Ecosystem Communities: Zoning Principles to Promote Conservation and the Economy

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ECOSYSTEM COMMUNITIES: ZONING PRINCIPLES TO PROMOTE CONSERVATION AND THE ECONOMY

I. INTRODUCTION

The Endangered Species Act, the federal government's strongest environmental conservation measure, has spawned numerous natural resources conflicts since its inception in 1973. Opponents who position themselves at opposite ends of a conservation versus economics spectrum control the dialogue of the debate. Both sides refuse to view development and preservation as mutually attainable goals. A recent controversy involving the California gnatcatcher illustrates the problems associated with the "last minute, intensive care approach" of the ESA. ESA litigation has focused on a particular, or "indicator species," as opposed to entire ecosystems. Conservationists find their goals frustrated by a system that focuses on a single species only after it has become endangered. On the other hand, developers and land owners adversely affected by ESA land use restrictions face rigid fed-

2. See infra notes 89-130 and accompanying text.
5. Melanie J. Rowland, Bargaining for Life: Protecting Biodiversity Through Mediated Agreements, 22 ENVTL. L. 503, 523 n.73 (1992). An "indicator species" is a species whose status is determined by the United States Forest Service to indicate the health of the entire ecosystem in which it exists. Id.
6. An ecosystem includes various animal and plant species and has been defined as "[a] unit comprising interacting organisms together with their environment (e.g. marsh, watershed and lake ecosystems)." STAFF OF HOUSE COMM. ON NATURAL RESOURCES, 2D SESS., REPORT ON ECOSYSTEM MANAGEMENT 3 (Comm. Print 1994) [hereinafter NATURAL RESOURCES COMMITTEE REPORT]. Ecosystem management has been described as the "management of resources in a coordinated and integrated manner in an area defined by its biological and ecological boundaries." Id. at ix. See also infra text accompanying notes 151-58.
7. See infra text accompanying notes 215-20.
eral regulation and the costly ban of development activity in an area determined to be a "critical habitat."

In addition to the burdens faced by both conservation and development interests, the government's lack of adequate scientific information on natural and biological resources weakens the ESA's efficacy. When making land management and species protection decisions, the government must often rely upon incomplete information which does not become available until a crisis emerges. Conservation efforts and commercial uses of land become incompatible under the ESA's approach because scientists lack an adequate data base to provide early warning of endangerment and because the ESA offers very little flexibility for land use activities after the listing of a species.

The Clinton Administration introduced the National Biological Survey within the Department of the Interior in response to continuing environmental and economic controversies and protracted litigation under the ESA. The Survey seeks to acquire relevant scientific information about the health of entire ecosystems instead of focusing on a single species. Whether the Survey becomes a land use regulator or maintains its proposed status as a non-advocate, scientific entity, the ecosystem definition employed by the research-

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8. Arnold, supra note 3, at 35.
9. 16 U.S.C. § 1532(5)(A)(i), (ii) (1988). Under the ESA, critical habitat is defined as the geographical area occupied by the species containing "features (i) essential to the conservation of the species and (ii) which may require special management considerations or protection." Id. Critical habitat also includes "areas outside the geographical area occupied by the species" if the Secretary determines them to be "essential for the conservation of the species." Id.
12. See infra text accompanying notes 144-46.
ers will play an important role in the ecosystem mapping activities.\textsuperscript{14}

The Survey's research represents progress toward overcoming the limitations of the single species conservation approach. The Survey will help prevent intense conflicts between conservation and development, however, only if it develops a comprehensive method of mapping entire ecosystems. The Survey should employ a spatial organizational scheme to guide the study of complementary and conflicting land uses and the relationships among species and their habitats. This comment proposes an amendment to the National Biological Survey Act adopting the land use compatibility principles of the Standard State Zoning Enabling Act\textsuperscript{15} to initially define and map ecosystems.\textsuperscript{16}

In order to provide a background to the current debate and challenge faced by the Survey, this comment first traces the ESA's development.\textsuperscript{17} It then examines the ESA's role in land use planning, protecting species, and defining critical habitats.\textsuperscript{18} This comment also addresses efforts under the ESA to develop Habitat Conservation Plans for entire ecosystems.\textsuperscript{19} After discussing the Survey in further detail,\textsuperscript{20} this comment examines the history and purposes of zoning law and its general land use compatibility principles, as established in the Standard State Zoning Enabling Act.\textsuperscript{21} Finally, this comment proposes an amendment to the National Bio-

\textsuperscript{14} For example, the current debate surrounding wetlands often hinges on how a wetland is actually defined and delineated. This definition and the amount of land it covers greatly affects conservationists, developers, and landowners. See generally JEFFREY A. ZINN & CLAUDIA COPELAND, WETLANDS ISSUES IN THE 102D CONGRESS (Congressional Research Service Rep. IB91058, 1992) (discussing current wetlands issues, including delineation issues).

\textsuperscript{15} MODEL LAND DEV. CODE app. A (Tentative Draft No. 1, 1968).

\textsuperscript{16} The scope of this proposal is limited to the spatial organization and management of ecosystems. Other components of ecosystem management include identifying ecological time frames, promoting sustainable development, maintaining biological diversity and ecosystem processes, utilizing cooperative institutional arrangements, combining science and management, generating public involvement, and adapting management techniques based on experimentation and monitoring. NATURAL RESOURCES COMMITTEE REPORT, supra note 6, at xi.

\textsuperscript{17} See infra part II.A.

\textsuperscript{18} See infra part II.A.

\textsuperscript{19} See infra part II.A.2.e.

\textsuperscript{20} See infra part II.B.

\textsuperscript{21} See infra part II.C.
logical Survey Act. Adoption of zoning principles will facilitate a comprehensive method of delineating and mapping ecosystems. The implementation of "ecosystem zoning" should occur at the regional and local level. This proposal includes a vehicle for local land use planners to use the resources of the Survey to incorporate "ecosystem zoning" into their decision making processes to provide a balanced, flexible approach allowing both conservation and development.

II. BACKGROUND

A. The Endangered Species Act

1. Background and Purpose

Congress passed the ESA in 1973 to conserve and protect endangered and threatened species as well as the ecosystems upon which they depend. Congress enacted the ESA in response to findings that economic growth and development, untempered by conservation efforts, had rendered various species extinct, while endangering others with extinction. The ESA recognizes the aesthetic, ecological, recreational, and scientific value of preserving these species, and imposes strict regulations to achieve its conservation goals.

2. The Legal Requirements

   a. ESA Section 4—Listing and Critical Habitat Designation

Federal protection for species begins once the species has been listed in the Federal Register as either threatened or endangered. The listing process is based on a two-tiered

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22. See infra part IV.
23. 16 U.S.C. § 1531(b) (1988). It is interesting to note that the ESA does not refer to ecosystems after its statement of purpose, nor does it contain an explicit definition of an ecosystem.
24. Id. § 1531(a)(1), (2).
25. Id. § 1531(a)(3).
classification system which defines a species as endangered\textsuperscript{27} or threatened\textsuperscript{28} based on its biological health.\textsuperscript{29} ESA Section 4 further requires that, when listing a species, the Secretary designates a critical habitat to the "maximum extent prudent and determinable."\textsuperscript{30} Legislative history indicates that Congress intended the "prudent and determinable standard" to be narrowly construed.\textsuperscript{31} This standard would require specification of critical habitat except in the "rare circumstances" where concurrent designation would not be beneficial to the species.\textsuperscript{32} In practice, however, the discretion to list a species before designating a critical habitat has been broadly exercised. For example, in 1986, the Secretary found that critical habitat designation was not prudent in 41 of 45 final listings.\textsuperscript{33} Concurrent critical habitat designation can be avoided when the designation would not be beneficial to the species,\textsuperscript{34} so the Secretary conducts a case-by-case balancing to determine the benefits of designation.\textsuperscript{35} In response to fears that critical habitat designations would impose costly federal land use restrictions, this section also directs the Secretary of Interior to consider economic impacts in this balancing process.\textsuperscript{36}

\textsuperscript{27} 16 U.S.C. § 1532(6) (1988). Endangered species are defined as those species "in danger of extinction throughout all or a significant portion of its range . . . ." Id. The factors used to determine whether a species should be listed as endangered are the present or threatened destruction of its habitat, the overutilization of the species, disease or predation, inadequacy of existing regulations, and other factors affecting its continued existence. Id. § 1533(a)(1).

\textsuperscript{28} 16 U.S.C. § 1532(20) (1988). Threatened species are defined as those that are likely to become endangered in the foreseeable future. Id.

\textsuperscript{29} ROHLF, supra note 26, at 25-26.


\textsuperscript{32} Id.

\textsuperscript{33} ROHLF, supra note 26, at 51.

\textsuperscript{34} 50 C.F.R. § 424.12(a)(1)(ii) (1994) (providing criteria for designating critical habitat).

\textsuperscript{35} ROHLF, supra note 26, at 51-52.

Section 7, often referred to as the most significant provision of the ESA, applies to federal agency activities and to activities involving federal authorization or funding. It provides that:

Each Federal agency shall . . . insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined . . . to be critical . . .

This section imposes strict substantive requirements on federal agencies and prescribes the factors which agencies must consider in determining whether their actions comply. When a proposed agency action impacts a geographic area containing a listed species, the agency must conduct a biological assessment to determine whether its action is likely to affect the listed species. If the administering agencies find that the action will not jeopardize the continued existence of the listed species, the proposed action is approved. When possible jeopardy to a listed species is found, alternatives to the proposal are suggested, or the agency may apply for an exemption from the Endangered Species Committee. Congress introduced the exemption process due to the intense controversy surrounding the Tellico Dam litigation in the 1970s.

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37. ROHLF, supra note 26, at 29.
39. Id. (emphasis added).
40. Id. § 1536(b), (c).
41. ROHLF, supra note 26, at 29.
42. Id.
43. Id.
44. 16 U.S.C. § 1536(h) (1988) (allowing an exemption upon determination by the Committee that "there are no reasonable and prudent alternatives to the agency action" and that "the benefits of such action clearly outweigh the benefits of alternative courses of action consistent with conserving the species or its critical habitat"). This section also makes exemptions contingent upon compliance with prohibitions of "any irreversible or irrevocable commitment of resources." Id. § 1536(d). The exemption process has been "virtually unused since creation." ROHLF, supra note 26, at 29. See infra notes 124-26 and accompanying text. The Tellico Dam litigation involved halting construction of a government dam when an endangered perch species was discovered in the area of the project. At the time the species was listed, the government had spent
In addition to recognizing the outright destruction of species from hunting and other activities,\textsuperscript{45} the ESA regulates habitat destruction resulting from development and other land use activities.\textsuperscript{46} ESA section 7 prohibits the "destruction or adverse modification" of habitat designated as critical by the Secretary.\textsuperscript{47} The section 7 regulations interpret destruction or adverse modification as "direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species."\textsuperscript{48}

c. ESA Section 9—Prohibition of Takings

The ESA regulations and prohibitions extend to private parties as well as federal entities.\textsuperscript{49} Under section 9 any activity that could harm a listed species or its habitat is enjoined unless it receives government approval.\textsuperscript{50} This section prohibits "any person subject to the jurisdiction of the United States"\textsuperscript{51} from "taking" any listed endangered wildlife or fish species.\textsuperscript{52} To "take" a species is broadly defined as "to harass, over $100 million on the project. TVA v. Hill, 437 U.S. 153 (1978). See infra notes 117-23 and accompanying text.

\textsuperscript{45} TVA, 437 U.S. at 179.

\textsuperscript{46} 16 U.S.C. § 1533(b)(2) (1988). See ROHLF, supra note 26, at 11-12. See also TVA, 437 U.S. at 179 (providing that the loss or destruction of habitat caused by humans is one of the greatest causes of species extinction).

\textsuperscript{47} 16 U.S.C. § 1536(a)(2) (1988). It is important to note that this section does not prohibit destruction of a species' habitat that has not been designated by the Secretary. See 50 C.F.R. § 402.02 (1994). See supra note 39 and accompanying text.

\textsuperscript{48} 50 C.F.R. § 402.02 (1994) (emphasis added).

\textsuperscript{49} The section 9 provisions of the ESA are enforced through section 11. 16 U.S.C. § 1540 (1988). The United States Attorney General or a private party can seek injunctive relief ordering a violator to cease the prohibited acts. Id. § 1540(e)(6), (g)(1)(A). The Secretary of Interior has the authority to impose civil penalties for each taking and for each violation of a regulation promulgated pursuant to the Act. Id. § 1540(a). Finally, section 11 provides for criminal penalties for knowing violators of the Act. Id. § 1540(b)(1). The citizen suit provision of section 11 provides standing to private citizens, including environmental groups, to enjoin violations of the Act. Id. § 1540(g)(1). Private citizens may also compel the Secretary of Interior to perform non-discretionary listing duties under section 4 or enforce section 9 taking prohibitions. Id.

\textsuperscript{50} Id. § 1538(a)(1).

\textsuperscript{51} Id. The ESA definition of person includes corporations, private entities, officials, employees, agents, departments and instrumentalities (including those of federal, state, local and foreign governments), and federal, state or local governmental entities subject to the jurisdiction of the United States. Id. § 1532(13).

\textsuperscript{52} Id. § 1538(a)(1)(B).
harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect” such species.53

The scope of the definition of “harm” to a species arises frequently in private land use development controversies54 and has produced a split in the federal circuit courts regarding the United States Fish and Wildlife Service’s [hereinafter FWS] statutory interpretation. The FWS has defined “harm” as “includ[ing] significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.”55 This language proscribes actions which would directly or indirectly injure a particular species or its members.

Recently, in Sweet Home Chapter of Communities for a Great Oregon v. Babbitt,56 the District of Columbia Circuit Court of Appeals determined that the FWS’ interpretation of harm, particularly its inclusion of habitat modification, was invalid.57 The court held that the definition was not clearly authorized by Congress, nor was it a “reasonable interpretation” of the Endangered Species Act.58 The court reasoned that because the other words in the definition of harm, “contemplate the perpetrator’s direct application of force against the animal,” the FWS erroneously interpreted the word “harm” broadly to include habitat modification.59 The FWS interpretation of harm, including habitat modification, had previously been upheld by the Ninth Circuit Court of Appeals in Palila v. Hawaii Department of Natural Resources (Palila IV).60 The recent split in the circuit courts has rendered the definition of harm under the ESA uncertain, particularly regarding whether destruction of a species’ habitat alone constitutes a “taking” under ESA section 9.61

53. Id. § 1532(19) (emphasis added).
54. ROHLF, supra note 26, at 62.
55. 50 C.F.R. § 17.3 (1994).
56. 17 F.3d 1463 (D.C. Cir. 1994).
57. Id. at 1472.
59. Sweet Home, 17 F.3d at 1464-65.
60. 852 F.2d 1106 (9th Cir. 1988). See infra notes 96-105 and accompanying text.
61. Despite this uncertainty, the Sweet Home decision has not appeared to have had much immediate, practical impact. The FWS has refused to enforce
d. **ESA Section 10—Incidental Take Permits**

The 1982 amendments to the ESA provided partial relief from the section 9 ban on development activity. These amendments introduced "incidental take" permits. These permits allow one to harm or "take" individual members of a species, "if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." Developers and landowners applying for an incidental take permit are required to prepare Habitat Conservation Plans setting forth the details of the development and must meet strict mitigation requirements.

Theoretically, Habitat Conservation Plans give flexibility to developers in using valuable land with a greater degree of economic certainty while providing a long-term approach to species conservation. The Habitat Conservation Planning approach facilitates cooperation between private landowners, and local, state and federal agencies, which is essential to resource management and planning, in a manner that transcends political and institutional boundaries. Habitat Conservation Plans also place conservation management efforts on a regional level, where land use decisions are most appropriately made.

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63. Id. § 1539(a).
64. Id. § 1539(a)(2)(B)(ii). Specifically, the Secretary must determine that "the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking." Id.
65. Id. § 1539(a)(1)(B).
66. Id. § 1539(a)(2)(A) (providing that the Habitat Conservation Plans must include the impact of the taking, the measures the applicant will take to minimize and mitigate those impacts, funding available to implement the plan, alternatives to the proposal, reasons for rejecting the alternatives, and other measures deemed necessary by the Fish and Wildlife Service to be necessary or appropriate for the plan).
e. Current Habitat Conservation Planning Efforts Under the Endangered Species Act

California has implemented the Natural Communities Conservation Planning Program (NCCPP), an ecosystem planning initiative pursuant to the Natural Community Conservation Planning Act (NCCP Act). Under the NCCP Act, the California Department of Fish and Game may agree to develop natural community conservation plans with private citizens. These plans should provide for "regional or area-wide protection and perpetuation of natural wildlife diversity, while allowing compatible development and growth." Currently, the NCCPP focuses on coastal sage scrub habitat. The current planning area covers about 6,000 square miles in five counties. The plan is voluntary and based on local and regional decision-making processes which follow existing land use laws. Under the NCCPP, developers enroll their land in permanent preserve areas subject to guidelines developed by a scientific review panel.

The NCCPP divides the coastal sage scrub area into planning subregions. To provide flexibility and allow regional conservation efforts to reflect local conditions, these subregions are designated by local agencies. The local governments involved in the NCCPP will enter into planning agreements with the California Department of Fish and Game and the Fish and Wildlife Service to coordinate the decision making efforts in each subregion. In addition, local land use regulatory agencies will increase their review of activities affecting coastal sage scrub habitat.

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69. Id. § 2810.
70. Id. § 2805(a).
72. Id. at 2.
74. Manson, supra note 65, at 612.
75. Id.
76. Id.
77. Id.
The California gnatcatcher is listed as a threatened species.\(^78\) It inhabits the coastal sage scrub located on prime real estate in San Diego and Orange Counties. Acknowledging the conservation planning efforts undertaken by the State of California through the Natural Community Conservation Planning Act,\(^79\) the Secretary of Interior issued a special rule on December 10, 1993.\(^80\) This rule permits limited taking of the gnatcatcher within regions involved in the NCCPP\(^81\) and intends to put conservation efforts under local control with guidance from state agencies with federal cooperation.\(^82\)

Critics of the NCCPP claim that the program has proven to be more of a theoretical success than a victory for conservationists. The program grants no interim protection for the gnatcatcher while the regional conservation plans are being developed.\(^83\) Furthermore, because developers enroll land on a purely voluntary basis, they only enroll the land they do not need.\(^84\) The enrolled land is not necessarily the best habitat for the gnatcatcher.\(^85\) It is important to note, however, that the possibility of regulatory intervention to protect listed species under the ESA should encourage landowners to voluntarily enroll with the NCCPP.\(^86\)

On the other side of the controversy, developers have incurred economic losses as a result of the gnatcatcher listing. Builders in San Diego County claim that the bird's listing has halted over $300 million in construction projects and that developers are awaiting approval of specific large development projects under the NCCPP.\(^87\) The Building Industry Association of Southern California reported that the threatened listing of the gnatcatcher could result in a loss of nearly $8 bil-

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\(^81\) Id.

\(^82\) Manson, supra note 67, at 614.

\(^83\) Reynolds, supra note 73, at 230.

\(^84\) Id.

\(^85\) Id.

\(^86\) Manson, supra note 67, at 612-13.

lion in business activity if construction in Southern California is reduced by 25%. \(^{88}\)

The Habitat Conservation Planning process provides a useful framework for ecosystem-based planning involving the public and private cooperation and flexibility which are absent from other ESA regulatory provisions. Whether or not Habitat Conservation Plans, such as the NCCPP, employ the necessary organizational schemes to recognize and manage according to the interrelated structures and components of ecosystems remains to be seen.

3. Judicial Interpretation

   a. Plaintiff's Proof Requirements

   Plaintiffs relying on the provisions of the ESA to prevent habitat modification and species degradation face many challenges. They bear the burden of proving an ESA section 9 violation by establishing a relationship between the habitat modification and harm to the species. \(^{89}\) Plaintiffs must also prove that the harm to the species is relatively certain and imminent. \(^{90}\)

   (1) Relationship Between Habitat Modification and "Harm"

   The courts have required plaintiffs to conclusively establish a relationship between habitat modification and harm to the species. \(^{91}\) Decisions recognize, however, that deterioration of overall populations of endangered species constitutes a harm and, therefore, a taking under ESA section 9. \(^{92}\) In *Palila v. Hawaii Department of Land & Natural Resources (Palila I)*, \(^{93}\) the Sierra Club sought to enjoin the State of Hawaii from maintaining herds of goats and sheep that were destroying the habitat of the palila. \(^{94}\) The Sierra Club showed

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88. *Id.*
89. *See generally supra* text accompanying notes 49-61.
90. *See generally supra* text accompanying notes 54-61.
91. *See generally Barcelo v. Brown, 478 F. Supp. 646 (D.P.R. 1979), aff'd in part and vacated in part, 639 F.2d 495 (9th Cir. 1981).* (ruling that injunctive relief was inappropriate since there was an insufficient nexus between the defendant's activities and the harm to the species).
92. *See generally supra* text accompanying notes 54-61.
93. 471 F. Supp. 985 (D. Haw. 1979), *aff'd, 639 F.2d 495 (9th Cir. 1981).*
94. *Id.* at 987. The palila is a bird species found only on the island of Hawaii that was listed in 1975 as "high priority." *Palila v. Hawaii Dep't of Land &*
that the palila survived solely on the vegetation being destroyed. The Ninth Circuit Court of Appeals affirmed the district court holding that this destruction constituted a taking of habitat under the ESA because it could affect the overall health of the palila population. The court of appeals noted that this holding was consistent with the ESA's legislative history indicating that Congress recognized that destruction of the natural habitat posed the greatest threat to endangered species.

Following the Palila I and Palila II decisions, the Fish and Wildlife Service rewrote the definition of "harm" to require that the prohibited action "cause actual death or injury." Following promulgation of this new definition, the district court again addressed the scope of the definition of harm in Palila v. Hawaii Department of Land & Natural Resources (Palila II). Endorsing the Fish and Wildlife Services' definition of harm and noting that it included indirect injury to a species by habitat modification, the Ninth Circuit Court of Appeals affirmed the district court's holding that damage to the palila's habitat caused by herds of sheep constituted a taking under section 9.

In Palila III, the plaintiff could not prove the actual injury or death of individual palila birds. Moreover, the population of palila had actually increased slightly since its listing. Maintenance of the sheep herds, however, would prevent the recovery of the species from its endangered sta-

Natural Resources (Palila II), 639 F.2d 495, 496 (9th Cir. 1981). At the time of this litigation experts believed that the palila was "dangerously close" to extinction. Id. The state was maintaining the goat and sheep herds on a reserve used for sport hunting. Id. See Palila II, 639 F.2d at 496. The herds of sheep and goats fed on the leaves, stems, seedlings, and sprouts of the forest habitat which prevented regeneration of the forest ecosystem. Id. at 498.

Id.

ROHLF, supra note 26, at 63 (emphasis added).


100. Palila v. Dep't of Land & Natural Resources (Palila IV), 852 F.2d 1106, 1108 (9th Cir. 1988).

101. Id. at 1110. The sheep species that was the subject of this litigation was present in the palila's habitat at the time of the Palila I litigation. Research on their effect on the palila's habitat, however, was not completed at that time. Id. at 1107.


103. Id. at 1073.
Therefore, the court reasoned that habitat modification or destruction that totally prevents the possibility of a species recovering from endangered status constitutes an actual and present injury. This holding placed new emphasis on the way habitat modification affects the recovery of a species. The standard formulated in Palila IV also allows plaintiffs to rely on information regarding general population trends instead of concrete effects on individuals.

A recent federal circuit split regarding the validity of the Fish and Wildlife Services' definition of "harm" may limit or eliminate a plaintiffs' ability to prove harm to a species by habitat modification. In Sweet Home Chapter of Communities for a Great Oregon v. Babbitt, the District of Columbia Court of Appeals invalidated the Fish and Wildlife Service definition of harm. The court held that the scope of the definition exceeded Congressional authorization as provided in the ESA, and specifically rejected the inclusion of habitat modification in the definition of harm. Until resolution of this conflict by the full panel of the District of Columbia Court of Appeals, or the United States Supreme Court, plaintiffs attempting to prove harm to a species by habitat modification face uncertain results.

(2) Relative Certainty and Imminence of a Taking

After establishing a relationship between habitat modification and harm to a species, plaintiffs must prove that a taking has or will occur. In North Slope Borough v. Andrus, plaintiffs relied on the citizen suit provision of the

105. Palila v. Dep't of Land & Natural Resources (Palila IV), 852 F.2d 1106, 1110-11 (9th Cir. 1988) (emphasis added).
106. ROHLF, supra note 26, at 65.
107. The court declined to rule, however, on whether actions that only slowly or partially prevent recovery of a species constitute a taking. Palila IV, 852 F.2d at 1110.
109. Sweet Home, 17 F.3d at 1472.
110. ROHLF, supra note 26, at 60.
ESA and sought to enjoin the granting of offshore oil leases as a violation of section 9.\(^{112}\) Although the defendants conceded that the activities to be performed under the leases may have harmed the endangered Bowhead Whales, the court refused to grant an injunction because the plaintiffs did not prove the certainty or imminence of the harm.\(^{113}\) This holding indicates that the possibility of harm is not enough to warrant protection under ESA section 9. The court, however, failed to indicate the degree of proof required to show a certain and imminent harm.\(^{114}\) The court found the harm resulting from oil leasing to be uncertain and speculative, but did not explicitly decide the issue of imminence.\(^{115}\)

b. Economic Effects of Listing

While conservation groups must cross many hurdles to accomplish their goals through litigation, private developers and government agencies find that imposition of the ESA causes great economic losses.\(^{116}\) For example, in *TVA v. Hill*,\(^{117}\) construction of the Tellico Dam in the Little Tennessee River was halted when the snail darter\(^{118}\) was listed as endangered. Its critical habitat\(^{119}\) was defined as the area of river which would be impounded by a reservoir created by the dam.\(^{120}\) This impoundment of water would cause complete

\(^{112}\) Id. See generally supra text accompanying notes 49-53.


\(^{114}\) ROHLF, supra note 26, at 60 n.8.

\(^{115}\) Id. at 62.

\(^{116}\) See Arnold, supra note 3, at 3-5.

\(^{117}\) 437 U.S. 153 (1978), superseded by statute as stated in Bd. of Governors of Fed. Reserve Sys. v. Dimension Fin. Corp., 474 U.S. 361 (1986), and superseded by statute as stated in Pyramid Lake Paiute Tribe of Indians v. United States Dep’t of Navy, 898 F.2d 1410 (9th Cir. 1990) and superseded by statute as stated in Pacific Rivers Council v. Thomas, 30 F.3d 1050 (9th Cir. 1994).

\(^{118}\) The snail darter was listed as an endangered species on October 8, 1975. Id. at 158.

\(^{119}\) See supra note 9.

\(^{120}\) TVA, 437 U.S. at 162. At the time, the Secretary determined that the snail darter only lived in the portion of the river which would be inundated by the reservoir created by the dam. Id. at 161. The Tellico Dam was built in a section of the river in Tennessee described as an area of “great natural beauty . . . contain[ing] abundant trout . . . and having [c]onsiderable historical importance . . . .” Id. at 156.
obliteration of the habitat and of the snail darter's food source.121 The dam was 80% completed when the snail darter was listed as endangered.122

The Court determined that it must accept the Secretary of Interior's determinations and prohibit "taking" of the species,123 even though Congress had appropriated additional funds for construction of the dam after the snail darter had been listed.124 The Court recognized the conflict between conservation interests and economic interests,125 but was compelled to enforce the mandate of the ESA, which affords "endangered species the highest of priorities."126 The Court further emphasized that the ESA contains no exceptions to section 7.127 Following this litigation, Congress authorized an Endangered Species Committee128 to provide exemptions to the section 7 provisions.129 Congress then voted to approve completion of the Tellico Dam project.130

The provisions of the ESA have evolved into an "on-off switch" approach to species conservation which has generated intense debate and litigation. In areas not containing listed species, unrestrained development and habitat modifi-

121. Id. at 161-62.
123. Id. at 173-74.
124. Id.
125. Id. at 172 ("It may seem curious to some that the survival of a relatively small number of three-inch fish among all the countless millions of species would require the permanent halting of a virtually completed dam for which Congress has expended more than $100 million.").
126. Id. at 174. "Our individual appraisal of the wisdom or unwisdom of a particular course consciously selected by the Congress is to be put aside in the process of interpreting a statute." Id. at 194.
129. Id. § 1536(h).
130. See infra notes 248-50 and accompanying text. Incidentally, additional populations of snail darters were found in other habitats after the completion of this project.
cation continue with no consideration of ecological or environmental effects. Once a species is listed, however, all development activity is halted and great economic losses are incurred by entire communities. The local Habitat Conservation Planning process, which attempts to provide flexibility for conservation and development, is still relatively new. It is uncertain whether it can address the losses associated with the ESA's "on-off" switch approach. The Clinton Administration hopes that a research entity focusing on entire ecosystems, rather than single species, will allow planners to prevent species from becoming endangered and provide greater flexibility to developers.\footnote{131}

B. The National Biological Survey

1. Functions and Purpose

The National Biological Survey was established by administrative initiative within the Department of Interior in April, 1993.\footnote{132} The Survey is an independent research bureau designed to provide a comprehensive information bank and inventory of the nation's biological resources.\footnote{133} The National Biological Survey Act of 1993 provides that the Survey shall perform the following tasks: (1) conduct research on biological resources;\footnote{134} (2) monitor methods of ecosystem management;\footnote{135} (3) collect and analyze data to inventory the distribution, abundance, health, status and trends of biological resources;\footnote{136} (4) develop methods to systematically gather

\footnote{131. See supra notes 11-14 and accompanying text.}
\footnote{133. H.R. REP. No. 193, 103d Cong., 1st Sess., pt. 1, at 4 (1993).}
\footnote{134. H.R. 1845, 103d Cong., 1st Sess. (1993). Section 3 states that biological resources includes "plants, fish, wildlife, and their habitat." However, section 6 defines biological resources as "plants, fish, invertebrates, and wildlife inhabiting terrestrial, aquatic, and marine ecosystems." Id.}
\footnote{135. Id.}
\footnote{136. Id.}
and analyze data on ecosystems and their parts;\textsuperscript{137} (5) disseminate information to entities involved in land management;\textsuperscript{138} (6) provide technical assistance within the Department of Interior and to other organizations;\textsuperscript{139} and (7) establish a network with other agencies and entities to collect and maintain data.\textsuperscript{140} The National Biological Survey Act limits the role of the Survey "to the conduct[ing] of biological research, survey and information transfer activities."\textsuperscript{141} Supporters of the Survey believe that providing information on the nation's biological resources will reduce the litigation and intense controversies between species conservation and economic development, and aid local land use planners in their decision-making processes.\textsuperscript{142} The Survey will consolidate the research activities scattered among various bureaus of the Department\textsuperscript{143} into a comprehensive program.

The purpose of the Survey is "to provide a national focus for research, inventorying, and monitoring of America's biological resources on an ecosystem basis."\textsuperscript{144} The United States Secretary of Interior, Bruce Babbitt, stated that taking inventory of biological resources will provide the government with early warning of deteriorating species and a better chance of preventing endangerment.\textsuperscript{145} Proponents of the Survey maintain that developing a "comprehensive national

\begin{footnotes}
\item[137.] Id.
\item[138.] Id.
\item[139.] Id.
\item[140.] Id. The National Biological Survey Act does not provide the Director with any "regulatory or land and water development authorities" and the bureau is to "act as an independent science agency, without advocating positions on resource management issues." H.R. Rep. No. 193, 103d Cong., 1st Sess., pt.1, at 4 (1993).
\item[141.] H.R. Rep. No. 193, 103d Cong., 1st Sess., pt.1, at 9 (1993). This comment will not address the proposed information transfer activities of the National Biological Survey because they are not relevant to the discussion of ecosystem definition and organization.
\item[143.] The National Biological Survey (NBS) will combine large portions of the research activity of the U.S. Fish and Wildlife Service (FWS), the National Park Service (NPS), the Bureau of Land Management (BLM) and smaller activities from the Minerals Management Service (MMS), the Office of Surface Mining Reclamation and Enforcement (OSM), the Bureau of Reclamation (BOR), the U.S. Geological Survey (USGS), and the Bureau of Mines (BOM). U.S. DEP'T OF INTERIOR, BUDGET JUSTIFICATIONS, F.Y. 1994, at 1 (1993).
\item[145.] Catalina Camia, Survey Would Inventory Every Plant, Animal, CONG. Q., July 17, 1993, at 1868.
\end{footnotes}
picture of the abundance, distribution, and health of biological resources" will enable them to prospectively address the natural resource and endangered species conflicts caused by a lack of broad and timely biological information.146

2. Ecosystem-Based Research

The acquisition of relevant scientific information about the health of entire ecosystems, instead of focusing on single species, is the main goal of the Survey.147 Advocates purport to recognize that management of individual elements of an ecosystem affects other management decisions regarding that system.148 Although proponents deny that the Survey will mandate national land use planning methods,149 the program seeks to develop a biological information bank “enabling land and resource managers at federal, state and local levels to develop comprehensive ecosystem management strategies.”150

Ecosystems151 are generally described as pyramidal structures of interconnected plants, herbivores, and carnivores with energy flowing along food webs between them.152 The loss or reduction of a single species in an ecosystem can cause great instability within the entire system because of the interconnections within the system.153 For example, in tropical forests, figs provide a crucial food source for many birds, insects, fish, turtles, and mammals.154 In turn, the survival of the fig trees depends upon the wasps that pollinate the trees.155 Thus, the eradication of the wasp, a seemingly insignificant species, would threaten or destroy the entire ecosystem, including plants and animals.156

147. "Research, information, and analysis are critical to the management of biological and natural resources on an ecosystem basis.” Id.
151. See supra note 6.
152. ROHLF, supra note 26, at 16.
153. Id. See Rowland, supra note 5, at 506.
155. Rowland, supra note 5, at 506 n.12.
156. Id.
sustenance and stability of ecosystems directly affects humans because of the "services" that ecosystems provide including maintenance of atmospheric quality, control of climate, soil generation and preservation, waste disposal, pest and disease control,\textsuperscript{157} nutrient recycling, and prevention of erosion and flooding.\textsuperscript{168}

While the stated purpose of the National Biological Survey Act is to promote ecosystem-based research, the current authorizing legislation lacks substantive scientific and organizational language defining this type of research. It does, however, refer to the importance of ecosystem-based research in its findings and purpose section,\textsuperscript{159} and requires the monitoring of ecosystem management and collection of information on ecosystems.\textsuperscript{160} The Act's definition of biological resources includes plants, fish, and wildlife habitats, indicating that the research will extend beyond a single species to focus on their relationship with their habitats.\textsuperscript{161} The relationship and difference between ecosystems and individual habitats is not explained, however, nor does the Act distinguish how ecosystem-based research differs from generalized research on biological and natural resources.\textsuperscript{162} Finally, the definition of "biological resources" in ESA section 6 refers to "living beings inhabiting ecosystems," but does not clarify whether the definition of the term includes these ecosystems themselves.\textsuperscript{163} In its present form, the National Biological Survey Act does not provide precise guidelines for performing ecosystem-based research and mapping activities.

The Survey and its method of mapping ecosystems will have a great impact on the wide and diverse factions of our society which are concerned with natural resource and land management. The timber, mining, grazing, commercial fishing, farming, and energy interests have already expressed opposition to the Survey and concern about increased federal

\textsuperscript{157} ROHLF, supra note 26, at 16.
\textsuperscript{159} H.R. 1845, 103d Cong., 1st Sess. (1993).
\textsuperscript{160} Id.
\textsuperscript{161} Id.
\textsuperscript{162} Id.
\textsuperscript{163} See infra notes 211-12 and accompanying text.
land use regulation and private property rights. Furthermore, various environmental and conservation groups will be affected by the Survey's activities because they currently lack a comprehensive and adequate method for defining the ecological interests affected by various land use activities. Finally, the research methods employed by the Survey will influence the activities of federal agencies involved in land use and natural resources, as well as state and local land use planners. The Survey intends to aid these groups by providing a vehicle for long-term planning decisions which will prevent intractable conflicts between conservation and economic growth. Presently, the legislation authorizing the Survey lacks an organizational structure which will allow planning based on entire ecosystems rather than a single, imperiled species. The needed structure may be provided by zoning law, which has been used in the municipal planning context throughout this century. Zoning law provides local planners with guidelines to organize and map land uses throughout entire communities.

C. The Standard State Zoning Enabling Act

1. Background

While precise spatial guidelines are absent from current Survey legislation, they do play a large role in the zoning ordinances employed by municipalities to regulate land uses. Zoning law evolved from nuisance law as a method of controlling nuisances prospectively and in a comprehensive manner. By geographically separating and organizing different

164. See Cone & Healy, supra note 4, at A1.

165. Many environmental groups, however, have expressed dissatisfaction with the administration's failure to provide a clear definition as to the role of the Survey. *Endangered Species: Bio Survey has Critics on Right and Left*, GREENWIRE (Am. Political Network, Inc.), July 22, 1993.

166. A private nuisance is a civil wrong involving "an interference with the use and enjoyment of land." W. Page Keeton et al., PROSSER AND KEETON ON THE LAW OF TORTS, § 87, at 619 & n.1 (5th ed. 1984). The plaintiff must prove four elements: (1) the defendant acted intentionally; (2) interference with the use and enjoyment of land, although the extent of the interference may not have been expected or intended; (3) substantial interference; (4) unreasonable interference. *Id.* The drafters of the Standard State Zoning Enabling Act (SSZEA) recognized that courts draw lines in nuisance cases to protect residential districts from offensive land uses. The SSZEA authorizes municipalities to draw lines to establish districts which only include compatible uses. DANIEL R. MANDELKER, LAND USE LAW 107 (2nd ed. 1988).

land uses, zoning law prevents incompatible uses from conflicting and interfering with one another.

2. Purposes

The Standard State Zoning Enabling Act (SSZEA) was developed in 1968 as a model tool for municipalities engaged in land use planning.\(^{168}\) Currently, all state zoning legislation follows the SSZEA, which provides a common statutory zoning scheme, allowing application of judicial interpretations of zoning law nationwide.\(^{169}\) Section 1 of the SSZEA provides for the grant of power to develop zoning ordinances in order to "promot[e] health, safety, morals, or the general welfare of the community."\(^{170}\) The zoning ordinance is composed of regulatory controls which are land use,\(^{171}\) density of population,\(^{172}\) and site development,\(^{173}\) and allows the local legislative body to "regulate and restrict" these elements.\(^{174}\) These three controls represent the "heart" of zoning ordinances.\(^{175}\)

Section 3 of the SSZEA describes the preparation of a zoning ordinance.\(^{176}\) This section provides that zoning "regulations shall be made in accordance with a comprehensive plan" to meet the public requirements of the municipality.\(^{177}\) The drafters of the SSZEA relied on the comprehensive plan to avoid "haphazard or piecemeal zoning."\(^{178}\) Comprehensive plans plot the physical development of the community, project this development to a future point in time, and are organ-

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168. Model Land Dev. Code, supra note 15, app. A. The SSZEA was drafted by the United States Department of Commerce. Id.

169. Mandelker, supra note 166, at 107. Some states have modified the SSZEA but these changes do not alter the basic framework. Id. This comment will not address modern changes in zoning legislation and newer flexible zoning innovations (such as planned unit developments and floating zones) and will limit its discussion to the SSZEA provisions. For a discussion of these modern changes, see generally Mandelker, supra note 166.


171. Land use includes the "location and use of buildings, structures, and land for trade, industry, residence, or other purposes." Id.

172. Id.

173. Site development includes "the height, number of stories, and size of buildings and other structures, the percentage of lot that may be occupied, the size of yards, courts, and other open spaces . . . ." Id.

174. Id.

175. Mandelker, supra note 166, at 134.


178. Model Land Dev. Code, supra note 15, § 3 n.22.
ized geographically and functionally. Ideally, a well-drafted comprehensive plan can account for future changes in a community by functioning as a flexible framework for land use planning. SSZEA section 3 further provides that zoning regulations shall be made with consideration of the character of the district and its suitability for particular uses, and to encourage the most appropriate use of land.

3. Zoning Districts

The comprehensive plan described above divides a municipality into districts to carry out the purposes of the Act. SSZEA section 2 provides for uniformity of regulations within each district but different regulations for separate districts. The three major land use categories, commercial, residential and industrial, are permitted within certain districts "as of right." Therefore, similar and harmonious uses are grouped together in districts apart from uses which would be incompatible.

4. Amendments

While a well-drafted comprehensive plan can account for changing circumstances, amendments to the zoning ordinance also allow the flexibility necessary for effective land use planning. SSZEA section 5 allows changes to the ordinance subject to neighbors' voting power. These changes include amendments, supplements, modifications, or the repeal of certain provisions. The drafters intended this section to allow local legislatures to account for changing conditions in the community and, therefore, to prevent a "straitjacket" planning approach. These alterations are accomplished by the local legislature upon application by a land-

179. The plans often contain both maps and textual statements of policies. MANDELKER, supra note 166, at 72.
180. The drafters of the SSZEA intended this direction to be "a reassurance to property interests that zoning be done in a sane and practical way." MODEL LAND DEV. CODE, supra note 15, § 3 n.24.
181. Id. § 3.
182. Id. § 2. See supra notes 177-81 and accompanying text.
183. MODEL LAND DEV. CODE, supra note 15, § 2.
184. MANDELKER, supra note 166, at 107.
185. MODEL LAND DEV. CODE, supra note 15, § 5.
186. Id.
187. Id. § 5 n.30. This section does not provide statutory standards to guide the amendment process. MANDELKER, supra note 166, at 109.
A zoning map amendment changes the regulations for a tract of land and switches the tract to a different zoning classification.

5. **Administrative Relief**

Flexibility and the comprehensive plan play a large role in SSZEA section 7. This section lays the foundation for administrative relief available from the zoning ordinance and provides for special exceptions and variances. Special exceptions are granted for circumstances specifically enumerated in the ordinance if they are "in harmony with [the ordinances'] general purpose and intent . . . ." The special exception allows a deviant use in a district with express permission from the board. Variances from the terms of the ordinance are allowed in rare circumstances where strict enforcement of the ordinance would result in unnecessary hardship to the landowner because of special circumstances. These SSZEA provisions illustrate the drafters' intent to develop a flexible system to prevent common nuisances resulting from conflicting land uses.

The SSZEA provides a mechanism for local planners which recognizes and organizes compatible and incompatible land uses through zoning districts and provides flexibility for future changes. This system has withstood constitutional challenges and effectively allows growth and development, while preserving the desired character of a community. To overcome the limitations of the ESA, the Survey seeks to provide comprehensive information about the relationships

189. *Id.* These zoning map amendments are often challenged as a violation of the Equal Protection Clause of the United States Constitution. U.S. Const. amend. XIV, § 1. "Spot zoning," which amends the zoning map by rezoning a tract of land from a less intensive to a more intensive use district, can be alleged when relief from an ordinance is granted to a single landowner. *Mandelker*, supra note 166, at 224.
191. *Id.*
194. In Village of Euclid v. Ambler Realty Co., 272 U.S. 365 (1926), the Court upheld a comprehensive zoning ordinance as a valid exercise of a state's police power, yet emphasized that it was not ruling on the specific applications of all zoning ordinances. The Court explained that the validity of a particular ordinance depends upon whether it represents a valid exercise of the police power. *Id.* at 372.
within entire ecosystems. The National Biological Survey Act, however, does not contain language which directs its research activities to study entire ecosystems and their interrelationships. Thus, the Survey's attempt to alleviate the problems caused by the single species conservation approach lacks such organizational principles to facilitate ecosystem-based research.

III. Analysis

As the above discussion illustrates, the ESA's approach to species conservation has evolved into an inflexible system which spawns litigation and imposes great costs borne by conservationists and landowners, as well as by species caught in the struggle between these groups. The ESA has failed to strike a balance between responsible development and conservation of biological diversity. Achieving this balance is crucial as a rapidly growing population places increased demands on our natural resources\(^1\) resulting in few areas left untouched by human development. The application of the land use compatibility principles discussed above to ecosystem-based research and local land management provides a critical tool in achieving this balance.

A. Ecosystem-Based Research

1. A Holistic Approach

The material difference between studying the health of ecosystems as opposed to the health of a single species lies in the focus of ecosystem study on the interrelationships among species and their habitats within the ecosystem, particularly ecological boundaries and time frames. To comprehend different species and their habitats functioning as an "ecological unit,"\(^1\) one must recognize the webs and interdependencies which sustain that unit. Approaching biological research in this holistic manner\(^1\) will provide long term benefits to both conservation and landowner interests, as well as to the myr-

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195. Natural Resources Committee Report, supra note 6, at ix.
196. See supra note 6.
197. Holistic study "emphasiz[es] the organic or functional relationship between parts and wholes" and is based on the premise that a whole cannot be analyzed without looking at the sum of its parts reduced to discrete elements. Webster's Third New International Dictionary, Unabridged (Ed Babcock Gove Philip Ph.D., ed., 1986). Atomistic study, on the other hand, focuses on
iad of animal and plant species. Understanding the natural functions and structures of the ecosystem and the interdependence of its members will allow planning which organizes the ecosystem according to compatible uses.198

Conversely, saving a single species in a degraded ecosystem is expensive, inefficient, and often impossible.199 These costs may be borne by a single species struggling to survive, by entire ecosystems,200 by humans relying on that ecosystem for ecological “services,”201 or by landowners with frustrated investment-backed expectations.202 Moreover, restoring the ecology of an ecosystem after problems have developed imposes great economic and social costs.203 For example, the cost of a planned restoration effort for the Greater Everglades Ecosystem in Florida exceeds $1 billion.204 The social costs caused by the controversy surrounding these efforts are high because scientists, landowners, and workers have conflicting interests which are affected by restoration activities.205

2. Ecosystem Identification

The scarcity of adequate scientific information clearly presents a significant hurdle to developing a balanced approach to species conservation and development. Lack of spatial techniques to identify ecosystems and their connected elements poses an additional problem. While the importance of understanding the dynamics of ecosystems is widely recognized and acknowledged,206 clear legal and scientific guidelines which define and map animal and plant habitats for the purpose of ecosystem management on federal, state and local levels do not exist.207 Definitions employed by conservation-

“structure[s] made up of sharply distinct and independent individuals or units.”

Id.


199. Id.

200. See supra notes 151-56 and accompanying text.

201. See supra notes 157-58 and accompanying text.

202. See generally Arnold, supra note 3.

203. NATURAL RESOURCES COMMITTEE REPORT, supra note 6, at 11.

204. Id.

205. These controversies often develop where private landowners are unwilling to sell their land to contribute to restoration efforts or where natural resource restoration limits or eliminates jobs, such as timber harvesting.

206. See supra notes 144-46 and accompanying text.

207. See supra notes 159-63 and accompanying text.
ists and scientists fail to provide concrete factors useful for setting legal standards. For instance, current theories focus on the benefits of biodiversity, which simply refer to the "vari-

ty of life." Ecosystem biodiversity in particular is defined as "the various assemblages of plants, animals, and microor-

ganisms that occur in different physical settings." When describing a population, scientists pinpoint "the individuals of a particular species in a particular group or in a definable place." Despite these descriptions, no standard exists to define and map the boundaries of these physical settings, the relationships of the assemblages, and the places where spe-

cies are found.

3. The National Biological Survey

As noted above, the National Biological Survey Act does not include a definition of ecosystems. Furthermore, the discrepancies in its description of biological resources reveal Congress' lack of clarity when conceptualizing the parameters of the Survey's research activities. Unless the Survey distinguishes and defines ecosystem-based research, the single species approach will continue to limit its activities. Without an organizational plan, research will be directed toward individual species and their habitats. An organized, ecosystem-based approach, on the other hand, would provide planners with information about the status and trends of species and their relationships. This would allow planners to monitor and predict problems, and therefore prevent endangerment of a species before crisis and conflict emerge.

B. The Single Species Conservation Approach

1. Listing Requirements

In contrast to the ecosystem-based approach described above, the ESA enforces the protection of a single species only after it has already become imperiled. By the time the Secretary lists a species as "threatened" or "endangered," gen-
eral scientific agreement indicates that its extinction is highly probable. At that point, it may be too late to meet conservationists' goals of species and habitat protection. Since protection under the ESA does not commence until after a species is listed, and because of the lack of a consolidated, comprehensive information bank about our nation's biological resources, the ESA has evolved into an inflexible method of species conservation.

2. Critical Habitat Designation

Similarly, lack of scientific information when designating critical habitats forestalls the listing and protection of species. When designating the critical habitat for a listed species, the government balances the survival of the species against the economic viability of the community. The government rarely has access to adequate information about either of these factors and only begins to study the problem when a crisis erupts. If comprehensive scientific information were available about entire communities and the relationships within them, the local land use planners could organize uses according to their compatibility and would already understand the factors necessary for the species' survival and the economic viability of the community.

Notwithstanding the inadequate scientific information available, Congress itself has displayed confusion about the methods utilized by the Secretary to define critical habitat

215. Rowland, supra note 5, at 511.
216. Once a species is listed, conservationists face other "unknowns," such as the probability of extinction within a given time period resulting from proposed activities and the length of that relevant time period. Furthermore, uncertainty surrounds decisions such as determining an acceptable level of extinction, and the significance of the spatial configuration of species populations and their habitats. Id. at 511 & n.32.
217. See supra notes 26-36 and accompanying text.
218. See supra notes 10-14 and accompanying text.
219. See supra notes 4-9 and accompanying text.
220. See supra note 9.
221. Other criticisms of the current approach to critical habitat designation include that it really does not offer any additional substantive protection, and that it has been largely ignored. ROHLF, supra note 26, at 65.
223. See supra note 10 and accompanying text.
224. By "communities," this comment refers to interrelated groups including plants, animals, and humans.
boundaries. Referring to the proposed critical habitat for grizzly bears, a 1978 Senate report stated that "[m]uch of the land involved in this proposed designation is not habitat that is necessary for the continued survival of the bear." The report also stated that the land was "instead being designated so that the present population within the true critical habitat [could] expand." ESA section 7 describes critical habitats as the areas essential for the conservation of a listed species, which includes areas necessary to allow species recovery to a point where it will be removed from the lists. According to this language, the ESA seeks to reverse existing trends as well as to prevent imminent extinction. The language of this Senate report, however, indicates that the authors believed the minimum habitat necessary to allow a species to survive and reproduce should be designated as a critical habitat. With legislators themselves displaying confusion as to the designation of critical habitats, land use planners cannot be expected to predict the impacts of habitat modification.

3. Takings Prohibitions

By prohibiting the "taking" of a listed species without a permit, the ESA forecloses any development or land use activities. This approach frustrates the investment-backed expectations of landowners who purchase property without knowing that an endangered species inhabits the property. The retroactive ban on development also causes great economic losses, as well as transactional costs associated with obtaining a permit or litigation. Meanwhile, with inadequate tools to predict the status or trends of entire ecosystems, conservationists find themselves applying an "intensive-care" approach to conservation. When deciding whether to list a species, difficulties often arise in determining whether it populates other areas and whether the

226. ROHLF, supra note 26, at 55.
227. Id. (emphasis added).
228. Id. (emphasis added).
229. See supra note 48 and accompanying text.
230. See supra notes 50-53 and accompanying text.
231. Timber harvesting in the Pacific Northwest and farming are two examples.
232. Arnold, supra note 3, at 32.
233. See supra note 4 and accompanying text.
problems facing the species foreshadow greater problems throughout the ecosystem.  
Moreover, saving a species which is already in "critical condition" costs a great deal more than managing habitat areas in order to conserve the interrelated species living there.  
To supplement data on various species and their habitats, an organizational method, such as mapping species' individual and related needs with "ecosystem zoning districts," is necessary.

C. Ecosystem Zoning

In contrast to the reactive, remedial approach of the ESA, the organization of compatible and incompatible land uses would provide a preventive mechanism to avoid conflicts between conservation and economic development. Zoning law attempts to prevent nuisances by organizing the municipality into districts, regulating the uses within each district, and separating those uses which would pose a nuisance to each other. Biological researchers can incorporate these organizational principles to define ecosystems. This information would allow local land use planners to test theories about possible incompatible and compatible uses, amend their plans as necessary, and avoid ESA litigation.

ESA litigation involving natural resource conflicts imposes great direct and transactional costs. When applied to municipalities, zoning law and city planning prevent nuisance litigation by separating incompatible uses before they interfere with one another. For instance, zoning law protects residential areas from industrial uses, which would constitute a nuisance, through exclusionary zoning districts. Similarly, ESA litigation could be reduced if local land planners utilized a comprehensive information bank which organized different ecosystems based on similar principles. When gathering information on various species and their habitats, the Survey researchers could focus on the compatibility of different species and their relationships within the entire ecosystem. This information could be organized into ecosystem maps designating "districts" to separate incompatible uses of the land from the species uses. Local land use planners could then incorporate this information into their planning

234. Cone & Healy, supra note 4, at A1, A18.
235. See supra notes 199-205 and accompanying text.
236. See supra notes 182-84 and accompanying text.
activities to prevent species from being listed and conflicts between development and conservation from erupting. This prospective approach would alleviate the costs associated with litigation, and prevent "surprises" for those wishing to develop, and protect our nation's biological resources.

Zoning law also recognizes the importance of flexibility through its reliance on a comprehensive plan which projects land uses to a future point in time, its amendment process, and its provisions for administrative relief. This flexibility is important when dealing with uncertainties such as "partial prevention of recovery" and would allow reorganization if the needs and dependencies of a species or of humans changed and altered the ecological balance within the ecosystem. Those involved in both land use planning and ecosystem management must recognize the inherent uncertainties in these activities, and be willing and able to adjust their plans as necessary. For instance, uses and species thought to be incompatible could gradually become compatible through limited contact over time. The application of a prospective and flexible zoning law would allow the Survey to transcend the role of simply cataloguing the nation's species and become a useful tool to ecosystem management.

1. Ecosystem Zoning Applied
   a. The Jeopardy Standard and the Tellico Dam Controversy

The drama surrounding the Tellico Dam project provides stark illustration of the potential losses resulting from the inflexible approach of the ESA, as well as from the lack of adequate data. In TVA v. Hill, the Court articulated the purpose of the ESA "to halt and reverse the trend toward spe-

237. See supra notes 177-79 and accompanying text.
238. See supra notes 185-89 and accompanying text.
239. See supra notes 190-94 and accompanying text.
240. See supra notes 104-07 and accompanying text.
241. The concept of incompatible uses becoming compatible over time is illustrated by municipal zoning districts. A shopping center which is built in a residential district may appear to be an incompatible use, especially to the residents, at first. However, over time, the community may come to rely on the shopping center and new residents may even move to the neighborhood because of the services it provides.
242. See supra notes 117-30 and accompanying text.
cies extinction, whatever the cost."\textsuperscript{244} Halting construction of the Tellico Dam, which was eighty percent completed, would have cost fifty-three million dollars.\textsuperscript{245} Additionally, the community surrounding the proposed dam would lose the economic opportunities associated with the dam and the surrounding development.\textsuperscript{246} The controversy stirred intense public opposition and threatened the credibility of the ESA itself.\textsuperscript{247}

This public opposition led Congress to pass the exemption provision to ESA section 7\textsuperscript{248} and to approve the construction of the dam and therefore, the total eradication of the known snail darter species.\textsuperscript{249} This conscious decision to obliterate a species through an "exemption" process certainly seems contrary to the spirit and intent of a law designed "to provide a program for the conservation of such endangered and threatened species . . . ."\textsuperscript{250} Given the limited resources and knowledge available at that time, however, conservation of the known snail darter population and a viable economic return on non-recoverable expenditures were simply not compatible.

Despite scientists' belief that they had thoroughly searched the areas surrounding the Tellico Dam for additional snail darter populations, more were discovered after completion of the dam.\textsuperscript{251} Thus, in this case, greater knowledge would have been the most effective tool to resolve the conflict. More importantly, this case demonstrates the need to apply that knowledge to effective organization and planning. While early resolution of conflicts is desirable, the value of planning to prevent conflict is even greater. If researchers and planners had understood the dynamics of the Tennessee River Valley ecosystem (including the food sources of particular species), they could have recognized the compatible and incompatible uses and separated them as zoning or-

\textsuperscript{244} Id. at 184 (emphasis added).
\textsuperscript{245} Id. at 166.
\textsuperscript{246} Id. at 157.
\textsuperscript{247} ROHLF, supra note 26, at 138.
\textsuperscript{248} Congress passed the exemption provision because it realized the importance of preventing conflicts between listed species and federal projects at the earliest possible moment. Id. (emphasis added).
\textsuperscript{249} Rowland, supra note 5, at 510.
\textsuperscript{250} 16 U.S.C. § 1531(b) (1988).
\textsuperscript{251} See supra note 130.
dinances do. By focusing on the entire Tennessee River Valley ecosystem, such a stark choice between economic development and species protection would not have been necessary because there would have been no surprises for developers, conservationists, or land use planners.

The land use compatibility principles of zoning law could also have prevented placing the Court in a position to choose between species conservation and economic development. The Court obviously recognized the great economic magnitude of its decision, but felt compelled to defer to the intent of Congress. Planning, rather than litigation, needs to be employed to prioritize and organize competing uses, values, and needs. The Court itself recognized that it is "the exclusive province of the Congress not only to formulate legislative policies and mandate programs and projects, but also to establish their relative priority for the Nation." Once Congress sets these priorities, local planners need to implement them with balanced, comprehensive programs based on scientific information and land use compatibility principles. The TVA Court articulated the essence of this problem stating that "[w]e have no expert knowledge on the subject of endangered species, much less do we have a mandate from the people to strike a balance of equities on the side of the Tellico Dam." The limited ability of the judiciary to choose among conflicting land uses in natural resource conflicts demonstrates the deficiencies of ESA litigation.

a. ESA Section 9—Prohibitions Against Taking and Harm

(1) Proving "Harm" to a Species

The ESA section 9 restrictions on private parties have not generated conflicts as notorious as the Tellico Dam controversy, but litigation involving the prohibition against "harm" of a species has illustrated the need for increased information and planning. While the Palila cases eased the burden on plaintiffs trying to prove a causal connection between habitat modification and harm to a species, this inter-

252. See supra notes 125-27 and accompanying text.
254. Id.
255. See supra notes 49-53 and accompanying text.
Interpretation has been thrown into question by the recent decision of the District of Columbia Court of Appeals in *Sweet Home*.\(^{256}\) Lack of scientific information and understanding about the relationships among species will continue to pose a problem. The current Fish and Wildlife Service definition of harm includes "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering."\(^{257}\) If research were approached with ecosystem organization in mind, these behavioral patterns would become apparent because they illustrate the reliance of different species upon one another.

The particular factual circumstances of the *Palila* cases\(^ {258}\) also eased the burden on the plaintiffs to link the habitat modification to harm to a species. The palila's habitat is a small, easily defined area. The species' existence depends exclusively on the vegetation that was being destroyed.\(^ {259}\) Litigation involving a wider ranging species with dependencies on more complex and diverse ecosystems or a species whose habits and needs are not well understood could prove very burdensome for plaintiffs.\(^ {260}\) In fact, incomplete research regarding the effects of one sheep species on the forest habitat prevented the plaintiffs from challenging its presence in the *Palila I* litigation.\(^ {261}\) Once the information was gathered, the plaintiffs litigated the issue in *Palila v. Hawaii Department of Land & Natural Resources (Palila III)*.\(^ {262}\) An extensive source of information about the relationships among the species in this forest habitat would have prevented needless delay and additional expense.

\(^{256}\) See supra notes 56-61 and accompanying text.

\(^{257}\) 50 C.F.R. § 17.3 (1994).

\(^{258}\) See supra notes 93-107 and accompanying text.

\(^{259}\) Rohlff, supra note 26, at 68. The defendants in this case did not dispute the finding that the palila depended solely upon the vegetation being destroyed for its existence. *Id.*

\(^{260}\) *Id.* Moreover, if the current Fish and Wildlife Service regulation interpreting harm is changed pursuant to *Sweet Home* to exclude habitat modification, litigation will prove a useless tool for preventing species extinction resulting from habitat modification.

\(^{261}\) See supra note 101.

\(^{262}\) 649 F. Supp. 1070 (D. Haw. 1986), aff'd, 852 F.2d 1106 (9th Cir. 1988).
(2) Certainty and Imminence

The certainty and imminence requirement of ESA section 9 further illustrates the need for planning and prevention instead of last minute litigation. The certainty requirement appears reasonable, especially considering the strict land use regulations and penalties imposed by section 9. It does, however, exacerbate the "on-off switch" approach of the ESA. This requirement assures that any certain harm will be halted. Alternatively, speculative or perhaps even probable harm does not warrant any protection. While this distinction is workable, and may be necessary in a litigation context, it has no value to comprehensive planning, which attempts to address and predict uncertainties and organize land uses accordingly.

Like the certainty and imminence requirement of section 9, a private nuisance action requires that the plaintiff has suffered a substantial harm. The law provides a remedy, either damages or injunctive relief, after the harm has already been suffered. Therefore, a homeowner in a residential area would not have legal recourse against a factory which located next door and began emitting unhealthful fumes until the harm to the homeowner's use and enjoyment of property had already occurred. Zoning law prevents these harms and nuisance litigation by separating these uses in its municipal plan in order to prevent them from interfering with one another.

c. Incidental Take Permits and Habitat Conservation Plans

Congress attempted to provide relief from the inflexibility of the ESA requirements discussed above by allowing incidental take permits and cooperative agreements with

263. The courts have never ruled solely on the imminence of harm. The cases have turned on the certainty requirement. It has been argued that the imminence requirement defeats the ESA's conservation purposes because species extinction is almost impossible to stop when the danger becomes very imminent. ROHLF, supra note 26, at 61. The application of zoning and planning principles would overcome the imminence requirement as well as the certainty requirement discussed in the text.

264. See supra notes 110-15 and accompanying text.

265. See supra note 166.

266. PROSSER AND KEETON, supra note 166, at § 87.
In practice, however, this process has become cumbersome to developers. The lengthy permitting process imposes direct costs on developers and causes building delays, leading to additional time-related costs. Furthermore, when granting permits, the Secretary analyzes only the possible jeopardy of the species, without considering the need for development. The substantive requirements of ESA section 10(a) compel permit applicants to “the maximum extent practicable, [to] minimize and mitigate the impacts of such taking.” Without the adequate scientific information that mapping the entire development area would provide, permit applicants do not have a clear understanding of the impacts of their project, nor do they understand how to minimize and mitigate them.

Granting permits based on inaccurate or incomplete information about an ecosystem could result in species decimation, which would thwart the goals of the ESA. For instance, habitat modification could harm an unknown or unlisted species which is a food source for a listed species. Unforeseen effects on one component of the ecosystem could thus cause instability throughout the system. It has also been argued that ESA section 10(a) is not applied as rigorously as possible. Therefore, conservationists, as well as developers, find their goals frustrated by this process.

The efforts undertaken through state cooperative agreements, such as the NCCPP, illustrate ambitious steps toward rectifying the problems of the inflexible approach of the ESA. These plans, however, will only work if they are based on a comprehensive research strategy which maps the habitat areas within ecosystems. By recognizing the webs and interconnections within the ecosystem, the impact of a proposed habitat modification will be more fully understood. If habitat conservation plans utilize comprehensive ecosystem maps and districts, they will be able to focus on entire ecosystems. These plans will account for the health of unlisted species and therefore, prevent these species from be-

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267. See supra notes 62-67 and accompanying text.
268. Arnold, supra note 3, at 32.
269. Id. at 14.
271. See supra notes 153-56 and accompanying text.
272. Arnold, supra note 3, at 15-16.
273. See supra notes 68-88 and accompanying text.
coming endangered. Preventing species from becoming endangered will alleviate the need to obtain incidental take permits and will provide landowners with notice of the scope of activity permissible on their land without the surprises of future species listings.274

The ESA has evolved into an unworkable system for both conservation and economic interests. Litigation under the ESA, which focuses on a single species, imposes great costs and forces the judiciary to make choices between these competing interests. Although the Survey seeks to rectify the weaknesses of the ESA, the current legislation does not provide an adequate mechanism to move beyond the single species approach and focus on the interrelationships of entire ecosystems. The land use compatibility principles of zoning law would provide this mechanism. "Ecosystem zoning" would allow researchers to comprehensively map ecosystems, allow local land use planners to separate uses to avoid crises, and would reduce the costs incurred by both conservationists and landowners under the ESA's approach.

IV. Proposal

In order to fulfill its legislative purpose and to serve as a useful tool in land management decisions, the National Biological Survey Act (NBSA) needs to focus on the interrelated components of ecosystems by spatially organizing them using the land use compatibility principles of the SSZEA. The research and survey activities of the National Biological Survey can provide a solid impetus to efforts to overcome the weaknesses of the ESA'S single species conservation approach.275 To direct these research activities effectively, however, the National Biological Survey Act of 1993276 should be amended to provide the Survey with legal guidelines to map the nation's ecosystems.

Viewing the land as clusters of communities would allow application of the land use compatibility principles of zoning law to map and define complex ecosystems. Proposed ecological factors related to a particular species, to the relationships among species and their habitats, and to the ability of the land to sustain these resources can be integrated with zoning

law principles to provide guidelines for mapping entire ecosystems rather than studying a particular species or habitat. An amendment adopting the general principles of the Standard State Zoning Enabling Act and applying them to ecosystems would provide a definition of "ecosystem-based research."

NBSA section 6, which lists the definitions used under the Act should be amended to include subsection (7):

(7) the term "ecosystem" is defined as a unit composed of interacting organisms functioning together with their environment. For the purposes of this Act, an ecosystem shall be mapped according to the following criteria:

(A) Purposes
   (I) Ecosystem units shall be mapped to sustain and promote the health, safety, productivity, and general welfare of soil, plant, animal, and human communities.

(B) For the purposes of ecosystem management, individual ecosystems shall be divided into "districts" according to the following criteria:
   (i) Characteristics of particular animal and plant species, including:
      (a) abundance and distribution,
      (b) overall health,
      (c) and reproductive patterns.
   (ii) The relationships among species and the relationships of species to their habitat, including:
      (a) food sources, and
      (b) atmospheric conditions for survival.
   (iii) Characteristics of the land and its ability to sustain biological resources, including:
      (a) present/threatened habitat destruction,
      (b) over-utilization, and
      (c) presence of natural resources.

277. MODEL LAND DEV. CODE, supra note 15.
279. See supra note 6.
280. See supra note 170 and accompanying text.
281. See supra notes 182-84 and accompanying text.
283. TVA v. Hill, 437 U.S. 153, 165 n.16 (1978). This is one of the factors used to delineate a critical habitat.
284. Id.
285. Factors (a) and (b) are used to determine whether a species should be listed as endangered under the ESA. See supra note 26.
This amendment would allow the Survey to make the critical step from simply inventorying each biological species to cataloging entire ecosystems in a way that provides a valuable resource to those making land use decisions at the local level. By making judgments about the status and trends of ecosystems, and sustainable land uses, the Survey would transcend the current limitations imposed by single species research. This organizational scheme would also allow land use planners to use zoning principles to map their communities and prevent intractable conflicts.

Once local decision-makers, who are best suited to make land use judgments, have access to the information provided by the Survey, they can choose to apply it to organize compatible and incompatible land uses. These planners should extend the application of zoning principles to the ecosystems described by the Survey to recognize communities composed of soils, waters, plants, animals and humans. The new local ecosystem zoning plan can separate ecosystem “districts” according to the criteria set out in the amendment to the National Biological Survey Act. The local plans can incorporate the other principles of the SSZEA to regulate these uses:

1. The Comprehensive Plan
   (a) Ecosystems shall be mapped according to a comprehensive plan to address the interrelationships of organisms and their environment within the ecosystem.
   (b) The comprehensive plan shall plot the current physical development and species uses, project the development and species uses and needs to a future point, and organize the ecosystems ecologically, geographically and functionally to account for present and projected animal, plant, and human needs.
   (c) The comprehensive plan shall be drafted according to the character of the ecosystem and its suitability for particular uses to encourage appropriate uses of such land considering the factors used to delineate ecosystem districts.

2. Changes

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286. These land use decisions, however, are still discretionary and not regulated by the Survey in any way.
287. See supra notes 177-81 and accompanying text.
288. See supra notes 179-81 and accompanying text.
(a) Amendments

(i) Amendments to the comprehensive plan altering the designation of ecosystem districts may be allowed if:

(A) the status of a single species or their interrelationships changes substantially,

(B) new information becomes available regarding the status of a single species or its interrelationships, or

(C) the ecological balance of the ecosystem is significantly altered.

(ii) Special Exceptions

(A) Special exceptions from the comprehensive plan changing the designation of “districts” within an ecosystem shall be allowed for circumstances specifically enumerated in the comprehensive plan. Such circumstances may include, but are not limited to:

(1) conditions leading to the listing of a species under the Endangered Species Act,

(2) greater use of natural resources in the ecosystem than anticipated,

(3) an increase in the overall population or health of a species within the ecosystem, or

(4) specific economic or social conditions affecting human uses of the ecosystems' resources, or

(5) substantial changes in federal and state land use regulations.

The zoning principles discussed above will allow prospective land use planning decisions which recognize compatible and incompatible uses. This planning scheme can prevent a myriad of potential conflicts between conservation and land use activity. Planning will reduce the litigation, transactional, and environmental costs incurred under the ESA's approach. The flexibility to address continually changing circumstances is provided by the comprehensive plan, the amendment process and the administrative relief provisions. These provisions will provide relief from the inflexibility of ESA regulation and litigation. When employed by researchers to map

289. See supra notes 185-89 and accompanying text.
290. See supra notes 190-94 and accompanying text.
entire ecosystems and by planners to regulate uses within them, zoning principles will prevent the crises which affect conservationists, land owners, and the nation's biological resources.

V. CONCLUSION

Striving to provide comprehensive information about the character, extent, distribution, and health of the nation's biological resources, the National Biological Survey seeks to overcome the weaknesses of the single species approach of the ESA. In its present form, however, the National Biological Survey Act does not serve as a valuable vehicle to move beyond the single species approach. The information gathered by the Survey must be organized in a manner that recognizes compatible and incompatible uses within ecosystems. While ecosystem management encompasses a range of considerations, this comment provides the National Biological Survey Act with one organizational mechanism to achieve these goals.

Local land use planners can apply the zoning principles suggested in this comment to prevent intense conflicts from developing between species protection and economic development. These zoning mechanisms will also shift the focus of land use planning back to the localities and provide warning to groups concerned about property rights and development. A system which only provides protection to a species once it is already imperiled, and which forecloses any development once a species is listed, does not allow a balanced blend of conservation and economic development. The National Biological Survey possesses the potential to create a system which recognizes that interrelated elements comprise the biological world, that these relationships sustain the system, and that biological diversity has great ecological and economic value. A system which plans according to the relationships among the nation's biological resources, as well as their relationships with humans, will allow the sustainable coexistence of economic development and biological diversity.

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292. Id.