

INCREASED SCIENTIFIC CAPACITY AND ENDANGERED SPECIES MANAGEMENT: LESSONS FROM THE RED WOLF CONFLICT

Joshua M. Duke and Laura A. Csoboth***

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* Corresponding author, Assistant Professor of Natural Resource Management and Legal Studies, Department of Food and Resource Economics, University of Delaware, Newark, DE 19717, USA. Tel.: 1-302-831-2512; fax: 1-302-831-6243. *E-mail address:* duke@udel.edu (J.M. Duke). Duke would like to acknowledge the University of Delaware Library for providing the use of a library research study.

** Former student, Department of Food and Resource Economics, University of Delaware, Newark, DE.

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I. INTRODUCTION

This article uses comparative institutional analysis¹ to evaluate the performance of dispute resolution processes in the red wolf land-use conflict.² The authors' goal is to assess the possible impact of increased scientific capacity on the effectiveness of endangered species conflict resolution. "Increased scientific capacity" refers to new techniques that challenge prevailing legal definitions of "species" or enhance the viability of an endangered species under the ESA.³ Examples include advances in genetics, which lead to clarifications of species purity or hybridization, and improved abilities to prevent extinction through captive breeding (controlled propagation) and reintroduction. Case law and administrative rules related to the Endangered Species Act ("ESA") have yet to incorporate increased scientific capacity coherently. As one recent article posits, are the distinctions in species that affect ESA listing/delisting going to be justified in terms of "law or genetics"?⁴ This article highlights key instances of science outstripping the law, a trend that is increasingly studied by legal scholars, albeit in a piecemeal fashion.

Legal scholars have already considered many of the issues presented both separately, and also with respect to current scientific capacity, including (1) delisting;⁵ (2) species definition;⁶ (3) captive breeding;⁷ and (4) reintroduction.⁸

1. This article follows the form of comparative institutional analysis developed by NEIL K. KOMESAR, *IMPERFECT ALTERNATIVES* (1994), as adapted by Joshua M. Duke, *An Institutional and Behavioral Analysis of Land-Use Conflict Resolution* (1998) (unpublished Ph.D. dissertation, University of Wisconsin-Madison) (on file with the University of Wisconsin-Madison library).

2. See generally *Gibbs v. Babbitt*, 214 F.3d 483 (4th Cir. 2000), *cert. denied sub nom.*, 531 U.S. 1145 (2001).

3. See 16 U.S.C. §§ 1532-1533 (2000).

4. Leslie Marshall Lewallen & Russell C. Brooks, *Alsea Valley Alliance v. Evans and the Meaning of "Species" Under the Endangered Species Act: A Return to Congressional Intent*, 25 SEATTLE U. L. REV. 731, 732 (2002).

5. See, e.g., JOHN COPELAND NAGLE & J.B. RUHL, *THE LAW OF BIODIVERSITY AND ECOSYSTEM MANAGEMENT* 125-29 (Robert C. Clark et al. eds., Foundation Press 2002); Holly Doremus, *Listing Decisions Under the Endangered Species Act: Why Better Science Isn't Always*

The popular press also captures the contentiousness of these issues in conflicts that often lead to quasi-judicial or judicial challenges.⁹ This article argues that these issues collectively constitute an underlying legal problem in dealing with increased scientific capacity and that, by recognizing the common underlying sources of these conflicts, the clarity of the institutional environment for managing endangered species may improve.

Although the manifestations of increased scientific capacity, their associated legal problems, and the conflicts that they give rise to seem somewhat independent, they all raise the same issues: concerns about the application, both inordinately lax and rigorous, of the ESA and its constitutional judicial review. There seems to be an emerging concern that the ESA is currently used to protect species that are scientifically different from the species that were originally listed. To the extent that such concerns are based in fact, the ESA acts as a poorly rationalized instrument to achieve other goals, such as the preservation of important lands. Furthermore, if future advances in the laboratory lead to increased species viability, then disputes involving delisting, captive breeding programs, and reintroduction are likely to increase in frequency and intensity. Strategic issues affecting policy are equally critical. Scientific breakthroughs create new opportunities for disputing parties to advance their interests in quasi-judicial and judicial processes. These strategic opportunities may arise by applying or by challenging increased scientific capacity to alter existing property rights allocations. Taken together, these concerns indicate that increased scientific capacity raises questions about the coherence of endangered species management. This, in turn, threatens to undercut popular support for the ESA.

Better Policy, 75 WASH. U. L.Q. 1029, 1130 (1997); Holly Doremus & Joel E. Pagel, *Why Listing May be Forever: Perspectives on Delisting Under the U.S. Endangered Species Act*, 15 Conservation Biology No. 5 Oct. 2001, at 1258; Philip Kline, Comment, *Grizzly Bear Blues: A Case Study of the Endangered Species Act's Delisting Process and Recovery Plan Requirements*, 31 ENVTL. L. 371, 371-73 (2001).

6. See, e.g., Lewallen & Brooks, *supra* note 4, at 732; Kline, *supra* note 5, at 371.

7. See, e.g., NAGLE & RUHL, *supra* note 5, at 125-29 (discussing the controversial captive breeding program for the California condor).

8. DALE D. GOBLE & ERIC T. FREYFOGLE, WILDLIFE LAW 1275-86 (Foundation Press, 2002).

9. See generally Pauline Arrillaga, *Efforts to Return Wolves and Other Imperiled Species to the Wild Face Setbacks from Man to Animal*, THE ASSOCIATED PRESS WIRE, Sept. 14, 2002; Mark Derr, *Crossbreeding to Save Species and Create New Ones*, N.Y. TIMES, July 9, 2002, at F3; *Landowners, State Officials at Odds Over Squirrels and Development*, THE ASSOCIATED PRESS WIRE, Oct. 29, 2001; *Squirrels: Wildlife Agencies, Builders Clash Over Protections*, Greenwire, Oct. 31, 2001.

A. *The Application—Red Wolf Reintroduction*

The reintroduction of the North American red wolf (*Canis rufus*) in North Carolina is a leading ESA conflict, which has become well known for the “significant”¹⁰ legal decisions related to *Gibbs*.¹¹ *Gibbs* involved a commerce clause challenge that came shortly after the U.S. Supreme Court “signaled a possible return to the more confined reading of”¹² the clause with decisions in *United States v. Lopez*¹³ and *Morrison v. United States*.¹⁴ It was suggested that the ESAs basis in the “expansive reading”¹⁵ of the commerce clause might be in jeopardy.¹⁶ Nevertheless, the Appellate Court opinion in *Gibbs* has been judged “properly determined”¹⁷ and has seemed to interpret *Morrison* as “rejecting further expansion of Commerce Clause powers rather than as cutting into the currently accepted reach of those powers.”¹⁸ *Gibbs* also demonstrates that the ESAs taking provision can survive a constitutional test after *Lopez*.¹⁹ *Gibbs* “falls in line with previous court rulings”²⁰ and solidifies the “connections between endangered species and commerce.”²¹ This article reviews the importance of *Gibbs* in terms of the many issues it raises with respect to increased scientific capacity.²²

The main conclusions from the analysis of the red wolf conflict are, first, that the quasi-judicial process is well positioned to handle increased scientific capacity because of its flexibility in establishing and refining rules. This reinforces previous findings of quasi-judicial flexibility in the application of the ESA.²³ Second, although quasi-judicial and judicial processes suffer flaws in the

10. Edward A. Fitzgerald, *Seeing Red: Gibbs v. Babbitt*, 13 VILL. ENVTL. L.J. 1, 2 (2002).

11. *Gibbs v. Babbitt*, 214 F.3d 483, 506 (4th Cir. 2000).

12. Walter Partain, Note, *Morrison Overcome: Protecting Red Wolves and the Administrative State*, 11 B.U. PUB. INT. L.J. 277, 278 (2002).

13. *United States v. Lopez*, 514 U.S. 549, 567 (1995).

14. *See Morrison v. United States*, 529 U.S. 598, 627 (2000).

15. Partain, *supra* note 12, at 278.

16. *See* David A. Linehan, Note, *Endangered Regulation: Why the Commerce Clause May No Longer Be Suitable Habitat for Endangered Species and Wetlands Regulation*, 2 TEX. REV. L. & POL. 365, 365 (1998).

17. Fitzgerald, *supra* note 10, at 3.

18. Partain, *supra* note 12, at 278.

19. Dave Owen, Note, *Gibbs v. Babbitt*, 28 ECOLOGY L.Q. 377, 378-79 (2001).

20. Mary Frances Patrick, *Recent Developments in Case Law: Destroying the Myth of the Big, Bad Wolf: Red Wolf Protection in Gibbs v. Babbitt*, 9 S.C. ENVTL. L.J. 253, 261 (2002).

21. Owen, *supra* note 19.

22. *See generally Gibbs v. Babbitt*, 531 U.S. 1145 (2001).

23. GOBLE & FREYFOGLE, *supra* note 8, at 1182 (pointing out that quasi-judicial flexibil-

face of increased scientific capacity, no other resolution process is positioned to produce superior outcomes. This conclusion is derived from the analysis of legislative and market processes that preceded quasi-judicial and judicial resolution. Indeed, the combined but imperfect ability of quasi-judicial and judicial bodies to process disputes may be an appropriate alternative, or even superior to the legislative solution, which is to revamp the ESA. Hence, the comparative institutional analysis presented in this article arrives at substantially the same conclusion as Holly Doremus' argument about the species definition problem: this problem does not necessitate better science or even a congressional correction of the "taxonomic 'science charade'."²⁴ The choices at stake go beyond science.²⁵ Doremus believes that Congress could offer further listing guidance in light of species-definition problems and rely on agencies to develop and implement rules objectively.²⁶ Alternatively, Doremus offers suggestions for agencies to solve the constraints of the "strictly science mandate" themselves.²⁷ Thus, this article's result about quasi-judicial ability to process conflicts with increased scientific capacity accords well with previous scholarship. The primary policy implication is that until Congress amends the ESA to reflect increased scientific capacity, quasi-judicial resolution is imperfect, but flexible, and therefore will produce the most procedurally fair and substantively efficient resolution.

ity arises from ESA species definitions, which allow for subspecies and distinct population segments and arguing that quasi-judicial flexibility in making listing decisions may open the agencies up to political pressures and give them the freedom to avoid the most controversial listings).

24. Doremus, *supra* note 5, at 1132-34 (speculating that the flexibility of quasi-judicial species definitions will be sacrificed as science increasingly applies "DNA comparisons to delineate groups").

25. *Id.* at 1134 (stating

The identification of groups eligible for protection is simply not a scientific exercise. No universal basis exists for evaluating the extent to which any group of organisms embodies the full range of values the ESA protects. Although many scientists and environmentalists would prefer not to have to face these difficult choices, they cannot be avoided. It is plainly impossible to preserve every individual creature, or even every identifiable group. Much as we might prefer to avoid them, choices will inevitably be made, and they cannot be made on the objective basis envisioned by advocates of "better" scientific distinctions).

26. *Id.* at 1135.

27. *Id.* at 1138.

B. *The Structure of the Inquiry*

In the second section, the legal and policy problems associated with increased scientific capacity are circumscribed through a review of legal scholarship on related issues, select scientific evidence, and reference to illustrative conflicts. Section three describes the comparative institutional analysis method developed by Neil K. Komesar²⁸ and adapted to the analysis of individual conflicts by Joshua M. Duke.²⁹ Sections four to six present the analysis of the historical progression of the red wolf conflict. The analytical results are suggestive of the relative performance of all the resolution processes in the presence of increased scientific capacity. Finally, section seven suggests possible conclusions that can be drawn and policy implications associated with those conclusions.

II. LAW, POLICY, AND INCREASED SCIENTIFIC CAPACITY

Complications associated with increased scientific capacity have mainly arisen from advancements in genetic research, which provide more precise descriptions of species, in addition to other scientific advances, which provide improved abilities to preserve life. Increased scientific capacity has also enhanced the identification of hybrids and captive breeding technologies. Although the ESA requires that listing decisions be made using scientific information,³⁰ John Copeland Nagle and J.B. Ruhl described the listing process as being less certain than might be implied by the language in the ESA.³¹ Nagle and Ruhl also note that the ESA does not require the government or anyone else to conduct research in making listing decisions, and thus “scientific uncertainty regarding the status of a species”³² pervades the process.

This section reviews the effects of increased scientific capacity on species definition (with concomitant listing/delisting debates), identification of hybrids, and captive breeding (with reintroduction). Legal scholarship, scientific, and popular sources raise key scientific and policy debates. The main synthetic result of this review is that increased scientific capacity complicates the admini-

28. See generally KOMESAR, *supra* note 1.

29. See generally DUKE, *supra* note 1.

30. 16 U.S.C. § 1533 (b)(1)(A) (2000).

31. NAGLE & RUHL, *supra* note 5, at 137 (stating “The quality of the scientific evidence supporting ESA listing decisions has been controversial in recent years.”).

32. *Id.* at 137-38 (noting that a cooperative policy, not a rule, adopted in 1994 by the Fish and Wildlife Service and the National Marine Fisheries Service provide scientific peer review for listing decisions).

stration and judicial review of the ESA with *increasing* frequency. A second result is that, in each instance, Congress and the courts have relied on the flexibility of the quasi-judicial process to determine precise conflict outcomes.

A. *Species Definitions, Listing, and Delisting*

The definition of species in the ESA differs from some other definitions³³ in that it includes subspecies and distinct population segments.³⁴ The ESA does not define the term “species” itself.³⁵ The ESA also lacks a specific definition for subspecies,³⁶ which, coupled with the option of creating distinct population segments, has made species-listings decisions especially controversial.³⁷ For instance, the grizzly bear has several separate “species” listings for various distinct population segments.³⁸

Distinct population segments have been a popular vehicle for offering enhanced protection for species, as well as defining one dimension of the scientific and policy debate for landowners seeking to argue against certain protections.³⁹ Lack of definitional specificity has also provided an opportunity for landowners to challenge the application of the ESA.⁴⁰ In practice, the classification process of endangered species has been characterized as ambiguous and simplistic.⁴¹ Congress intended to delegate authority to list subspecies, although it has been argued that congressional intent did not include the observed level of “administrative agency creativity in defining ‘sub-subspecies’.”⁴² The listing of sub-subspecies has been especially contentious with respect to the various list-

33. Kline, *supra* note 5, at 380.

34. 16 U.S.C. § 1532(16) (1994) (stating “The term ‘species’ includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature . . .”).

35. See NAGLE & RUHL, *supra* note 5, at 126.

36. *Id.* at 127.

37. Lewallen & Brooks, *supra* note 4, at 741.

38. Kline, *supra* note 5, at 380.

39. GOBLE & FREYFOGLE, *supra* note 8, at 1182 (suggesting factors for determining a distinct population segment as published in the Federal Register, but not acting as a regulation).

40. NAGLE & RUHL, *supra* note 5, at 126-27 (noting several examples of such challenges, including the red-bellied turtle and the Arizona leatherflower, and have noted as a possibility that a species may even be removed from the list based on new evidence of whether or not it is a distinct species).

41. Kevin D. Hill, *What Do We Mean by Species?*, 20 B.C. ENVTL. AFF. L. REV. 239, 257 (1993).

42. Lewallen & Brooks, *supra* note 4, at 732.

ings of salmon.⁴³ A recent U.S. District Court decision has limited the National Marine Fisheries Service's ability to create sub-species of salmon,⁴⁴ and the decision may have implications for other listed species.⁴⁵ In this case, as in others, judicial review allows courts to temper and reshape some quasi-judicial decisions. Nevertheless, the imprecision with which definitions are given to species, subspecies, and distinct population segments also signals congressional reliance on quasi-judicial flexibility.

If increased scientific capacity has improved the application of the ESA, then one might expect the ability to delist would arise. Delisting requires the satisfaction of at least one of three prerequisites: (1) extinction, (2) recovery, or (3) original data for classification in error.⁴⁶ There is a political push for delisting a recovered species because it shows that the ESA works.⁴⁷ Nevertheless, listings vastly outnumber delistings,⁴⁸ partly because delisting is as contentious for environmental interests as listing is for landowners. Delisting requires a recovery plan that resolves the issues leading to the listing decision. Holly Doremus and Joel E. Pagel, however, argue that for many species, the ESA provides the species' only protection, and delisting would likely require affirmative protection from another set of regulations.⁴⁹ Since many of the same human activities that fostered initial degradation continue, ongoing management activities are typically necessary to prevent extinction.⁵⁰

In the extreme, genetic advances may allow for cloning of extinct or near-extinct animals and then reintroducing them to their historic habitat or even new habitats. Scientific efforts and academic debates have already begun to address the possibility of cloning endangered species.⁵¹ Nagel and Ruhl question whether federal criteria used to justify captive breeding could also be used to justify cloning.⁵² Certainly, quasi-judicial bodies responsible for ESA implementation have few guidelines to direct their decision making in the event that clon-

43. *See id.* at 731.

44. *See* Alcea Valley Alliance v. Evans, 161 F. Supp. 2d 1154, 1163-64 (D. Or. 2001).

45. *See* Lewallen & Brooks, *supra* note 4, at 732.

46. 50 C.F.R. § 424.11(d) (2003).

47. Doremus & Pagel, *supra* note 5, at 1259.

48. *Id.* at 1260.

49. *Id.* at 1259.

50. *See* Holly Doremus, *The Rhetoric and Reality of Nature Protection: Toward a New Discourse*, 57 WASH. & LEE L. REV. 11, 56 (2000) (discussing that "Ongoing management efforts are often necessary to compensate for the effect of past actions, or current actions outside the designated reserves.").

51. *See* NAGLE & RUHL, *supra* note 5, at 67.

52. *Id.*

ing conflicts emerge. Moreover, it is likely that if cloning of endangered species is realized, then the first rights assignments will occur at quasi-judicial bodies under ESA authority with no clear mandate or direction from Congress.

B. *Identification of Hybrids*

Hybridization in the laboratory or in the barn often improves the viability of a species by increasing genetic diversity. Yet, natural and controlled hybridization of endangered species tends to corrupt the species distinction that led to the initial listing. As such, the ESAs rules on hybrids have been called “an especially acute definitional problem.”⁵³ Genetic advances verify that hybridization of some endangered species is occurring or has occurred, which raises questions about the integrity of the species that is listed and whether landowners should remain constrained after hybridization has been demonstrated.

Increased scientific capacity has allowed DNA testing for hybridization within species that show no outward signs of mixing. For instance, a recent genomic study has verified that many bison have bison-cow hybrid ancestries.⁵⁴ This hybridization occurred long before the scientifically managed reintroduction; scientists suggest that hybrid bison may have descended from the actions of five private ranchers who crossbred the bison with cattle about one-hundred years ago.⁵⁵ Bison numbers have recovered from under 1,000 in 1900 to between 200,000⁵⁶ and 300,000 now.⁵⁷ Yet, new research has shown that, genetically, perhaps as few as 15,000 are pure bison.⁵⁸ Issues concerning the genetic purity of a species threatened with extinction, therefore, pre-date modern genetics and the ESA.

Hybridization now involves more than species corruption. Scientific capacities raise the possibility that hybridization can be used to inject new genes into threatened species to increase their fitness or numbers.⁵⁹ The first species for which laboratory hybridization prevented extinction was the endangered Florida

53. *Id.* at 126.

54. See T.J. Ward et al., *Differential Introgression of Uniparentally Inherited Markers in Bison Populations with Hybrid Ancestries*, *Animal Genetics* 32(2), 89-91 (2001).

55. Mark Derr, *Genetically, Bison Don't Measure up to Frontier Ancestors*, N.Y. TIMES, Apr. 23, 2002, at F2.

56. Ward et al., *supra* note 54, at 89.

57. Mark Derr, *supra* note 55, at F2.

58. *Id.*

59. See Mark Derr, *Crossbreeding to Save Species and Create New Ones*, N.Y. TIMES, July 9, 2002, at F3.

panther, which was bred with a Texas cougar in the 1990s.⁶⁰ Some members of the panther population have also been found to be hybrids of Costa Rican pumas released decades ago.⁶¹

The red wolf is a leading example of the hybridization (gray wolf and coyote)⁶² of an ESA protected species and the regulatory complications it creates. The scientists who found evidence of the hybridization of the Florida panther have also cited evidence of red wolf hybridization and have argued that hybrids and hybrid zones should be better reflected in conservation legislation.⁶³ Some support the call for refined legislation,⁶⁴ but others question the scientific basis of the wolf hybridization claim.⁶⁵ Stephen J. O'Brien and Ernst Mayr argue that hybridization has caused "anxiety generated in the scientific-conservation community over the enforcement of the U.S. Fish and Wildlife Service's 'hybrid policy,' which excludes 'hybrids' from protection."⁶⁶ The ability of quasi-judicial bodies to creatively interpret hybridization issues will likely be increasingly challenged as scientific capacity continues to expand.

C. *Captive Breeding and Reintroduction*

Increased scientific capacity improves the ability to preserve and enhance species numbers through captive breeding, though captive breeding also may somewhat alter ESA intent and scope vis-à-vis habitat because of reintroduction. Captive breeding and reintroduction were explicitly authorized by ESA amendments in 1978 and 1982. However, recent reintroductions have extended the ESA into habitats for which neighboring landowners had no reason to expect constraints when the amendments were passed. Given the pace of genetic research, the possibility of cloning and then reintroducing an endangered species may soon become a real issue.

Captive breeding programs are by no means automatically employed for every species. They may be authorized by satisfying certain criteria, such as the

60. *See id.*

61. *Id.*

62. Partain, *supra* note 12, at 280.

63. S.J. O'Brien et al., *Genetic Introgression within the Florida Panther Felis Concolor Coryi*, 6 Nat'l Geographic Research 485 (1990).

64. George D. Amato, *Species Hybridization and Protection of Endangered Animals*, 253 SCIENCE 250, 250 (1991).

65. Ronald M. Nowak, *Species Hybridization and Protection of Endangered Animals*, 253 SCIENCE 250, 250-51 (1991).

66. Stephen J. O'Brien & Ernst Mayr, *Species Hybridization and Protection of Endangered Animals*, 253 SCIENCE 251, 252-53 (1991).

inadequacy of efforts to save a species in the wild.⁶⁷ Captive breeding was initially circumscribed by the 1978 Amendments to the ESA, which introduced “recovery planning.” This provision required the appropriate Secretary to “develop and implement plans . . . for the conservation and survival of endangered species and threatened species”⁶⁸ and allowed him or her to “procure the services of appropriate public and private agencies and institutions, and other qualified persons.”⁶⁹ Congress authorized the funding of “recovery teams” to help implement the recovery plans. The lack of a definition for “recovery” has been noted,⁷⁰ and this imprecision again represents legislative deference to the quasi-judicial process, which is more flexible.

By itself, captive breeding insufficiently conserves endangered species. Doremus argues that “captive species, divorced from any natural ecosystem, have no ecological value.”⁷¹ Reintroduction, therefore, is affected, critically, by habitat conservation. Reintroduction relies on the spreading of extinction risks that would otherwise be borne by a geographically isolated species with limited numbers.⁷² Yet some landowners, concerned with the constraints that may be placed on their land, oppose reintroductions.⁷³ Reintroduction is probably so contentious from the landowners’ perspective because they have less reason to expect constraints than landowners would who had been living in the area of a species that may one day be listed. The contentiousness of reintroductions should increase with the length of time the population was absent from the targeted habitat because this period coincides with limited constraints of private land uses. During this unconstrained period, landowners have an opportunity to manifest reasonable investment-backed expectations and thus bolster future regulatory takings challenges.

To attenuate objections to reintroductions, Congress amended the ESA in 1982 to allow for “experimental populations.”⁷⁴ Experimental status, in part, allows the appropriate Secretary to classify the experimental population as non-essential and select which of the taking prohibitions would apply.⁷⁵ The conces-

67. NAGLE & RUHL, *supra* note 5, at 66.

68. 16 U.S.C. § 1533(f)(1) (2000).

69. *Id.* § 1533(f)(2).

70. GOBLE & FREYFOGLE, *supra* note 8, at 1264.

71. Holly Doremus, *Restoring Endangered Species: The Importance of Being Wild*, 23 HARV. ENVTL. L. REV. 1, 13 (1999).

72. GOBLE & FREYFOGLE, *supra* note 8, at 1275.

73. *Id.*

74. *Id.*

75. *Id.* at 1275-77 (discussing takings prohibitions and other aspects of experimental status).

sions to landowners afforded by experimental status have not averted legal conflicts. The red wolf conflict provides an example of landowners pursuing further legal protections of their interests, even after such concessions are offered. Some have argued that this set of procedures relies on quasi-judicial flexibility in managing reintroduced species,⁷⁶ but some also questioned the legal purity of the experimental designation if intermingling between reintroduced and wild populations occurs.⁷⁷

The nonessential-experimental designation is rarely used, and to date, only fourteen populations have been reintroduced.⁷⁸ The first population was the Delmarva fox squirrel,⁷⁹ which was reintroduced in 1984 to southern Delaware after fifty years of being extinct in the area.⁸⁰ Although the Delmarva fox squirrel in this area may only have numbered 150⁸¹ by 2001, an estimated forty-thousand acres of Sussex County, Delaware – 1/32 of the entire state – is affected by this quasi-judicial decision under ESA authority.⁸² The main obstacle to reintroduction in 1984 was seen to be accidental takings by hunters.⁸³ As such, an exemption allowed hunters to avoid the penalty of up to \$25,000 for accidental takings.⁸⁴ The main threat now, however, is from development. The period after reintroduction of the Delmarva fox squirrel has coincided with increasing residential growth in and around the area designated as habitat.⁸⁵ As a result, land-use and legal conflicts that may not have been foreseen in 1984 are now prevalent as a result of the reintroduction.

Wolves have been at the center of the reintroduction debate, with four of the populations reintroduced.⁸⁶ The Mexican gray wolf has been reintroduced into Arizona and New Mexico,⁸⁷ and the other reintroductions of the gray wolf in Montana, Idaho, and Wyoming have been so successful that delisting may soon occur.⁸⁸ Although reintroduction has been “essential” to recovery of the red

76. See Owen, *supra* note 19, at 380.

77. See GOBLE & FREYFOGLE, *supra* note 8, at 1284.

78. *Id.* at 1285.

79. *Id.*

80. *Landowners, State Officials at Odds Over Squirrels and Development, supra* note 9.

81. *Squirrels: Wildlife Agencies, Builders Clash Over Protections, supra* note 9.

82. See *Landowners, State Officials at Odds Over Squirrels and Development, supra* note 9.

83. See *id.*

84. *Id.*

85. See *Squirrels: Wildlife Agencies, Builders Clash Over Protections, supra* note 9.

86. See GOBLE & FREYFOGLE, *supra* note 8, at 1285.

87. Arrillaga, *supra* note 9.

88. *Id.*

wolf,⁸⁹ the red wolf reintroduction into North Carolina preceded the others and may be the most contentious. For instance, the red wolf reintroduction has affected private landowners more so than other wolf reintroductions, which tend to involve more ranchers on leased land.⁹⁰ The red wolf also was later reintroduced in Tennessee, but this effort was unsuccessful and the wolves were removed in 1998.⁹¹ Since the red wolf conflict embodies species definition, hybridization, captive breeding, and reintroduction issues, it is a useful illustration of how different resolution processes handle endangered species conflicts in the presence of increased scientific capacity.

III. THE COMPARATIVE INSTITUTIONAL ANALYSIS METHOD

Various forms of comparative institutional analysis have been developed, though all seem to recognize the insufficiency of judging the performance of conflict resolution in a single resolution process without comparing the performance relative to other processes. This article draws conclusions by analyzing data, which are systematically collected, across seven main processes of conflict resolution: markets, quasi-markets, legislatures, quasi-judicial bodies, judiciaries, alternative dispute resolution processes, and moral suasion.

Comparative institutional analysis requires the assessment of the performance of each resolution process in terms of its ability to achieve social goals relative to the performance of other processes. Social goals are typically dichotomized as fairness and efficiency.⁹² These goals are operationalized for this article. Fairness is taken to be a multidimensional ethical issue involving three main facets. First, freedom and rights capture an individual's ability to use property in his or her interest or to be protected from another's use of property. Second, equality demands that the opportunities and outcomes of conflict resolution not clearly be to the detriment of one party, this definition is similar to the substantive due process standard in judicial resolution. Third, justice requires that the benefits and burdens of policy do not fall unduly on one party. Collectively, the performance of resolution processes can be judged by how well their outcomes achieve fairness.

89. Partain, *supra* note 12, at 277.

90. *See id.*, at 289 (citing *Gibbs v. Babbitt*, 214 F.3d 483, 489 (4th Cir. 2000)) (stating that some red wolves have wandered off federal property onto private land).

91. *Id.* at 283.

92. KOMESAR, *supra* note 1, at 5.

The efficiency goal has been cast as resource allocation efficiency.⁹³ For judicial processes, this criterion means that judges and juries should balance social costs and benefits, or the “aggregate impacts” of judicial rulings.⁹⁴ Alternatively, this perspective has been formalized as allocating rights to those who value them the most.⁹⁵ Resolution processes, then, are judged by the degree to which their outcomes maximize the net social benefits available from scarce resources. In this article, the choice is reduced to the social value of land uses when wolves are afforded protection versus when they are not.

Komesar’s approach analyzes decision making at institutional processes by questioning what decides rather than what is decided.⁹⁶ In other words, comparative institutional analysis asks which resolution process is best positioned to resolve conflict. Since each decision-making body is imperfect, the analysis seeks to identify conditions under which certain resolution processes tend to minimize deficiencies.⁹⁷ Komesar also proposes analytical criteria for assessing institutional performance, which he terms the “participation-centered approach.”⁹⁸ The participation-centered approach evaluates the relative abilities of “important institutional actors common to all the” resolution processes to defend their interests, i.e., participate.⁹⁹ Numerous questions were assessed including how easy is it for parties to get their voices heard and are any parties systematically excluded from certain resolution processes? The costs of participation vary across resolution processes and, inequitable distributions of cost may suggest shortcomings in institutional performance. Komesar’s comparative institutional analysis has been previously adapted to many important legal questions. Komesar has used it to evaluate tort law, constitutional law, and judicial review.¹⁰⁰ Others have used these techniques to study the gun industry¹⁰¹ and cyberspace.¹⁰² Duke adapts comparative institutional analysis from macro-level legal issues to assess performance in individual land-use conflicts.

93. *Id.* at 14.

94. *Id.* at 15.

95. See R.H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 2 (1960).

96. KOMESAR, *supra* note 1, at 3.

97. See *id.* at 1.

98. *Id.* at 7.

99. *Id.*

100. See generally *id.*

101. See generally Timothy D. Lytton, Symposium, *Lawsuits Against the Gun Industry: A Comparative Institutional Analysis*, 32 CONN. L. REV. 1247 (2000).

102. See generally Susan Freiwald, *Comparative Institutional Analysis in Cyberspace: The Case of Intermediary Liability for Defamation*, 14 HARV. J.L. & TECH. 569 (2001).

Individual land-use conflicts are delimited spatially and are restricted in terms of the parties involved. Comparative institutional analysis works best by identifying two private parties competing for the use of a natural resource. Parties are defined as private individuals or collections of individuals who have shared interests. Each party may have many members. Governmental bodies and catalytic subgroups¹⁰³ may represent the interests of a given party during quasi-judicial and judicial stages of conflict and, although such representation lowers the costs of participation, the private parties' interests remain at stake. Defining parties in this way allows for the development of a parallel analytical structure for evaluating participation and thus the performance of resolution processes. In this conflict, the parties are labeled the "landowners" and the "environmentalists" for clarity.

The ability of parties to defend their interests may be evaluated by factors that increase or decrease the relative costs of participating in resolution processes, including the following criteria: (1) average per capita stakes; (2) information costs; (3) contracting costs; (4) enforcement costs; (5) organizational costs; (6) group cohesiveness; (7) sophistication; (8) wealth; and (9) number of members in each party. Duke offers the "environmental transactions" method as a systematic way to collect conflict data, which are commensurable. Environmental transactions occur each time a resolution process identifies conflict winners and losers.¹⁰⁴ As such, each resolution process assigns what might be termed "appellate rights" or "conditional rights."¹⁰⁵ If the conflict were to end after any resolution, then an environmental transaction has occurred if the winner would be the right holder and the loser would be the duty bearer. With parties identified, the analysis locates the origins of the conflict prior to activation of the environmental harm. For the red wolf conflict, this would be a historic period in North Carolina when the red wolf habitat was not scarce and, thus, the red wolf had no need to compete with humans for the use of this habitat.

The comparative institutional analysis will be presented in three sections. Section four reviews this conflict "background" and identifies the parties. Then, over time, a series of resolution processes acted to assign rights and duties as competition for the habitat increased. The environmental transaction method describes these resolution processes in section five. Each attempted resolution has its own issues and outcomes that can then be compared for its performance in

103. Neil K. Komesar, *A Job for the Judges: The Judiciary and the Constitution in a Massive and Complex Society*, 86 MICH. L. REV. 657, 674-75 (1988).

104. Duke, *supra* note 1, at 57-76.

105. *Id.* at 16.

resolving the conflict. Section six applies the participation-centered approach to assess the performance of the two most important resolution processes: quasi-judicial and judicial.

IV. BACKGROUND—*GIBBS*

In contrast to the Commerce Clause aspects of *Gibbs* – which had generated notoriety for the case – this article evaluates the performance of the resolution processes that resolved the conflict from its origins until the judicial processing. Identification of the key characteristics that explain why the conflict giving rise to *Gibbs* persisted until the denial of certiorari at the Supreme Court is of particular interest. These characteristics distinguish *Gibbs* from other environmental conflicts, many of which never mature past the most rudimentary legislative or regulatory decisions.

The systematic review of the history begins by locating the underlying conflict in an ecological context. This historical perspective clarifies the private parties to the conflict and their interests. Indeed, each dispute originates as a conflict of interest in which the underlying issue is which party will bear the external cost of the other party's preferred use of land? This background section reviews the ecological setting, the parties and their interests, and concludes with a formal classification of Hohfeldian¹⁰⁶ correlates.

A. *The Red Wolf and its Habitat*

The conflict arose from a series of interactions between humans and the natural habitat in North Carolina long before the litigants came into conflict with one another. The red wolf reintroduction occurred in and around what is now known as the Alligator River National Wildlife Refuge (“ARNWR”) in eastern North Carolina, which was thought to be part of the wolves' former habitat.¹⁰⁷ The area was apparently settled during the eighteenth century,¹⁰⁸ though the land's abundance of lowland marshes and swamps may initially have been perceived to be unsuitable for agriculture. The soils in the coastal regions of North Carolina were eventually found to be richer than inland soils in addition to being

106. See generally WESLEY NEWCOMB HOHFELD, *FUNDAMENTAL LEGAL CONCEPTIONS AS APPLIED IN JUDICIAL REASONING* (Walter Wheeler Cook ed., 1964) (1919).

107. *Gibbs v. Babbitt*, 214 F.3d 483, 488 (4th Cir. 2000).

108. ROD HACKNEY, *FIELD TRIP EARTH, A TOUR OF THE ALLIGATOR RIVER 1* (2001) at <http://www.fieldtripearth.org/article.xml?id=696> (last visited Mar. 11, 2004).

well-stocked with fish and timber.¹⁰⁹ Plantation agriculture of crops, including tobacco, and livestock dominated the land uses in these years.¹¹⁰ Crop land uses, however, continually depleted the soils and forced farmers to clear more land.¹¹¹ The forest reclaimed abandoned fields from the initial agricultural land uses.¹¹²

The accepted mindset of this era favored predator eradication,¹¹³ which undoubtedly included the red wolves. Although domestic pets and livestock are not common prey for red wolves,¹¹⁴ conflicts between agricultural and natural land uses probably intensified over time and thereby reinforced anti-predator practices. Predator control programs assisted with eradication.¹¹⁵ This included wolf bounties awarded in North Carolina between 1768 and 1789.¹¹⁶ Systematic eradication probably pushed the remaining wolves to the most remote areas before they were completely eliminated from the region.

The timber industry in coastal North Carolina expanded after the Civil War.¹¹⁷ Timber was harvested from oak, pine, hickory, cypress, and Atlantic white cedar.¹¹⁸ Over harvesting of cedar significantly altered the balance of the ecosystem and caused the marshes and swamps in the area to expand.¹¹⁹ Railroads were built to accommodate the logging industry, and an accompanying population boom lasted from the early 1900s until the 1950s.¹²⁰ Despite the lack of sustainable land uses in this area, the progression of human interactions with red wolves' habitat led to continual degradation and encroachment.

B. *Toward Extinction and Recovery: Red Wolf Numbers*

The red wolf was first described in 1791 and first recognized as a distinct species in 1905.¹²¹ Yet, it is unclear when wolves disappeared from North Carolina. The red wolves' historic range is considered to be the southern areas of the

109. *See id.*

110. *See id.*

111. *See id.*

112. *See id.*

113. *See* U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, ENDANGERED RED WOLVES 2 (1997).

114. *See id.*

115. *See id.*

116. *See id.* at 4.

117. *See* HACKNEY, *supra* note 108, at 1.

118. *See id.*

119. *See id.*

120. *See id.*

121. U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 7.

United States, from Pennsylvania southwesterly to Texas.¹²² However, by the 1930s, the two remaining populations of red wolves were in Arkansas, Oklahoma, and Missouri, and southern Louisiana and Texas.¹²³ In 1962, the possibility of extinction was recognized by scientists.¹²⁴ Federal predator control programs in Texas, where many of the last red wolves lived, were stopped in 1966.¹²⁵ As their numbers diminished, coyotes increasingly encroached on the red wolves' habitat.¹²⁶ The origins of the hybridization issues may have arisen after this encroachment as red wolves that had difficulties finding mates bred with coyotes.¹²⁷

Captive breeding was initiated in 1969 when the first wolf was placed in the Point Defiance Zoo in Washington State.¹²⁸ The formal captive breeding program began to remove the remaining red wolves in 1973.¹²⁹ Although more than four hundred wolves were captured, only forty were judged to be genetically pure.¹³⁰ Most of the captured hybrids were destroyed.¹³¹ In 1980, the last fourteen red wolves, residing in Texas and Louisiana, were removed from the wild.¹³² By one report, of the forty genetically pure wolves placed at the Point Defiance Zoo for breeding, only fourteen successfully bred but these produced 220 offspring.¹³³ Of these, one third were destroyed as hybrids and one third died naturally.¹³⁴ The population numbered seventy-five in 1987.¹³⁵ The number of captive-breeding centers increased and reached thirty-five separate facilities by 1997.¹³⁶

122. See *id.* at 4.

123. Linda M. Rancourt, *Red Wolf Redux: Thanks to a Captive Breeding Program, the Red Wolf Population Has Grown from 17 to 300 Animals*, 71 NAT'L PARKS 47 (1997).

124. See U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 4.

125. Jeffrey P. Cohn, *Red Wolf in the Wilderness*, 37 BIOSCIENCE 313, 314-315 (1987).

126. See U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 4.

127. See *id.* at 5.

128. See *id.* at 7.

129. See Rancourt, *supra* note 123, at 47.

130. See Cohn, *supra* note 125, at 314; but see Rancourt, *supra* note 123, at 47 (putting this number at seventeen rather than forty).

131. Cohn, *supra* note 125, at 314.

132. Patrick, *supra* note 20, at 254 (stating that the last fourteen wolves were removed from the wild in 1980).

133. Cohn, *supra* note 125, at 314-15.

134. *Id.* at 315.

135. *Id.*

136. See U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 5.

Forty-two wolves were reintroduced in the ARNWR area between 1987 and 1992.¹³⁷ ARNWR is located on a peninsula and is an ideal habitat for the wolves, in part, because it is bordered by water and non-livestock agricultural operations.¹³⁸ At least seventy percent of reintroduced wolves were quickly recaptured and returned to captivity.¹³⁹ A second reintroduction in Tennessee was started in 1993,¹⁴⁰ but this was abandoned.¹⁴¹ Throughout the 1990s, private agreements and acquisitions provided additional lands in the vicinity of ARNWR for wolf habitat.¹⁴² These new lands provided a critical mass of habitat for the wolves, but suffered in that they brought the wolves into the proximity of private land and homes.¹⁴³ By 1998, forty-one wolves were located on private land and thirty-four were in the ARNWR.¹⁴⁴ It was estimated that, by 2000, ninety-five red wolves existed in the wild and 136 in captivity.¹⁴⁵ Coyotes continue to be a significant threat to the red wolves since they share habitat, food, and mating.¹⁴⁶ The FWS sterilized coyotes in the area.¹⁴⁷

The reintroduction of captive-bred wolves marked a turning point in the red wolf's recovery. Two main challenges faced the FWS. The scientific challenge required the FWS to manage, biologically, the red wolves and alter land-use patterns to promote a sustainable population. The policy challenge involved making the necessary land-use patterns as palatable as possible to the local population. With the increased flexibility provided by the 1982 ESA amendments, biologists and environmentalists hoped to be able to dispel swiftly any public opposition to reintroduction.¹⁴⁸ Landowner cooperation was sought through the experimental designation, yet the success of the red wolf reintroduction depended upon minimizing wolf-human interactions.¹⁴⁹ To this end, the FWS worked quickly to remove problem wolves, including those who tolerated human interac-

137. Gibbs v. Babbitt, 214 F.3d 483, 488 (4th Cir. 2000).

138. John Manuel, *Red Wolf Showdown: The Release Program in North Carolina is in Trouble*, 97 AUDUBON 22 (Mar./Apr. 1995).

139. Patrick, *supra* note 20, at 254.

140. Gibbs, 214 F.3d at 488.

141. Gibbs v. Babbitt, 31 F. Supp. 2d 531, 534 (E.D.N.C. 1998).

142. Manuel, *supra* note 138, at 22.

143. *Id.*

144. Gibbs, 214 F.3d at 488 (4th Cir. 2000).

145. Patrick, *supra* note 20, at 254.

146. *Id.* at 262.

147. *Id.*

148. JENNIFER GILBREATH, U.S. FISH & WILDLIFE SERV., *A Bright Decade for the Red Wolf*, 23 ENDANGERED SPECIES BULLETIN 18, 18 (1998).

149. *Id.*

tion or attacked livestock.¹⁵⁰ When interactions did occur, however, the experimental designation offered landowners “increased flexibility in wolf management” including attenuation of the taking prohibitions.¹⁵¹

C. *The Landowners Party and Participation Costs*

North Carolina landowners in Dare, Washington, Tyrell, Hyde, and Beaufort Counties,¹⁵² all near the ARNWR, bore many of the costs of the initial reintroduction and eventual roaming of the red wolves onto private land. These costs include direct risks, however unlikely,¹⁵³ to livestock, pets, and humans, in addition to indirect burdens, such as the limitation on land uses associated with the accommodation of the reintroduced red wolves. Prior to reintroduction, landowners did not need to account for the red wolves in making land-use or land-management decisions.¹⁵⁴ Landowners could not be reasonably expected to anticipate the changes to neighboring lands, which occurred in the 1980s, including the designation of federal wildlife refuges or the reintroduction plan.¹⁵⁵ Therefore, it is not surprising that landowners tended to pursue land uses which were somewhat incompatible with a natural environment.¹⁵⁶ Unconstrained, these land-uses would neither guarantee a sustainable wolf population, nor would they tolerate wolves that inadvertently wandered off their protected lands and onto private land.¹⁵⁷ Despite this lack of accommodation, landowners tended to pursue rural and agricultural land uses prior to reintroduction that revealed a lower relative scarcity of land than one would find in many exurban and more-productive agriculture areas.¹⁵⁸ From an efficiency perspective, therefore, the social opportunity cost of reintroduction may have been comparatively low in the ARNWR region.¹⁵⁹ Equity, however, requires that those who bear the social costs of reintroduction also share, substantively, in the social benefits.¹⁶⁰

150. *Id.*

151. *Id.*

152. *Gibbs v. Babbitt*, 31 F. Supp. 2d 531, 533 (E.D.N.C. 1998).

153. U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 5.

154. *See* FIELD TRIP EARTH, OVERCOMING OBSTACLES TO RED WOLF RECOVERY 1, at <http://www.fieldtripearth.org/article.xml?id=686> (last visited Mar. 11, 2004).

155. *See id.*

156. *See id.*

157. *See id.*

158. *See* Cohn, *supra* note 125, at 315.

159. *See* U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 8.

160. *See id.*

The affected landowners included homeowners and farmers.¹⁶¹ County and state officials represented the interests of these owners.¹⁶² Farmers contended that the red wolf posed a threat to their livestock and would cause undue losses through depredation.¹⁶³ Richard Lee Mann, whose shooting in 1990 of a wolf threatening his cattle precipitated the judicial resolution of this conflict, is included in this group.¹⁶⁴ Homeowners living within the counties believed that their safety was threatened outdoors and, with free-roaming predators in the vicinity, they also bore psychic costs. It must be stressed that not all landowners share the concerns of the “landowner” party.¹⁶⁵ Although anti-wolf fears have persisted among landowners, many landowners also supported reintroduction.¹⁶⁶ For instance, a survey in eleven eastern North Carolina counties found that a large majority of residents believe that the reintroduction program is “important” and would be willing to contribute money to support it.¹⁶⁷ Landowners also derive direct benefits from wolves, which control deer, raccoon, and rodent populations.¹⁶⁸

The landowners’ party is primarily characterized by a small group of high per-capita stakes residents in the five surrounding counties of ARNWR. The region is not heavily populated. Residents in these counties account for only 1.2% of the population of North Carolina, and Hyde and Tyrrell Counties are the two least densely populated counties in the State.¹⁶⁹ The first wolves reintroduced were estimated to affect approximately 1400 people living in Dare County.¹⁷⁰ These residents also tend to be less wealthy than in other areas of North Carolina.¹⁷¹

161. See *Gibbs v. Babbitt*, 214 F.3d 483, 489 (4th Cir. 2000).

162. See *id.*

163. See *id.* at 495.

164. *Id.* at 489.

165. See GILBREATH, *supra* note 148, at 20.

166. See *id.*

167. See *id.*

168. See *id.* at 18-19.

169. U.S. CENSUS BUREAU, U.S. DEP’T OF COMMERCE, POPULATION & HOUSING UNITS, AREA, AND DENSITY: 2000 (2000), available at <http://factfinder.census.gov> (stating the population of the five nearest counties is: Beaufort (44,958), Dare (29,967), Washington (13,723), Hyde (5,826), and Tyrrell (4,149). The State population density averages 165.2 people per square mile. The density of the counties at issue is much less than the mean: Dare (78.1), Beaufort (54.3), Washington (39.4), Tyrrell (10.6), and Hyde (9.5)).

170. Cohn, *supra* note 125, at 315.

171. U.S. CENSUS BUREAU, U.S. DEP’T OF COMMERCE, PROFILE OF SELECTED ECONOMIC CHARACTERISTICS (2000), available at <http://factfinder.census.gov>. (noting the median household income in four of the counties is below the State median income of \$39,184, including Tyrrell

After the conflict reached national prominence, catalytic subgroups such as the Pacific Legal Foundation joined local governments in supporting the interests of the North Carolina landowners. The state governments also represented the landowner party in the judicial resolutions because the legal issue centered on a state statute. This representation provides the landowner party with a high level of sophistication and resources, which are necessary to pursue, aggressively, their claims in legislative and judicial resolution. Nevertheless, because of the higher variance in their per capita stakes, the landowners may be less cohesive as a group than the environmental party, which had nearly perfect uniform low per capita stakes. Due to collective-action problems and varying stakes, inter-county and intra-county organizational costs are likely to be high. These groups also used moral suasion¹⁷² to overcome some of the organizational costs, mainly by communicating human safety and livestock-depredation fears through newspapers.¹⁷³ The response of local and state representatives to the reintroduction seemed to correspond with these concerns initially made using moral suasion. A small subset of the landowners also absorbed resolution costs such as fines and initial litigation costs. Catalytic subgroups and the State of North Carolina, however, likely absorbed the litigation costs from the main judicial transactions.

D. *The Environmentalist Party and Participation Costs*

Members of the local and broader communities who have an interest in reintroducing the red wolf to this area represent the opposing side of the conflict. This group is termed “environmentalists,” even though many would not think of themselves as such. The environmentalist party has two separate factions: those who derive use values from the reintroduction and those who derive non-use values.

Local environmentalists in the ARNWR area and other members of the community may derive use values from seeking out and viewing wolves, or they hold pecuniary interests from supplying tourist opportunities. Among the

(\$25,684), Hyde (\$28,444), Washington (\$28,865), Beaufort (\$31,066), and Dare (\$42,411)).

172. BARRY C. FIELD, ENVIRONMENTAL ECONOMICS: AN INTRODUCTION, 204-06 (Lucille H. Sutton & Ira C. Roberts eds. 1997) (defining moral suasion as “[p]rograms of persuasion that appeal to a person’s sense of moral values or civic duty.” In the red wolf case, landowners strategically advertised against the reintroduction of the red wolf through information that communicated the threats of the Recovery Plan).

173. See, e.g., Taft Wirebac, *Red Wolf Snared in Controversy; Once Near Extinction*, NEWS & RECORD, March 5, 1995, at B1 (describing some frightening accounts of interactions between the reintroduced wolves and residents).

broader communities, eco-tourists enjoy augmented use of the conserved resources. Scientists also value the red wolf reintroduction for the scientific data it produces. The court in *Gibbs* cited four market-based activities—equivalent to “use values”—that warrant the application of the commerce clause: (1) promoting tourism;¹⁷⁴ (2) scientific research;¹⁷⁵ (3) possible resumption of the trade in fur pelts;¹⁷⁶ and (4) agricultural products and livestock.¹⁷⁷ The *Gibbs* Court noted an unpublished study that claims tourism revenues associated with the red wolf reintroduction could range from \$39,610,000 to \$183,650,000 per year.¹⁷⁸ Although members of the environmentalist party holding use values have higher per capita stakes than the non-use-value members, they may have a less important voice in quasi-judicial and judicial resolution processes because these processes tend to be dominated by the catalytic subgroups representing the low average-per-capita stake members.

The largest group in this party includes the broader environmentalist community, whose members hold non-use values for the wolves. Their non-use values arise from an intrinsic appreciation of the wolves’ and the habitat on public and private lands that results from the restrictions on land use required to protect the wolves. The parties’ interest in red wolves arises, in part, from protecting species diversity and reaping the nonmarket benefits of promoting this species of “charismatic megafauna.”¹⁷⁹ Ecologically, large predators may signify a healthy ecosystem with an abundance of lower-level flora and fauna. These non-use values are often classified by economists as existence values (knowing the resource exists even if the person does not intend to visit), option value (preserving the option to visit the resource in the future), stewardship value (deriving utility from knowing one is a good steward of a collectively owned resource), and bequest value (knowing that certain resource management practices will allow future generations to enjoy the resource). A study estimates the non-use values for the Red Wolf Recovery Program to be \$18,430,000 per year.¹⁸⁰

Most members of the environmentalist party represent a low per capita stakes majority in this conflict. Those members deriving use values have higher per capita stakes, but are nevertheless well-aligned with the majority, who hold

174. *Gibbs v. Babbitt*, 214 F.3d 483, 493-494 (4th Cir. 2000).

175. *Id.* at 494.

176. *Id.* at 495.

177. *Id.* at 495 (making it clear that the wolves’ effect on agricultural markets is deleterious, but holding there is an economic effect and a “legitimate subject for regulation”).

178. *Id.* at 493-94; see also GILBREATH, *supra* note 148, at 20.

179. GILBREATH, *supra* note 148, at 19.

180. *Id.* at 20.

only non-use values. The costs associated with organizing large numbers of stakeholders are attenuated for the environmentalist party because they are represented—since the early stages of formal resolution—by catalytic subgroups such as the Defenders of Wildlife, National Wildlife Federation, World Wildlife Fund, and Environmental Defense Fund.¹⁸¹ Catalytic subgroups collect the interests of their members and then speak with a single voice. These groups also have substantial resources and expertise in affecting outcomes in judicial and legislative resolution processes. The environmental groups representing the environmentalists' interests pursue educational and recreational-outdoor programs that not only raise awareness and appreciation of the red wolves' plight but also may attract significant amounts of money through tourism and further expand their base of support.¹⁸²

E. *Property Rights Relationships*

Wesley Hohfeld offered a framework for describing property rights regimes in a conflict and the relationship of each conflicting party vis-à-vis one another.¹⁸³ Conflicts originate in informal, or presumptive rights regimes, where one party may act with privilege and a second party has no correlative right.¹⁸⁴ In the red wolf conflict, landowners originally had a privilege to manage their lands, and the wolves living there, in any way that maximized their private benefits from land use and without regard for whether or not they jeopardized the interests of the environmentalist party. Economists define the harm in this conflict of interests as an externality.¹⁸⁵ Resolution commences with actions by the party with no Hohfeldian right, since the privileged party has little incentive to formalize its privilege. With the initial legislative resolution, the environmentalist party made claims upon the state to protect their interests as rights.

Coase argued that in conflicts such as these, the initial allocation of rights has no effect on the final allocation (when transaction costs are low) because, if necessary, markets will be used to reallocate rights.¹⁸⁶ The red wolf con-

181. See *Gibbs v. Babbitt*, 214 F.3d 483, 483 (4th Cir. 2000).

182. The environmentalist party may also enjoy support from people with no direct interest (use or non-use values) in this conflict beyond the adjudicated outcome, which may affect other conflicts in which they hold a direct stake.

183. HOHFELD, *supra* note 106, at 36-39.

184. *Id.*

185. Duke, *supra* note 1, at 2.

186. Coase, *supra* note 95, at 5,6 & 10.

flict undoubtedly has high relative transactions costs (including organization costs) because there are a large number of disputants in each party and many have low per capita stakes. Accordingly, the red wolf conflict would be an instance where the market is likely not available to resolve this conflict and the initial rights allocation will have an effect on efficiency.¹⁸⁷ The process by which the rights regime was formalized—and Hohfeldian rights and duties¹⁸⁸ were assigned—is systematically studied in the next section.

V. ENVIRONMENTAL TRANSACTIONS IN *GIBBS*

Most key events in the red wolf conflict occur during environmental “transactions.” Each of these transactions between disputing parties contains instances of conditional rights assignment, usually with one party winning and the other party losing every time a resolution process occurs. Conditional rights become fully formal Hohfeldian rights if the conflict ends after the conditional rights assignment.¹⁸⁹ Each transaction consists of identification of the specific and general type of resolution process, the transaction issue, and the transaction outcome. The following section describes these transactions and the ultimate assignment of rights.

A. *Initial Market and Legislative Transactions*

The first transaction occurred during the extended period of time prior to the 1970s when the initial decline of red wolves resulted from anti-predator killings and the decrease in available habitat. These environmental harms constitute costs borne by the environmentalist party and, as an externality, are a failed market transaction.¹⁹⁰ The transaction issue is to identify who will bear the external cost of protecting the wolves and their habitat. Landowners acted unilaterally on the resource. As privilege holders, landowners benefited from protecting their livestock, pets, family, and homes from intruding wolves. Environmentalist interests were poorly established and organized during this period. In addition, the resources at stake were less scarce in these early years, which indicates a lower relative value when compared to competing land uses. Landowners and envi-

187. See *id.* at 18; Carl J. Dahlman, *The Problem of Externality*, 22 J.L. & ECON. 141, 158 (1979).

188. HOHFELD, *supra* note 106, at 36-39.

189. Duke, *supra* note 1.

190. *Id.*

ronmentalists both lacked knowledge about the ecological importance of red wolves in the early years of the conflict. These conditions led to the market failure, mainly because of the high costs of transacting and the relatively low transaction benefits. The comparative institutional analysis thus must examine whether other resolution processes performed better under these circumstances.

The 1970s proved to be an era of organized change for environmentalists. Spurred by increasing scarcity, environmentalists' interests coalesced with the formation of catalytic subgroups. These groups were particularly successful in pushing for legislation that protected environmentalists' interests by constraining degradatory behavior on public and, more importantly, private lands. There were several key legislative transactions at the federal level that allocated newly created conditional rights to environmentalists and eventually provided greater protection for threatened and endangered species. Initial legislation offered only limited protection for endangered species. In 1966, the Endangered Species Preservation Act was passed, which was revised in 1969 as the Endangered Species Conservation Act.¹⁹¹ The red wolf was listed as federally endangered in 1967 under provisions of the Endangered Species Preservation Act.¹⁹² The most meaningful conditional rights, however, were established by the ESA in 1973. The transaction issue facing Congress, as it related to the endangered red wolf, was whether the government should be allowed to restrain the land-management decisions of private landowners so as to protect environmental interests. The ESA established broad powers for the FWS to alter activities on public land and, more importantly, to restrict private land use. In effect, the ESA recognized a conditional right for the environmentalist party with a correlative conditional duty for private landowners, who lost the privilege to make unconstrained land-use decisions that affect the wolves and their habitat. Of course, in 1973 the North Carolina landowners probably did not recognize the importance of the institutional sea change since red wolves had been eradicated several years earlier, and provisions for reintroduction had yet to be established. This, in turn, implies that the landowner party may not have participated in the ESA-authorization debate as fully as was warranted by their interests at stake.

191. See GOBLE & FREYFOGLE, *supra* note 8, at 1164-65 (discussing the Endangered Species Preservation Act and the Endangered Species Conservation Act).

192. *Gibbs v. Babbitt*, 31 F. Supp. 2d 531, 532 (E.D.N.C. 1998).

B. *Early Quasi-Judicial Transactions Test Flexibility*

Prior to the ESA, quasi-judicial resolutions had limited effects on the interests of the parties: (1) the red wolf was first identified as endangered in 1967;¹⁹³ (2) the captive breeding program began when the first red wolf was taken into captivity in 1969;¹⁹⁴ and (3) the FWS's first recovery plan was adopted for the red wolf.¹⁹⁵ Perhaps the earliest substantive legal protections occurred at the state level when, by 1970, the Louisiana and Texas state environmental departments offered legal protections for the red wolves.¹⁹⁶ The ESA, however, provided a stronger legislative mandate. The initial quasi-judicial transactions were the first nonlegislative interpretation of the extent to which Congress intended to constrain landowner behavior, and the FWS was the primary arbiter in this regard. The Red Wolf Recovery Plan was implemented in 1973, initially focusing on buffer zones, habitat preservation, and public education.¹⁹⁷ However, inadequacies with the initial strategy became clear, and the recovery plan shifted toward captive breeding.¹⁹⁸ After management in the wild was abandoned, the transaction issues facing the quasi-judicial bodies had a limited impact on the parties. The efforts to remove and stabilize the remaining red wolves may have slightly benefited both landowners and environmentalists, but it put no constraints on land use. Nevertheless, the initial stages of captive breeding increased scientific knowledge and, once the success of captive breeding became apparent, issues involving reintroduction naturally arose.

In 1982, Congress guided these agency decisions through extensive amendments to the ESA, which increased the flexibility of the FWS when reintroducing endangered species to their historic range.¹⁹⁹ This legislative resolution relaxed a cornerstone of the Act, the prohibition on the taking of endangered species, which was a part of the ESA that was especially controversial when accompanied by reintroduction.²⁰⁰ The amended ESA allowed the FWS to designate the red wolf as nonessential and experimental, where regulations are similar to those of threatened rather than endangered species.²⁰¹ Thus, the transaction issue facing

193. *Id.* at 532 n.1.

194. U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 7.

195. Cohn, *supra* note 125, at 314.

196. *Id.*

197. *Id.*

198. *Id.*

199. *Gibbs v. Babbitt*, 214 F.3d 483, 487 (4th Cir. 2000).

200. *Id.*

201. *Id.*

the FWS after 1982 is raised in two parts: (1) to what extent will landowners' uses of private land be constrained by the reintroduction and (2) when a conflict of use arises, such as the taking of a wolf on private land, to what extent should landowners in North Carolina bear the external costs of reintroducing the red wolf? Although many refinements of these issues occurred in subsequent quasi-judicial transactions, the amendments to the ESA substantially supported the interests of landowners because their uses of land would be less restricted than they had been prior to 1982. Of course, environmentalists won to the extent that the amendments increased the political palatability of reintroduction and thus made reintroduction more likely to occur.

In the early 1980s, an exogenous event reignited the reintroduction conflict between the North Carolina landowners and the environmentalists and dramatically altered the landowners' expectations about private land use. The original wolf reintroduction proposal involved a 170,000 acre site at the Land Between the Lakes in Tennessee and Kentucky.²⁰² The FWS began studying this site in 1979²⁰³ and formally proposed reintroduction in 1981,²⁰⁴ but strong opposition from farmers, state officials, and even defenders of wildlife led to the abandonment of the initial reintroduction plan.²⁰⁵ Around this time, Prudential Insurance Company donated 118,000 acres of land in Dare County to the FWS, which used these lands to establish the ARNWR in 1984.²⁰⁶ The donation is considered to be a quasi-market transaction, or a quid pro quo exchange in which one party is the government.²⁰⁷ The transaction issue in any successful market or quasi-market transaction is whether or not the parties should use contracts, voluntarily, to share jointly in the benefits and burdens of conflict resolution.

This transaction, however, is somewhat novel in that the conditional rights allocation between landowners and environmentalists would not have been altered but for the actions of a third party, Prudential Insurance Company. After the donation and the quasi-judicial decision to establish the ARNWR, the expectations of landowners and environmentalists were significantly altered. The conditional rights available to the environmentalist party through the ESA suddenly became much more valuable, while the probability increased dramatically that

202. U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 7; *See also* Cohn, *supra* note 125, at 313.

203. U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 7.

204. Cohn, *supra* note 125, at 315.

205. U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 7; *See also* Cohn, *supra* note 125, at 315.

206. Cohn, *supra* note 125, at 315.

207. Duke, *supra* note 1.

restrictions imposed upon private land use would become binding. Lands that could easily shift to wolf-accommodating private land uses enjoyed windfall capitalization—for instance, parcels that enjoyed a comparative advantage in tourism. Owners pursuing land uses in conflict with wolf reintroduction—livestock or agriculture—who also could not easily alter their land uses, suffered from diminished future returns to land and thus lower land values. These landowners thus had an incentive commensurate to the anticipated loss to challenge reintroduction at quasi-judicial or judicial bodies. Such strategic behavior is often pejoratively labeled rent-seeking; however, one might also view the affected landowners as merely responding to the incentives provided by the institutional environment.

The FWS demonstrated quasi-judicial flexibility—and creativity—in pursuing efforts to compliment and facilitate the planned reintroduction. The FWS revised the Red Wolf Recovery Plan, and the red wolf was included in the American Zoo and Aquarium Association’s Species Survival Plan.²⁰⁸ On November 19, 1986, the final rule for the recovery plan was issued.²⁰⁹ During initial reintroductions in ARNWR, beginning in 1987, the FWS recognized that the refuge’s capacity was approximately twenty-five wolves, a number far below the Species Survival Plan’s goal of 220 wolves in the wild.²¹⁰ In 1990, the FWS obtained an additional 104,000 acres of natural habitat near, but not contiguous to, the ARNWR.²¹¹ This land became known as the Pocosin Lakes National Wildlife Refuge (“PLNWR”) and could support a similar number of wolves, though the habitat was in closer proximity to private lands and residences than the ARNWR.²¹² In 1993, reintroduction began in the PLNWR.²¹³ A nearby U.S. Air Force bombing range was also used as habitat.

Voluntary agreements with landowners were sought in the areas around and between the ARNWR and PLNWR to establish greater roaming areas for the wolves.²¹⁴ By 1995, landowners of 188,000 acres agreed to voluntary restrictions on land use to ensure buffer zones for wolves wandering off federal lands.²¹⁵ Land subject to these voluntary agreements reached approximately 200,000 acres

208. U.S. FISH & WILDLIFE SERV., U.S. DEP’T OF THE INTERIOR, *supra* note 113, *supra* note 113, at 7.

209. *See* Gibbs v. Babbitt, 31 F. Supp. 2d 531, 532 (E.D.N.C. 1998).

210. *See* Manuel, *supra* note 138, at 22.

211. *See id.*

212. *See id.*

213. *See id.*

214. *See id.*

215. *See id.*

by 1997.²¹⁶ No evidence was found to suggest these landowners received compensation for their agreements. These voluntary agreements imply that some landowners in the affected counties benefited from the wolf reintroduction and had interests aligned with the environmentalist party. Other landowners, however, remained opposed to reintroduction.²¹⁷ During public hearings about the expansion of reintroduction to PLNWR, residents expressed concern about wolf attacks on pets and livestock.²¹⁸

The landowner concerns were actualized after the PLNWR reintroduction as reports were made of missing pets and livestock and of wolf sightings on roads and private land.²¹⁹ The means by which the FWS addressed these concerns tended to attenuate the burdens of reintroduction on private land use.²²⁰ FWS accommodations demonstrate a capacity for conflict processing that is more flexible and offers more refined resolution than other formal resolution processes. The next set of transactions involves such accommodations and introduces new efforts by disputants on both sides to use increased scientific capacity to claim or reinforce protection of their interests.

C. *Reintroduction Transactions and Quasi-Judicial Attenuation*

Reintroduction began slowly with four pairs of red wolves released in 1987 at the ARNWR site.²²¹ However, by 1997, the FWS had released seventy-one red wolves,²²² affecting over 560,000 acres in North Carolina,²²³ representing substantive conditional rights for environmentalists. Red wolves enjoyed protected habitat, and this habitat may not have earned protection except for the necessity of reintroduction and opportunity for habitat offered by this region.²²⁴ Environmentalists also achieved reintroduction in an area from which the red wolf had long since been eradicated, thus representing the exertion of control over a resource that seemed beyond control before the Prudential Company's land donation in 1984.²²⁵ The FWS accommodated landowner interests by using

216. See U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 3.

217. See Manuel, *supra* note 138, at 22.

218. *Id.*

219. *See id.*

220. *See id.*

221. GILBREATH, *supra* note 148, at 19.

222. *Id.*

223. See U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 3.

224. *See id.* at 6.

225. *See id.* at 7.

the nonessential experimental species designation to lessen constraints on private land use and additionally by using the most advanced technology to track, remove, and protect the population of reintroduced red wolves.²²⁶ These accommodations are reviewed because they represent how quasi-judicial bodies can act with great flexibility in resolving conflict in the presence of increased scientific capacity. In each case, quasi-judicial resolution is acting under delegated authority from Congress and is faced with the issue of how to refine Congress's coarse allocation of conditional rights and duties.²²⁷

The "nonessential experimental species" designation was adopted in 1986²²⁸ and offered several key exceptions that benefited landowners when compared to typical ESA-taking constraints. Several key accommodations provided landowners with an enlarged choice set from which to make their private land-use management decisions:

(4)(i) Any person may take red wolves found on private land . . . provided that such taking is not intentional or willful, or is in defense of that person's own life or the lives of others; and that such taking is reported within 24 hours

(iii) Any private landowner, or any other individual having his or her permission, may take red wolves found on his or her property . . . when the wolves are in the act of killing livestock or pets, provided that freshly wounded or killed livestock or pets are evident and that all such taking shall be reported within 24 hours

(iv) Any private landowner, or any other individual having his or her permission, may harass red wolves found on his or her property . . . provided that all such harassment is by methods that are not lethal or physically injurious to the red wolf and is reported within 24 hours

(v) Any private landowner may take red wolves found on his or her property . . . after efforts by project personnel to capture such animals have been abandoned, provided that the Service project leader or biologist has approved such actions in writing and all such taking shall be reported within 24 hours²²⁹

In addition to these exceptions to the taking provision on private land, area residents also enjoyed accommodations in the use of public land:

226. *See id.* at 5.

227. *See generally*, KOMESAR, *supra* note 1.

228. 50 C.F.R. § 17.84(c) (1986).

229. *Id.* § 17.84(c)(4)(i)-(v) (2002).

(4)(ii) Any person may take red wolves found on lands owned or managed by Federal, State, or local government agencies . . . provided that such taking is incidental to lawful activities, is unavoidable, unintentional, and not exhibiting a lack of reasonable due care, or is in defense of that person's own life or the lives of others, and that such taking is reported within 24 hours²³⁰

These accommodations could be seen as limitations to the conditional rights enjoyed by environmentalists and attenuations of the conditional duties borne by landowners. A final set of exceptions granted quasi-judicial bodies greater flexibility in managing the wolf populations so as to address scientific constraints associated with the reintroduction and to accommodate landowner interests:

(5) Any employee or agent of the Service or State conservation agency who is designated for such purposes, when acting in the course of official duties, may take a red wolf if such action is necessary to:

- (i) Aid a sick, injured, or orphaned specimen;
- (ii) Dispose of a dead specimen, or salvage a dead specimen which may be useful for scientific study;
- (iii) Take an animal that constitutes a demonstrable but non-immediate threat to human safety or that is responsible for depredations to lawfully present domestic animals or other personal property, if it has not been possible to otherwise eliminate such depredation or loss of personal property, provided that such taking must be done in a humane manner, and may involve killing or injuring the animal only if it has not been possible to eliminate such threat by live capturing and releasing the specimen unharmed on the refuge or Park;
- (iv) Move an animal for genetic purposes.²³¹

Increased scientific capacity also helped the FWS better manage problem wolves and thus mitigate some of the negative effects on landowners of reintroduction. For instance, radio transmitters are attached to all red wolves released into the wild,²³² which allowed the FWS to track the wolves movement using airplanes.²³³ When reports of sightings or complaints are received from residents

230. *Id.*

231. *Id.* § 17.84(c)(5)(i)-(iv).

232. U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 5.

233. Wirebac, *supra* note 173, at B1.

in the area, the FWS can quickly locate and remove problem wolves using radio telemetry.²³⁴ The FWS also traps, vaccinates, and attaches radio collars to wolves born in the wild.²³⁵

Presently, the threat of hybridization with coyotes remains.²³⁶ The ARNWR site was originally chosen, in part, because permanent coyote populations were estimated to be more than four hundred miles away.²³⁷ Coyotes, nevertheless, have emerged as a pressing challenge. The U.S. Fish & Wildlife Service's strategy of trapping, sterilizing, and killing coyotes has not been completely successful.²³⁸ Feral dogs have also emerged as a problem.²³⁹ For instance, twenty-one coyotes and dogs were sterilized and thirty-one were euthanized from May 1999 through September 2001.²⁴⁰ The increased scientific capacities that allow for hybridization testing jeopardize the environmentalists' conditional rights and offer opportunities for landowners to challenge what they view as an overly burdensome allocation of duties.

Despite the FWS's efforts and exceptions to the rule that provided flexibility for landowners, agency staff, and scientists in managing the wolves, members of the landowner party contended that the constraints on private land use were unwarranted.²⁴¹ The landowners would eventually raise a Constitutional question, challenging the ability of the FWS to promulgate the rule.²⁴² Prior to the judicial challenge however, the landowners used increased scientific capacity at the quasi-judicial process to challenge the constraints.²⁴³

D. *Strategic Use of Increased Scientific Capacity in Quasi-Judicial Transactions*

During the initial years of reintroduction, the FWS produced a refined resolution, which balanced landowner and environmentalist interests and which

234. See GILBREATH, *supra* note 148, at 19.

235. Wirebac, *supra* note 173, at B1.

236. Scott Harper, *Red Wolves' Future Faces New Threat: A 14-year Experiment to Protect the Endangered Species in North Carolina has a New Enemy: The Wolves Themselves. Their Cross-breeding Habits Could Vanquish the Species in Just Two Decades*, THE VA. PILOT, Sept. 8, 2001, at A1.

237. Cohn, *supra* note 125, at 315.

238. Harper, *supra* note 236, at A1.

239. *Id.*

240. *Id.*

241. Gibbs v. Babbitt, 31 F. Supp. 2d 531, 533 (E.D.N.C. 1998).

242. See *id.* at 531.

243. See generally KOMESAR, *supra* note 1.

demonstrated the flexibility of quasi-judicial processes in general.²⁴⁴ However, increased scientific capacity had had a limited impact and tended to benefit the environmentalist party. The landowner party began to use science to challenge the resolution and the key event was a particularly controversial taking of a red wolf.²⁴⁵

In October 1990, Richard Mann, a North Carolina landowner, shot and killed a red wolf that was threatening his cattle.²⁴⁶ Mann was confronted by the FWS soon after killing the red wolf.²⁴⁷ In terms of environmental transactions, Mann's actions exemplify an illegal externality—an externality explicitly proscribed by a formal rights regime. If not fined, this type of incident may have signaling value for other conflicts and thus shift landowner expectations. Institutions, however, were in place to resolve such complications, and Mann, who pled guilty to his crime, was prosecuted, fined \$2,000, sentenced to build “wolf-houses,” and feed the wolves.²⁴⁸ The Mann incident catalyzed opposition to the constraints borne by landowners.²⁴⁹

The first major challenge began in September 1991 when the American Sheep Industry Association filed a petition to delist the red wolf from the ESA.²⁵⁰ The petition was filed, at least in part, in response to a 1991 scientific paper.²⁵¹ Robert Wayne and Susan Jenks' analysis of mitochondrial DNA demonstrated hybridization for all red wolves: “[T]he red wolf is entirely a hybrid form or a distinct taxon that hybridized with coyotes and grey wolves over much of its previous geographical range.”²⁵² The petition contended that the evidence of hybridization warranted (1) the removal of the red wolf from the U.S. Endangered Species List; (2) suspension of release programs in eight states until the delisting decision was made; and (3) suspension of funding for the red wolf program until the delisting decision was made.²⁵³ The petition exemplifies how increased scien-

244. See Endangered and Threatened Wildlife and Plants; Determination of Experimental Population Status for an Introduced Population of Red Wolves in North Carolina, 51 Fed. Reg. 41,790, 41,792 (Nov. 19, 1986) (codified at 50 C.F.R. pt. 17.40).

245. See *Gibbs v. Babbitt*, 214 F.3d 483, 489-90 (4th Cir. 2000).

246. *Id.* at 489.

247. *Id.*

248. *Gibbs v. Babbitt*, 31 F. Supp. 2d 531, 533 (E.D.N.C. 1998).

249. See *Gibbs v. Babbitt*, 214 F.3d 483, 489 (4th Cir. 2000).

250. See generally Endangered and Threatened Wildlife and Plants; Finding on a Petition to Delist the Red Wolf, 57 Fed. Reg. 1246 (Jan. 13, 1992) (codified at 50 C.F.R. pt. 17).

251. See *id.*

252. Robert K. Wayne & Susan M. Jenks, *Mitochondrial-DNA Analysis Implying Extensive Hybridization of the Endangered Red Wolf *Canis-Rufus**, 351 NATURE 565, 568 (1991).

253. Endangered and Threatened Wildlife and Plants; Finding on a Petition to Delist the

tific capacity can trigger a quasi-judicial transaction, as procedures in the ESA required the FWS to make a finding within ninety days.²⁵⁴

Nevertheless, the FWS found that the petition did not warrant delisting because it did not offer “substantial information.”²⁵⁵ Specifically, the FWS found that the available data did not provide “substantial support” for hybridization²⁵⁶ and that the scientific results were “misinterpreted” by considering mitochondrial DNA from the Wayne and Jenks study to be “equivalent” to nuclear DNA.²⁵⁷ The FWS concluded that “the best scientific and commercial data” supported continued listing.²⁵⁸ The National Wildlife Institute mounted a similar challenge in 1994, arguing that the hybridization evidence about the red wolf made listing non-essential to the survival of the species.²⁵⁹ On December 9, 1997, the FWS found this petition to be unwarranted, stating that new scientific evidence that questioned hybridization existed.²⁶⁰

The ostensible arena of these disputes had moved from politics to science, yet the quasi-judicial transactions concerned the same interests at stake. The landowners sought to reallocate the conditional rights so as to expand the opportunities for private land use.²⁶¹ Because the transaction issues were couched as scientific ones—to evaluate competing scientific data and interpretations—quasi-judicial bodies were relatively well positioned to spend the time and apply a higher level of expertise. Courts and legislatures are comparatively less flexible, have less expertise, and can offer less refined outcomes. These transactions were also important because the North Carolina landowners were joined in their cause by catalytic subgroups and landowners from other states, who feared similar restrictions.²⁶² This increased the number of affected parties and the interests at stake, which in turn increased the incentives to defend the interests of the landowners’ party. When the FWS found the petition to be unwarranted, they reaffirmed the environmentalists’ conditional right to enjoy protection of their interests in free-roaming red wolves.²⁶³

Red Wolf, 57 Fed. Reg. 1246 (Jan. 13, 1992) (codified at 50 C.F.R. pt. 17).

254. *Id.*
 255. *Id.*
 256. *Id.*
 257. *Id.*
 258. *Id.* at 1249.
 259. Fitzgerald, *supra* note 10, at 7.
 260. *Id.*
 261. *Id.*
 262. *See id.* at 1.
 263. *Id.* at 7.

In addition to using increased scientific capacity to try to shape quasi-judicial outcomes, the landowner party also used political means to ease constraints on their behavior. In 1994, the North Carolina legislature passed a law which allowed people to kill red wolves that strayed onto private property in four counties.²⁶⁴ The purpose of the law was to allow property owners to trap or kill any wolves that they “reasonably believed” were threatening the person’s life, lives of others, or lives of livestock on the property.²⁶⁵ The U.S. Court of Appeals for the Fourth Circuit subsequently pointed out that one of the principal ways that the North Carolina law conflicted with federal regulations is that it allowed landowners to take wolves that they “reasonably believed” would be a threat, as opposed to wolves “in the act” of killing livestock or pets as required under federal regulations.²⁶⁶ The transaction issue before the North Carolina legislature was whether the State should partially reverse the federal conditional rights allocation by attenuating some of the constraints on landowners’ management of their private lands.

The immediate result of the law was to give landowners an enhanced right to take or kill wolves on private property. In addition, this created a direct conflict between FWS regulations regarding the red wolf under the ESA and the state laws of North Carolina. Until the conflict between federal and state law could be resolved, this resolution left environmentalists with a conditional duty to bear the costs of diminished protections for the red wolf population. The North Carolina law triggered institution of the *Gibbs* case, and the law would later be nullified in 2000.²⁶⁷

The FWS and environmentalist party, in response, used the quasi-judicial process to attenuate the impact of the North Carolina law. Procedures were established so that landowners could be compensated for depredation of pets and livestock.²⁶⁸ The FWS also revised the regulations to further relax the constraints on landowners by allowing them to kill wolves when depredation occurred on private land.²⁶⁹ Nevertheless, the revised FWS policy was stricter than the state law because wounded livestock or animals were required to be produced to justify the taking.²⁷⁰ Landowners benefited from the relaxed ESA regulations by bearing fewer conditional duties in defending against red wolves, while environ-

264. *Gibbs v. Babbitt*, 214 F.3d 483, 489 (4th Cir. 2000).

265. *Id.*

266. *Id.*

267. *See id.* at 483.

268. U.S. FISH & WILDLIFE SERV., U.S. DEP’T OF THE INTERIOR, *supra* note 113, at 6.

269. *Id.*

270. *Gibbs*, 214 F.3d at 489.

mentalists' conditional rights were reduced. Despite the persisting conflict between state and federal laws, the FWS demonstrated the flexibility of the quasi-judicial processes in making accommodations for landowners' use of private land.²⁷¹

At the federal level, the landowners made further legislative challenges by attacking the financing of the recovery plan. In 1995, an amendment to the Interior Appropriation Bill was offered in the Senate, which would suspend all funding for the recovery program during the 1996 fiscal year and thereafter.²⁷² Landowners hoped legislators would reassign rights in the red wolf conflict directly and thus bypass the quasi-judicial process, where the FWS refused to liberate landowners fully from the constraints of reintroduction.²⁷³ The Senate decided, by a narrow margin, to continue funding the recovery program.²⁷⁴

In sum, the landowners' party acted strategically. Displeased with the initial allocation of rights from the FWS, they used the state and federal legislatures to attenuate the constraints on their use of private land.²⁷⁵ Moreover, the landowners questioned the appropriateness of the quasi-judicial listing decision using increased scientific capacity.²⁷⁶ Although the legislative and quasi-judicial strategies were not completely successful, the landowners' victory at the North Carolina legislature triggered the judicial review that would ultimately settle this conflict.²⁷⁷

E. *Judicial Transactions*

Prior to 1997, the environmental transactions, which were most important to the private parties to the conflict, involved the main quasi-judicial body, the FWS which struggled to accommodate landowner and environmental interests while also addressing increased scientific capacity.²⁷⁸ Initially, increased scientific capacity allowed scientists to remove red wolves from the environment, establish a successful captive breeding program, and rapidly prepare for reintroduction. Later, however, increased scientific capacity in the form of genetic evidence of hybridization was used to challenge the original listing decision and,

271. U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 6.

272. *Id.* at 8.

273. *See Gibbs*, 214 F.3d at 483.

274. U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 6.

275. *See id.* at 6.

276. Manuel, *supra* note 138, at 24.

277. *See Gibbs v. Babbitt*, 31 F. Supp. 2d 531, 533 (E.D.N.C. 1998).

278. *See generally GILBREATH*, *supra* note 148, at 23.

thus, reintroduction.²⁷⁹ Congress, with the ESA, had not given the FWS a great deal of guidance in adjusting policy to reflect increased scientific capacity. The FWS demonstrated the relative flexibility and speed with which a quasi-judicial body could act to adjust periodically the allocation of conditional rights in the face of changing information or preferences.²⁸⁰ Nevertheless, the patchwork solution of the FWS lacked a comprehensive, coherent plan and was not capable of resolving the constitutional issues raised by North Carolina's new law. This limitation was addressed by judicial review in federal courts.²⁸¹

Oddly, the constitutional challenge did not arise from the prosecution of a landowner who violated the FWS regulations or the North Carolina statute.²⁸² Rather, on March 3, 1997, Richard Lee Mann and Charles Gibbs instituted a lawsuit against Department of the Interior Secretary Bruce Babbitt in U.S. District Court for the Eastern District of North Carolina.²⁸³ The lawsuit challenged the federal authority to control private land management.²⁸⁴ On October 27, 1997, Defenders of Wildlife were added to the case as defendant-interveners.²⁸⁵ The transaction issue was whether the FWS rules, under delegated authority from Congress, were a valid exercise of constitutional power. The court determined that the commerce clause warranted congressional action because red wolf related tourism was a part of interstate commerce.²⁸⁶ Thus, the conditional rights allocation generated by the FWS was validated.

During the judicial transactions, increased scientific capacity continued to complicate resolution of the conflict. This, in turn, affected the judicial processing. In 1999, the aforementioned evidence of coyote and feral-dog crossbreeding was documented.²⁸⁷ In addition, a government study showed that if this genetic trend continued, in twelve to twenty-four years the red wolf "would be unrecognizable" from coyotes.²⁸⁸ Another study found that the effect of reintroduction on landowners was significant; in 1998, forty-one of seventy-five wolves in the wild lived on private land around the refuge.²⁸⁹ By 2001, the wolf population had grown to about one hundred, even though 161 wolves had died from

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279. Manuel, *supra* note 138, at 23.
280. Gibbs v. Babbitt, 214 F.3d 483, 487 (4th Cir. 2000).
281. *See id.* at 483.
282. *See id.* at 483.
283. Gibbs v. Babbitt, 31 F. Supp. 2d 531, 532 (E.D.N.C. 1998).
284. *Gibbs*, 214 F.3d at 489.
285. *Gibbs*, 31 F. Supp. 2d at 532.
286. *Id.* at 535.
287. Harper, *supra* note 236, at A1.
288. *Id.*
289. *See Gibbs*, 214 F.3d at 488.

natural causes, car collisions, or unknown reasons.²⁹⁰ The judicial opinions noted many of these facts, which suggests that hybridization and the rapidly expanding wolf population may have influenced their thinking even though the legal issue was more abstruse.

The decision of the district court was appealed to the Fourth Circuit, and argued on October 28, 1999.²⁹¹ The Fourth Circuit affirmed the ruling on June 6, 2000, in a two-to-one decision.²⁹² The majority opinion expanded the district court's theory of interstate commerce, concluding that "[t]he red wolves are part of a \$29.2 billion national wildlife-related recreational industry that involves tourism and interstate travel."²⁹³ The court also stated that the legislative, not the judicial process, must weigh the "scientific value and commercial impact" of the conflict.²⁹⁴ Finally, on February 20, 2001, the U.S. Supreme Court declined to reopen the debate over the ESAs impact on private landowners.²⁹⁵ The case was turned away without comment, solidifying the duty of landowners to abide by endangered species regulations on private land.²⁹⁶ Environmentalists were the final right holders and gained the ability to enjoy their preferred use of public and private lands involving the red wolves.

F. *Conflict Outcome*

The broader environmental conflict involved issues that are more fundamental than the legal questions answered by the *Gibbs* court. Collectively, the resolution processes determined the extent to which landowners would be constrained in their use of private land so as to accommodate environmentalists' interests in the red wolf reintroduction.²⁹⁷ In other words, the conflict outcome dictated what costs would be borne by private landowners and what costs would be borne by environmentalists when habitat conducive to endangered species is designated for these areas. The conflict began in an informal rights regime, where environmentalists fully bore the costs of landowners' privately optimal

290. See Harper, *supra* note 236, at A1.

291. *Gibbs*, 214 F.3d at 483.

292. *Id.*

293. *Id.* (citing *Heart of Atlanta Motel, Inc. v. United States*, 379 U.S. 241, 256 (1964)).

294. *Id.* at 495.

295. *Gibbs*, 214 F.3d at 483, *cert. denied sub nom.*, *Gibbs v. Norton*, 531 U.S. 1145 (2001).

296. See generally *id.*

297. See *Gibbs*, 214 F.3d at 483.

behavior.²⁹⁸ Then, individual environmental transactions progressively refined the allocation of conditional rights.²⁹⁹ Finally, the U.S. Supreme Court let the Fourth Circuit's interpretation of the constitutional issues stand and thereby fully formalized the property rights at stake.³⁰⁰

Environmentalists, scientists, and their associated catalytic subgroups nationwide secured a formal right to affect the landowners' management of private land near the ARNWR.³⁰¹ Landowners were left with somewhat attenuated duties not to take red wolves wandering off public land.³⁰² This limitation on the freedom of action ensures a type of habitat management that may not have been selected by landowners if they were free to do as they wanted.³⁰³ In addition to landowners in North Carolina facing prosecution for violating the rules established under the ESA and refined by the FWS, they also lost some ability to protect themselves, their family, their pets, and their livestock from the threat of a wolf attack.³⁰⁴ This permanently alters their expectations about the returns to certain land uses and thus codifies the new institutional environment in which they may select privately optimal land uses.³⁰⁵

At a broader level, the environmentalist party may have also benefited from the value this conflict holds as a signal to future disputants. The judicial system signaled that reintroductions under the ESA will be constitutionally valid under the commerce clause even when private land use is affected.³⁰⁶ The outcome of red wolf reintroduction also reduces the institutional uncertainty facing supporters of other experimental endangered species programs for large predators, including the gray wolf and grizzly bear. Tactics observed and lessons learned throughout this conflict will help environmentalists deal with future stakeholder acceptance, law enforcement, and landowner incentives. Moreover, future reintroductions may be more boldly implemented, especially in terms of the required encumbrances on private land use.

The red wolf conflict also revealed the importance of increased scientific capacity and, perhaps, offered a preview of the manner through which quasi-

298. See GILBREATH, *supra* note 148, at 18, 19.

299. See U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 6.

300. *Gibbs*, 214 F.3d at 483.

301. See GILBREATH, *supra* note 148, at 18.

302. See *id.*

303. See Manuel, *supra* note 138, at 22.

304. See *Killing Red Wolves Could Prove Costly*, THE HERALD-SUN (Durham, N.C.), Feb. 12, 1995, at B10.

305. See generally GILBREATH, *supra* note 148 (discussing the private landowners increased management of the wolves).

306. See *Gibbs v. Babbitt*, 31 F. Supp. 2d 531, 536 (E.D.N.C. 1998).

judicial and judicial bodies will deal with evolving capacity in the future.³⁰⁷ Increased scientific capacity was a necessary condition for this ultimate resolution because it allowed the recovery plan to be implemented.³⁰⁸ However, increased scientific capacity can also be used to challenge the validity of the reintroduction.³⁰⁹ These issues increasingly arose as the conflict progressed. Hybridization was the key challenge, but one could imagine other conflicts involving scientific debates about aspects of the habitat, competing species, human health, and cloning. Experience with the red wolf suggests that the main arbiter of science will be the quasi-judicial process. Until the legislature decides to clarify interpretation of the challenges of increased scientific capacity—such as an amendment addressing hybridization—quasi-judicial bodies enjoy the best position to offer flexible, refined dispute resolution even though these ad hoc outcomes do not necessarily involve coherent policies or a consistent scientific bases.

VI. A COMPARATIVE INSTITUTIONAL ANALYSIS OF *GIBBS*

The main resolution processes encountered in the red wolf conflict were the market, legislative, quasi-judicial, and judicial.³¹⁰ The failed market resolution of externality prevailed in the early years of the conflict.³¹¹ During this presumptive rights regime, landowners and others were able to advance substantially their interests without constraints on land use. Then the ESA, other laws, and the initial quasi-judicial transactions dramatically reallocated economic opportunities³¹² by granting a conditional right to the environmentalists and a conditional duty to landowners.³¹³ The importance of this reallocation was initially misperceived because the captive breeding program removed wolves from the wild and thus, apparently, perpetuated the landowners' privileged use of land.³¹⁴ The legislative process was crucial in creating the first version of the ESA, but more importantly for adding the nonessential experimental species clause to the Act in the amendments, which lessened the burden on landowners of reintroducing the

307. See generally Press Release, U.S. Fish & Wildlife Service, Federal Court Upholds Federal Authority to Regulate "Taking" of Red Wolves (Jan. 11, 1999), at <http://southeast.fws.gov/news/1999/r99-007.html> (last visited Apr. 20, 2004).

308. See *id.*

309. See generally *id.*

310. See *Gibbs v. Babbitt*, 214 F.3d 483, 495 (4th Cir. 2000).

311. See generally GILBREATH, *supra* note 148, at 18, 19.

312. DANIEL W. BROMLEY, ECONOMIC INTERESTS AND INSTITUTIONS 143 (1989).

313. See 16 U.S.C. § 1533(f)(1)-(2) (2000).

314. FIELD TRIP EARTH, *supra* note 154, at 1.

red wolf.³¹⁵ Reintroduction in the 1980s reignited the conflict, and thus the subsequent transactions were the most important for drawing lessons for comparative institutional analysis. These were also the transactions that dealt with the major issues arising from increased scientific capacity. These transactions were primarily quasi-judicial, occurring at the FWS,³¹⁶ and judicial, occurring within the federal court system.³¹⁷

The application of comparative institutional analysis will consist of two steps. The performance of the quasi-judicial and judicial processes are assessed, first, in terms of procedural fairness, and second, in terms of substantive efficiency. Komesar argues that comparative institutional analysis requires goal choice (here, fairness and efficiency) and institutional choice (here, quasi-judicial and judicial).³¹⁸ The data in the background and environmental-transactions sections identifies the participation costs facing the parties and the allocation of rights and duties, which offer evidence about the relative performance of the processes.³¹⁹

A. *Assessing Procedural Fairness*

It is not surprising that when compared to other resolution processes the quasi-judicial and the judicial processes tend to produce procedurally fair results.³²⁰ Unlike the coarse procedures of market externalities, which completely ignore the interests of environmentalists, and the legislative process, which unilaterally assigns conditional rights to environmentalists, the quasi-judicial and judicial processes offer opportunities for disputants to argue for more subtle re-

315. Endangered and Threatened Wildlife and Plants; Determination of Experimental Population Status for an Introduced Population of Red Wolves in North Carolina, 51 Fed. Reg. 41,790, 41,792 (Nov. 19, 1986) (codified at 50 C.F.R. pt. 17.40).

316. *See generally* Notice of Three Public Open Houses Prior to Proposing a Revision to the Special Rule for a Nonessential Experimental Population of Red Wolves in North Carolina, 64 Fed. Reg. 60,454 (Nov. 5, 1999); Endangered and Threatened Wildlife and Plants; Revision of the Special Rule for Nonessential Experimental Populations of Red Wolves in North Carolina and Tennessee, 60 Fed. Reg. 18,940 (Apr. 13, 1995) (codified at 50 C.F.R. pt. 17); Endangered and Threatened Wildlife and Plants; Proposed Revision of the Special Rule for Nonessential Experimental Populations of Red Wolves in North Carolina and Tennessee, 58 Fed. Reg. 62,086 (Nov. 24, 1993) (codified at 50 C.F.R. pt. 17).

317. *See generally* *Gibbs v. Babbitt*, 214 F.3d 483 (4th Cir. 2000); *Wyo. Farm Bureau Fed'n v. Babbitt*, 199 F.3d 1224 (10th Cir. 2000); *Defenders of Wildlife v. Lujan*, 792 F. Supp. 834 (D.D.C. 1992).

318. KOMESAR, *supra* note 1, at 5.

319. *Id.*

320. *Id.*

finements to the allocation of conditional rights.³²¹ Each opportunity to challenge a conditional rights allocation typically led to a more elaborate, refined specification of rights and duties rather than an entirely new conditional rights allocation. This subsection argues that the FWS had a superior ability to protect procedural fairness when compared to the judiciary.

The 1982 revisions to the ESA empowered the FWS to alter protections for reintroduced species and allowed them to address some aspects of increased scientific capacity.³²² This amendment allowed the FWS to make the first subtle adjustments to the conditional rights allocation assigned by the ESA.³²³ The success of the captive breeding program led to the need to reintroduce wolves, but reintroduction with full prohibitions against taking an endangered species meant that affected landowners would not be able to continue a land use for which they had enjoyed a privilege since eradication. Any affected landowner likely had substantially manifested reasonable investment-backed expectations for their land uses, even if they had no actual right. Regardless of whether they had been sufficiently constrained to warrant compensation for a regulatory taking, basic fairness considerations suggest that they may be unduly bearing societal burdens for the reintroduction of the red wolves.³²⁴

The FWS demonstrated flexibility in processing landowner objections to reintroduction, and the more equitable distribution of benefits and burdens arising from these interactions seemed to be arrived at in a procedurally fair manner.³²⁵ First, the FWS negotiated the donation of the ARNWR land so as to provide habitat for the red wolf on public land, which did not force private landowners, as a group, to bear the entire burden of reintroduction.³²⁶ Landowners, instead, were only required to bear the burden of red wolves that strayed from the refuge.³²⁷ Second, the landowners' duty to accommodate straying red wolves was attenuated by defining the red wolf as an experimental species, which limited liability for landowners taking the species. In addition, the FWS had procedures and staff in place for removing or relocating red wolves that became a nuisance.³²⁸ The latter process further demonstrates the flexibility of the quasi-

321. See generally Endangered Species Act Amendments of 1982, Pub. L. No. 97-304, 96 Stat. 1411 (codified as amended at 16 U.S.C. §§ 1531-1544 (2000)).

322. See generally *id.*

323. See *id.*

324. See *Penn Cent. Transp. Co. v. City of N.Y.*, 438 U.S. 104, 129-30 (1978).

325. See GILBREATH, *supra* note 148, at 18.

326. See U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, *supra* note 113, at 6-8.

327. See *id.* at 6.

328. See Manuel, *supra* note 138, at 28.

judicial bodies, which not only arbitrate disputes but also implement laws and regulations.

The instances of quasi-judicial dispute processing that involved increased scientific capacity may have been less fair procedurally because the issues raised did not fit well into existing conflict resolution procedures. Specifically, landowners used the genetic evidence of hybridization to argue repeatedly to delist the red wolf.³²⁹ The FWS heard and denied each request.³³⁰ One may infer from the judicial record that the FWS administered procedurally fair reviews of the delisting requests. The subsequent judicial proceedings did not claim that the FWS violated notice or hearing requirements,³³¹ nor were their decisions arbitrary or capricious. Detailed documents were published with the FWS's decisions.³³² Nevertheless, the FWS may have been somewhat constrained by its legislative mandate or its own interests in processing hybridization issues fairly.

In comparative institutional analysis, it is insufficient to point to the shortcomings or successes in one resolution process without also judging the performance of other resolution processes in addressing the same issues.³³³ Did the judiciary perform better than the quasi-judicial bodies in processing the red wolf conflict? There were only three judicial transactions, and the most fundamental requirements of procedural fairness were satisfied.³³⁴ For instance, the landowner party was supported by a catalytic subgroup and the North Carolina government, which meant that limitations of sophistication and financial resources that may have jeopardized an individual landowner's case were not at issue in *Gibbs*.³³⁵ Indeed, the evidence suggests that landowners were able to participate fully with their catalytic subgroups and state government representatives in the judicial process.³³⁶

The judicial process, nonetheless, may have limited the landowners' ability to make their best arguments regarding the conflict because the legal issue was substantially different from the fundamental conflict issue.³³⁷ The judicial

329. See *id.* at 24.

330. See Endangered and Threatened Wildlife and Plants; Finding on a Petition to Delist the Red Wolf, 57 Fed. Reg. 1246 (Jan. 13, 1992) (codified at 50 C.F.R. pt. 17); see also Harper, *supra* note 236, at A1.

331. See generally 57 Fed. Reg. 1246 (Jan. 13, 1992) (detailing the FWS judicial proceedings regarding the red wolf delisting petition).

332. See, e.g., *id.*

333. See KOMESAR, *supra* note 1, at 6.

334. See *Gibbs v. Babbitt*, 214 F.3d 483, 506 (4th Cir. 2000).

335. See *id.* at 483.

336. See *id.*

337. *Id.* at 489-90; see also KOMESAR, *supra* note 1.

challenge, involving the primacy of North Carolina laws and the ability to enforce FWS regulations, was reduced to a question of whether reintroduced red wolves affected interstate commerce.³³⁸ In contrast, the conflict issue focused on whether the landowners could be constrained in their use of land to accommodate the red wolf.³³⁹ Rather than simply being able to argue for their private interests, the judicial process forced landowners to challenge federal authority directly. To some extent, this creates an asymmetric distribution of stakes and promotes a bias that works against the interests of the landowners. The impact of the decision and the incentives for the government to mount a vigorous defense seem out of proportion with the somewhat limited question of land use. In deciding to mount a legal challenge, the landowners themselves raised the visibility and importance of the conflict.³⁴⁰ The judicial procedures demonstrated procedural fairness, but the questions raised were broader than the interests of the private parties. Moreover, the legal issue was framed so as to determine an absolute winner and an absolute loser.³⁴¹ This prevented the design of creative compromises, which were more available in the quasi-judicial processes. Also, in contrast to quasi-judicial resolution, the legal issue did not allow the landowners to raise challenges based on increased scientific capacity, although they were noted in the opinions.³⁴²

The judicial resolution formalized the previously issued FWS regulations, which protected the environmental party's interests while somewhat limiting the burden on landowners.³⁴³ Nevertheless, landowners were ultimately constrained in their land-use decisions. Despite accommodations to landowners, some land-use constraints associated with reintroduction were borne by a small set of landowners in the historic range of the red wolf.³⁴⁴ Many others in the historic range bore no costs. The differential effects between affected landowners and unaffected landowners imply that some *substantive* unfairness resulted from the quasi-judicial and judicial decisions even though the processes exhibited *procedural* fairness. One might call upon average reciprocity of advantage to justify such differential effects; landowners are encumbered in this instance, but they benefit from constraints on others. In the aggregate, everyone is better off due to the multilateral constraints. Alternatively, one may argue that the new institu-

338. See *Gibbs*, 214 F.3d at 489-490.

339. See *id.* at 489.

340. See Fitzgerald, *supra* note 10, at 8.

341. See *Gibbs*, 214 F.3d at 487.

342. See *id.* at 494.

343. See *id.* at 505-06.

344. *Id.* at 488.

tional environment defined the relative scarcity of land uses in such a way as to benefit most landowners. For example, landowners may have been constrained in their current land use, but new tourism markets were created which benefited landowners in this area of North Carolina and not other landowners in the historic range of the red wolf. It can best be summed up by saying that governmental regulations create “takings” and “givings.”

B. *Assessing Substantive Efficiency*

Substantive efficiency reflects an allocation of resources that maximizes the value of social product. Many different efficiency criteria could be applied—some of which fundamentally differ in concept—while others substantially overlap. Komesar has used the most general efficiency criterion, “resource allocation efficiency,”³⁴⁵ which generally accords with Kaldor-Hicks efficiency or potential Pareto improvements. Others prefer the perspective of the Pigovian tradition to locate substantively efficient outcomes in the internalization of negative externalities (i.e., market failures leading to inefficiency). One perspective in the Coasean tradition argues for a focus on assigning rights rather than worrying about internalizing externalities.³⁴⁶ Coase has pointed out that when transaction costs are low, relative to the gains from trade, resource allocation efficiency through bargaining is achieved regardless of who is assigned the right.³⁴⁷ In the red wolf conflict, the transaction costs seem to be quite high relative to the values at stake. This is common in environmental conflicts and suggests that the initial allocation of rights has an important effect on resource allocation efficiency.³⁴⁸ Specifically, the party with the highest valued use must get the right for there to be substantive efficiency.³⁴⁹ Analysis of substantive efficiency thus depends on which party has the highest valued use.³⁵⁰

The majority opinion in *Gibbs* makes clear that this conflict involves market and nonmarket values, which are difficult to measure and compare.³⁵¹ The court was unwilling to apply a precise calculus to this issue and, in its defense, offers a comparative result on substantive efficiency:

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345. KOMESAR, *supra* note 1, at 30-32.
346. *See* Dahlman, *supra* note 187, at 143-147.
347. Coase, *supra* note 95, at 14-15.
348. *See id.* at 14-15; *see also* Dahlman, *supra* note 187.
349. *See* Coase, *supra* note 95, at 15-16.
350. *See id.*
351. *See* *Gibbs v. Babbitt*, 214 F.3d 483, 495 (4th Cir. 2000).

The regulation here targets takings that are economically motivated—farmers take wolves to protect valuable livestock and crops. It is for Congress, not the courts, to balance economic effects—namely whether the negative effects on interstate commerce from the red wolf predation are outweighed by the benefits to commerce from a restoration of this species. To say that courts are ill-suited for this act of empirical and political judgment is an understatement.³⁵²

A resolution process tends to be substantively efficient when its transactions award more complete rights to the party with the highest valued use.³⁵³ This conflict deals with a natural resource whose value is difficult to calculate, but evidence of this value does exist.³⁵⁴ The use values associated with both parties are less difficult to quantify; the environmentalists' party seeks tourism and, according to the majority opinion in *Gibbs*, resumption of the fur trade.³⁵⁵ The landowners' party argues for an unconstrained use of land, but their interest could be better described as seeking to maximize the private returns to the use of their land.³⁵⁶ In addition, the landowners' stake is the opportunity cost of the constrained land use—not the value of their land. The landowners' stake therefore is the difference between the returns to land in the unconstrained use and returns to land in the constrained use.

Some evidence on the use values associated with the conflict is available in the judicial record.³⁵⁷ The Fourth Circuit noted an unpublished study that claims tourism revenues associated with the red wolf reintroduction could range from \$39,610,000 to \$183,650,000 per year.³⁵⁸ The court noted that the “national wildlife-related recreational industry” is \$29.2 billion.³⁵⁹ The court also suggested that scientific research constitutes a significant use value and has an important economic impact because it may generate jobs.³⁶⁰

It is even more difficult to quantify the non-use values environmentalists hold for the reintroduction of the red wolf. Environmentalism is popular in con-

352. *Id.* at 495.

353. *See* Coase, *supra* note 95, at 15-16.

354. *See Gibbs*, 214 F.3d at 504.

355. *Id.* at 494-95.

356. The alternate definition recognizes that resolution processes establish institutions from which value is determined. Institutions allocate opportunities so that a constrained landowner may actually be better off than an unconstrained landowner. Or, the “givings” from any regulation may outweigh the “takings”.

357. *Id.* at 493-94.

358. *Id.* (citing William E. Rosen, Red Wolf Recovery in Northeastern North Carolina and Economic Impacts 633 (unpublished study, Cornell University)).

359. *Id.* at 493.

360. *Id.* at 494.

temporary society, and any court ruling will have associated effects on other ESA programs. The red wolf, like other wolves and large predators, has increased in popularity and public support. Charismatic mega-fauna³⁶¹ capture public interest, gather lobbyist support, and influence courts and legislatures. Although the environmentalists include a large number of people with low average per capita stakes in the red wolf conflict, it is unknown how “low” this average is. The difference between \$1.00 and \$10.00 average per capita stakes in the red wolf conflict could be tens of millions of dollars given the large number of people holding non-use values. Clearly, the determination of the highest valued use depends most directly on the average per capita stakes for the environmentalists’ non-use values.

Economists use formal techniques like contingent valuation to estimate non-use values, especially for environmental resources. Although no contingent valuation studies were found on the red wolf reintroduction, a closely related study of wolf recovery in Yellowstone National Park was published in 1991.³⁶² This contingent valuation study asked respondents to value the recovery of ten to twelve wolf packs in Yellowstone.³⁶³ Since the respondents were park visitors, their willingness to pay for recovery might include use and non-use values.³⁶⁴ The mean willingness to pay for recovery was \$69.97 and the median was \$18.68.³⁶⁵ A similar study was conducted in Sweden to estimate the value of a viable Swedish wolf population.³⁶⁶ Mean annual willingness to pay was estimated to be \$77.00 to \$99.00, while the corresponding median value was \$11.00 to \$22.00.³⁶⁷

Extrapolating from these results, it appears that the Red Wolf Recovery Program may provide substantial values to the environmentalist party through use and non-use values. As such, the authors will presume that the environmentalist party has the higher valued use. This assumption implies that transactions, which allocate conditional rights to the environmental party, tend to demonstrate

361. GILBREATH, *supra* note 148, at 19.

362. See John W. Duffield, Symposium, *Total Valuation of Wildlife and Fishery Resources: Applications in the Northern Rockies*, THE ECONOMIC VALUE OF WILDERNESS 112 (1991) (providing a summary of recent total valuation studies of wildlife and fishery resources in the Northern Rockies, paper developed for presentation at the Society of American Foresters Symposium).

363. *Id.*

364. *Id.*

365. *Id.*

366. Mattias Boman & Göran Bostedt, *Valuing the Wolf in Sweden: Are Benefits Contingent on the Supply?*, TOPICS IN ENVTL. ECON. 157 (Mattias Boman et al. eds., 1999).

367. *Id.* at 170.

substantive efficiency. Consequently, the judicial processes generate efficient results. The initial transactions in the quasi-judicial process demonstrated substantive efficiency because conditional rights were firmly established for the environmentalist party. However, later quasi-judicial transactions that attenuated the constraints on landowners may have been suboptimal.

Once final rights are assigned—which occurred when the Supreme Court denied certiorari—then the parties may be able to use market processes to reallocate resources to achieve the most efficient distribution of rights. For instance, landowners, who now know that the constraints on their land use are permanent, are able to balance the net benefits of continuing the current land use with alternate land uses, such as converting from livestock agriculture to residences or commercial tourism. Environmentalists also have the opportunity to “vote with their pocketbooks.” Environmentalists can reveal their demand for tourist and residential activities, which are enhanced by the wolves. Alternatively, environmentalists can seek enhanced management of private lands by purchasing land from the landowners and donating it to the government or private land trusts.

VII. CONCLUSIONS FROM THE COMPARATIVE INSTITUTIONAL ANALYSIS OF GIBBS

The quasi-judicial and judicial resolution processes generated the most important environmental transactions that were responsible for resolving this conflict. Through their collective powers of interpretation, application, and judicial review, the FWS and the federal courts generated an outcome that was largely efficient and protected procedural fairness. The analysis suggests that the quasi-judicial process was superior in ensuring procedural fairness because it allowed many opportunities to refine the conditional rights allocation and more effectively addressed increased scientific capacity. In contrast, the judicial process tended to focus on a single legal issue that detracted from the fundamental conflict issue. Certainly, the quasi-judicial process was better positioned to deal with the real issue at stake. The analysis also suggests that the judicial process produced more substantively efficient outcomes because the party with the highest valued use won. Shortcomings in the substantive efficiency of the quasi-judicial process arose from inordinate limitations on the conditional rights assigned to environmentalists. Judicial review merely validated the conditional rights assignment of the quasi-judicial process.

Both processes inadequately addressed the issue of increased scientific capacity. The most successful attempt to address increased scientific capacity was the 1982 amendments to the ESA and the subsequent rules adopted by the FWS, which allowed for the nonessential experimental species designation.

Nonessential experimental species designation allows the FWS to overcome some landowner objections to the new and particularly contentious concept of reintroduction. This demonstrated the flexibility of the quasi-judicial process to adapt to increased scientific capacity. However, the quasi-judicial process was less successful in addressing the hybridization issue, which arose in the 1990s. Indeed, the FWS seemed to lack adequate procedures for fully dealing with this new information. The judicial process may have more success in the future in interpreting statutes with regard to these issues. In its current form, however, the judicial process was constrained to the legal issues raised and increased scientific capacity had no role in its dispute processing.

A. *Implications—Disputes with Increased Scientific Capacity*

This article has reviewed the issue of increased scientific capacity and the performance of dispute processing in a leading ESA conflict. The main lesson learned is that although quasi-judicial and judicial processes perform well in assigning refined rights, the procedures for dealing with increased scientific capacity are poorly developed. Many questions of law and policy are raised. Has the application of the ESA begun to slide down a slippery slope where highly contentious conflicts of interest are inappropriately affected by or even exacerbated by new technology? Will the ESA be perversely implemented on species kept “artificially” alive or viable through technology? Will technological advances be used to control land uses on private lands through reintroductions? Will science further constrain landowners currently affected by ESA restrictions? Will an increasingly expansive ESA undercut its political feasibility?

Scholarly research on increased scientific capacity and the comparative institutional analysis of the red wolf conflict suggests answers to some of these questions. First, the most direct way to deal with issues of increased scientific capacity is with the legislative process through an amended ESA. However, the political feasibility and the capacity of the legislature to codify social preferences for a constantly evolving scientific capacity are unclear. Environmental interests may also be as wary about reopening debate on the ESA as landowners are about the possibility of a more far-reaching ESA. Both groups may prefer the imperfect-but-flexible-resolutions offered by quasi-judicial bodies.

Thus, a second conclusion points to the potential flexibility of quasi-judicial processes in dealing with increased scientific capacity. Quasi-judicial bodies have the expertise and time to make sensible rules, which process new genetic evidence and capabilities for reintroducing species to their natural habitats. The quasi-judicial process is, nonetheless, vulnerable to strategic use and

can develop its own interests. The red wolf conflict demonstrated that the FWS accommodated increased scientific capacity in terms of reintroduction better than genetic evidence on hybridization. Landowner parties will likely increase their challenges of the genetic applicability of ESA rules and perhaps reduce the number of challenges in courts.

There also may be future opportunities for environmental parties to use the ESA perversely to secure joint benefits. Reintroduction can be used to protect key habitat and the species itself, so some environmental groups may prefer trading off some species protection for greater habitat protection. This threat may increase with the potential to generate endangered species in the laboratory. The effect of increased scientific capacity on habitat conservation plans, which were popular during the Clinton administration, remains unknown. In sum, it is more likely that scientific discoveries may be applied strategically to well-intentioned laws for rent seeking and to the detriment of social efficiency.

Third, the emerging disconnection between the genetics of listed species and current species raises important policy issues concerning the effect on private landowners who maintain habitat for these species. A naïve perspective of the 1973 ESA seemed to accept that nature was an effective randomizing device, where all landowners risked being constrained if a species on their land turned out to be endangered or threatened. After several years of the ESA, however, the snail darter conflict³⁶⁸ clarified that the ESA could be used selectively to preserve habitat on certain lands of political interest. More recently, policy makers have been concerned with preemptive habitat destruction, where a landowner selects a land-use management plan that destroys habitat that might be constrained in the future. Reintroduction intensifies all these concerns. ESA affected landowners are no longer victims of chance: it is scientists and others in the policy process who identify those to be constrained. Reintroduction also limits landowners' option for preemptive habitat destruction, their primary extra-legal resolution process. The possibility of reintroduction coupled with advances in the laboratory could potentially affect almost any owner of undeveloped land. This expands the numbers sharing interests with the landowner party who may object to the ESA. At the same time, a broader application of the ESA, resulting from increased scientific capacity, will likely enhance the total non-use values accruing to environmentalists, but at a decreasing rate.

After some critical point, further extensions of the ESA may generate more aggregate animosity than support, and ultimately, more costs than benefits. The red wolf conflict demonstrates how quasi-judicial processes, in conjunction

368. *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 194-95 (1978).

with judicial review, will likely make such trade offs. However, if one is only concerned with the effect of increased scientific capacity on the coherence of the ESA—and not the broader issues associated with comparative institutional analysis—then the clear implication is that Congress must revisit the ESA and give guidance. Congressional intent must be clarified on how the interests of landowners and environmentalists will be balanced when new genetic evidence emerges, particularly with regard to hybridization, when reintroduction is appropriate, what the limitations to reintroduction are, what criteria should be used to determine the viability of species in the wild versus species in the laboratory, and to what extent should viability affect listing and delisting procedures.