Florida State University Journal of Land Use and Environmental Law

Volume 1
Number 1 *Winter 1985*

Article 1

April 2018

The Valuation of Wetlands

Kathryn Gale Winter Cowdery

Karl Scheuerman

J. Christopher Lombardo

The Valuation of Wetlands

Cover Page Footnote
The authors are indebted to the work of Daniel Lewan, who contributed greatly to the content of this article.

JOURNAL OF LAND USE AND ENVIRONMENTAL LAW

VOLUME 1 WINTER 1985 NUMBER 1

THE VALUATION OF WETLANDS

KATHRYN GALE WINTER COWDERY,† KARL SCHEUERMAN,†† AND J. CHRISTOPHER LOMBARDO†††

I. INTRODUCTION

Florida wetlands are valued by appraisers in a variety of contexts: to determine market value in wetlands sales, to provide compensation in eminent domain proceedings, and to determine damages in administrative and court proceedings involving wetland destruction. Valuation also occurs for tax purposes. Special problems exist in determining the value of wetlands which can frustrate attempts to accurately appraise them. These problems must be understood in order for administrative agencies and the courts to hear and to decide complex wetland regulatory cases.

Understanding wetland valuation requires consideration of many disciplines including biology, chemistry, social sciences, economics, and state and federal law. The term "wetland" must be defined so that the area under study can be identified, and the various situations in which wetlands are valued must be understood to determine the correct valuation technique to apply. Different valuation models should be explored, and the shortcomings of each identified. If practitioners understand the major points of wetland appraisal, they will be able to present hearing officers and judges with relatively sophisticated, comprehensive, and accurate information upon which rulings can be based. Increasing such understanding is the purpose of this article.

† Associate, Madigan, Parker, Gatlin, Swedmark, and Skelding, Tallahassee, Florida. B.S. in Biology 1978, Florida State University; J.D. 1982, Florida State University.

†† Staff Attorney, Florida Department of Business Regulation, Tallahassee, Florida. B.S. 1979, Indiana University; J.D. 1982, Florida State University.

††† Associate, Asbell, Hains, Doyle & Pickworth, Naples, Florida. B.A. in Political Science 1980, University of Central Florida; J.D. 1983, Florida State University.

The authors are indebted to the work of Daniel Lewan, who contributed greatly to the content of this article.

II. The Definition and Functions of Wetlands

The Warren S. Henderson Wetlands Protection Act of 1984[1] (Wetlands Protection Act) includes the first Florida statutory definition of "wetlands." The Act provides that "[f]or purposes of dredge and fill permitting activities by the department, "wetlands" are defined as those areas within department jurisdiction pursuant to section 403.817."[2] The Wetlands Protection Act, then, makes use of current Department of Environmental Regulation (DER) regulatory powers pursuant to section 403.817 to define wetlands. An early draft of this legislation had included a definition of "wetlands" based on a description of wetland characteristics.[3]

The DER's regulatory jurisdiction, determined pursuant to section 403.817, extends to the "landward extent of the waters of the state,"[4] which is determined by examining the species of plants or soils at a site and determining whether they are indicative of land regularly and periodically inundated with water.[5] The DER implements section 403.817 through maintenance of a list of such plant species in the form of a "vegetative index."[6] Any changes to the vegetative index must be approved by the legislature.[7] The 1984 Legislature ratified significant changes to the vegetative index rule which had been adopted by the Environmental Regulatory Commission on January 25, 1984.[8] In addition, the legislature created a nine member Vegetative Index Review Committee to review the operation of the vegetative index rule and to recommend any necessary changes.[9]

The DER has authority to determine the landward extent of waters of the state, and thus wetlands, by use of soil and plant indica-

---

1. The Warren S. Henderson Wetlands Protection Act of 1984, ch. 84-79, 1984 Fla. Laws 202 (to be codified at FLA. STAT. §§ 403.901-.915).
2. Ch. 84-79, § 1, 1984 Fla. Laws 204 (to be codified at FLA. STAT. § 403.902(4)).
3. Wetlands were defined as "all lands which are characterized by the presence of water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions and which are commonly referred to as swamps, marshes, saltmarshes, wet prairies, bayheads, bogs, or similar terms, including the Everglades." PCB 84-6, House Committee on Natural Resources, 1/20/84 draft of the Wetlands Protection Act, available from the Committee.
4. FLA. STAT. § 403.817(2) (1983).
5. *Id.*
6. FLA. ADMIN. CODE Rule 17-4.02(17) (1982). The index as amended in 1984 will be FLA. ADMIN. CODE Rule 17-4.022 (1984). *See infra* note 8.
7. FLA. STAT. § 403.817(3) (1983).
8. Ch. 84-79, § 9, 1984 Fla. Laws 216.
9. *Id.* at § 9(8).

tors.[10] Currently, it uses only plant indicators to determine the landward extent of such waters even though soil saturation is considered to be the most pervasive characteristic of wetlands.[11] The Wetlands Protection Act recognized the importance of soil saturation in determining the DER's jurisdiction. A permit applicant may request a soils assessment to determine whether hydric soils at the site corroborate a finding of DER jurisdiction based on vegetation.[12] Hydric soils are simply those which are saturated with water. If a permit applicant's soils assessment indicates the presence of hydric soils in conjunction with dominant vegetation, the DER is presumed to have jurisdiction. Where an absence of hydric soils is indicated, the DER is presumed not to have jurisdiction.[13] Additionally, the DER is directed to investigate the creation of a wetlands indicator index using soils in combination with vegetation.[14]

This recognition by the legislature of the importance of soil indicators is a retreat from a proposed requirement in a draft of the Wetlands Protection Act that the DER adopt by rule a methodology for use of soils to establish jurisdiction, either alone or in combination with vegetation, or both.[15] The extent of saturation determines the species of plants and animals which are able to survive in a wetland area. Soil saturation is thus a factor in distinguishing the various types of wetlands.

Traditionally, the determination of what is a wetland has created much confusion. Different interpretations of the definition of "wetlands" undercut the effectiveness of legislation designed to

10. *See supra* note 4.

11. L. COWARDIN, V. CARTER, F. GOLET AND E. LAROE, CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES, 3 (1979) [hereinafter cited as COWARDIN]. This is a report on a study performed for the U.S. Department of Interior. It can be obtained through the U.S. Government Printing Office, Stock Number GPO 024-010-00524-6.

12. Ch. 84-79, § 1, 1984 Fla. Laws 204 (to be codified at FLA. STAT. § 403.905(3)).

13. *Id.*

14. *See supra* note 8, at § 14.

15. PCB 84-6, House Committee on Natural Resources, March 8, 1984, draft of the Wetlands Protection Bill, § 10. The Committee proposed to appropriate $86,000 from the General Revenue Fund to the DER for the purpose of adopting such rules.

protect them.[16] Basically, wetlands fall within one of five categories. The first type, marshes and swamps, supports hydrophytes and is composed of hydric soils.[17] Hydrophytes are plants specially adapted for growth in water. A second type of wetland has hydric soil which cannot support plant life;[18] for example, a lowland flat where tidal action or salt concentration prevents plant growth. A third wetland variety supports hydrophytes but is too newly formed to have developed hydric soil.[19] Excavations illustrate this variety. A fourth wetland type is composed of rocky waterfront areas which can support limited numbers of hydrophytes, such as seaweed, but which do not have hydric soils.[20] The final wetland category has neither hydrophytes nor hydric soils; gravel beaches are a good example.[21]

To appraise wetlands, their functions and benefits must be identified. Many of the services wetlands provide "for free" would be very expensive if replaced by artificial systems. The Wetlands Protection Act recognizes that wetlands "perform economic and recreational functions that would be costly to replace should their vital character be lost . . . ."[22] One of the most important functions of wetlands is the conservation of water. Wetlands serve as water storage banks by holding excess water during the rainy seasons and releasing water during the dry seasons. These areas serve as natural funnels for channeling water to underground aquifers, which in turn provide water for drinking and commercial use. As the num-

---

16. New York experiences this problem in the courts' interpretations of its wetlands legislation. The statute defines "freshwater wetlands" as "lands and waters of the state as shown on the freshwater wetlands map . . . ." N.Y. Envtl. Conserv. Law § 24-0107 1 (McKinney, 1983). The court in People v. Bondi, 104 Misc. 2d 627, 429 N.Y.S.2d 146, 147 (Town Ct. of Webster, 1980) held that wetlands must be mapped before they would be protected under the statute. In TriCities Industrial Park v. Commissioner, 76 A.D.2d 232, 430 N.Y.S.2d 411 (N.Y. App. Div. 1980), the court held that in the absence of a map it is not unreasonable to regulate wetlands.

17. COWARDIN, *supra* note 11. *See generally* C. WHARTON, H. ODUM, K. EWEL, M. DUEVER, A. LUGO, R. BOYT, J. BARTHOLOMEW, E. DEBELLEVUE, S. BROWN, M. BROWN AND L. DUEVER, FORESTED WETLANDS OF FLORIDA—THEIR MANAGEMENT AND USE 1, 11 (1976) [hereinafter cited as WHARTON].

18. COWARDIN, *supra* note 11.

19. *Id.*

20. *Id.*

21. *Id.*

22. Ch. 84-79, § 1, 1984 Fla. Laws 203 at first "Whereas Clause." The cited language is a retreat from the DER's February, 1984, proposed draft which stated: "The state's surface waters and wetlands are valuable and fragile resources. Wetlands attenuate flooding, improve fresh water supply, purify water of pollutants, and protect many species of fresh water and salt water fish, and wildlife." *See* DER Feb. 29, 1984, draft of the Wetlands Protection Bill, available from the Department of Environmental Regulation.

ber of wetlands decreases, the water levels of the aquifers drop, causing salt water intrusion or sink holes.[23] In the same way, wetlands lessen the possibility and impact of floods.

In addition to flood protection, many coastal wetlands serve as buffer zones by reducing the impact of waves and tidal changes, thus maintaining upland real estate values through erosion prevention.[24] This water management function of wetlands is recognized in the Wetlands Protection Act. Under the act, the DER is directed to encourage natural means of stormwater management by establishing performance standards for stormwater permits issued for using certain waters.[25]

Some researchers believe that wetlands have a natural ability for treating waste.[26] Many nutrients, particularly phosphates and nitrates from agricultural areas and sewage treatment plants, are removed in wetlands.[27] Research indicates that removal of these nutrients by artificial means would require a large expenditure of money for a system that may be less efficient than a natural wetland system.[28] The Wetlands Protection Act directs the DER to establish by rule criteria for the use of certain wetlands to receive and to treat domestic wastewater which has been treated and upgraded to at least secondary standards.[29]

Wetlands also function as nursery grounds for marine species of recreational and commercial value.[30] In addition, wetlands provide a collecting area for detritus. Detritus is the food source of the smallest animals in the food chain,[31] which in turn are the food source for more valuable species. Hence, commercial and sport

---

23. *See* WHARTON, *supra* note 17, at 312.
24. *Id.* at 310.
25. Ch. 84-79, § 1, 1984 Fla. Laws 209 (to be codified at FLA. STAT. § 403.906(4)).
26. Reed, *Wetlands, a Major Southern Challenge*, 1 ENVIROSOUTH 2, 4 (Spr. 1977).
27. Researchers at the University of Florida studied the effect of depositing treated sewage wastes into a small cypress dome. During the process of nutrient uptake in the wetland, vegetation increased and reduced dissolved oxygen, resulting in a reduction of the fish population. Other than the effect on the fish population, no detrimental effects were discovered. *See* WHARTON, *supra* note 17, at 320-28.
28. From an economic standpoint, the cost of maintaining this method was approximately $0.27 per 1000 gallons of water. In comparison, other methods of comparable waste treatment cost anywhere from $0.17 to $1.00 per 1000 gallons. *See Id.* at 327.
29. Ch. 84-79, § 1, 1984 Fla. Laws 209 (to be codified at FLA. STAT. § 403.906(5)).
30. B. HARRIS, K. HADDAD, K. STEIDINGER AND J. HUFF, ASSESSMENT OF FISHERIES HABITAT: CHARLOTTE HARBOR AND LAKE WORTH, FLORIDA 13-15 (1983) [hereinafter cited as HARRIS]. This document is a Final Report for a contract for the DNR Bureau of Marine Research, Marine Research Laboratories.
31. McGregor & Dawson, *Wetlands and Floodplain Protection*, 64 MASS. L. REV. 73, 74 (1979).

fishing directly or indirectly rely on detritus production to support the stock of valuable fish.[32] To remove or alter wetlands could disrupt the food chain which would eventually have a negative impact on the economy of an area dependent on commercial or recreational fishing industries.[33]

Wetlands provide other benefits not easily quantified in monetary terms. For instance, the Wetlands Protection Act expressly recognizes the recreational value of wetlands.[34] Further, the Wetlands Protection Act considers the functions performed by wetlands in granting or denying dredge and fill permits.[35] In determining that a project is not contrary to the public interest, the DER will include an assessment of the current condition and relative value of functions being performed by areas affected by the proposed activity.[36]

III. THE CONTEXTS OF VALUATION

The process of valuation occurs in a variety of contexts. Valuation is required in real estate transactions between private parties, and in transactions between a state agency and a private party where taxation or environmental regulation is involved. The valuation method used is controlled to a considerable extent by the precise context in which valuation occurs. For example, a market data approach is generally used where a private landowner either sells to another private landowner or claims that actions of a sovereign have resulted in a "taking" for which full or just compensation of the property was not paid.[37] On the other hand, valuation in a regulatory context usually involves some type of cost-benefit analysis. As a practical matter most accounts of the application of valuation principles are found in the various case reporters. It should be ac-

32. House Comm. on Natural Resources, Bill Analysis, PCB 84-6, at I.A.(4) (Feb. 6, 1984).

33. McGregor & Dawson, *supra* note 31.

34. *See supra* note 25. Earlier in the 1984 session, the House Committee on Natural Resources had specifically recognized the open space, educational, scientific and research values of wetlands. PCB 84-6 Bill Analysis, *supra* note 32, at I.A.(8) and (9).

35. Ch. 84-79, § 1, 1984 Fla. Laws 208 (to be codified at FLA. STAT. § 403.906(2)(g)). It is arguable whether the "functions" to be considered are limited to the stormwater management and wastewater treatment functions, criteria for which will be determined by rule, or whether the DER is free to consider other functions not defined by rule.

36. *Id.*

37. For instance, section 380.08(1), FLA. STAT. (1983), provides that nothing in the Florida Environmental Land and Water Management Act of 1972 authorizes a taking without payment of full compensation to the landowner.

knowledged, however, that the valuation of wetlands is a process which occurs on an almost daily basis in a multitude of non-adversarial contexts, such as the outright sale of a tract of land by one private person to another.

Wetlands are routinely appraised by the Department of Natural Resources (DNR) Bureau of Appraisal. The two primary contexts in which valuation occurs at the DNR are state acquisition of property, and leasing of submerged sovereignty land.[38] The DNR appraises wetlands for state acquisition as Conservation and Recreation Lands (CARL).[39] Wetlands are particularly suitable purchasing targets under the CARL program since part of the CARL Trust Fund may be allocated to acquire any interest in lands used:

> 1. For use and protection as a natural flood plain, marsh, or estuary, if the protection and conservation of such lands is necessary to enhance or protect water quality or quantity or to protect fish or wildlife habitat which cannot otherwise be accomplished through local and state regulatory programs;
> 2. For use as state parks, recreation areas, public beaches, wilderness areas, or wildlife management areas; or
> 3. For restoration of altered ecosystems to correct environmental damage that has already occurred.[40]

The commercial and private development of wetlands is expensive and time consuming because of the permitting constraints imposed on such development by the state. The commercial demand for wetlands is thus lower today than it has been in the past. As a result, the state is probably the largest buyer of wetlands in Florida.[41] Governmental entities purchase floodplain lands in order to reduce potential flood losses. Whether a fee simple or a lesser interest is conveyed, an appraisal of the wetlands is almost always required.[42] The valuation of sovereignty lands is based on its use in conjunction with the highest and best use of the riparian upland.[43]

---

38. Interview with Kennard P. Howell, Chief, Bureau of Appraisal, Division of State Lands, DNR, Tallahassee, Florida (Feb. 2, 1984) [hereinafter cited as Howell].

39. *See* FLA. STAT. § 253.023-.025 (1983). The purpose of the CARL Trust Fund is to assure the availability of recreational lands for Florida citizens.

40. FLA. STAT. § 253.023(3)(b) (1983).

41. Howell, *supra* note 38.

42. Floyd, *Valuation of Floodplain Lands for Stream Valley Parks*, LI THE APPRAISAL J. 202 (1983).

43. Division of State Lands, DNR, INSTRUCTIONAL MEMO 82-2, VALUATION OF UNECONOMIC TRACTS OF SOVEREIGNTY LANDS ADJACENT TO UPLANDS, (March 17, 1982).

Valuation in this context is thus in terms of the property's value to the buyer. This context is usually commercial.

IV. Economic Methodologies for Wetland Valuation

A. *Valuation by Direct Sales Comparison: The Market Data Approach.*

Traditionally, real estate is appraised by comparing the property to sales of similar property.[44] This method, commonly referred to as the market data approach, is also used for appraising wetlands.[45] While straightforward, this evaluation technique is difficult to apply to wetland sales. Data of sales directly comparable to the wetland valuation at issue must exist. Often, this market data is scarce.[46] The DNR uses this method of valuation when it appraises lands for possible acquisition under the CARL program. The DNR's Bureau of Appraisal has difficulty finding sales data for parcels of property that are completely wetlands.[47]

This scarcity of comparative data, and the inability of a buyer to develop a wetland area because of restrictions imposed by the numerous government agencies involved in approving wetland development,[48] results in low marketability of this type of property. Because the use of wetlands is heavily regulated, buyers generally do not purchase wetlands with development in mind. Wetlands do have other uses, however, and certain wetland areas are prime recreation spots. The typical buyer seeks beach access for boating, hunting, or other activities.[49]

The paucity of wetland sales means that an appraiser must search for comparable transactions by inspecting records of either recent takings of tax titles, or sales to hunting clubs, conservation groups, or municipalities.[50] Interestingly, the DNR Bureau of Ap-

---

44. *See, e.g.* Floyd, *supra* note 42, at 205.

45. Reenstierna, *Appraisal of Wetlands*, 46 The Real Estate Appraisal and Analyst 4, 7 (May-June 1980).

46. The problem of scarce data is increased when the wetland is unique or specialized; a good example is a floodplain. *See* Floyd, *supra* note 42.

47. Howell, *supra* note 38.

48. Reenstierna, *supra* note 45, at 6. In Florida, wetlands can be regulated by the United States Army Corps of Engineers, the U.S. Department of Urban Development, the Florida DER, the Florida DNR, and the Florida Department of Community Affairs, as well as local governments.

49. Kline, *An Alternative Method of Valuing Nondevelopable Waterfront Land and Beaches*, LII The Appraisal J. 53 (1984).

50. Reenstierna, *supra* note 45, at 7. Reenstierna believes that sales to municipalities

praisal has witnessed wetland prices inflate over the years.[51] Because of the lack of wetlands sales, however, prices may drop in the future.[52] The 1984 Legislature directed property appraisers to consider the effect of issuance or denial of a dredge, fill, or other construction permit by the DER when determining wetland value, and "any limitation such issuance or denial may impose on the highest and best use of the property to its landward extent."[53]

B. *Alternatives to Direct Sales Comparison*

When comparable market data is not available, methods other than the direct sales comparison approach must be used. An appraiser can look to values of upland property in the vicinity of the wetlands. That value can then be adjusted, generally downward,[54] after looking at factors that affect the wetland property's value. Physical inaccessibility[55] and government restrictions are examples of factors which decrease the value of wetlands as compared to uplands. On the other hand, a wetland can be used to satisfy open space requirements where mandatory dedication is required in large developments.[56]

Another method which can be employed to appraise wetlands when no direct sales data exists is to research sales of real estate where the parcel consists of both uplands and wetlands. The appraiser subtracts the upland property value from the sale price to determine the value of the wetland portion of the parcel.[57] Where a parcel consists of both wetlands and uplands, it is not unheard of for the buyer to pay for the value of the uplands, and to have the wetlands which cannot be developed "thrown in."[58]

---

should be avoided in most cases since the sales may not reflect the market value. He cites, however, Loring v. Barnstable, (Commonw. of Mass., Super. Ct., Barnstable Co.) Civ. Act. No. 35,155, as holding that a public agency active in acquisition created a market and a level of value that may be applied to other land suited for conservation.

51. One reason for increased prices of wetlands is the correlative increase in land values generally, notwithstanding the fact that wetlands usually will not be able to be developed. Howell, *supra* note 38.

52. *Id.* Mr. Howell cited an example in which a parcel of property made up primarily of wetlands was purchased by investors for $1000 per acre. A recent state appraisal of the property considered the property as nondevelopable. The price range on several parcels from the original purchase was between $175 and $250 per acre.

53. Ch. 84-79, § 3, 1984 Fla. Laws 214 (to be codified at FLA. STAT. § 193.023(5)(a)).

54. *Id.*

55. Reenstierna, *supra* note 45.

56. *Id.* at 6.

57. Floyd, *supra* note 42, at 205-7; Reenstierna, *supra* note 45, at 7.

58. Howell, *supra* note 38.

The subdivision or development procedure of valuation is used to appraise waterfront property which cannot be developed.[59] Under this method, the appraiser determines retail land values[60] regardless of whether demand for the wetland property actually exists. The appraiser also estimates the proper absorption rate and then prepares a hypothetical subdivision plan for the area based on similar subdivisions approved by local authorities.[61] This method supposedly eliminates subjective adjustments of value for particular wetlands caused by consideration of factors affecting the marketability and value of the particular wetland. However, the method artificially creates a subdivision as if development were allowed, which would seem to inflate the appraisal. Furthermore, an appraiser still must estimate an initial value of the property. Nonetheless, the U.S. Department of the Interior uses this method of appraising those waterfront lands which cannot be developed, and the Internal Revenue Service uses it to value beaches for estate tax purposes.[62]

C. *Valuation to Determine the Benefits of Wetlands to Society*

The DER values wetlands primarily in the context of determining restoration costs in enforcement actions and damage amounts in court cases.[63] To determine the value of a wetland, basic economic theory is used to quantify and to measure the monetary value of the benefits derived. Many different methodologies have been developed to handle this economic problem. A contrasting method of wetlands valuation is "opportunity cost." This method determines what is foregone by the decision to retain the wetlands.[64] This method is not dependent on baseline environmental

59. Kline, *supra* note 49.

60. *Id.* Kline suggests estimating land value by using one or more of the following methods:

> 1. Extraction from paired sales, with and without water frontage, or with and without beach rights;
> 2. Extraction of prices paid for nondevelopable portions of waterfront cluster or planned unit developments (PUDS);
> 3. Capitalization of annual membership fees in beach associations (without improvements or amenities);
> 4. Capitalization of annual membership fees in hunting, fishing, and canoe clubs, which own similar land; and
> 5. Sale of small waterfront lots for boathouses. *Id.* at 55.

61. *Id.* at 58.

62. *Id.* at 59.

63. Interview with Thomas A. Lynch, Chief Economist, DER (Feb. 21, 1984).

64. C. Austin, Decision Elements of Economic Damage Assessment, South Atlantic

data or ecological studies, but determines the cost of maintaining the wetland in its natural state by excluding development.[65] Crucial to determining value is the definition of "benefit," since the variables so defined form the basis of the wetland valuation. Just as important is the empirical method used to estimate benefits. The accuracy of the technique will obviously affect the usefulness and credibility of the final estimate of value. If valuation is to be undertaken at all, the test of reasonableness should be applied both to the methodology and to the results and the approach must be unbiased and disinterested.[66]

Benefits can be broken down roughly into two groups, physical and nonmaterial.[67] Physical benefits include goods and services derived from wetlands and can be divided further into three areas: physical products produced in and gathered from the wetland, products generated in the wetland but reaped elsewhere, and services provided by the wetland.[68]

Physical products produced in and gathered directly from wetlands are measured by the dollar value of their yields. These products include timber, aquacultural production, fisheries, organic fuels such as peat,[69] visitor days of recreational activity, and yields from hunting or trapping.[70] Physical products generated in wetlands but reaped elsewhere include animals that live in wetlands during one form or stage of their lives, but which are harvested elsewhere while in different life stages.[71] An analogous product in this category is one which is not consumed directly by people, but which is used to generate another product that people do consume, such as life forms eaten by fish or crustaceans which in turn are eaten by humans. These products are often overlooked and excluded from wetlands valuation.[72] Services which natural wetlands

---

Fishery Management Council (undated) (unpublished graph).

65. Letter from J. Alan Huff, Environmental Specialist, Bureau of Marine Research, DNR to K.G.W. Cowdery (May 29, 1984).

66. Foster, *Measuring the Social Value of Wetland Benefits*, in WETLAND FUNCTION AND VALUES: THE STATE OF OUR UNDERSTANDING 84, 89-90 (P. Greeson, J. Clark, & J. Clark, 1978) [hereinafter cited as WETLAND FUNCTION AND VALUES].

67. T. LYNCH AND D. BULLOCH, REVIEW OF ECONOMIC METHODOLOGIES IN ENVIRONMENTAL TANGIBLE AND INTANGIBLE ASSESSMENT, SUPP. 16 at 1 (1976) (available in DER Library).

68. *Id.* at 1, 13.

69. *See* Ch. 94-79, § 2, 1984 Fla. Laws 213 (to be codified at FLA. STAT. § 403.265), concerning DER regulatory powers over peat activities.

70. Lugo and Brinson, *Calculations of the Value of Salt Water Wetlands*, in WETLAND FUNCTION AND VALUES, *supra* note 66, at 120, 121.

71. Lynch and Bulloch, *supra* note 67, at 10-12.

72. *Id.* Lynch and Bulloch give as examples river swamps and tidal marshes which pro-

provide, and which often overlap with the products previously described, include flood control,[73] waste treatment,[74] and sea life nursery grounds.[75] The inability to pigeon-hole benefits into a uniform classification scheme is one of the problems of appraising wetlands.

A second type of benefit derived from wetlands is aesthetic or nonmaterial.[76] This type can be described broadly as the recreational aspect of wetlands.[77] This benefit is most often measured using a willingness-to-pay formula based on recreational value. One problem with this approach is that the accuracy of willingness-to-pay data is relatively untested.[78] When benefits are defined in terms of willingness-to-pay, a demand curve is directly or indirectly determined.[79] Willingness-to-pay is based solely on demand, that is, individual behavior and preference. The determination of use preference should include some measure of environmental quality, such as changes in pollution levels. Actual empirical data used should correspond as closely as possible to the variables of the theoretical model.[80] It is important that the empirical technique used account for any inadequacies in data so that the accuracy of estimated benefits is known.

Wetland valuation by willingness-to-pay is thus the sum of the values of individual benefit estimates. The benefits will usually include various physical products as well as aesthetic benefits. Complexities are caused by the existence of benefits which are not easily quantified or converted into monetary form. Markets for wetland services, such as fish and wildlife habitat, either do not exist or do not operate according to theoretically ideal criteria.[81] A variety of methodologies will be considered below, as no single ap-

---

duce little that can be consumed by people, but are highly productive for intermediate life forms.

73. Reed, *supra* note 26.

74. *Id.* Littlejohn, *Wetlands Protection: What's Ahead for 1984?* 37 J. FLA. ENGINEERING SOC'Y 8, 10 (Nov. 1983).

75. McGregor & Dawson, *supra* note 31; HARRIS, *supra* note 30; Larson, *Wetland Value Assessment—State of the Art,* 3 NAT. WETLANDS NEWSLETTER 4, 7 (The Envtl. L. Inst., Mar./Apr. 1981).

76. Lynch and Bulloch, *supra* note 67, at 3-10. Few other wetland regulatory programs consider recreation.

77. A. FREEMAN, III, THE BENEFITS OF ENVIRONMENTAL IMPROVEMENT, THEORY AND PRACTICE at 97-99 (1979).

78. *Id.* at 4, 10-11.

79. Lynch and Bulloch, *supra* note 67, at 3.

80. *Id.* at 4, 10-13.

81. Shabman and Batie, *Economic Analysis and Wetland Policy,* 3 NAT. WETLANDS NEWSLETTER 2, 2-3 (The Envtl. L. Inst., Mar./Apr. 1981).

proach is ultimately superior in estimating the value of the different types of benefits.

1. Value Based on Effort to Obtain Physical Goods

Physical goods that are produced and reaped in wetlands are the most easily quantified and valued. The total quantity of goods obtained is estimated from survey data relating the average number of physical products being obtained and the number of persons engaged in obtaining these products.[82] The total value of the goods is equal to the price of such goods in the marketplace. In other words, the value of the wetland is calculated by the dollar value of its yield.[83]

2. The Valuation of Nonmaterial or Aesthetic Products

The basic problems encountered in quantifying nonmaterial benefits are developing a model to estimate the quantity of derived benefits and developing a pricing scheme to estimate the value of each unit of benefit.[84] Methodologies based on a willingness-to-pay scheme use a demand curve to estimate consumption rates at various prices and to determine the social valuation of the product and the number of consumers at that price.

The "site specific recreation area model" is a commonly used method of quantifying benefits using a willingness-to-pay function.[85] This model is based on the assumption that the only costs involved with visiting the recreational area would be the travel and time costs involved in getting there. Concentric circular distance zones surrounding the recreational area are established and the participation rate for each zone gathered. A price-participation relationship is determined from the data which is then graphed as a demand curve. Social valuation of the recreational services is the product of the admission price charged which would maximize the owner's profit and the corresponding participation rate.[86]

The "population specific model" is very similar to the site specific recreation area model but is more complete. The "population specific model" considers more variables, such as characteristics of

---

82. Lynch and Bulloch, *supra* note 67, at 2.

83. Lugo, *supra* note 69.

84. *See* Lynch and Bulloch, *supra* note 76, for a thorough economic analysis of quantifying nonmaterial benefits.

85. *Id.* at 4-6.

86. *Id.*

alternative area recreation facilities. This model is expensive because it requires large population samples and is more complicated mathematically.[87]

"Scaling" and "weighting" approaches are designed to quantify environmental quality and aesthetics through the use of weighted subjective factors such as view, species habitat, or uniqueness.[88] These methods generally do not quantify the benefits well enough to compare preservation and development alternatives, but they may be a sufficient means for comparing different wetland areas.[89] The obvious problem with this methodology is the lack of both quantitative benefits and monetary value. The Institute for Water Resources maintains that the reliable application of absolute mathematical values is limited to the comparison of wetland areas within the same geographic locale.[90] Thus, although these methods may be the easiest to apply, they are the least useful.

The U.S. Army Corps of Engineers has developed a system of categorical ratings of wetlands through classification or location.[91] This type of evaluation has been of little use because of disagreement over a schedule of values.[92] The system of wetlands valuation currently in use by the Corps involves the comparison of numerical ratings of wetland variables after judgments are made. Deductive analysis, a non-quantitative approach, is used to evaluate wetlands where no site alternatives are present. The deductive analysis measures the degree to which each of the wetland variables is satisfied. A comparative analysis, semiquantitative in nature, measures two or more wetland areas simultaneously and documents the results in relative numerical value.[93]

Another scaling and weighting approach to forming a rational basis for deciding wetlands management options uses four basic

87. *Id.* at 6-7.

88. *Id.* at 15-16.

89. *Id.* at 16.

90. Reppert and Sigleo, *Concepts and Methods for Wetlands Evaluation Under Development by the U.S. Army Corps of Engineers*, in WETLAND FUNCTION AND VALUES, *supra* note 66, at 57, 61-62.

91. *See* Lynch and Bulloch, *supra* note 67, at 15, where the factors and weights are listed for small, urban river valleys: (1) natural habitat for various species (20%); (2) vegetation of the valley (20%); (3) appearance and quality of water in the stream (20%); (4) channel's appearance (10%); (5) floodplain vista (10%); (6) view of valley from above (10%); and (7) view of valley from below (10%).

92. Reppert, *supra* note 90, at 58.

93. *Id.* at 61.

steps.[94] First, all known values which can be applied to the wetlands are listed and assigned a numerical value of "1." Second, each factor is scaled in terms of a maximum level; that is, a product's scaled factor would be 0.5 if it were being supported at only 50 percent of the maximum possible support level. Third, each scaled factor is weighted in proportion to its relative importance to the other factors; for example, if value 2 is 10 times as important as value 1, it is multiplied by 10. Finally, the value index is obtained by adding the scaled and weighted values. This method, like the U.S. Army Corps of Engineers' model, is useful primarily in comparing different wetlands or different management options for a single wetland.[95]

3. The Replacement Value Approach

The value of services obtained from a wetland can be determined in a manner similar to the method described in Part C for physical goods.[96] The first step, quantification, is determined by estimating the scope of the wetland's functions, rather than by physically counting products. Wetlands perform "free externality" services, such as maintaining a certain level of water quality through nutrient uptake. If the wetland is destroyed, energy and technology must be substituted to perform the same work.[97] The value of the ecosystem is calculated by estimating the cost of the technological replacement for the wetland.

A related concept values the wetland by calculating the cost of replacing the natural ecosystem itself. The replacement value approach seems to be more satisfactory to economists than are other methods, such as the energy analysis discussed below, because an accurate estimate of the monetary costs associated with the loss of a "free" service performed by a wetland is usually possible.[98] The replacement value approach can be applied to situations where a decision must be made between a preservation alternative and development alternatives. Under this analysis it is assumed that an undisturbed area provides reusable services and is a nondepreciating asset.

One analysis, known as the Hells Canyon study, compared alter-

94. E. Odum, *The Value of Wetlands: A Hierarchical Approach*, in WETLAND FUNCTION AND VALUES, *supra* note 66, at 16, 22-23.
95. *Id.*
96. *See* Part C. 1. of this article.
97. Lugo, *supra* note 69, at 122.
98. Odum, *supra* note 94.

native possibilities — the preservation of the river and canyon and the development of a hydroelectric plant on the river.[99] The value of the preservation alternative was based on recreational demand.[100] The value of preservation alternative benefits is the demand for each time period the area is used. Essentially, the services are measured by the public's willingness to pay. Recreational benefits are quantified by determining the number of user days per year for each benefit. The number of days is then multiplied by a dollar value (imputed value per user day) to determine the economic value.[101]

In the Hells Canyon study, two variables introduced complexity into the benefit analysis: consideration of future growth in the demand for the benefit, or service, of recreation and consideration of the capacity limit of the canyon, which placed a limit on the demand schedule. Ideally, each separate benefit should have been quantified by determining the amount of "service" in demand by the public. Specific present worths of each benefit would be computed under the willingness-to-pay schedule, taking into account any congestion costs of distinct recreational activities occurring simultaneously.[102] The analysts opted against determining specific present worths because of the costs and complexities of that approach. Instead, a "compound demand function" was used, where the implied quantification measure was the aggregate willingness of users to pay for use of the area in its natural state. The result of this approach is that the preservation alternative value must equal or exceed the value of any individual development alternative for it to be a productive use of the area.

4. Multiple Use Models: A Hierarchical Approach

Multiple use models develop a series of models for one subject area. The models quantify all alternative uses, the qualities the region now possesses, the value and nature of development or use, and the extent to which development or preservation should be implemented for the optimization of economic benefits.[103] Essentially, this method extends the "traditional" benefit valuation approach by evaluating benefits simultaneously through linear program-

---

99. Krutilla and Cicchetti, *Evaluating Benefits of Environmental Resources With Special Application to the Hells Canyon*, 12 NATIONAL RESOURCES J. 1 (1972).

100. *Id.*

101. *Id.* at 9-13.

102. *Id.* at 12-13.

103. Lynch and Bulloch, *supra* note 67, at 16.

ming.[104] A total management plan and management plans for each of the potential uses are developed for the wetland area.[105]

Disadvantages of this system are its costs and the continuing problem of quantifying certain benefits.[106] For the system to work effectively it is necessary to understand how changes in the level of one or more of the variables, individually or taken together, translate into changes in the service or product yield. Economic, biological, and physical interactions must be understood and quantified.[107]

"Energy analysis" is a recently developed method of evaluating wetlands in monetary terms based on the "work" which wetlands perform in producing services and goods. The economic basis of the methodology is that the exchange of energy and money is the foundation of economic transactions.[108] The work of wetlands is estimated directly using net energy flow. This energy flow is the common denominator for evaluating a single water system, comparing different water systems, and valuing aggregate systems. Net energy flow is converted into a value-per-acre by multiplying the total net energy produced in the area by the ratio of GNP to the national energy consumption (dollar kilocalorie ratio).[109] The common denominator approach essentially clusters and sums the wetland values around a particular energy cycle or force. The main energy flows which contribute work are the sun, wind, water, tide, and land uplift.[110]

One researcher[111] proposed that value should be calculated on the basis of the magnitude of energy flow associated with the primary productivity of the ecosystem. There has been little productivity research, however, and hydrologic data is inadequate to document movement of produced organic matter.[112] There are, however, various methods for estimating the value of wetland bioproductivity. Under one method, the sum of the wildlife value that is produced or supported by the area is calculated and then divided by the acreage of the area. That resultant dollar-per-acre

104. *Id.* at 17.
105. *Id.* at 19.
106. *Id.*
107. Shabman and Batie, *supra* note 81, at 3.
108. Lynch and Bulloch, *supra* note 67, at 19-22.
109. *Id.*
110. WHARTON, *supra* note 17, at 404, 410.
111. H. ODUM, ENVIRONMENT POWER AND SOCIETY, (1971) as cited in LUGO, *supra* note 69, at 123.
112. Larson, *supra* note 75, at 6.

value of productivity can then be used to estimate an income-capitalized value-per-acre for the wetland.[113]

Another method begins with the estimate that two-thirds of the cash value of species harvested in the Atlantic and Gulf coasts are "estuarine dependent." Under this approach, the annual value of an acre of coastal Florida wetlands to commercial fisheries was $75.70 in 1971.[114] This approach has the advantage of available data in the form of national fisheries catch records. Disadvantages include the questionable estimate of the percentage of species that are in fact "estuarine dependent," and problems in proving that the average annual value applies to each distinct wetland area.

The energy analysis has been criticized for ignoring the basic economic laws of supply and demand as well as the problems of market failures, and for not recognizing that the estimates of primary production are actually measurements of "stored" energy and not the net "flow" of energy required in the analysis.[115]

V. Valuation of Wetlands: A Case Analysis

Recent court decisions involving wetland valuation have revealed a wide variety of judicial approaches. This lack of uniformity is the result of several factors, including the inherent complexity of the problem posed by valuation, the confusing array of economic and scientific techniques available, and the variation of contexts in which this process occurs.

In *Burkey v. Ellis*,[116] a federal district court was asked to enjoin the Soil Conservation Service from constructing a stream modification or channelization of the Blue Eye Creek in Alabama. Plaintiff, an affected landowner, argued that the environmental impact statement (EIS) submitted was invalid, and as a result, the decision to proceed with the channelization constituted an arbitrary decision in violation of provisions of the National Environmental Policy Act of 1969.[117] The plaintiff contended that the EIS was invalid because it used historic rather than current cost, a 100-year versus a 50-year project life, an interest rate of 3 ¼ percent versus a rate of 6 ⅜ percent at the time of the study, and erroneous rainfall data; plaintiff also contended that the EIS omitted factors

113. Lynch and Bulloch, *supra* note 67, at 11.

114. *Id.* at 12.

115. *Id.* at 20-21. The authors criticize Odum's model as being "practically void of economic theory."

116. 483 F. Supp. 897 (N.D. Ala. 1979).

117. 42 U.S.C. §§ 4321-4370a (1977).

such as loss of fishing resources, downstream flooding, and the destruction of woodlands when computing the cost/benefit ratio. Not considered by the court in making its determination was the impact on wetlands. This omission is significant as it represents one way to approach the wetland valuation issue, namely, to ignore it.

In many cases where wetland valuation is at issue, expert opinion is used. However, the types of data considered relevant and the weight given these opinions by the courts vary greatly. An excellent example of the futile use of expert witnesses in a wetland valuation case can be found in *Commonwealth of Puerto Rico v. SS Zoe Colocotroni.*[118] The First Circuit was confronted with the issue of actual dollar damages to be awarded as a result of an oil spill off Bahia Sucia on the southwestern tip of Puerto Rico. Over 5000 tons of crude oil were discharged into the sea in an attempt to refloat a tanker which had gone aground on a reef. The resulting oil slick washed ashore at Bahia Sucia, damaging the coast. To establish damages, the Commonwealth of Puerto Rico offered the testimony of numerous experts, including a wetlands specialist, an engineer, a contractor, a marine biologist, an economist, and a nurseryman. Plaintiff argued that damages for clean-up expenses already incurred — mangrove replanting and sediment removal, replacement of the invertebrate organisms killed by the oil spill, and continued monitoring of the area — added up to a total damage estimate of over $14,733,000.[119] The defense lined up an equally impressive array of experts to refute plaintiff's estimates, including a wetlands expert, a biologist, a marine biologist, and a marine contractor. The total cost of defendant's proposed remedial measures was just under $1 million. Without evaluating the accuracy of the dollar estimates, the court rejected both damage theories and remanded the case to the district court with instructions to reopen the record for further evidence on the issue of damages. To assist the lower court in this task, the court stated:

> . . . we think the appropriate *primary standard* for determining damages in a case such as this is the *cost reasonably to be incurred* by the sovereign or its designated agency *to restore or rehabilitate the environment* in the affected area to is [sic] preexisting condition, or as close thereto as is feasible *without grossly disproportionate expenditures.* The focus in determining such a remedy should be on the *steps a reasonable and prudent*

118. 628 F.2d 652 (1st Cir. 1980), *cert. denied,* 450 U.S. 912 (1981).
119. *Id.* at 661.

> *sovereign or agency would take to mitigate the harm done by the pollution*, with attention to such factors as technical feasibility, harmful side effects, compatibility with or duplication of such regeneration as is naturally to be expected, and the extent to which efforts beyond a certain point would become either redundant or disproportionately expensive. Admittedly, such a remedy cannot be calculated with the degree of certainty usually possible when the issue is, for example, damages on a commercial contract. On the other hand, a district court can surely calculate damages under the foregoing standard with as much or more certainty and accuracy as a jury determining damages for pain and suffering or mental anguish.[120]

In addition to the restoration measure of damages, the court also indicated its approval of a measure of damages based on diminution in market value caused by the oil spill.[121] Under this measure the difference between the commercial or market value before and after the event causing injury is awarded. Puerto Rico did not attempt to establish this loss, however, probably because the wetlands had no significant commercial or market value. The defendant had produced evidence showing that comparable property in the vicinity was selling for less than $5000 per acre.[122]

The court ruled that plaintiff would not be restricted to this measure of damages because the negligible market value rendered the wetlands commercially useless.[123] It also held that the applicable Puerto Rico statute authorizing recovery for the "total value of the damages caused to the environment and/or natural resources"[124] implied an intention not to restrict the state to ordinary market damages. A strict application of the diminution in value rule would deny the state meaningful recovery, as many ecological factors represent little commercial value.[125]

The court finally approved damages in the amount required to restore or rehabilitate the environment. Direct restoration expenses are awarded unless rehabilitation is physically impossible or unreasonably and disproportionately expensive.[126] The court recognized that traditional methods of real property valuation should

120. *Id.* at 675 (footnote omitted) (emphasis added).
121. *Id.* at 672-74.
122. *Id.* at 672-73.
123. *Id.* at 673-74.
124. *Id.* at 673 *quoting* 12 L.P.R.A. § 1131(29).
125. *Id.* at 673.
126. *Id.* at 675.

have little bearing on situations in which ecological factors are present. The court rejected a second theory of damages based on the summation of the replacement values of the estimated 92 million invertebrate animals destroyed by the spill. This theory was rejected in part because no actual replacement of the creatures was being contemplated.[127]

Sometimes, as in *Florida Wildlife Federation v. Goldschmidt*,[128] the experts agree. The federal district court evaluated the damage to wetlands in South Florida caused by the construction of a segment of Interstate 75 from Broward County to Dade County. The expert witnesses for both sides agreed that "these wetlands are already degraded because of drainage unrelated to the highway. Thus the loss is, from an environmental standpoint, not significant, and from a practical viewpoint, irreversible whether or not I-75 is constructed."[129] The court further determined that the harm to the environment which could result from the challenged highway construction did not outweigh the monetary loss from the delays in construction.[130] Implicit in this determination is the application of a balancing approach, with each factor equally weighted. In the court's analysis, environmental factors do not outweigh "other legitimate and appropriate considerations."[131]

South Louisiana Environmental Council, Inc. v. Sand[132] gave a narrow interpretation of the court's power to review the economic assumptions underlying the cost-benefit analysis in an EIS. The Fifth Circuit held that the only role for a court was to "insure that the agency has considered the environmental consequences."[133] The court also ruled that ". . . agencies are not required by NEPA to 'elevate environmental concerns over other appropriate considerations.' "[134] Considerable evidence was presented showing that completion of the project in the Atchafalaya River basin in south-central Louisiana would result in the erosion of hundreds of acres of coastal wetland. Further evidence showed additional flood protection measures may be necessary which would destroy thousands

127. *Id.* at 676.
128. 506 F. Supp. 350 (S.D. Fla. 1981).
129. *Id.* at 365.
130. *Id.* at 369.
131. *Id.* at 375.
132. 629 F.2d 1005 (5th Cir. 1980).
133. *Id.* at 1011, *quoting* Strycker's Bay Neighborhood Council, Inc. v. Karlen, 444 U.S. 223 (1980).
134. *Id.*

of additional acres.[135] The court declined to enjoin continued project construction because the Corps had "acted in objective good faith throughout the consideration of this project."[136]

State v. Sapp[137] is a wetland valuation case of significant impact to Florida practitioners. For a period of ten years, the Sapp Battery Service Corporation was in the battery salvage business in Jackson County, Florida.[138] As part of its regular business, the corporation purchased used vehicle batteries and stripped the lead for sale to smelters. The remaining contents, including sulfuric acid and cadmium were emptied directly into a cypress swamp. It was estimated that 50,000 batteries per week were disposed of in this fashion.[139]

The DER brought an action for damages in early 1981.[140] In May of 1981, a Final Judgment was entered permanently enjoining Sapp from any further violations of the state pollution laws and requiring restoration of the site by removing the battery casings and fill material and appropriately revegetating the area.[141] Also, the court ordered groundwater studies and monitoring of the stream flowing off the property which emptied into the Chipola River. Finally, if the water quality standards indicated violations of pertinent state standards, Sapp was required to apply the best available treatment technology to control discharges of contaminated water into state waters.[142]

In July of 1981, a Supplemental Judgment was entered which determined that Sapp had not complied with any part of the previous Final Judgment.[143] The court awarded over $6.6 million in damages to the state for the loss incurred by the destruction of its water related resources. The Supplemental Judgment allowed the DER to reapply to the court for further monetary relief if necessary.[144] The damage figure was based on an environmental eco-

135. *Id.* at 1015.
136. *Id.* at 1018.
137. Case No. 10-81-74; 14th Jud. Cir., Jackson County, Florida (1981).
138. Tallahassee Democrat, July 26, 1981, at 1, col. 1.
139. *Id.*
140. *Supra* note 137.
141. State v. Sapp, Final Judgment, Case No. 10-81-74; May 15, 1981.
142. *Id.*
143. State v. Sapp, Supplemental Final Judgment, Case No. 10-81-74; July 14, 1981. The Sapp judgment awarded the state approximately $11,000 in costs and attorney fees, and imposed a civil penalty of $4,530,000 in view of the Defendant's longstanding noncompliance with the DER directives.
144. *Id.*

nomic damage assessment study performed by the DER.[145] This study utilized a restoration plan which contemplated extensive removal of contaminated fill material and the limited treatment of contaminated water. The total restoration cost of the plan was an estimated $5.1 million which included assessments for monitoring the site and conducting various water and soil tests.[146]

In addition to these restoration costs, the agency sought to evaluate the ecological impacts of the site. This aspect of the study focused on offsite externality impacts, including a calculation of the value of the annual destruction to freshwater fishing in Jackson County, an assessment of the loss of non-fishing outdoor recreational activities, and an estimate of annual timber losses.[147] The destruction to the wetlands was also measured, based on the cost of replacing the services provided by the swamp. These services included surface water storage, soil and groundwater recharge, atmospheric heat storage and modification, soil erosion protection, storm drainage protection, waste disposal, and recreation.[148]

The economic analysis performed by the DER in the Sapp case represents a progressive, informed, and integrated approach to wetlands valuation. Equally important, the results of the approach gained judicial acceptance.

VI. Conclusion

This article has presented numerous methods by which wetlands may be evaluated. The fact that so many valuation techniques exist may at first blush seem confusing. Why can't appraisers develop one model which could be applied across the board? The answer may be that the perception of Florida wetlands value has changed and continues to change. One hundred years ago Florida's wetlands were considered worthless mosquito-infested swamps. In the last several decades, however, wetlands have come to be viewed as a diminishing Florida resource. With this change in perception, the state began regulating wetlands more intensively. Once wetlands came to be viewed as having an intrinsic worth, the question of how they were to be valued arose.

There is still no agreement in the scientific community on how

---

145. T. Lynch, Environmental Economic Damage Assessment for the Sapp Battery (Jackson County) Hazardous Waste Violation Case (1981), prepared by the Office of Economic Analysis, Department of Environmental Economics.

146. *Id.* at Table 1.

147. *Id.*

148. *Id.* at Table 6.

valuable wetlands are. It is thus essential that more research be conducted on the functions and benefits of wetlands. Until such functions and benefits are understood, it is difficult for environmental groups, developers, or the state to justify conclusions on "value." We must know *why* wetlands are valuable before we can develop a consistent formula for determining value.

Although more study is needed, valuation is possible, and occurs routinely in Florida. At present, lawyers facing valuation problems must first identify the reason for valuation. If a client is selling property to the state through the CARL program, it can be anticipated that market data will be utilized by the DNR appraisers. If, on the other hand, the DER is taking enforcement action against that client, and is seeking damages for destroyed wetlands, the economic damage assessment could likely inquire into the physical and aesthetic benefits that the wetland provided. Likewise, knowledge of the various methods of valuating wetlands can allow an attorney to be more creative in representing a property owner in an eminent domain proceeding.

As growth pressures increase in Florida and more wetlands are lost, the state no doubt will increase wetlands protection. The more valuable wetlands become, the more it will be necessary to improve and understand wetland valuation techniques.