401 See 59 *Fed. Reg.* 34,270 (1994). Requirement for peer review is a theme that runs through many of the reauthorization bills that have been presented to Congress. See Nancy Kubasek et al., *The Endangered Species Act: Time for a New Approach?*, 24 *ENVTL. L.* 329, 339-49 (1994).

n402 See 59 *Fed. Reg.* 34,271 (1994).

n403 See TOBIN, *supra* note 44, at 65. There have been exceptions. But the point to make is that these exceptions have either resulted in immediate criticism from outside the organization or been recognized as exceptional within the organization. See YAFFEE, *supra* note 394, at 81-82. Tobin suggests that "action is most likely in those situations in which public and political support is high, when potentially well-organized opposition groups are absent, when the regulatory actions will not threaten another agency's mission, and when scientific 'proof' is compelling." TOBIN, *supra* note 44, at 67.

n404 See TOBIN, *supra* note 44, at 114-15.

n405 See YAFFEE, *supra* note 394, at 122-23.

n406 *See id.* at 74. Note that a duty is placed on the Secretary of the Interior to seek out or at least to identify biological data necessary to make a critical habitat designation prior to a decision to list a species. *See Northern Spotted Owl v Lujan*, 758 F. Supp. 621, 626 (W.D. Wash. 1991). *Cf. Enos v. Marsh*, 769 F.2d 1363, 1370-71 (9th Cir. 1985) (affirming Secretary's decision not to designate critical habitat due to inadequate information). But there is no duty to seek out information relevant to whether a species should be listed in the first place.

n407 *See Idaho Farm Bureau Fed. v. Babbitt*, 839 F. Supp. 739, 748-49 (D. Idaho 1993) (holding that FWS acted arbitrarily and capriciously by refusing to allow public experts to review and comment on FWS scientific reports).

n408 Another approach is for the Service to initiate listing proposals itself. The Secretary can publish notices of review, indicating species that are candidates for listing. 50 C.F.R. § 424.15(b) (1993). In practice, the majority of listings result from petitions. *See* GAO REPORT ON ESA IMPLEMENTATION, *supra* note 106, at 24.

n409 16 U.S.C. § 1533(b)(3)(B) (1988).

n410 This is the "warranted but precluded" category. *See supra* notes 379-380 and accompanying text. In these circumstances, the Secretary must monitor the species and make use of the emergency interim listing procedures to prevent a significant risk to its well-being. 16 U.S.C. § 1533(b)(3)(C)(iii) (1988). A species can be listed on an interim basis for a period of up to 240 days, provided that a detailed explanation is given as to why there is "an emergency posing a significant risk" to its well-being. 16 U.S.C. § 1533(b)(7) (1988); 50 C.F.R. § 424.20 (1993).

n411 *See* 16 U.S.C. § 1533(b)(3)(B)(ii), (5)(A)(i), (6)(A) (1988).

n412 16 U.S.C. § 1533(b)(1)(A) (1988).

n413 *See* 50 C.F.R. § 424.17(a)(1)(iv) (1993). *Cf.* 16 U.S.C. § 1533(b)(6)(B)(i) (1988) (granting Secretary authority to allot additional six-month period for data collection concerning: determination of endangered species, determination of threatened species, or revision of critical habitat). If the decision is to be made on the basis of the best scientific data *available*, there would seem to be no room for disagreement over whether the data is sufficient.

n414 *See* GAO REPORT ON ESA IMPLEMENTATION, *supra* note 106, at 23, 29. For example, of the 105 findings that petitions contained substantial evidence, the FWS only completed reviews on time in 33% of the cases. In 22% of cases, it was late by six months or more, and 18% were over a year late. On the legal consequences of a seven-and-a-half-year delay from initial proposal to final rule, see *Idaho Farm Bureau Fed. v. Babbitt*, 839 F. Supp. 739 (D. Idaho 1993).

n415 TOBIN, *supra* note 44, at 135.

n416 Ironically, in the past the FWS has argued that it is taking a "cautious" approach to listing, but this has

meant processing listings slowly with a view toward avoiding legal challenges. See YAFFEE, *supra* note 394, at 67.

n417 See UN Convention, *supra* note 4.

n418 See *supra* part VI.B.2.

n419 Compare the stringent approach to scientific proof taken under the ESA listing provisions with the Clean Water Act provision for allowing wetlands compensation through creation and restoration projects, where the standard of scientific proof required has been dramatically downgraded. See *supra* notes 310-315 and accompanying text.

n420 See TOBIN, *supra* note 44, at 136.

n421 The ESA does in fact claim to be concerned not simply with the conservation of species listed as endangered or threatened, but broadly with the conservation of the ecosystems on which they depend. See 16 U.S.C. § 1531(b) (1988). "Species" is defined to include distinct population segments, though only of vertebrate, not invertebrate, species. See 16 U.S.C. § 1532(16) (1988); 50 C.F.R. § 424.19 (1993). In practice, populations are rarely listed. One study found that vertebrate populations constituted only two percent of listings and proposed listings between 1985 and 1991. See David S. Wilcove et al., *What Exactly Is an Endangered Species? An Analysis of the U.S. Endangered Species List: 1985-1991*, 7 CONSERVATION BIOLOGY 87 (1993). The broader focus of the ESA is most apparent in those provisions dealing with the protection of "critical habitat." Critical habitat is only directly protected through ESA section 7, which, *inter alia*, requires Federal agencies to insure that their actions do not result in destruction or adverse modification of critical habitat. See *supra* note 357. In practice, critical habitat has been designated for only 16% of listed species. See GAO REPORT ON ESA IMPLEMENTATION, *supra* note 106, at 29. The FWS has recently committed itself to a greater emphasis on ecosystem management in its implementation of the ESA, for example through group listings on an ecosystem basis. See 59 Fed. Reg. 34,273-74 (1994); Glitzenstein, *supra* note 381, at 3. Ecosystem protection is also being pursued through the habitat conservation planning process. See *supra* text accompanying notes 349-356. However, these approaches are still ultimately species centered. They depend on the gathering of adequate proof that particular species are endangered or threatened before protection is provided.

n422 See Malcolm L. Hunter, *Coping with Ignorance: The Coarse-Filter Strategy for Maintaining Biodiversity*, in BALANCING ON THE BRINK OF EXTINCTION: THE ENDANGERED SPECIES ACT AND LESSONS FOR THE FUTURE 266 (Kathryn A. Kohm ed., 1991). The author contrasts the fine-filter approach of the ESA with a coarse-filter strategy that focuses on the conservation of representative ecosystems gathered together into clusters, forming large landscape units (biophysical regions), connected with other clusters by ecological corridors. Two of the significant advantages of the coarse-filter approach are that it can operate with relatively little information and that it is cheaper to manage ecosystem units than individual species. Nevertheless a fine-filter approach is needed for species that escape the coarse filter.

n423 See Julie B. Bloch, *Preserving Biological Diversity in the United States: The Case for Moving to an Ecosystems Approach to Protect the Nation's Biological Wealth*, 10 PACE ENVTL. L. REV. 175, 201-22 (1992); Doremus, *supra* note 394; Constance E. Hunt, *Creating an Endangered Ecosystems Act*, ENDANGERED SPECIES UPDATE, Jan.-Feb. 1989, at 1; McNaughton, *supra* note 2, at 120; Daniel J. Rohlf, *Six Biological*

Reasons Why the Endangered Species Act Doesn't Work -- And What to Do About It, 5 CONSERVATION BIOLOGY 273 (1991); Salwasser et al., *supra* note 67, at 247; Andrew A. Smith et al., *The Endangered Species Act at Twenty: An Analytical Survey of Federal Endangered Species Protection*, 33 NAT. RESOURCES J. 1027, 1069-74 (1993).

n424 *See, e.g.*, BEAN ET AL., *supra* note 354, at 41-43 (1991). *See also* Kunich, *supra* note 18, at 561-62.

n425 "Private property in land more or less appeared and grew up as America did, and we Americans have believed in that institution more than any other people on earth. In fact it may be our most cherished institution." WORSTER, *supra* note 62, at 98.

n426 *See* Beliveau, *supra* note 99, at 525-28 (1993) (discussing predicted voluntary participation by different kinds of landowners under Forest Legacy Program).

n427 *See, e.g.*, H.R. 1388, 103d Cong., 1st Sess. (1993) (proposing payment of just compensation for property value diminution caused by federal activity under a bill entitled the Just Compensation Act of 1993); H.R. 9, 104th Cong., 1st Sess. (1995) (proposing similar measures in an effort to "strengthen property rights." Passed House of Representatives, Mar. 3, 1995, by margin of 136 votes. Senate had not voted on H.R. 9 at time of publication.).

n428 *See* PROTECTING THE NEW JERSEY PINELANDS: A NEW DIRECTION IN LANDUSE MANAGEMENT 251-57, 296-302 (Beryl R. Collins & Emily W.B. Russell eds., 1988). The authors discuss an example of the use of command-and-control regulation delivered through a regional planning system in combination with a complementary economic program. The program compensated affected landowners by giving them transferable development credits. Inadequacies of this system included the lack of marketability of the credits and a failure to fully address equity issues. *See id.* at 300.

n429 The discussion that follows assumes that the theory of partial regulatory takings, recently adopted by the Federal Circuit Court of Appeals in *Florida Rock Indus. v. United States*, 18 F.3d 1560, 1571-73 (Fed. Cir.), *reh'g denied* 1994 U.S. App. LEXIS 16257 (Fed. Cir. June 21, 1994), *cert. denied*, 115 S. Ct. 898 (Jan. 17, 1995), ultimately prevails. According to this theory, once a regulatory taking is found to have taken place, the regulator does not have to purchase the whole fee and take the land in question into the public domain. *See* 18 F.3d at 1572. Rather, the amount of compensation payable is measured by the loss in value *attributable to the regulation*, and the landowner is left in possession of the land. *Id.* If, on the other hand, the Fifth Amendment effectively forces governments to take land into the public domain, the issue of encouraging sensitive management of land in private hands necessarily ceases to be relevant.

n430 "[N]or shall private property be taken for public use without just compensation." U.S. CONST. amend. V.

In Australia, environmental and natural resources legislation bearing on private land emanates primarily from the states, rather than the Commonwealth Parliament, but there is nothing in any of the state constitutions that guarantees compensation for landowners, even in situations where they are totally excluded from their land by state action. The payment of compensation where land is resumed for public purposes is purely a matter of convention under legislation. Section 51 (xxxi) of the Commonwealth Constitution does provide that any "acquisition" of property by instrumentalities of the Commonwealth Government must be made on just terms.

However, in *Commonwealth v. Tasmania*, 158 C.L.R. 1 (1983), three of the four members of the High Court who dealt with the issue made it clear that even the severe restrictions on land use in Tasmania imposed under the World Heritage Properties Conservation Act 1983, Austl. Acts P. No. 5 of 1983, did not constitute an "acquisition" requiring the payment of compensation. 158 C.L.R. at 70-79, 146, 187-88, 235-39, 253-68. According to Justice Mason, the Commonwealth had acquired no proprietary interest in the land in question, and therefore did not have to pay compensation, even though in terms of its potential use the property was sterilized in the same way as a dedicated park, subject only to the power of the Minister to consent to development on a case-by-case basis. *Id.* at 145-46.

The absence of a constitutional guarantee of compensation for regulatory takings in Australia does not mean that there is no debate about whether compensation should be paid. It simply means that the primary forum is Parliament rather than the courts. If a decision is made to pay compensation, it will be the result of a general formula worked out in the context of particular legislation. Having said this, provision for compensation is rarely made in Australian land use legislation.

n431 See *Florida Rock Indus. v. United States*, 18 F.3d 1560, 1570-71 (Fed. Cir. 1994) (stating that in determining whether a compensatory regulatory taking has occurred, in addition to a loss of economic use of property, the trial court must consider: (1) whether the government acted in a responsible and fair manner, (2) whether direct compensating benefits accrue to the property or are spread more widely throughout the community and society, and (3) whether alternative permitted activities are realistically available); *Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393, 413 (1922) (holding that when diminution in property value reaches certain magnitude, which depends on specific facts of case, regulatory taking has occurred).

n432 See, e.g., Jan Goldman-Carter, *Protecting Wetlands and Reasonable Investment-Backed Expectations in the Wake of Lucas v. South Carolina Coastal Council*, 28 LAND & WATER L. REV. 425, 439 (1983) (stating that in hundreds of thousands of section 404 permitting decisions, taking has only been found in three cases).

n433 See *Connolly v. Pension Benefit Guaranty Corp.*, 475 U.S. 211, 224-25 (1986) (identifying three significant factors to weigh in the regulatory takings decision: (1) the economic impact of the regulation on the claimant, (2) the extent to which the regulation has interfered with distinct investment-backed expectations, and (3) the character of the governmental action); *Penn Central Transp. Co. v. New York City*, 438 U.S. 104, 124 (1978) (stating that significant factors include the economic impact of the regulation on the claimant and the extent to which the regulation interferes with distinct investment-backed expectations). Sax has pointed out that in practice the Supreme Court has upheld regulations that cause very severe economic impacts to landowners. See Joseph L. Sax, *Property Rights in the U.S. Supreme Court: A Status Report*, 7 UCLA J. ENVTL. L. & POLY 139, 149 (1988).

n434 112 S. Ct. 2886 (1992). For a discussion of the implications of the decision in *Lucas* for biodiversity conservation, see Tarlock, *supra* note 16, at 593-98.

n435 See Tarlock, *supra* note 16, at 594.

n436 Ungulate grazing, for example, is a vital process within some ecosystems, and there are those who believe that, with appropriate adjustments, grazing patterns of domestic cattle can be made to replicate those of buffalo. See *supra* note 229.

n437 *Florida Rock Indus. v. United States*, 18 F.3d 1560, 1566 (Fed. Cir. 1994).

n438 *See id.* at 1567.

n439 *See Sax, supra* note 3, at 1440. To this extent, he argues, it repudiates the conclusion in *Just v. Marinette County*, 201 N.W.2d 761, 768 (Wis. 1972), that the police power can be reasonably used to limit the use of land to its natural uses. *See Sax, supra*, at 1438-39.

n440 *See Sax, supra* note 3, at 1442.

n441 *See id.* at 1442-46.

n442 *See generally id.* at 1451-52. Sax cites a number of historical examples of situations where new conceptions of property, generated by changing economic goals, did not result in innocent losers being compensated. *See id.* at 1446-51. He suggests that this "reflects a decision to encourage adaptive behavior by rewarding individuals who most adroitly adjust in the face of change." *Id.* at 1449.

n443 Such an approach will bear harshly on existing landowners, who will simply not have an opportunity to respond adaptively. *See Sax, supra* note 3, at 1451. Nor will there be any room for adaptive behavior when regulation leaves the landowner with no opportunities at all for economic use. *See id.* at 1455.

n444 For example, he raises the possibilities of grandfathering existing development, variances for hardship, gradual phasing in of new regulations, and exemptions for individual homesites. *See id.* at 1451.

n445 S. AUSTL. ACTS NO. 87 of 1985.

n446 *See David Farrier, Vegetation Conservation: The Planning System as a Vehicle for the Regulation of Broadacre Agricultural Land Clearing*, 18 MELB. U. L. REV. 26, 28, 46 (1991).

n447 *See David Farrier, Regulation of Rural Land Use: Coercion or Consensus?*, 2 CURRENT ISSUES IN CRIM. JUST. 95, 102-03 (1990).

n448 *See id.*

n449 *See id.*

n450 *See Richard J. Lazarus, Putting the Correct "Spin" on Lucas*, 45 STAN. L. REV. 1411, 1412 (1993). The origins of this fear are as recent as the decision in *First English Evangelical Lutheran Church v. Los Angeles*, 482 U.S. 304 (1987), where the Supreme Court held that "temporary regulatory takings" were compensable. Even where a regulatory agency responded to a finding that there had been a taking by ceasing enforcement of the offending law, the landholder was nevertheless entitled to compensation for the period during which the law was operational. *See id.* at 310-11. Note the comments of Justice Stevens, dissenting:

"The policy implications of today's decision are obvious and, I fear, far reaching. Cautious local officials and land-use planners may avoid taking any action that might later be challenged and thus give rise to a damages action." *Id.* at 340. He goes on to comment: "[T]he Court has repeatedly recognized that it itself cannot establish any objective rules to assess when a regulation becomes a taking How then can it demand that planners do any better?" *Id.* at 340 n.17.

n451 For a general discussion of monitoring procedures, see O'Connell & Noss, *supra* note 81, at 448-50.

Sax does not neglect the issue of management. He talks of the need for "[a]ffirmative obligations by owners to protect natural services." Sax, *supra* note 3, at 1451. Yet how can we realistically expect landowners to manage land in situations where management neither tolerates nor provides any economically viable use, without contemplating some form of ecological slavery?

n452 The "moral hazard" created by guaranteeing compensation is that landowners will tend to overinvest in objectively higher-risk ventures because they have no reason to take the risk of failure into account. This results in a reduction in economic efficiency. See C. Ford Runge, *Economic Implications of Wider Compensation for "Takings" or, What If Agricultural Policies Ruled the World?*, 17 VT. L. REV. 723, 730-31 (1993).

n453 See, e.g., *Goldblatt v. Town of Hempstead*, 369 U.S. 590 (1962) (regulation banning excavations below water table, effectively prohibiting existing sand and gravel mining operation); *Hadacheck v. Sebastian*, 239 U.S. 394 (1915) (municipal regulation prohibiting operation of brickyard on grounds that it was inconsistent with subsequently established neighboring residential uses). See also *Penn Central Transportation Co. v. New York City*, 438 U.S. 104, 125-27 (1978) (discussing aforementioned cases). Note that the prohibition on the taking of species under section 9 of the ESA, 16 U.S.C. § 1538 (1988), could well interfere with existing uses. See *supra* part VI.B.

n454 See, e.g., ROBERT R. WRIGHT & MORTON GITELMAN, *LAND USE: CASES & MATERIALS* 873-92 (West, 4th ed., 1991).

n455 See *supra* note 15.

n456 Compare the following explanation of just compensation: "In principle the ideal solution is to leave the individual owner in a position of indifference between the taking by the government and retention of the property. In *Olson v. United States* [292 U.S. 246 (1934)] it was rightly stated that the owner of the condemned property should be placed 'in as good a position pecuniarily as if his property had not been taken. He must be made whole but is not entitled to more.'" RICHARD A. EPSTEIN, *TAKINGS: PRIVATE PROPERTY AND THE POWER OF EMINENT DOMAIN* 182 (1985).

n457 See *supra* part VII.C.

n458 The extent to which many landholders fear the discovery of endangered species on their land is vividly illustrated by the opposition to recent legislation designed to set up the National Biological Survey, which will facilitate the gathering of sound scientific data on biodiversity. The primary objection was in essence that the discovery of endangered and threatened species on their land would increase the impact of regulation on

landholders. See Melz, *supra* note 354, at 412 n.232.

n459 See Gregory S. Alexander, *Takings and the Post-Modern Dialectic of Property*, 9 CONST. COMMENTARY 259, 273 (1992).

n460 See, e.g., Bruce Babbitt, *The Endangered Species Act and "Takings": A Call for Innovation Within the Terms of the Act*, 24 ENVTL. L. 355, 366 (1994) (pointing in particular to economic hardship that small landowners face under existing legislation).

n461 In 1987 only about half of farm operators reported farming as their principal occupation, and well over half carried out off-farm work. Brooks hypothesizes that the decline in the numbers of mid-sized farms, particularly small commercial farms with annual returns of \$ 50,000-99,999, may be partly explained by the fact that "they are too large to operate on a part-time basis, yet typically do not generate enough net income to cover family living expenses." See Nora Brooks, *In Search of the Family Farm: Characteristics of Mid-Sized Farms*, AGRIC. OUTLOOK, Oct. 1991, at 36. See also H. Frederick Gale & David H. Harrington, *U.S. Farms -- Diversity and Change*, AGRIC. OUTLOOK, July 1993, at 3, 4 (pointing out that "only about 18 percent of farm operator households received more income from the farm than off-the-farm in 1991"). The authors suggest that "off-farm income is an important source of cash flow for beginning farmers and provides a cushion to offset variations in farm income." *Id.* at 3.

n462 Savings from the modification of existing schemes also provide a source of funding for the introduction of a stewardship payment scheme. Although government payments for the major subsidized crops have fallen substantially from just under \$ 14 billion in 1987, they still amounted to \$ 5.5 billion in 1993. See Feder, *supra* note 159, at D2. On the politics of farm program reform, involving a much greater emphasis on conservation funding that is not attached to commodity programs, see generally Ralph Grossi, *The Politics of Choice*, 46 J. SOIL & WATER CONSERVATION 401 (1991).

n463 See COCHRANE & RUNGE, *supra* note 115, at 83.

n464 In essence, these are determined by the difference between actual market price and the "target price" that has been fixed by government. See *id.* at 68.

n465 See generally Tim Osborn, *The Conservation Reserve Program: Status, Future, and Policy Options*, 48 J. SOIL & WATER CONSERVATION 271, 274-75 (1993).

n466 See *id.* at 274.

n467 Cochrane and Runge, citing USDA statistics, point out that in 1988, the larger farms received approximately 90% of direct government payments, even though they represented only about 18% of the country's farms. Another 18%, representing the smaller farms producing program crops, received only 10% of payments, and some 64% received no payments at all. See COCHRANE & RUNGE, *supra* note 115, at 19. Figures for 1989 show that the 627,000 farms grossing over \$ 40,000 per year received payments totaling \$ 9.2 billion (just over \$ 14,600 per farm), while the 1,544,000 grossing less than \$ 40,000 per year received payments totaling \$ 1.7 billion (about \$ 1,100 per farm). See *id.* at 117. See also Feder, *supra* note 159, at D2 (observing

that while farms grossing in excess of \$ 250,000 make up about five percent of country's 2 million farms, they received nearly one-third of government payments in 1992).

n468 For the terminology, *see* RUNGE, *supra* note 175, at 4.

n469 *See* Ehrenfeld, *supra* note 79, at 38.

n470 "The manipulative maintenance or repair of any apparatus is limited if we cannot identify its various parts." *Id.* at 36.

n471 *Id.* at 38.

n472 O'Connell & Noss, *supra* note 81, at 441. These authors assume that this is feasible if done in conjunction with the advice of an ecologist and in collaboration with experts from federal, state, and local agencies.

n473 "The smaller the size of a conservation area, the more diverse and more intense must be our actions. The amount of intervention required increases as the size of any specific preserve decreases. The smallest area is simply a zoo within which we provide all the necessities and remove all the wastes for the forms of life that we maintain there." BOTKIN, *supra* note 85, at 196.

n474 *See generally* Tarlock, *supra* note 16, at 584.

n475 *See* KEYSTONE REPORT, *supra* note 2, at 31.

n476 Wildlife managers have traditionally aimed at increasing the numbers of popular game species by maintaining multiple interspersed successional stages rather than homogeneous habitat. *See* O'Connell & Noss, *supra* note 81, at 437. *See also* *Regional Landscape Approach*, *supra* note 63, at 702, which argues that wildlife managers have traditionally managed for "edge effects." Edges are places where plant communities meet or where successional stages within plant communities come together, and are particularly rich in wildlife, including game species. But they benefit edge-adapted opportunists at the expense of forest interior species.

n477 Because different species of plants and animals utilize different stages of biological community succession, maximizing the number of successional stages can increase the number of species within a given tract of land. Any habitat manipulation involves a trade-off between species that benefit from the change and those that do not. Whether this increase in local species richness represents an increase in overall biological diversity is a question of geographic scale. Understanding the importance of scale is critical to accurately assessing the impacts of various activities on biological diversity. If the species that are harmed by a given management action are rare or more imperiled than the ones that benefit or if the manipulation eliminates one of the few occurrences of a species, community, or process, then biological diversity is reduced. If the manipulation eliminates an element that is common elsewhere in the landscape and provides an opportunity for an imperiled element in the landscape to increase, then biological diversity is more secure.

KEYSTONE REPORT, *supra* note 2, at 8.

n478 See LEOPOLD, *supra* note 62, at 213.

n479 Worster is quite rightly skeptical about the likely success of such appeals: "How can one expect a land ethic, with its strong emphasis on ecological community, to emerge where the institution of sacrosanct private property exists? How can one expect people living with such an institution to develop broader moral ideals than the self-interest of the individual? They can only do so by becoming *bad* property owners. Once a farmer or rancher has put other values ahead of acquiring personal wealth, he or she has ceased to have a good reason for exclusive, sovereign ownership. Private deeds and private fences can simply get in the way of the land ethic." WORSTER, *supra* note 62, at 109-10. *But cf.* Carol M. Rose, *Given-ness and Gift: Property and the Quest of Environmental Ethics*, 24 *ENVTL. L. J.* 28 ("[E]nvironmentalism needs to build on the normative metaphors of property . . . the norms that lurk in property go beyond the wondrous power of exclusion that so awed Blackstone in the case of individual property. They include as well the qualities of restraint and responsibility that characterize common or shared property.").

n480 For a discussion of these topics, see Harris & Eisenberg, *supra* note 37, at 176; McNeely, *supra* note 76, at 155-56; Western, *supra* note 62, at 165.

n481 See *supra* note 427.